



3 1293 00880 3698

This is to certify that the
thesis entitled
The Relation of Weight History To Weight Control
Strategies and Body Dissatisfaction
in Young Women

presented by

Darlene Carol Zimmerman

has been accepted towards fulfillment
of the requirements for

M.S. degree in Human Nutrition

Major professor

Date 11-10-92

LIBRARY
Michigan State
University

PLACE IN RETURN BOX to remove this checkout from your record.
TO AVOID FINES return on or before date due.

DATE DUE	DATE DUE	DATE DUE
MAY 02 1994 MAY 02 1994	DEC 07 2007 DEC 07 2007	
JUN 12 1995 JUN 12 1995		
DEC 19 1994 DEC 19 1994		
MAY 08 2002 MAY 08 2002		
JAN 13 2003 JAN 13 2003		
JUL 01 2003 JUL 01 2003		

MSU is An Affirmative Action/Equal Opportunity Institution

c:\clic\date\due pm3-p.1

THE RELATION OF WEIGHT HISTORY TO WEIGHT CONTROL
STRATEGIES AND BODY DISSATISFACTION
IN YOUNG WOMEN

By

Darlene Carol Zimmerman

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE

Department of Food Science and Human Nutrition

1992

ABSTRACT

RELATION OF WEIGHT HISTORY TO WEIGHT CONTROL STRATEGIES AND BODY DISSATISFACTION IN COLLEGE WOMEN

By

Darlene Carol Zimmerman

The purpose was to determine if dieting practices, dietary and activity patterns, and body dissatisfaction differed between young women who were weight stable compared to women whose weight fluctuated. One hundred and fifty-five college women completed a questionnaire and were measured for height and weight. In the final analysis, 132 women were classified into one of three groups based on weight and dieting history: 1) weight regainers; 2) weight stable dieters; and 3) weight stable non-dieters. Only three women were classified as maintainers and two as gainers and were not used in the final analysis. Regainers ($n=61$) used more dieting methods ($p \leq 0.01$), used more unsafe dieting methods ($p \leq 0.01$), reported consuming fewer calories ($p \leq 0.05$), had higher BMI's ($p \leq 0.01$) and had greater body dissatisfaction ($p \leq 0.01$) than stable dieters ($n=48$) and stable non-dieters ($n=23$). Regainers had the most difficulty in accurately perceiving their actual body weight. These findings support undesirable outcomes with weight fluctuation related to repetitive dieting.

ACKNOWLEDGEMENTS

To the members of my Guidance Committee:

To Dr. Sharon Hoerr, Department of Food Science and Human Nutrition, who served as my major professor, her guidance and availability over the past two years was invaluable. Thank you for your prompt feedback and editorial support. Your concern for my intellectual growth was appreciated.

To Dr. Jenny Bond, Department of Food Science and Human Nutrition, for having confidence in me and my work. Her support and interest in my professional and personal life will be remembered.

To Dr. Lois Lund, Department of Food Science and Human Nutrition, for her interest in my research. I valued the information pertaining to my research that she shared with me over the past year. Her support has certainly strengthened my research.

To Dr. Mary Noel, Department of Family Practice, for her positive comments. Her words of encouragement were extremely motivating and will not be forgotten.

To Dr. Harry Perlstadt, Department of Sociology, for his invaluable guidance with the development of the

questionnaire. His interest and concern for my research was appreciated.

To Vicki Alexander, Department of Psychology, for her assistance in using the psychology pool and to Dr. Feltz for making these students available to me. To Linda Hudson, thank you for your assistance and for making the office a brighter place to be.

To Gail Haus and Gail Mortenson, graduate students who came before me. Thank you for your encouragement, guidance and insight into the world of "Graduate School".

To Karen Schmitz, Madhuri Kakarala, Heather Wells, Marcia Kwantes and Jia-Yau Doong, thanks for the good times and for making graduate school more than just an academic experience. Thanks to Terri Carson, my roommate, friend and colleague. Your support and wisdom throughout the past four years will not be forgotten.

Thanks to my family, Phyllis, Paul and Bob, for their support and tolerance. To Sally Berthiaume and Susan Baran, thank you for your friendship, concern and knowing how to make me laugh. Finally, thank you John Tucker, for your constant encouragement over the last few months and for being there during the good and "not so good" times.

TABLE OF CONTENTS

Chapter	Page
List of Tables	vii
List of Figures	x
I. INTRODUCTION	1
Hypotheses	6
Conceptual Model	8
Glossary	9
II. REVIEW OF THE LITERATURE	12
The diet industry	12
Popular diets and appetite suppressants	14
Evaluating dietary approaches for weight loss	21
Federal and State regulations on the diet industry	22
Dieting practices of adults	25
Weight control strategies of children and adolescents	26
Weight control strategies of college students	28
Weight control strategies of adults	35
Weight fluctuation	39
Weight fluctuation and metabolic effects	40
Weight fluctuation and health risks	44
Psychological risks related to dieting and weight regain	49
Restrained eating	51
Food intake and weight control	53
Eating patterns and weight control	55
Diet composition and weight loss	57
Physical activity	58
Exercise and weight loss and maintenance	59
Social pressure for thinness	63
Body dissatisfaction among females	65

	Page
III. METHODS	68
Subjects	68
Procedures	71
Measurements	72
Data analysis	80
Funding and equipment	81
IV. RESULTS	82
Hypothesis one	84
Hypothesis two	87
Correlation coefficients for nutrient variables	88
Hypothesis three	98
Body mass index and weight classification	99
Relation of dieting, weight and body satisfaction	100
V. DISCUSSION	102
Frequency of dieting	102
Use of weight control methods	103
Nutrient intake	106
Correlation coefficients for nutrient variables	110
Eating patterns	111
Physical activity	112
Body dissatisfaction	113
Body mass index and perceived weight status	114
Relation of dieting, weight and body dissatisfaction	117
Limitations and strengths	118
Directions for future research	120
VI. SUMMARY AND IMPLICATIONS	122
VII. APPENDICES	127
A Weight maintainer descriptive summary	127
B Weight gainer descriptive summary	129
C UCRIHS letter for worksite population	131
D UCRIHS letter for college population	132
E Descriptive summary of pilot study	133
F Consent form	135
G Questionnaire	136
H Revised questionnaire	160
I Participant feedback information	162
J Codebook for data	163
LIST OF REFERENCES	167

LIST OF TABLES

Table		Page
2.0	Review of popular dieting approaches to weight control.	14
2.1	Summary of research reviewed on weight control strategies of college students.	30
2.2	Frequencies of disordered eating and weight control practices in 159 women who were college freshmen in 1965.	35
2.3	Percent of urban adults (n=154) reporting use of specific weight control methods used by urban adults.	39
2.4	Summary of research supporting and refuting the effects of weight fluctuation on metabolic rate in humans and animals.	41
3.0	Descriptive data of weight maintainers (n=3) and weight gainers (n=2) not examined in groups.	70
4.0	Percent of popular weight control methods used by women categorized and stable non-dieters, stable dieters or regainers.	83
4.1	Percentage of women categorized as stable non-dieters, stable dieters or regainers who have used 0 to 11 different weight loss methods.	85
4.2	Percentage of women categorized as stable non-dieters, stable dieters or regainers who have used 0 to 5 safe and effective weight loss methods.	86
4.3	Percentage of women categorized as stable non-dieters, stable dieters or regainers who have used 0 to 6 unsafe and/or ineffective weight loss methods.	87

	Page
4.4	Daily mean intakes ($\pm$ standard deviation) of nutrients consumed by stable non-dieters, stable dieters or regainers. 88
4.5	Correlation matrix of dietary variables. 90
4.6	Percentage of women categorized as stable non-dieters, stable dieters or regainers who reported eating breakfast. 92
4.7	Percentage of women categorized as stable non-dieters, stable dieters or regainers who reported eating lunch. 92
4.8	Percentage of women categorized as stable non-dieters, stable dieters or regainers who reported eating supper. 93
4.9	Daily mean intakes ($\pm$ SD) of nutrients consumed by breakfast eaters and breakfast skippers. 94
4.10	Percentage of women categorized as stable non-dieters, stable dieters or regainers who consumed 1 to 5 meals per day. 95
4.11	Percentage of women categorized as stable non-dieters, stable dieters or regainers who consumed 0 to 4 snacks per day. 96
4.12	Percentage of women categorized as stable non-dieters, stable dieters or regainers who reported eating snacks at various times during the day. 96
4.13	Activity of women by weight history categories. 97
4.14	Percentage of women categorized as stable non-dieters, stable dieters or regainers based on body dissatisfaction subscale score in quartiles. 98
4.15	Percentage of women classified as stable non-dieters, stable dieters or regainers according to body mass index (BMI) and perceived weight (PW) category. 100

		Page
4.16	Correlation matrix of dieting methods, weight and body dissatisfaction.	101
5.0	Percent of college women from three different studies who have used health- threatening weight loss methods.	105
5.1	Comparison of caloric intake of women from three different studies.	108

LIST OF FIGURES

Figure		Page
1.0	Conceptual model of variables that may be related to weight fluctuation patterns.	8
6.0	Summary of results based on conceptual model.	123

INTRODUCTION

Our society is obsessed with thinness and the result has been an epidemic of dieting. Nearly 50% of American women and 25% of American men are dieting at any one time (NCHS, 1985). According to a Gallop poll in November 1985, 31% of American women aged 19 to 39 reported dieting at least once per month and 16% considered themselves perpetual dieters (Blackburn et al., 1989). The increasing prevalence of dieting among North American women suggests "normal" eating is now characterized by dieting (Polivy et al., 1987). American women have subscribed to an unrealistic set of standards for physical appearance that has put them under intense pressure to diet to meet social expectations for thinness (Council on Scientific Affairs, 1988; Garner et al., 1985; Rodin, 1992). Failure to maintain weight loss may be harmful both psychologically and physically.

Chronic dieting practices of young women have psychological implications that can create unnecessary emotional strains on individuals (Allon, 1979; Brownell et al., 1987a; Wadden et al., 1985) such as negative self-esteem (Polivy et al., 1988). Bulimia almost always occurs in the context of strenuous dieting efforts due to great

dissatisfaction with body shape (ADA Reports, 1989; Garner et al., 1985). Dieting in many instances is destructive in that it provides individuals with failure experiences and increases a sense of ineffectiveness and inferiority (Wooley et al., 1991).

For many years little has been known about the effects of weight fluctuation on health and metabolism (Brownell, 1989). Lissner et al. (1991) and Hamm et al. (1989) found that persons whose body weight fluctuated often or greatly appear to increase their risk of dying from heart disease. Rodin et al. (1989) reported that repeated bouts of weight loss and regain in women may promote abdominal adiposity which may contribute to long-term health risks. Metabolic effects of weight fluctuation remain controversial. Some studies have suggested that weight cycling may cause increased food efficiency (Brownell et al., 1986b), reduced metabolic rate (Steen et al., 1988) and slower rates of weight loss (Blackburn et al., 1987). Lissner et al. (1991) indicated a need to evaluate the implications of current weight-loss practices and advice further, if dieting emerges as a major factor in body weight fluctuation.

Women are bombarded with weight loss information of varying quality from media sources. It is not surprising that a number of women use ineffective and potentially dangerous weight control methods (Crawford et al., 1988; Klesges et al., 1987). A profitable diet industry has

emerged to meet the public's dieting demands. This weight reducing "mania" has fostered a \$33 billion-a-year diet and exercise industry (Marketdata Enterprises, 1989) which has tripled in seven years (Johnston, 1982). Despite this enormous proliferation of weight loss programs and devices, the vast majority of techniques generally are ineffective as indicated by the 75 to 95% recidivism rate for treatment of obesity (Blackburn, 1992; Collins, 1989; Wadden, 1992). Effective and long-term treatments for obesity have not been found after decades of research (Bennett, 1987). Yet the diet industry continues to provide "new", "effective", and "miraculous" weight control techniques to a vulnerable and at times desperate consumer. Considering the economical, psychological and possible physiological costs of intentional weight fluctuation to women, an assessment of weight control strategies used in relation to weight fluctuation is needed.

Only one study located to date has examined the relation between specific weight control methods and weight maintenance or relapse in women 21 to 73 years old (Kayman, et al., 1990). Subjects were categorized into three weight groups: regainers, maintainers and controls. Researchers found most maintainers (90%) and control subjects (82%) exercised regularly and used personally developed weight loss strategies to help themselves. These strategies typically included a new eating style of reduced fat and

sugar, more fruits and vegetables and less food than previously eaten. Few regainers exercised (34%) to lose weight. More regainers lost weight by taking appetite suppressants, fasting or going on restrictive diets that they could not maintain.

The purpose of this study was to determine whether dieting practices, dietary and activity patterns and body dissatisfaction in young women were associated with potentially harmful weight fluctuation patterns. The current study was unique in that: 1) subjects were young, 18 to 24 years of age; 2) the population was diverse, meaning they were not part of a particular weight loss program nor were they using one specific weight loss strategy; and 3) current methods used for weight control in 1991-1992 were assessed.

Findings should be especially relevant to public health policy toward safe weight loss in Michigan. In the late 1970's, seven deaths in Michigan were associated with the use of liquid protein diets (Drewnowski et al., 1990). Legislation to regulate the diet industry was defeated due to heavy lobbying from the weight loss industry and lack of consensus among health professionals regarding which weight loss practices were dangerous, unsafe or ill-advised (Drewnowski et al., 1990). Therefore, safe weight loss guidelines were developed by a consensus of health professionals in the state. However, before legislation can

be passed regulating the diet industry, further studies are needed that document harm and/or inefficiency of weight loss products and programs.

Research Questions

- 1) What is the frequency of diet product usage among college-aged women classified as weight regainers, weight maintainers, weight stable and weight gainers?
- 2) Are there differences with respect to number and type of weight control strategies used among college-aged women who are classified as weight regainers, weight maintainers, weight stable or weight gainers?
- 3) Are there differences in self-reported dietary and activity patterns among college-aged women who are classified as weight regainers, weight maintainers, weight stable or weight gainers?
- 4) Are there differences in body satisfaction or dissatisfaction among college-aged women who are classified as weight regainers, weight maintainers, weight stable or weight gainers?

Hypotheses

- 1) There will be differences in the number and types of weight control products and strategies used among college-aged women who are classified as weight regainers, weight maintainers, weight stable or weight gainers.

2) There will be differences in dietary or physical activity patterns among college-aged women who are classified as weight regainers, weight maintainers, weight stable or weight gainers.

3) There will be differences in body satisfaction among college-aged women who are classified as weight regainers, weight maintainers, weight stable or weight gainers.

Conceptual Model
(See glossary for terms)

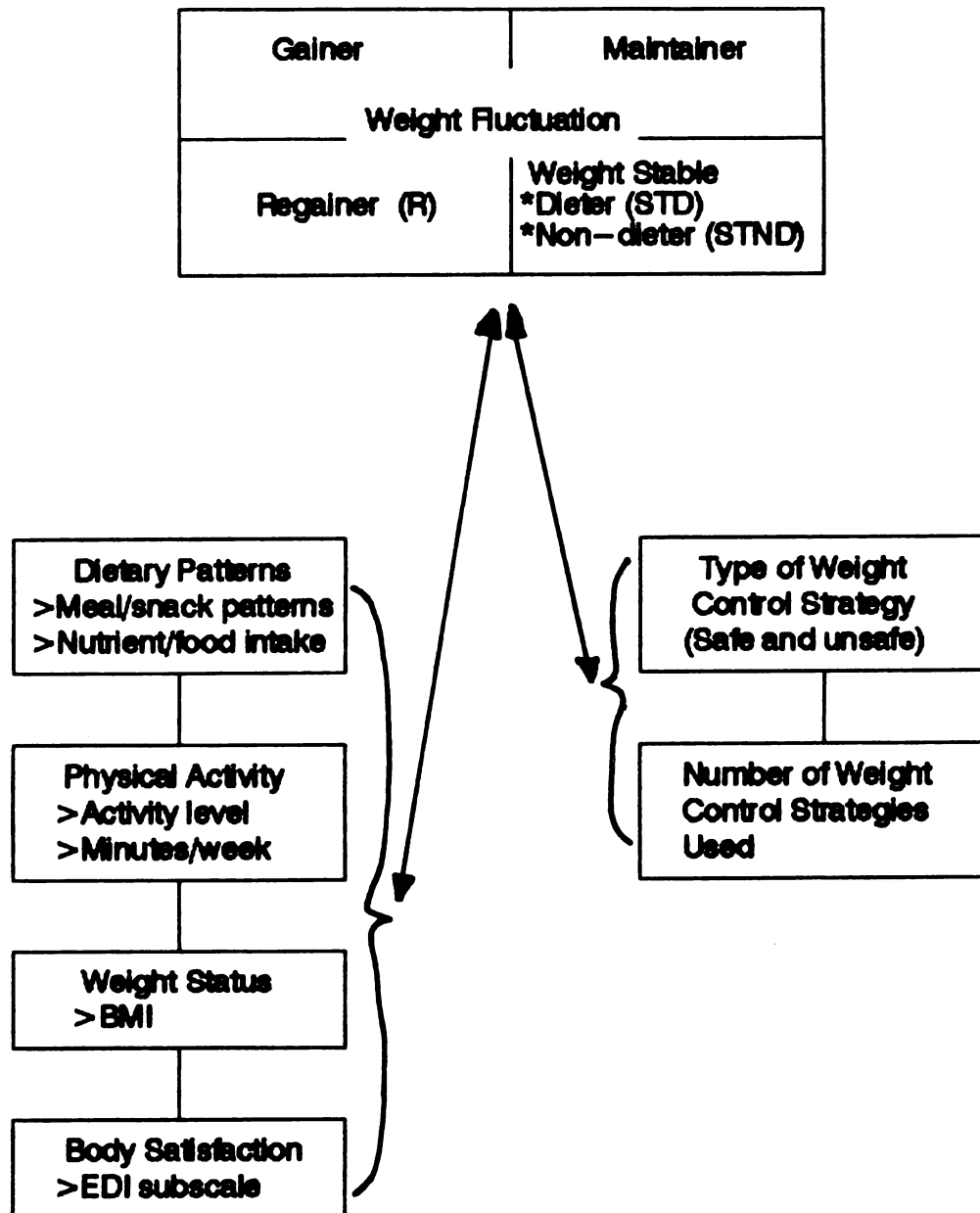


Figure 1.0. Conceptual model of variables that may be related to weight fluctuation patterns.

GLOSSARY

Type of weight loss strategy: Is the kind of weight loss strategy used. These methods are broadly categorized into two groups: 1) generally recognized as effective for weight loss and safe and effective for weight maintenance, and 2) generally recognized as unsafe or ineffective for weight loss and/or long-term weight maintenance (Technology Assessment Conference Panel, 1992).

1) Generally recognized as safe and effective:

- A) **Moderate caloric restriction:** Are diets that typically provide 1,000 to 1,800 calories per day and provide a balance of nutrients from the conventional food supply. Examples include: Weight Watcher's Diet and Slim Chance in a Fat World. (Rock et al., 1988)
- B) **Exercise:** Includes intentional, regular, moderate and long-term, as defined by Blair (1989), exercise sessions to promote weight loss.

2) Generally recognized as unsafe and/or ineffective:

- A) **Extreme restriction of selected macronutrient:**
 - 1) **Low carbohydrate diets:** Are generally less than 100 grams of carbohydrate per day. Examples include: Atkin's Diet Revolution, The Doctor's Weight Loss Diet (Stillman's) and The Complete Scarsdale Medical Diet. (Markeddata Enterprises, 1990; Rock et al., 1988)
 - 2) **Extremely low fat diets:** Are typically less than 20 percent fat. Examples include: The Rice Diet Report and the Macrobiotic Diet. (Rock et al., 1988) Such diets are categorized as ineffective due to difficulty in their maintenance.
- B) **Over-the-counter formula diets:** Are formulated or packaged products used in addition to one or two low-calorie meals. Examples include: SlimFast and Dynatrim.
- C) **Diet pills:** Include over-the-counter, non-prescription appetite suppressants taken to curb the appetite. Examples include: Dexatrim and Acutrim. (Markeddata Enterprises, 1990)

- D) Novelty diets: Include those that promote certain nutrients, foods or combination of foods as having unique, magical or previously undiscovered properties that promote weight loss. Examples include: Fit For Life Diet and The Beverly Hills Diet. (Marketdata Enterprises, 1990; Rock et al., 1988)
- E) Very-low-calorie diets: Also known as protein-sparing modified fasts, typically provide less than 800 calories per day. Examples include: Optifast, Health Management Resources (HMR), The Rotation Diet and The Last Chance Diet. (Rock et al., 1988)

Number of Weight Control Strategies: Is the number of different weight loss strategies used.

Weight Fluctuation: Self-reported intentional loss and regain of ≥ 8 pounds.

"Maintainer": Subjects who have regained $\leq 25\%$ of an intentional weight loss of ≥ 8 pounds (since the age of 16) and have kept that weight off for at least 2 years (Van Dale et al., 1990).

"Regainer": Subjects who have regained $>25\%$ of an intentional weight loss of ≥ 8 pounds (since the age of 16) at least once (Van Dale et al, 1990).

"Gainer": Self-reported continual weight gain since the age of 16.

"Weight Stable": Self-reported weight that has remained within <8 pounds (since the age of 16) of current weight, excluding pregnancy.

"Weight Stable Dieter": One who reports dieting to lose weight and has a body weight that has remained within <8 pounds (since age 16) of current weight, excluding pregnancy.

"Weight Stable Non-Dieter": One who does not report dieting to lose weight and has a body weight that has remained within <8 pounds (since age 16) of current weight, excluding pregnancy.

Eating Patterns: In this study, are defined as frequency of breakfast, lunch, supper and snack consumption along with frequency of meal skipping.

Breakfast Eater: One who consumes breakfast five to seven times per week.

Breakfast Skipper: One who consumes breakfast zero to four times per week.

Body Satisfaction: Is defined as a form of body image disturbance which includes dissatisfaction with body shape and weight. It is one of the diagnostic criteria for anorexia nervosa and bulimia nervosa in the Diagnostic and Statistical Manual of Mental Disorders, DSMIII-R (1987).

Physical Activity: Is the frequency and duration of participation in physical activities such as running, swimming, walking, aerobics, weight lifting, etc.

LITERATURE REVIEW

The literature reviewed includes topics regarding weight loss products promoted in the diet industry as well as regulation within the industry. Dieting practices of adults and children are also reviewed. The health and psychological consequences of weight loss and regain are examined. Eating patterns, physical activity levels and body satisfaction of young women as related to weight fluctuation patterns are also addressed.

The Diet Industry

Business is booming in the diet industry and shows no signs of dwindling. The weight loss industry is a sprawling \$33-billion-a-year business with 65 million Americans attempting weight loss at any given time (Marketdata, 1989). According to a report released by Marketdata Enterprises (1989), current spending for weight loss products and services is over \$29 billion per year, including indirect markets such as health spas, exercise clubs, artificial sweeteners and diet soft drinks. The core market, (hospital weight loss clinics, low-calorie prepared foods, commercial weight loss clinics, diet books and appetite suppressants) worth \$8.2 billion in 1988 is predicted to grow 19% during

1989, increasing 15% annually up to \$16.9 billion by 1995. Total spending is estimated to reach \$50.7 billion by 1995. Garner et al. (1991) put this figure in perspective; the United States Federal Government spent a total of \$31.9 billion in 1988 on education, training, employment and social services.

Medical experts agree that the best approach for losing weight permanently is slow weight loss and exercise (Brownell et al., 1987b; Green et al., 1991). Yet the fastest growing markets of the diet industry have been quick weight loss centers and over-the-counter meal replacement powders that promise a fast easy way to shed pounds. Weight loss clinics and programs, both commercial and non-profit, claim a \$1.5 billion market with 13,000 programs in operation (Marketdata, 1989). Unfortunately almost no weight loss or maintenance data are available on those who participate in commercial programs or consume over-the-counter products (Blackburn, 1992). Hospital sponsored weight loss programs are rising quickly with \$4.5 billion spent in 1988. Health spas and exercise clubs raked in a hefty \$8 billion. Fifty-four million diet books are sold each year, accounting for \$382 million in sales. Over-the-counter appetite suppressants are projected to increase at a 13 percent annual rate, from \$314 million in 1988. Billions more are spent on diet soft drinks (\$10 billion), low calorie foods (\$1.5 billion) and artificial sweeteners.

Popular Diets and Appetite Suppressants

The host of options available to the dieting consumer is mind boggling and confusing. Approaches include an array of diets, surgery, drugs, exercise and behavior modification (Miller, 1991; Rock et al., 1988; Van Itallie, 1980). For the purpose of this review, only popular dieting approaches and appetite suppressants will be briefly discussed and are listed in Table 2.0.

Table 2.0. Review of popular dieting approaches to weight control.

Approach	Characteristics
Moderate caloric restriction	Typically nutritionally adequate Use of regular table foods May involve behavior modification Encourage exercise
Macronutrient restriction Low carbohydrate diets	Typically less than 100g carbohydrates per day Limited food choices Initial weight loss due to diuresis
Very low fat diets	Generally less than 20% of the calories from fat Limited or elimination of animal protein sources, all fats, nuts, seeds

Novelty diets

Promote undiscovered or magical weight loss properties of food or food combinations
 Generally extreme and incompatible with normal lifestyle
 Usually scientifically unsound, expensive and potentially dangerous
 Promise quick and easy weight loss

Very-low-calorie diets

Less than 800 Kcal per day
 Liquid supplement only source of intake during fasting phase
 Limited to those 30% or more overweight

Over-the-counter liquid formula diets

Liquid supplement that replaces one or two regular meals
 Low-calorie meal advised for supper

The cornerstone of most weight control programs is typically considered to be diet therapy (Morgan, 1989; Rock et al., 1988; Van Itallie, 1980; Wadden, 1992). Dietary approaches to weight control can be categorized as moderate caloric restriction, macronutrient restriction, novelty diets, very-low-calorie diets and formula diets (Kirk, 1990; Weinsier et al., 1984). Non-prescription appetite suppressants will also be discussed in this section.

Moderate caloric restriction

Moderate caloric restriction diets are based on reducing intake of calorie dense food. Greater attention is now paid to decreasing fat intake to less than 30% and increasing fiber (Wadden, 1992). These diets can be nutritionally adequate and regular table foods are used (Marketdata, 1990; Morgan, 1989). Some weight control programs using this type of diet also involve behavior modification and lifestyle changes and encourage exercise (Brownell et al., 1987b; Marketdata, 1990; Spielman et al., 1992). A balanced reduced energy diet is the most reasonable method of weight loss (Brownell et al., 1987b). Rate of weight loss should be approximately 0.5 to 2 pounds per week (Brownell et al., 1987b). Examples of such regimens include The American Heart Association Diet, Weight Watchers, Slim Chance in a Fat World and the American Dietetics Association/American Diabetes Association diets.

Macronutrient restriction

Weight loss, gain or maintenance is determined by energy balance, therefore restricting macronutrients-carbohydrate, protein and/or fat-all create a caloric deficit that leads to weight loss. Low carbohydrate diets typically consist of less than 100 grams of carbohydrate per day (Nicholas et al., 1986; Rock et al., 1988). The limited food choices of carbohydrate restricted diets facilitate weight reduction, initially due to diuresis (Brownell et al., 1987b; Morgan,

1989; Rock et al., 1988). Such diets, however, can lead to ketosis, nausea, fatigue and hyperuricemia (Brownell et al., 1987b; Nicholas et al., 1986; Rock et al., 1988). Diets included in this category are Atkin's Diet Revolution, the Doctor's Quick Weight Loss Diet (Stillman's) and The Complete Scarsdale Diet.

Low fat diets promote weight reduction primarily because fat contributes more calories per gram than do carbohydrate and protein. A minimal amount of fat is needed to meet essential fatty acid requirements, to promote satiety (which enhances dietary compliance) and to enable absorption of fat soluble nutrients (Kirk, 1990). Low fat diets, typically less than 20% of the calories from fat, consist primarily of fruits, vegetables, breads and cereals. Animal protein sources, all fats, nuts and seeds are limited or eliminated (Dwyer, 1980; Rock et al., 1988). Although a reduction in fat intake is advisable for most adults (USDA, 1990), extreme reductions in fat (less than 20% of total calories) is not likely to be advantageous (AHA, 1984). Fisher et al (1985) found that after evaluation of published weight reducing diets that limited ingestion of any macronutrient resulted in the least adequate nutrient intakes. Examples of low fat diets include The Pritikin Diet, The Rice Diet Report and The Macrobiotic Diet. Novelty diets promote the myth that certain nutrients, foods, food combinations or other substances have unique, previously undiscovered or

magical properties that promote weight loss (Brownell et al., 1987b; Kirk, 1990; Newmark et al., 1983; Rock et al., 1988). Such diets promise that a special food combination will increase metabolic rate, oxidize body fat or suppress food intake. The Rotation Diet, The Beverly Hills Diet, Fit For Life Diet, Dr. Berger's Immune Power Diet and the Zen Macrobiotic Diet are examples of novelty diets. Novelty diets are generally so extreme and incompatible with normal lifestyles that consumers are only temporarily compliant (Nicholas et al., 1986). Because weight loss cannot be maintained with such odd diets the cycle of chronic dieting is perpetuated (Feuerstein et al., 1989; Rock et al., 1988). With novelty diets consumers are not provided with information necessary to maintain a desired body weight (Newmark et al., 1983). Weight control experts report that fad diets are nutritionally inadequate, scientifically unsound, expensive and potentially dangerous, do nothing to promote healthy changes in eating or exercise habits, and weight lost is typically regained (Brownell et al., 1987b). All diets that promise quick results and little effort should be regarded with caution (Brownell et al., 1987b; Drewnowski, 1990).

Very-low-calorie diets

Very-low-calorie (VLCD's) liquid protein or "fasting" diets are becoming increasingly popular (Marketdata, 1990). Such diets generally provide less than 800 calories per day

(Brownell et al., 1987b; Morgan, 1989; Rock et al., 1988; Spielman et al., 1992; Wadden et al., 1990b) and come in powdered form. The powder is mixed with water, consumed three to five times daily and is supplemented with vitamins and minerals (Apfelbaum et al., 1987; Wadden et al., 1990b). Clients are required to drink at least two liters of non-caloric fluid daily, but all other foods are usually prohibited (Apfelbaum et al., 1987). Under these conditions women lose an average of 1.5 kilograms per week and men average 2 kilograms per week (Brownell et al., 1987b; Wadden et al., 1990b). Medical opinion is that VLCD's should be limited to adults who are 30% or more overweight (Blackburn, 1992), have had a recent medical examination and are free of contraindicating conditions including a recent myocardial infarction, a cardiac conduction disorder, history of cerebrovascular, renal or hepatic disease, cancer, type I diabetes or psychiatric disturbance (Wadden et al., 1990b). Minor complications with the use of such diets include headache, nausea, occasional vomiting, bad breath, fatigue and lack of stamina (Atkinson, 1986). Optifast, Health Management Resources (HMR) and Medifast are examples of medically supervised VLCD's.

Over-the-counter liquid diets

Over-the-counter liquid formula diets such as SlimFast, Dynatrim and the Cambridge Diet, attract dieters because food decisions and meal planning are avoided (Rock et al.,

1988). Over-the-counter liquid formula diets are mixed with water or come ready made and replace one or two regular meals, usually breakfast and lunch (Glinsman et al., 1992). A low-calorie meal is advised for supper. The diet plan is designed to provide 1,250 calories per day with each meal replacement providing 190 calories (Glinsman et al., 1992). Wadden et al. (1990b) express concern about the misuse (sole source of nutrition) of such products and summarize potential complications to include dehydration, electrolyte imbalance, orthostatic hypotension and increased uric acid concentrations. For long-term use, these products do nothing to support changes in lifestyle eating habits (Brownell et al., 1987b).

Over-the-counter diet pills

Over-the-counter, non-prescription appetite suppressants disrupt hunger signals to the brain and cause dryness of the mouth, making food taste bland and unappetizing (Marketdata, 1990). Appetite suppressants come in a variety of forms. Phenylpropanolamine hydrochloride (PPA) is the only over the counter drug that is available for weight control (Bray, 1992). Following a review of this drug, an advisory panel to the Food and Drug Administration (FDA) concluded that PPA was probably safe and effective. However, no long-term, well controlled studies have shown PPA to be an effective aid in weight control. The safety of this drug has been questioned (Bennion et al., 1991; Marketdata, 1990). High

doses (75mg) of PPA have been reported to increase blood pressure in healthy adults (Bray, 1992; Bennion et al., 1991).

Evaluating Dietary Approaches for Weight Loss

Judging from the fad diets available, one could conclude that the dieting public is exposed to hype and quackery rather than science. Much of the failure experienced by dieters (Jequier, 1990) is due to unrealistic expectations that fad diets, pills, potions or devices will quickly and miraculously burn away unwanted pounds (Brownell et al., 1987b).

The California Dietetic Association suggests the following criteria when evaluating dietary approaches (Rock et al., 1988). A weight loss diet should: 1) satisfy all nutrient needs except energy; 2) meet individual tastes and habits; 3) minimize hunger and fatigue; 4) be readily obtainable and socially acceptable; 5) promote a changed eating pattern; and 6) be conducive to improving overall health. Rock et al (1988) also characterize weight reduction strategies associated with poor outcome as: 1) very low calorie diets which promote rapid weight loss; 2) extreme macronutrient restriction; and 3) reliance on formula diets or special products. Rock et al. (1988) concluded that weight reduction methods are beneficial, if maintenance of weight loss is achieved with no cost to overall health. Furthermore, weight management approaches

that include moderate diet changes, an exercise program, behavior management and involve minimal risk are likely to yield a favorable, long-term outcome.

Federal and State Regulations on the Diet Industry

Rationales for government regulation in the weight loss industry are developed based on the concepts of market failure and possible harm to the client (Begley, 1991). Difficulty judging the quality of the industry's products and services may be due to the manner in which they choose to market goods. The inability of consumers to assess a product's value can lead to unsafe, inefficient or possible harmful use of a weight loss product. Another common justification for government regulation in the diet industry is potential consumer harm. Begley (1991) suggests the following government interventions in attempts to protect the consumer: labeling requirements, mandatory disclosure rules, licensure and outright prohibitions. Unfortunately at this time, criteria do not exist to determine when potential consumer harm is severe enough to justify intervention (Begley, 1991).

Currently there are no federal or state regulations to oversee the maze of diet programs on the market (Drewnowski et al., 1990; Green et al., 1991). Nor are there recognized minimum standards of care or established criteria for health monitoring and medical supervision of clients in commercial weight loss programs (Green et al., 1991; Drewnowski et al.,

1990). A survey of 50 contiguous states revealed no special licensing requirement, no specialized inspection, no restrictions on the sale of products or the dispensing of information and no ongoing investigation into operating weight loss programs (Ries, 1984). Claims made in news articles, magazines and books are generally outside the FDA's domain which means that anyone, regardless of nutritional or medical expertise, can make any claims he/she wishes in such media (Marketdata, 1990).

Michigan is the first state in the nation to establish recommendations for safe weight loss (Drewnowski et al., 1990). Recommendations were produced by a 25 member Task Force representing the medical and health community and universities. Towards Safe Weight Loss: Recommendations for Adult Weight Loss Programs in Michigan takes a consumer protection approach to the weight loss industry (Drewnowski et al., 1990). Recommendations encourage programs to promote a reasonable rate of weight loss (average maximum of two pounds per week), include nutrition education, exercise, behavior change and maintenance and adequately trained staff appropriate for the level of health risk of the clients. Programs should provide screening to determine if potential clients will be at risk by participating in a weight loss program.

The Task Force identified a number of irresponsible claims, practices and questionable methods for weight loss,

some of which included: 1) promise of rapid sustained weight loss for the duration of the program (more than an average of two pounds per week); 2) failure to include exercise programs as part of the overall strategy for weight reduction; and 3) reliance on appetite suppressants rather than lifestyle changes.

Michigan has also taken legal action in attempts to regulate dangerous practices in the weight loss industry (House Bill 4430, 1991). The proposed bill requires that weight loss providers post notices informing consumers that ultra low calorie diets may have poor outcomes and limited success. Potential clients would have to sign a similar notice before service was provided. Diet powder supplements would be required to have warning labels disclosing potential health effects of using the product.

The state of New York also is involved actively in initiating regulation of the weight loss industry. The New York City Department of Consumer Affairs is proposing new consumer protection regulations to help avoid the dangers and deceptions often built into the industry (Green et al., 1991). First, proposed regulation would increase consumer safety by requiring weight loss providers to disclose health risks and side effects of rapid weight loss in promotional material. This same warning would be posted in weight loss centers and contain a statement that "weight loss in excess of two pounds per week has not been proven effective for

long-term weight reduction." Secondly, regulation would require weight loss centers to establish ongoing records of their customers attrition rates. This information would be made available to prospective clients allowing them to better select programs. This provision would enhance the centers' accountability to the public and cause providers to be more responsible for the outcome of the clients diet rather than placing blame on the dieter for failure.

Dieting Practices of Adults

To reduce the prevalence of overweight and related chronic diseases in the United States, the U.S. Department of Health and Human Services proposed, "By the year 2000, at least 50% of overweight people aged 12 and older should have adopted sound dietary practices combined with regular activity to attain an appropriate body weight (U.S. Department of Health and Human Services, 1990). One question relevant to this objective is, what dietary or dieting practices do people actually incorporate into their lifestyle in attempts to attain a healthy weight? The following section reviews prevalence of dieting, popular weight loss methods used by women of various ages and reported reasons for wanting to control weight.

Millions of Americans, striving to lose weight and minimize health risks, embark on numerous diets every year. A survey done by the Calorie Control Council (Calorie Control Commentary, 1991) found that approximately one out

of four adults, or 48 million consumers are dieting, with women (31 million) more likely to diet as compared to men (17 million). According to the survey the most popular methods used were cutting down on high-calorie, high-fat foods, using reduced fat foods and beverages and exercising. Other methods used included counting calories, skipping meals, using meal substitutes, attending weight loss classes, using physician supervised liquid diets and taking diet pills.

This high prevalence of dieting is certainly not new nor only prevalent among adult women. Dwyer et al (1970) reviewed two surveys conducted by the American Institute of Public Opinion in 1950 and 1956. Forty-five percent of women and 22 percent of men wanted to lose weight in 1950. Seven percent of all men and 14% of all women claimed that they were doing something to lose weight in 1950 and 1956.

Weight Control Strategies of Children and Adolescents

Dwyer et al. (1967) surveyed 446 senior high school girls about weight control. Sixty-one percent reported dieting to lose weight at some time in their lives and the average age when dieting first started was between 14 and 15 years. The most important reason for students' most recent diet was personal discontent with body appearance. Popular methods included cutting down on certain foods and snacks, increasing exercise and skipping meals. Fasting and taking diet pills were reported less often.

A more recent study by Maloney et al. (1989) showed that in a sample of 318 third to sixth grade boys and girls, 35% of the boy's and 55% of the girls wanted to be thinner. Weight loss and weight control behavior increased with age and more girls than boys had attempted weight loss, 41% and 31% respectively. Weight loss methods reported used most often were exercise and restricting calories; vomiting was reported less frequently.

Emmons and colleagues (1992) examined dieting and purging behaviors in a sample of 1,269 male and female, black and white high school students. Forty-one percent of black boys, 42% of white boys, 61% of black girls and 77% of white girls were classified as dieters (report of an intentional 5 pound or more weight loss). The three most common weight loss methods used were exercise, fasting and low energy diets. A higher percentage of girls purged in a effort to lose weight. Six percent of boys (0% black, 6% white) reported using diet pills whereas 39% of girls (16% black, 23% white) used diet pills to lose weight. The authors suggested that the pressure to be thin in today's society has lead to an increasing number of adolescents who are dieting and purging to lose weight. They also express concern regarding the potential health implications associated with weight fluctuation at this young age considering the findings by Lissner et al. (1991) of weight

fluctuations after 25 years of age associated with increased risk of coronary heart disease and death.

Chronic dieting among adolescents was investigated by Story and colleagues (1991). A comprehensive school based survey was administered to 36,320 students in grades 7-12 in Minnesota. Students were classified as "chronic dieters", if they reported having been on a diet more than 10 times during the past year or were always dieting during the past year. Report of chronic dieting was higher in girls (12%) than boys (2%). Among girls, chronic dieting was significantly less in grades 7 and 8 (8%) than in grades 9 through 12 (14%). Chronic dieters were significantly more likely than other students to use maladaptive weight loss techniques such as self-induced vomiting (relative risk, RR), 9.9 for girls and 9.4 for boys, ipecac use RR, 8.3 for girls, 11.0 for boys, diuretics RR, 7.3 for girls and 13.5 for boys, and laxative use RR, 7.18 for girls, 11.0 for boys. Male and female chronic dieters were twice as likely as other students to report binge eating and also more likely to have a poor body image and feel overweight.

Weight Control Strategies of College Students

Prevalence of dieting behaviors by college students has been investigated by several researchers (Arrington et al., 1985; Connor-Greene, 1988; Grunewald, 1985; Klesges et al., 1987; Klesges et al., 1988). A summary of these studies can be found in Table 2.1. Klesges et al. (1987) assessed self-

help dieting strategies used by 204 college students (102 men and 102 women). Subjects were asked: 1) the degree of importance placed on achieving and maintaining their ideal weight; 2) reasons for dieting; and 3) specific types of food restrictions and exercise methods used to control weight. A significant difference was found between males and females regarding benefits of improved appearance by achieving ideal body weight ($p \leq 0.01$) with females rating appearance benefits of obtaining a normal weight higher than males. Much more dieting was reported among women; 89% of all females and 54% of all males had restricted calories over the past six months. Self-help strategies were most popular among these students; 98% of males and 96% of females reported dieting on their own without the use of formal weight loss programs. Sixty-one percent of the females reported using inappropriate or dangerous weight loss strategies (eg. laxatives, appetite suppressants and meal skipping). One alarming finding was the 21% of female students using cigarette smoking and caffeine as a weight control strategy. Engaging in some type of physical activity as a weight loss strategy was reported by 80% of females and 46% of males. The authors concluded that females in this study were much more likely to be actively dieting than were males. Females were likely

Table 2.1. Summary of research reviewed on weight control strategies of college students.

Author	n	Findings
Klesges et al., 1987	204 male & females	More women (89%) reported dieting than men (54%). Self-help strategies were most popular, 96% of women dieted on their own without use of formal weight loss program. 61% of females used inappropriate or dangerous weight loss methods. 21% used cigarette smoking and caffeine as a weight loss strategy.
Klesges et al., 1988	1076 male & females	33% of all smokers reported smoking as a weight loss strategy. 5% of females and 10% of males started to smoke for weight control.
Arrington et al., 1985	400 females	48% followed a weight loss diet. Popular programs were hypocaloric diets and exercise. The main incentive for dieting was figure improvement.

Grunewald, 1985	166 females	Commonly used weight loss strategies were exercise, caloric restriction, fasting/starvation and diet pills. Average age of first weight loss diet was 16 years. Dieters weighed 12 pounds more than non-dieters and were more likely to be obese.
Connor-Greene, 1988	178 male & females	69% of women and 32% of men had been on a weight loss diet at some time. Those dieting in the past 12 months had begun an average of 5 diets over that time.

to engage more frequently in inappropriate and/or dangerous weight control strategies.

Finding college students to use smoking and caffeine as weight control strategies (Klesges et al., 1987) led to further investigation (1988) to determine the prevalence of smoking as a dieting strategy in a college population. Male (n=458) and female (n=618) students were asked what strategies they used to curb hunger, and whether they either began smoking or were currently smoking as a weight loss or weight maintenance strategy. Thirty-three percent of all smokers (39% of females and 25% of males) reported smoking as a weight loss strategy. A small percentage of smokers

(5% of females, 10% of males) reported that they started to smoke for weight control.

Arrington et al. (1985) surveyed 400 randomly selected female college students at a major southern university. Forty-eight percent of the subjects reported following a weight reduction program since their enrollment at the university. The main incentive for following a weight reduction program was figure improvement. Programs often selected were hypocaloric diets, with calorie levels ranging from 300 to 1,800 calories per day, and exercise such as jogging, walking, calisthenics and aerobic dancing. Other methods used in descending order included the Cambridge Diet, drugs like starch blockers and appetite suppressants, weight loss clinics and low-carbohydrate diets (eg. Atkin's and Stillman's).

Grunewald (1985) studied dieting behavior in 166 college women, 18-24 years old. These students were divided into three groups based on the amount of time they had spent dieting during the previous school year (8 months). Of the entire sample, 18% had spent more than half the time dieting (chronic dieters), 45% had dieted 50% of the time or less (periodic dieters) and 37% had not dieted during that period (nondieters). Weight loss experiences were compared among groups. Chronic and periodic dieters weighed an average of 12 pounds more than nondieters and were more likely to be obese. The average age at which subjects went on their

first reducing diet was 16 years. The four most commonly tried weight loss strategies were exercise, moderate caloric restriction, fasting/starvation and diet pills (were used by more than a third of the population).

Connor-Greene (1988) investigated gender differences in body weight perception, satisfaction and weight loss strategies of 178 college students. Subjects completed a questionnaire assessing perception and satisfaction with body weight (discussed later), desire to lose or gain weight and use of weight loss strategies. More females (88%) than males (37%) expressed a desire to lose weight. Only 6% of the females and 16% of the males reported being satisfied with maintaining their current weight. Being on a weight loss diet at some time was reported by 69% of the women and 32% of the men surveyed. Dieting within the past twelve months was reported by 65% of the women. These same women had begun an average of 5.1 diets over the 12 month time period. Fewer men (28%) dieted in the past year and averaged 2.2 diets. Twenty percent of the females and 4% of the males admitted to self-induced vomiting as a weight control strategy. Laxative use was reported by 11% of females and 1% of the males.

Rosenzweig et al. (1987) surveyed past and present weight control habits of women to determine whether the "epidemic" of bulimic-like behaviors represented an actual increase in incidence or merely underreporting in earlier

years. Subjects (n=159) were women who were college freshmen at a major southern university in 1965. They completed a questionnaire describing their past (high school and college) and present weight control strategies, indicating how often they fasted, used diet pills, diuretics and laxatives, or vomited. The subjects were Caucasian and between the ages of 34 and 45 years. The number of subjects indicating use of the aforementioned weight control strategies or engaging in bingeing was compared for each of the three time periods measured. The results are presented in Table 2.2. Fasting appeared to be most frequently used in college. The number of women who used diet pills, diuretics and laxatives increased over time as well as the number of people bingeing. The authors concluded that bulimic-like behaviors were not confined to adolescents and college students. More of the women as middle aged used extreme weight control practices and binged than they did as young adults 20 years earlier. Also, the frequency with which these behaviors were performed, excluding vomiting, increased. Caution must be used, however, in interpreting these results, because the response rate was 39% and the increase in bulimic-like behaviors is small, hardly of epidemic proportions. Nonetheless, it appeared that more older adult women are engaging in bulimic-like behaviors with a greater frequency than they did as young adults.

Table 2.2. Frequencies of disordered eating and weight control practices in 159 women who were college freshman in 1965 (Rosenzweig et al., 1987).

	<u>Dieting History</u>		
	In high school	In college	At present, post college
Fasting	13**	24	15
Diet Pills	15**	23	31
Diuretics	0**	5	15
Laxatives	2**	3	12
Vomiting	3	3	4
Binge Eating	32**	38	56

** $p \leq .01$, χ^2 .

Weight Control Strategies of Adults

Bennet (1991) reviewed data from the Behavioral Risk Factor Surveillance System (BRFSS) and assessed dieting practices of overweight adults. Group data on the weight loss practices of 112,108 adults 18 years and older from 21 states that took part in the BRFSS from 1985 to 1988 were used in the analysis. BMI was determined from self-reported weights and heights and overweight was defined as BMI of ≥ 27.3 for women and ≥ 27.8 for men. Increasing physical activity and eating fewer calories was the most frequently reported weight loss strategy reported by overweight women (blacks, 33%; whites, 34%). Overweight men reported not trying to lose weight (blacks, 55%; whites, 49%) more frequently than women. Use of the "recommended" weight loss practices (increasing physical activity and eating fewer calories) for all sex and race groups, were higher for those

who were at least high school graduates and for those with an annual income of $\geq \$20,000$. It should be noted that reported weight loss practices may differ from actual practices considering that respondents only had four options from which to choose.

Jeffery et al. (1991) attempted to estimate the prevalence of intentional weight loss efforts of randomly selected employed men ($n=2,107$) and women ($n=2,540$) in 32 worksites in the upper Midwest. Researchers examined whether reports of dieting were associated with eating and exercise behavior. Findings indicated that dieting to lose weight was a common behavior of both men and women. Estimated prevalence of dieting throughout one's life was 47% in men and 75% in women. One out of eight men and one in four women reported being on a diet to lose weight at the time of the study. Women dieted more often than men and were more likely to participate in organized weight loss programs. Dieters reported lower calorie intakes than nondieters. Associations between reported exercise habits and dieting behavior were less consistent. Both men and women who reported participating in an organized weight loss program, reported lower levels of physical activity than those who had not participated. However, current dieting in women was associated with more reported exercise.

Crawford et al. (1988) surveyed a random population of 406 Australian women between the ages of 18 and 86 years.

Results showed that in the previous year, 68% of the women had exercised for weight control, 38% dieted using a variety of methods (Weight Watchers, low carbohydrate diets, vegetarian diet, the Grapefruit Diet, F-plan, Pritikin, Scarsdale and Beverly Hills Diet), 15% fasted, 10% took slimming tablets, 6% used diuretics, 4% smoked cigarettes and 3% used laxatives in order to reduce or control their weight. Forty-three percent of the women were attempting to lose weight at the time of the survey. The most common reasons for wanting to lose weight were to feel better (75%), to look better (65 percent) and for health or medical reasons (33%). A majority of the women were dissatisfied with the shape of their stomach, hips, waist, thighs and buttocks. The authors concluded that many women are concerned about their weight or shape and employ a number of dieting strategies, some of which may pose a risk to their health (laxatives, diuretics, slimming tablets and cigarette smoking).

Hahn et al. (1986) wanted to determine types of weight loss diets used by urban adults during the past two years and to assess which types of weight control techniques were most successful in obtaining and maintaining weight loss over time. Subjects were randomly selected from the Lincoln, Nebraska area and were sent a questionnaire. The 39% response rate (45% men) resulted in 154 subjects with mean age of 40 years. The types of weight control methods

used are summarized in Table 2.3. The majority of subjects (41%) used a combination of increased exercise and caloric reductions as a weight loss strategy. Self-regulated and unsupervised diet and/or exercise regimens were used by approximately 73% of the adults surveyed. Three of the self-regulated methods (caloric restriction only, increased exercise only and a combination of the two) were rated by the majority of subjects as the most successful in achieving (75%) and maintaining (66%) weight loss. It should be noted that these ratings do not imply that subjects were successful in achieving and maintaining lost weight when the above self-regulated methods were actually used.

Table 2.3. Percent of urban adults (n=154) reporting use of specific weight control methods used by urban adults (Hahn et al., 1986).

Weight Control Method	Percent
Increase exercise and caloric restriction	41
Caloric restriction only	19
Increase exercise only	13
Diet pills	5
Cambridge diet	2
Weight Watchers and TOPS	5
Health club with exercise	4
Nutri/System	1
Diet Center	1
Herbalife	1

Weight Fluctuation

Considering the popularity of dieting efforts and their potential importance to public health policy toward safe weight loss, an assessment of weight control strategies used by young women in relation to weight fluctuation is needed. Weight reduction methods are almost always only temporarily effective, creating a cycle of weight loss and regain (Ernsberger et al., 1987). Furthermore, repeated weight loss followed by weight gain may have detrimental health, metabolic and psychological consequences. The present study is unique in that it investigates an outcome of specific

dieting strategies (weight change) in relation to use of such strategies.

For a number of years little has been known about the effects of weight fluctuation on metabolism, health and behavior (Brownell, 1989). Recently a number of studies have indicated that the effects of weight fluctuation may be important to public health policy considering the prevalence of weight loss and regain in the population (Brownell, 1989; Rodin et al., 1989). The following section discusses the metabolic and health consequences associated with weight loss and relapse. Psychological risks associated with dieting and weight loss are also discussed.

Weight Fluctuation and Metabolic Effects

The obsession with dieting among Americans has led researchers to investigate potential adverse effects of dieting, particularly those related to changes in metabolic rate (Wadden et al., 1990a). Table 2.4 briefly summarizes research supporting and refuting the effects of weight fluctuation on metabolic rate. Elliot et al., (1989) examined long term effects of weight loss on resting metabolic rate (RMR) in women following discontinuation of a modified fast. Seven obese women from 31 to 55 years of age

Table 2.4. Summary of research supporting and refuting the effects of weight fluctuation on metabolic rate in humans and animals.

Author	Sample	Major Findings
Evidence of decrease in RMR due to weight cycling		
Elliot et al., 1989	7 obese females	RMR decreased significantly following a modified fast, a maintenance diet and a 2-month follow-up.
Steen et al., 1988	27 high school wrestlers	Weight cycling wrestlers had a 14% lower RMR compared to non-cycling wrestlers.
Brownell et al., 1986	28 male Sprague-Dawley rats	Obese male rats cycled through two bouts of caloric restriction and refeeding showed significant increases in food efficiency in the second weight cycle as compared to the first.
Evidence of no effect on RMR due to weight cycling		
Wadden et al., 1990a	18 obese females	RMR decreased in two groups women consuming a 1200 kcal diet or a 420 kcal liquid diet (VLCD). RMR rose sharply in the VLCD group when kcal intake increased. Dieting when combined with exercise was not associated with long-term reductions in RMR above those expected by reduced body mass.

Melby et al., 1990	25 high school wrestlers & non-wrestlers	Post season RMR of weight cycling wrestlers was not significantly different from weight stable non-wrestlers.
Gray et al., 1988	40 female Sprague-Dawley rats	Two successive periods of severe food restriction and refeeding did not produce increased body fatness or decreased rate of weight loss in these female rats.

($X=40 \pm 10$ years) participated in a medically supervised protein sparing modified fast (300 calories per day) for approximately 10 weeks. Following the fasting period subjects consumed a low fat diet with caloric intakes ranging from 1100 to 1400 calories per day. RMR was measured by indirect calorimetry prior to weight loss, during the fast and for 2 months after completion of the fast. RMR decreased (22%) significantly ($p \leq 0.001$) with the start of the modified fast. The RMR values throughout the fast and during the maintenance diet, when subjects were at a stable reduced weight, were not significantly different and all were lower than the pre diet measure ($p \leq 0.01$). RMR remained depressed for ≥ 2 months following weight reduction despite the increased caloric consumption that supported weight stabilization.

Wadden et al. (1990a) found conflicting results of the effect of caloric restriction on RMR. In this study 18 obese women were placed on a balanced deficit diet (BDD) (n=9) which contained approximately 1200 calories per day or a very low calorie diet (VLCD) (n=9) which contained 420 calories per day. Subjects on the BDD consumed the diet for 48 weeks. Subjects on the VLCD consumed that diet for 16 of the first 17 weeks and then followed a conventional reducing diet for the remainder of the 48 weeks. The authors reported a decrease in RMR in both treatment groups during the first 5 weeks. However, the RMR rose sharply in the VLCD group when caloric intake increased. The authors concluded that dieting combined with modest exercise was not associated with long-term reductions in RMR above that expected with a lower body weight. Although the initial changes in RMR were partially reversed following refeeding, Garner et al., (1991) noted that caloric restrictions were apparently necessary to maintain weight losses of these women. At week 48, both the BDD and VLCD subjects reported mean intakes of 1285 and 1392 calories, respectively. These somewhat restrictive intakes may attribute to the weight regain that can be anticipated for these women (Garner et al., 1991).

Brownell et al., (1986) suggested that the body responds to dieting as it would to starvation by increasing food efficiency. Chronic dieting may enhance food

efficiency, thereby making subsequent dieting efforts more difficult (Brownell et al., 1986). Metabolic efficiency of weight cycling has been demonstrated in animal studies (Brownell et al., 1986; Reed et al., 1988).

Conflicting studies of metabolic changes during weight loss indicates great individual variability in response to caloric restriction. Therefore, it is imperative for future studies to identify individual factors that make weight fluctuation a negative experience for some and not for others (Brownell et al., 1989).

Weight Fluctuation and Health Risks

A number of health risks have been associated with obesity including hypertension, diabetes mellitus, cardiovascular disease, hypertriglyceridemia, low high-density-lipoprotein cholesterol, endometrial cancer in women and colorectal cancer in men (Pi-Sunyer, 1991). Although weight loss is associated with a reduction in risk factors for cardiovascular disease (NRC, 1989), weight regain is accompanied by their reemergence (Ashley et al., 1974; Borkan et al., 1986). Recently, epidemiologists have looked for associations between weight cycling and increased risk of death and morbidity from coronary heart disease, cancer mortality and increased total mortality (Ashley et al., 1974; Hamm et al., 1989; Lissner et al., 1991).

Prior to Lissner's work in 1991, Stevens and Lissner (1990) suggested that the role of weight cycling and chronic

disease requires further study. Data from the Charleston Heart Study was used to examine all-cause mortality. Subjects consisted of 291 white males, 300 white females, 153 black males and 184 black females. Body weight variability was based on two measured weights, taken three years apart and one recalled weight (weight at age 25). Findings suggested that body weight variability was not a risk factor for mortality. These results are questionable considering only three measurements were used to assess weight variability. Meaningful conclusions about the phenomenon of weight cycling should be based on more than three different measures of body weight.

Associations between variability in body weight and health outcomes was studied by Lissner et al. (1991) by use of data from subjects (n=5127) participating in the Framingham Heart Study. Weight cycling was quantified as the coefficient of variation, defined as the standard deviation of the subject's nine BMI's (BMI's were from eight biennial examinations during the study and their recalled weight at age 25) divided by their mean BMI. A high value indicated either many changes in weight or large changes, whereas a low value indicated weight stability. Subjects with highly variable body weights had increased total mortality ($p \leq 0.01$ for women, $p \leq 0.005$ for men), increased mortality from coronary heart disease ($p \leq 0.009$ for both women and men) and increased morbidity due to coronary heart

disease ($p \leq 0.006$ for women, $p \leq 0.0009$ for men). Weight variability was not associated with morbidity due to cancer in women or men. The authors concluded that persons whose weight fluctuated often or greatly had a higher risk of coronary heart disease and death compared to those with relatively stable body weights.

Hamm et al. (1989) investigated the hypothesis that large fluctuations in weight are associated with increased risk of coronary heart disease during young adulthood. Participants were men, 40 to 56 years of age who worked at the Western Electric Company in Chicago. Hamm and colleagues investigated the 25-year mortality of three groups of middle aged men with distinctly different patterns of self-reported weight during young adulthood. The "gain and loss" group ($n=98$) included men whose maximum gain during any one five-year period and maximum loss during another five-year period were each 10% or more. This group was compared with a "gain only" group ($n=133$) and a "no change" group ($n=178$). The relative risk of coronary death in the "gain and loss" group when compared to the "no change" group was 2.0 (95% confidence interval). Weight cycling did not appear to increase the risk of death from cancer or death from other causes. The author suggests that results support the hypothesis that large fluctuations in weight during young adulthood is associated with increased risk of coronary disease.

Data from the Framingham Study was also used in a report by Ashley et al. (1974) who hypothesized that during weight regain blood lipid levels become elevated, increasing atherogenesis. Results indicated that risk factors associated with cardiovascular disease increased as weight increased, and relative weight had little influence on the observed changes in the coronary risk factors. A recent review of Framingham data indicated that subjects whose BMI changed (weight loss and regain) or increased over a 10 year period had higher systolic blood pressures than those whose BMI did not change over the same 10 year period (Higgins, 1992).

Jeffery et al. (1992) suggested that hazards of diet related weight fluctuations are currently premature following their examination of the relationship between weight cycling and cardiovascular risk factors in obese men (n=101) and obese women (n=101). Jeffery and colleagues divided subjects into quartiles based on weight cycling measures. Weight cycling was defined in three ways: 1) number of previous weight losses ≥ 4.5 kilograms; 2) total weight lost in prior weight loss attempts; and 3) the difference between highest and lowest weight as an adult. Cardiovascular risk factors included waist to hip ratio, blood pressure, total and high density lipoprotein cholesterol, triglycerides and percent of calories from fat. Results did not support the hypothesis that weight cycling

was associated with increased cardiovascular risk factors in men or women. These results are limited considering participants were excluded if they had existing weight related diseases such as hypertension or diabetes. One must question whether those with pre-existing diseases had experienced greater weight fluctuations, than those included in this study.

Recent studies have shown an association between a number of risk factors for cardiovascular disease and abdominal fat distribution (Larsson, 1991). Major complications of obesity, including hypertension, hyperlipidemia, cardiovascular disease and diabetes mellitus are associated with increased abdominal fat (Pi-Sunyer, 1991; Sjöstrom, 1992). Considering the health implications of regional fat distribution, interest in factors that enhance abdominal adiposity has arisen (Rodin et al., 1990). To consider the possible relationship between weight cycling and fat patterning, the association between cycles of weight loss and waist to hip circumference ratio (WHR) in women was examined by Rodin et al. (1990). Eighty-seven normal weight subjects were randomly selected from those who responded to a recruitment effort for studies on women's health. A weight cycling index was calculated for each subject based on self-reported frequency and magnitude of weight loss and regain. Two discrete groups were also formed based on weight fluctuation patterns: 1) "weight cyclers" (n=33)

included those who reported losing a minimum of 10 pounds at least once; and 2) "non weight cyclers" (n=23) included those who had never lost more than 10 pounds. Results showed that a higher WHR was significantly associated with a higher degree of weight cycling. These findings support that a history of weight cycling may be associated with a pattern of more abdominally distributed fat which may contribute to long term health risks.

Psychological Risks Related to Dieting and Weight Regain

As summarized by Garner et al. (1991), the psychological effects of uncomplicated dieting in normal weight males was reported by Keys and associates in 1950. Thirty six normal weight male volunteers participated in a "semi starvation" diet. Over a six month period the men had lost approximately 25% of their former body weight. Although subjects were psychologically healthy prior to the experiment, most experienced depression, apathy, diminished sex drive and became wholly preoccupied with food (Wadden et al., 1987). Nutritional rehabilitation did not immediately correct these emotional aberrations. Some men became more depressed, irritable and argumentative with nutritional replenishment. Stunkard (1957) also found emotional disturbances secondary to dieting among participants in a weight reduction program. Adverse emotional reactions included depression, nervousness and irritability.

Wadden et al. (1988) examined the long-term efficiency of obesity treatment of a very low calorie diet, behavior therapy (BT) and their combination. This study was unique in that psychological consequences of weight regain was examined. Mean weight losses at the end of treatment were 14.0 kilograms in the VLCD group (n=15), 14.26 kilograms in the BT group (n=16) and 19.25 kilograms in the combined group (n=19). Mean weight losses for 45 subjects three years after treatment were not significantly different at 3.8 kilograms, 4.8 kilograms and 6.5 kilograms respectively. At the three year follow up, 47% of the diet alone subjects regained all or more of their pretreatment weight as compared with 43% of the behavior therapy group and 38% of the combined group. There were significant ($p < 0.01$) reductions in depression from baseline to both the end of treatment and one year follow up in the BT and combined group. However, at the three year follow up their score had increased and were no longer significantly different from baseline. Subjects reported that regaining weight adversely affected their psychological health. Satisfaction with appearance, self-esteem, self-confidence and general level of happiness were affected most adversely by weight regain. Other negative effects reported due to weight regain were reduced quality of physical health, job performance and sex life. Although not a consensus of the nutrition community, Garner states "at best, weight loss can only promise

temporary psychological benefits, and at worst, it sets the occasion for yet another failure experience" (Garner et al., 1991).

Restrained Eating

Many cases of binge eating may be linked to restrictive dieting efforts (Garner et al., 1985) and is a central characteristic of bulimia (Duchman et al., 1989). As defined by the Diagnostic and Statistical Manual of Mental Disorders (DSM-III-R, 1987), essential features of bulimia nervosa include: recurrent episodes of binge eating; a feeling of lack of control over eating behavior during binges; self-induced vomiting, use of laxatives or diuretics, strict dieting, fasting or vigorous exercise in order to prevent weight gain and constant over concern with body shape and weight. Estimates of bulimia prevalence vary greatly depending on the diagnostic criteria used but generally range from 5% to 20% in college women (Kirkley, 1986). Binge eating typically begins in late adolescence, frequently following a weight loss attempt (Fairburn et al., 1986; Wadden et al., 1987). However, Rosen et al. (1987) indicated that dieting does not always lead to an eating disorder but is one of several risk factors for the development of an eating disorder.

Duchman et al. (1989) examined the role of dietary restraint in a clinical sample of bulimics. Two experimental groups were formed: 1) "binge-purgers" (n=15)

reported bingeing and purging behavior and 2) "binge-eaters" (n=15) reported binge behavior in the absence of purging. A control group of "normal" eaters was also formed. Purging bulimics expressed greater concern about dieting than binge eaters. Normal eaters had the lowest concern about dieting. The authors suggested the greater concern about among purging bulimics may attribute to the more extreme methods of weight control used by this group. It is proposed that the most distinguishing characteristic of binge purgers may be their preoccupation with dieting, body weight and body shape.

The cost of weight loss and regain are not strictly monetary, but are physical and psychological as well (Pace et al., 1991). Physical and psychological consequences of dieting and weight cycling may be more harmful than maintaining higher stable weight (Brownell et al., 1987b; Wooley et al., 1984). Dieting and repeated cycles of weight loss and regain may increase metabolic efficiency, therefore contributing to obesity. Increased risk of death and morbidity from coronary heart disease and increased mortality has been linked to frequent and/or large fluctuations in weight. Dieting can lead to binge eating in some individuals which may further lead to serious eating disorders such as anorexia nervosa and bulimia nervosa. Finally, dieting and weight loss can have adverse psychological effects including depression, nervousness,

apathy and anxiety. Research indicates that effective and long term treatments of weight reduction have yet to be discovered (Goodrick et al., 1991; Wooley et al., 1991). Wooley et al. (1991) argue that obesity treatment in many instances is destructive, providing individuals with failure experiences and causing them to view themselves as deviant and flawed. Therefore, we must consider more carefully what happens to those diet and experience weight relapse (Wooley et al., 1984).

Food Intake and Weight Control

From recent studies it appears that there are differences in selection of food items between unrestrained and restrained eaters. Laessle and colleagues (1989) compared eating behaviors of restrained and unrestrained eaters with respect to total caloric and macronutrient intake and long-term food preferences. Sixty young women were divided into groups based on restrained and unrestrained eating. Caloric intake of restrained eaters, based on seven day food records, was about 400 calories less than the unrestrained group. Restrained eaters avoided calorie dense food items high in carbohydrate and fat. Restrained eaters reported having been on intensive weight reducing diets more frequently. Twenty-three percent of the restrained group reported nine or more previous dieting periods with a weight loss of at least 8 pounds. None of

the women in the unrestrained group had such a dieting frequency.

Tuschl et al. (1990) investigated food use of restrained eaters in terms of food choice frequencies. Consumption frequency of food items was examined in young, normal weight women classified as unrestrained (n=19) or restrained (n=20) eaters. No significant differences were found in the consumption of basic foods and snacks between groups. However, the restrained eaters avoided high fat foods, specifically pure fats such as oils, butter and mayonnaise. Restrained eaters did not avoid high calorie sweetened fat such as chocolates and cake. The authors suggested that differences between eating behaviors of the two groups could be one of the links between dietary restraint and binge eating.

Hernon et al. (1986) examined food consumption patterns of 245 college women using three day food records. The women were divided into two groups, those who consumed ≤ 1200 calories per day and those who consumed >1200 calories per day. Those who consumed fewer calories ate less frequently and had fewer mean number of servings of meat and eggs, bread, starchy vegetables, milk products, desserts, added fat and added sugar. Although, these diets were below the recommended number of servings from the Basic Four Food Groups, these women group consumed food of greater nutrient density than did the group that consumed >1200 calories.

The relation between food intake and body appearance was examined in adolescent girls. Work by Macdonald and colleagues (1983) revealed some interesting differences between food habits of adolescent girls with poor and good dietary intakes. Twenty-four food records from 276 female students aged 14 to 18 years were used to assess diet quality. Canada's Food Guide was used to determine diet quality and a score was assigned based on number of food group servings consumed per day. Two groups were formed on the basis of the diet quality score: 1) good diets (the 50 highest scores) and 2) poor diets (the 50 lowest scores). Individuals with the poorest diet scores, when compared with the other group, skipped one or more meals per day ($p \leq 0.001$), were currently dieting ($p \leq 0.05$), and had attempted to diet more in the past ($p \leq 0.001$). Those with the poorest quality intake weighed significantly more than those with the high quality intake ($p \leq 0.05$).

Eating Patterns and Weight Control

In an attempt to control weight many people skip breakfast in order to reduce total caloric intake (Schlundt et al., 1992). Schlundt and colleagues examined the role that breakfast eating plays in weight reduction. Fifty-two obese women were stratified according to their baseline breakfast eating patterns (breakfast eaters or breakfast skippers) and randomly assigned to a weight loss program. The breakfast group ate three meals per day while the no-

breakfast group ate two meals per day. The caloric content of both groups was the same. The authors found some advantages to eating breakfast such as breakfast eaters had lower fat intakes and higher carbohydrate intakes. There was also a significant reduction in impulsive snacking among breakfast eaters ($p \leq 0.01$). The authors concluded that in the short-term, eating breakfast may be an important component of a weight reduction program.

Kayman et al. (1990) assessed behavioral differences between long-term weight loss maintainers, weight relapsers and weight stable women. Meal and snacking patterns varied among groups. Relapsers ate significantly more snacks each day than those in the other two groups ($p \leq 0.0001$). Relapsers also consumed more candy and chocolate than women in the maintaining and stable groups ($p \leq 0.05$). Most women in all three groups ate lunch and dinner everyday. However, relapsers skipped breakfast more often than maintainers and weight stable women ($p \leq 0.01$).

Kirkley et al. (1988) investigated dieting behavior patterns of chronic dieters. Fifty, well educated women (mean age 28 years) responded to a newspaper announcement about the study. Thirty-nine participants returned 4-day diet records. Herman's Restraint Scale was used to classify women as high or low restrained eaters. Both groups ate a similar number of meals at similar times. Highly restrained eaters however, consumed more snacks ($p \leq 0.05$) and ate more

frequently ($p \leq 0.05$) than the low restrained eaters. These findings contradict those of Hernon et al. (1986) who found women that consumed ≤ 1200 calories per day ate less frequently than those consuming >1200 calories per day. This difference may be due to the way in which the women were classified. Hernon classified subjects based on caloric intake whereas Kirkley used Herman's Restraint Scale to classify subjects.

Diet Composition and Weight Loss

The effects of variations in the macronutrient composition of moderate caloric diets has been examined in the success of obesity treatment (Hill, 1992). A model developed by Flatt (1989) suggested that regulation of body weight and body composition depends on the amount of fat eaten in relation to the amount oxidized. A reduction of fat intake without energy restriction could lead to fat oxidation that exceeds fat intake and a lowering of body fat stores. An unrestricted intake of a low fat diet would lead to an increased carbohydrate intake which, according to Flatt, would not result in excess energy deposited as fat.

It has been suggested that a reduction in dietary fat, without an overall caloric deficit, may lead to weight loss (Kendall et al., 1991; Stunkard, 1992). Kendall and colleagues evaluated the degree to which individuals compensate for a reduction in dietary fat by increasing caloric intake. Thirteen women were randomly assigned to a

low fat diet (20-25% of calories as fat) (n=5) or a control diet (35-40% of calories as fat) (n=8) for 11 weeks. The conditions were reversed following a 7-week washout period. Energy intake on the low fat diet gradually increased over the 11-week period resulting in a total caloric compensation of 35%. A five pound weight loss over the 11 weeks was the result of failure to compensate calorically. Subjects on the control diet lost approximately 2 pounds over the same 11-week period. The authors concluded that body weight could be lost by limiting fat intake without voluntarily restricting food intake. Similar findings have been reported by Sheppard et al. (1991), Prewitt et al. (1991) and Romieu et al. (1988).

At this time it is not possible from existing data to identify an optimal diet composition for moderate calorie weight reducing diets (Hill, 1992). However, there are intriguing data that suggest a reduction in fat intake in the absence of caloric restriction can reduce body weight. It is important to note that most of these data in humans are short-term and that research is needed to document the degree to which diets can reduce body fat in the long term (Hill, 1992).

Physical Activity

The health benefits of regular physical activity have been identified and depend largely on long-term adherence to an active lifestyle (Brownell et al., 1986a; Lenfant, 1992).

Regular exercise among adults can reduce risk of chronic diseases such as heart disease, hypertension, noninsulin dependent diabetes mellitus, colon cancer and depression as well as reduced all-cause mortality rates (Blair et al., 1989; Lenfant, 1992; Paffenbarger et al., 1986; Powell et al., 1989).

Despite the rewards of regular physical activity, current exercise habits among Americans suggest that our relatively sedentary lifestyles have shown little improvement over the past 20 years (McGinnis, 1992). Population estimates indicate that Americans, Canadians, Europeans and Australians engage in little or no leisure-time activity and only a mere 10% of American adults are regularly and rigorously active (Dishman, 1988). The proportion of women, 29 years and older, engaging in regular exercise had not substantively improved from 1978 to 1985 and has remained essentially stable with an estimated 38% of women exercising regularly (Caspersen et al., 1986).

Exercise and Weight Loss and Weight Maintenance

Exercise training, depending on the type, intensity and duration produces an increase on caloric expenditure (Pavlou et al., 1989). The type, frequency (times per week), duration (minutes per session) and length (number of weeks) of training have all been shown to affect the ability of exercise to elicit changes in body mass, fat mass, and fat-free mass (Ballor et al., 1991).

Exercise, when combined with a hypocaloric diet in the treatment of obesity would be expected to result in greater body fat loss, better preservation of lean body mass and a lessening of diet-induced reduction of resting metabolic rate (Pavlou et al., 1989). Pavlou and colleagues (1989) studied the effects of exercise in a weight loss dietary regimen. Thirty-one volunteer overweight (120%-150% of ideal body weight) women between the ages of 26 and 49 years enrolled in a weight loss program and were randomly assigned to either an aerobic exercise group (EX, n=15) or a nonexercise group (NE, n=16). During the 8-week program all were instructed to follow a 1000 calorie per day, low fat diet. The EX group participated 3 times per week in an hour long walk\jog and strengthening program. Both groups attended weekly hour long behavior modification or nutrition education classes. The EX group lost significantly ($p \leq 0.05$) more weight than the NE group over the 8 week treatment period. A decrease in body fat percent was apparent in both groups with the percent change greater in the EX group ($-6.7 \pm 3.1\%$ vs. $-4.5 \pm 2.5\%$, $p < 0.05$). Resting metabolic rate was unchanged in the EX group, but decreased in the NE group. Findings suggested that aerobic exercise when combined with a caloric deficit had a greater effect on enhancing weight and fat loss than did a caloric deficit alone.

It is suggested that exercise plays a crucial role in weight control because it is one of the few factors

positively correlated with successful long-term body weight maintenance (Stunkard, 1992; Brownell et al., 1986). One of the greatest problems in the treatment of obesity is maintenance of the reduced weight. Van Dale et al., (1990) studied the affects of a diet alone or a diet/exercise treatment on long-term weight maintenance. Forty-four subjects (32 females, 12 males) successfully completed the intervention programs which consisted of a diet (D) treatment (n=19) or a diet/exercise (DE) treatment (n=25). Subjects were followed for 18, 36 or 42 months. Mean weight loss after treatment was 12 kg for the D group and 16.5 kg for the DE group ($p<0.05$). Mean fat loss between groups was also significant with a 9.5 kg loss in the D group and 13.5 kg loss in the DE group. Follow up data at 18, 36 or 42 months revealed that the diet group regained 90% of their initial weight loss compared to 60% of the DE group ($p<0.05$). Seven subjects from the DE group continued their exercise activities, while two subjects from the D group began exercising. These nine subjects regained only 23% of their weight loss. The authors concluded that exercise was a key factor in long-term weight maintenance.

Work by Kayman et al., (1990) supported the conclusions of Van Dale. The majority of women in Kayman's study who maintained a weight loss or had remained at a stable weight exercised regularly (at least 3 times per week for more than 30 minutes) whereas few regainers (34%) reported exercising

regularly. Although more research is needed in this area, it is reasonable to promote physical activity for weight loss, weight maintenance and reduction of risk for chronic disease (Blair, 1992).

Differences in response to exercise training may exist between males and females. Ballor et al. (1991) performed a meta-analysis to assess the effects of exercise training on changes in body mass both for adult males and females. Differences appeared to emerge with respect to male (n=41) and female (n=12) responses to exercise training with males losing more body mass ($X=1.2$ kg) than females ($X=0.6$ kg) for run/walk exercise. Two factors likely contributed to the greater body mass reduction observed for males. The males participating in these studies were heavier than the females, and the energy per session for males was approximately twice that of females. Wood et al. (1991) found similar effects of exercise on men and women. Diet alone and diet plus exercise was evaluated in a large (132 women and 132 men) well-controlled, one-year randomized trial. The diet plus exercise group lost more weight, more fat and had a greater improvement in the abdomen and hip ratio than the diet only group, however these changes were not statistically significant in women. More research concerning male-female responses to exercise training appears necessary. In any case the differences between males and females with respect to weight loss are modest

with males reducing body mass by approximately 1.5% following training and females by 0.1% (Ballor et al., 1991).

Social Pressure for Thinness

People in Western cultures strive for physical perfection (Rodin, 1992). The multibillion dollar industry (cosmetics, fashion, diet programs, exercise regimens and plastic surgery) to assist people in obtaining physical perfection exemplifies the societal pressure to look good. The value society places on appearance enhances an attractive individual's self-confidence and questions an unattractive individual's sense of self-worth (Rodin, 1992).

Physical beauty and concern with body weight and shape is much more common and socially important for females than for males (Bunnell et al., 1992; Kallen et al., 1984). The standards defining attractive and unattractive body shapes are both clearer and more narrowly defined for females than for males (Kallen et al., 1984; Rozin et al., 1987; Silverstein et al., 1986). Women and girls engage in more weight related activities such as weighing themselves more frequently, counting calories, expressing concern about being overweight and dieting more frequently than do men and boys (Rozin et al., 1987). While the preferred body shapes of women have become thinner over the past few decades (Rodin, 1992), women's actual body weights have increased

creating greater disparity between "real" and "ideal" body size (Garner et al., 1980).

Women have subscribed to a set of standards for physical appearance which have placed them under intense pressure to diet (Garner et al., 1985; Grodner, 1992). This mounting pressure to lose weight is demonstrated by the increase in the number of diet and exercise articles published in women's magazines (Wiseman et al., 1992). Silverstein et al. (1986) hypothesized that given this pressure to be unrealistically thin, some women respond by becoming dissatisfied with their bodies and as a result become chronic dieters. Recently Grodner (1992) discussed the need for a conceptualization of a new disorder: chronic dieting syndrome. The proposed criteria of the chronic dieting syndrome included: 1) persistent overconcern with body shape and weight; 2) restriction of food choices (dieting) for two years or more by skipping meals, ignoring physiological hunger cues or eating significantly fewer calories; and 3) over a two year period, continual dieting to lose weight but without success, or success at weight loss but weight was gained. Associative symptoms also included: 1) use of three or more weight loss techniques and/or diets within a two year time period; 2) constant assessment of caloric intake; 3) weight fluctuations; 4) self-esteem levels vary from high to low, often related to weight status; 5) overconsumption

of forbidden foods; and 6) guilt associated with consumption of prohibited "bad" foods.

Body Dissatisfaction Among Females

Body weight and shape dissatisfaction among adolescent girls and adult women has been studied by a number of researchers (Eisele et al., 1986; Kayman et al., 1990; Matsuura et al., 1992; Moore, 1988; Mortenson et al., 1992; Richards et al., 1990). Attitudes toward body weight and shape among adolescent girls was investigated by Moore (1988) who collected data from 854 girls and young women (12 to 23 years old) in a military adolescent outpatient clinic. An anonymous questionnaire was used to obtain information regarding attitudes towards body weight and shape and eating and weight control practices. Sixty-seven percent of the girls were dissatisfied with their body shape.

Dissatisfaction with body weight was seen among all weight classes with 92% of overweight girls being dissatisfied, 53% of normal weight girls being dissatisfied, and 40% of underweight girls being dissatisfied. The majority of girls (82%) who wanted to lose weight were not overweight indicating that an unrealistic ideal weight exists for many adolescent girls.

Eisele et al. (1986) found 385 girls (12 to 14 years old) attending a career conference to be dissatisfied with their body shape. The Body Dissatisfaction subscale of the Eating Disorders Inventory (EDI) was used to assess body

dissatisfaction. While 81% of the young girls were within the range for ideal weight or were underweight, 78% preferred to weigh less and only 14% were satisfied with their current weight. Richards and colleagues (1990) found preoccupation with food and dieting among 243 randomly selected females who were in 5th to 9th grades. This preoccupation began in the 5th and 6th grades and increased with age. Weight and diet preoccupied girls in the 8th and 9th grades displayed a depressed mood, had a lower self-esteem and a distorted body image.

Matsuura et al. (1992) reported similar misperceptions between actual and ideal body shape and weight among Japanese female college students. A questionnaire was administered to 433 college women in 1985 and 973 women in 1990 to assess their body shape preference. The percentages of those who overestimated their actual body shapes were 69% in 1985 and 64% on 1990. Many of those in the normal/thin group underestimated their actual average body shape and estimated their "ideal" shape at extremely thin levels.

Kayman et al. (1990) examined body satisfaction in a 108 women between 21 and 73 years of age. Subjects were categorized into three groups: relapsers, maintainers and controls. The majority of maintainers (86%) and control (94%) subjects thought of themselves as thin or average weight or a little "out of shape". Relapsers were mostly dissatisfied with their bodies, more than 70% of relapsers

viewed themselves as heavy or ugly with 25% wanting to change everything about their bodies and 43% wanted to be thinner.

Body dissatisfaction and restrained eating was investigated in Michigan State University college women by Mortenson et al. (1992). Findings revealed more body dissatisfied dieters used vomiting and smoking for the purpose of weight control. Body dissatisfaction was positively associated with body weight and negatively associated with self-esteem.

Currently, there is considerable emphasis on weight and appearance. This emphasis encourages many individuals to try countless weight loss techniques and promotes extreme body preoccupation and dissatisfaction (Rodin, 1992). Over the past few decades, there has been an increasing trend toward the thinning ideal shape in women's beauty. Body dissatisfaction is evident at all weight levels and is widespread among adolescent girls and women. These issues need to be considered when developing recommendations for weight control and maintenance.

METHODS

Subjects

Subjects volunteering to participate in this study were part of the psychology research pool at Michigan State University. The pool consisted of students enrolled in one of the following psychology courses: Introduction to Psychology: Social and Personality (PSY 160); Introduction to Psychology: Brain and Behavior (PSY 170); Developmental Psychology (PSY 224). While 191 female college students signed up to participate, 155 students came to the data collection site and completed the survey and anthropometric measurements. Students received two extra credit points as an incentive for participation. Those who agreed to participate signed an informed consent form before completing the questionnaire. Subjects (n=137) were categorized into one of five groups:

- Regainer (R): subjects who have regained >25% of an intentional weight loss of ≥ 8 pounds (since the age of 16) at least once (Van Dale et al, 1990);

- Maintainer (M): subjects who have regained $\leq 25\%$ of an intentional weight loss of ≥ 8 pounds (since the age of 16) and have kept that weight off for at least 2 years (Van Dale et al., 1990);

•Weight Stable Dieter (STD): one who reports dieting to lose weight and has a body weight that has remained within <8 pounds of current weight since age 16, excluding pregnancy;

•Weight Stable Non-Dieter (STND): One who does not report dieting to lose weight and has a body weight that has remained within <8 pounds of current weight since age 16, excluding pregnancy;

•Gainer (G): self-reported continual weight gain since the age of 16.

A total of 18 subjects were unable to be classified into one of the five groups listed above. Eight of these subjects reported maintaining an intentional >8 pound weight loss for less than two years. The remaining ten subjects did not provide enough information about their weight history and dieting practices to be classified.

Only the data collected from 137 subjects were analyzed for this study. Hereafter, these 137 women will be referred to as the "total sample". These 137 subjects were classified into one of the five groups defined based on body weight history and dieting practice: R (n=61); M (n=3); STD (n=48); STND (n=23); and G (n=2). The maintainer and gainer groups were included only in the descriptive analysis due to their small sample sizes. A descriptive summary of these two groups can be found in Table 3.0 and in Appendices A and B. The remaining 132 women classified as R, STD and STND

Table 3.0. Descriptive data of weight maintainers (n=3) and weight gainers (n=2) not examined in groups.

	Maintainers			Gainers	
	1	2	3	4	5
BMI^a	20	21	20	22	26
Number of weight loss methods used	2	5	5	0	0
Number of safe weight loss methods used	2	3	2	0	0
Number of unsafe weight loss methods used	0	2	3	0	0
Kcal intake	3561	1472	1542	6967	1173
Kcal/kg body weight	72.2	26.2	26.3	118.3	16.2
Fat (g)	125	49	38	194	40
Fr/veg^b	5	5	6	21	2
Breakfast skipper^c	Yes	Yes	Yes	Yes	Yes
Minutes physical activity/week	87	638	N/A	279	N/A
Body Dissatisfaction^d	14	1	15	4	9

^a Body Mass Index

^b Mean number of fruits and vegetables eaten per day

^c Breakfast skipper reported consuming breakfast
0-4 time/week

^d Body dissatisfaction: 0=satisfied-27=dissatisfied
N/A Data incomplete

were called the "final sample" and were included in the comparative data analysis. The mean age of the 132 women in the final sample was 20 years with a 19-23 year range.

The majority of subjects were White or non-Hispanics (83%), 8% were Blacks, 7% were Asian and the remaining 2% were Hispanic-Americans and Native American Indians. This distribution self-defined by ethnicity and race was representative of MSU women enrolled Spring term, 1992 (85% White or non-Hispanics, 9% Blacks, 2% Asian, 2% Hispanic-Americans and 1% Native American Indian). The majority of women were freshmen (52%) and sophomores (33%). The proportion of female freshmen and sophomore undergraduates enrolled at MSU during Spring term 1992, was much lower (11% and 11% respectively) than the study sample. However, the classes which were part of the psychology pool were 100 and 200 level classes and students at this level are typically freshmen and sophomores.

Procedures

After approval of this study by the University Committee of Research Involving Human Subjects (UCRIHS) (Appendices C and D), a pilot study was administered to a worksite population to provide insight into possible corrections and complications with the questionnaire. Female employees who volunteered to participate received the questionnaire, designed specifically for this worksite population, with an informed consent form. Subjects were asked to participate in the study at a scheduled time outside of their work schedule. This same population was intended to be used for the final study, but the participation rate in the pilot

study was inadequate. Therefore, a student population was used for the final study (see Appendix E for further information regarding the worksite population).

The final data collection for this study was completed during Spring term 1992. Three weeks prior to the time of data collection, female students in the psychology pool had the opportunity to sign-up to participate in the study. Sign-up sheets included information about the purpose of the study, data collection time and place, and number of extra credits points received for participation. Subjects were asked to take part in the study at a time scheduled outside of regular class time (7:00pm to 8:00pm during one weekday evening towards the end of Spring term). Upon arrival, students completed the informed consent form (Appendix F) and the questionnaire (Appendix G). Following completion of the questionnaire, each subject was weighed and measured semi-privately in one of the two auditorium exits by a registered dietitian or graduate student in human nutrition. They also received written information that explained the purpose of the study and how to obtain study results if interested (Appendix I).

Measurements

Questionnaire

The questionnaire used in the present study consisted of six parts described in the following paragraphs. Five focus groups were held with a student population to generate item

content of questions related to weight control practices and behaviors. Each focus group lasted approximately 60 minutes and each participant received a coupon for a free ice cream cone (\$1.50 value). Group discussions were tape recorded, transcribed and analyzed according to dominant themes that emerged. The questionnaire was administered to both student and a worksite population prior to the pilot study to check the readability and clarity of the instrument (Fern, 1982). A few minor changes were made in the questionnaire following the study. Revised questions to the questionnaire can be found in Appendix H.

Physical Activity. The first part of the questionnaire assessed physical activity and is currently being used in the third National Health and Nutrition Examination Survey (NCHS, 1990). Twelve questions assessed the type and frequency of exercise during the past month, typical physical activity and self perceptions of physical activity. Subjects were categorized into one of three physical activity groups based on frequency and duration of activities (Blair, 1989).

- 1) Highly active: Subjects who run, swim, dance, bicycle or do aerobics for at least 30 minutes each day for 5 to 6 days per week or walk two miles in 20 to 24 minutes, lift weights, garden or do calisthenics at least 5 to 6 days per week.

2) Moderately active: Subjects who run, swim, dance, bicycle or do aerobics for less than 30 minutes at least three days per week or walk two miles in 30 to 40 minutes, lift weights, garden or do calisthenics at least four days per week.

3) Low physical activity: Subjects not meeting either of the above criteria.

Minutes per week of physical activity was also calculated for each subject.

Food Group Intake. Gladys Block's Food Frequency Questionnaire (FFQ) (Block et al., 1986) was the second part of the questionnaire and was used to gather dietary intake information. The FFQ allows for data collection of large samples of individuals, is easily administered and measures frequency or number of times common foods have been eaten over an extended period (Frank et al., 1992). The National Cancer Institute's or Block FFQ (NCI, 1988) was chosen for this study for the following reasons, it 1) can be self-administered; 2) is time efficient and relatively brief; 3) is inexpensive; and 4) is representative of an individual's usual intake over the last month (Block et al., 1992a). The food list for this FFQ is based on major nutrient contributors as determined by population data from NHANES II. This FFQ allows for the calculation of reasonably accurate quantitative measures of nutrient intake (Block et al., 1992b; Willett, 1988). Reliability studies have shown

correlations between repeat administrations of questionnaires ranging from 0.5-0.8 for various nutrients with intervals between repeated administrations ranging from 3 months to 1 year (Block et al., 1989). Validation studies have been conducted for the Block FFQ and correlations ranged from 0.5-0.6 for most nutrients, except vitamin A (Block et al., 1989). It has been observed that actual amounts of the nutrient estimates produced by the questionnaire are quite similar to estimates produced by multiple diet records over a considerable range of gender and age groups (Block et al., 1989). Briefel et al. (1992) argued that the FFQ is a shortcut method that does not capture all the information needed to calculate nutrient intake. However, there is currently no gold standard for estimating usual dietary intake (Briefel et al., 1992) and given the objectives and data collection needs in the present research, the FFQ was the most appropriate tool to use.

The Block FFQ was modified to include only medium size portions for 92 different food items. Foods were categorized into nine different groups: dairy products; breakfast foods; breads, snacks and spreads; fruit and fruit juices; vegetables; meat and mixed dishes; side dishes; beverages; and snacks. Food frequency data were scored to the nearest 1/4 ounce, piece, slice or item depending on the food.

Dietary quality was evaluated by mean adequacy ratio (MAR) for calcium, iron, vitamins A, C, B-6, and dietary fiber. These specific nutrients were targeted because they have been identified as potential problem nutrients (i.e. inadequate consumption relative to the RDA's) for many population segments of the U.S. (NCHS, 1983; USDA, 1985). Also, the density in the diet of vitamins A, C, B-6, calcium and iron has been reported in some studies to be inversely related to fat and calories (Gorbach et al., 1990; Schectman et al., 1990). MAR is an index of the average percent of recommended intake of several nutrients (Krebs-Smith et al., 1989). Percentages were truncated at 100. The MAR was calculated as follows:

$$\text{MAR} = \frac{\% \text{RDA of Actual Intake of Specific Nutrient} \times 100}{\% \text{RDA for the Nutrient}}$$

Caloric intake per kilogram of body weight was calculated for each subject. Nutritionist III dietary analysis software (version 6.0) was used to generate nutrient intake information (Nutritionist III, 1990). Fruit and vegetable consumption was also calculated by Nutritionist III dietary analysis software using the diabetic exchanges for meal planning.

Eating Patterns. The third portion of the questionnaire assessed meal and snack consumption. Subjects reported how frequently they typically ate breakfast, lunch, supper and snacks during the day. Eating patterns were determined by

the number of meals and snacks consumed per week and the frequency of meal skipping (Bailey et al., 1989; Jakobovits et al., 1977; Kayman et al., 1990; Khan et al., 1982).

Subjects were also classified as breakfast eaters (those reporting consuming breakfast ≥ 5 times per week) or breakfast skippers (those consuming breakfast < 5 times per week).

Weight Control Practices. The fourth part of the questionnaire pertained to weight control strategies used by subjects. Questions used in this section were adapted from various sources (Grunewald, 1985; Kayman et al., 1990; Rodin et al., 1990). The following questions regarding weight control practices were included: age of dieting onset, number of weight fluctuations over time, number and type of weight loss attempts used, reasons for wanting to lose weight and problems encountered with weight loss attempts.

Weight History and Lifestyle Information/Demographics. The fifth section of the questionnaire contained questions regarding current weight status and weight history. Questions used to address these issues were adapted from various sources (Kayman et al., 1990; Michigan Department of Public Health, 1990; Rodin et al., 1990). The following questions regarding weight history included, current weight, age of onset of overweight, description of weight patterns and weight status of family members. Demographic questions included age, race/ethnicity and educational level. Smoking

habits, television viewing and sleeping patterns also were examined.

Body Dissatisfaction. This final portion of the questionnaire consisted of the Body Dissatisfied subscale of the Eating Disorder Inventory (Garner et al., 1991).

Beliefs regarding satisfaction or dissatisfaction with specific body parts and overall body satisfaction or dissatisfaction are assessed by this subscale. The 9-item test requires the subject to respond to a 6-point forced choice item by rating whether each item applies "always", "usually", "often", "sometimes", "rarely", or "never." The most extreme "anorexic" responses ("always" or "never", depending on the keyed direction) receives a score of 3, the immediate response receives a score of 2, the next response receives a 1, and the three choices opposite the most extreme response receives no score (0). Scale scores are the summation of all item scores for the subscale. The higher the score, the greater dissatisfaction with ones body. The Body Dissatisfaction score was divided into quartiles for statistical analysis. The quartile ranges were based on the percentile ranks for 770 college females (Garner, 1991).

Anthropometric Measurements

Height and weight measurements were taken following standardized procedures (Lohman et al., 1988) using a metal measuring tape, right angle head block and calibrated

balance beam scale. Measurements were taken by undergraduate and graduate students studying nutrition in the Department of Food Science and Human Nutrition at Michigan State University. All measurers were trained in anthropometric measurements. Weight measurements were taken once and heights were taken twice and averaged. Subjects were weighed in street clothes without shoes. Weight was measured to the nearest 0.5 kilograms. Height was measured without shoes with the back of the head, shoulders, buttocks, and heels touching the wall. A flat edged, right angle wooden device was placed on top of the subjects head and the height on the measuring tape was recorded to the nearest 0.25 centimeters. Body Mass Index $[wt(kg)/ht(m)^2]$ was computed from height and weight measurements. BMI was used in this study because it correlates well with body fat (Atkinson, 1992) and could be determined from height and weight measurements alone.

Each subject was classified as overweight, slightly overweight, normal weight, slightly underweight or underweight based on reference data for females aged 20 to 29 from the National Center for Health Statistics (NCHS, 1976-80). Subjects having a BMI ≤ 17.9 ($\leq 5^{th}$ tile) were classified as underweight. Subjects with BMI's > 18.0 and ≤ 19.1 ($> 5^{th}$ to $\leq 15^{th}$ tile) were classified as slightly underweight, subjects with BMI's > 19.2 and < 27.2 ($> 15^{th}$ to $< 85^{th}$ tile) were classified as normal weight. Those with

BMI values ≥ 27.3 and < 32.2 ($\geq 85^{\text{th}}$ to $< 95^{\text{th}}$ tile) were classified as slightly overweight and those with a BMI ≥ 32.3 were classified as overweight ($\geq 95^{\text{th}}$ tile).

Data Analysis

Analyses was run using the Statistical Package for the Social Sciences (SPSS-PC+) (Norusis, 1988). A codebook for the data can be found in Appendix J. Subjects were classified into one of three groups (dependent variable) based on weight fluctuation history (regainers, weight stable dieters or weight stable non-dieters) and the data analyzed using appropriate statistical tests. Descriptive statistics were used to characterize the sample and a correlation matrix was run on regainers, stable dieters and stable non-dieters for interval variables.

Data on type and number of weight control strategies used was analyzed by Chi square analysis to determine if differences between observed and expected frequencies of variables were significant between women categorized as regainers ($n=61$), stable dieters ($n=48$) or stable non-dieters ($n=23$). Physical activity was analyzed by Chi square analysis for the three activity levels to determine if they were independent between the three groups of women and by ANOVA for the minutes per week of activity. Chi square analysis was also used to determine if the frequency of meal and snack consumption was independent or related between the three groups of women.

Oneway analysis of variance (ANOVA) was used to screen interval-level variables for unequal means among the three groups of women (regainers, stable dieters and stable non-dieters). For each interval variable that achieved significance at $p \leq 0.10$ (Gill, 1992), the means of each possible pair of groups (regainers vs. stable dieters, regainers vs. stable non-dieters and stable dieters vs. stable non-dieters) were tested for equality using the Bonferroni Multiple Comparison method (Gill, 1992; Glass et al., 1984). Bonferroni Chi square was used to evaluate categorical data. These methods were used to control for the increased probability of committing a Type I error when running multiple comparisons.

Funding and Equipment

Estimated expenses for this research project were approximately \$22,000. Printing costs of the questionnaire was \$280.00. The scales (\$300.00), measuring tapes (\$35.00), computer (\$2500.00) and computer software (\$1,100) were provided by Dr. Sharon Hoerr and the Nutrition Assessment Laboratory at Michigan State University. Travel cost to the pilot study sites was approximately \$30.00. Graduate research assistantship support (0.25 FTE for two years: \$17,900) was provided by the Department of Medicine and the Department of Food Science and Human Nutrition at Michigan State University.

RESULTS

Fifty-eight percent of the final sample reported they were dieting at the time of data collection, 83% reported that they had dieted sometime in their life and 24% described themselves as "always dieting". The mean age reported for the first diet attempt was 15 years with a range of 10 to 20 years.

A variety of weight loss methods were used by regainers and stable dieters (Table 4.0). The three most popular methods used by all groups were: 1) increasing exercise; 2) increasing exercise plus following a reduced calorie personal eating plan; and 3) only following a reduced calorie personal eating plan. A number of subjects, particularly regainers, used unsafe, ineffective and potentially health-threatening methods to lose weight. Approximately 50 to 65% of regainers used SlimFast and starvation to lose weight. Twenty-five to 30% smoked, vomited, or took diet pills to lose weight and 13 to 18% used laxatives or diuretics. The following methods not listed in the table were used by less than 5% of the women: diet books (Fit For Life and The Rotation Diet); figure salons/toning; hypnosis; weight loss camp; Nutri/System; Overeaters Anonymous and a very-low-calorie supervised

Table 4.0. Percent of popular weight control methods used by women categorized as stable non-dieters, stable dieters or regainers.^a

Method Used	Stable Non-Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
<u>Safe and Effective</u>			
Increased exercise	30.4	98.0	98.4
Increased exercise plus moderate caloric restriction	17.2	85.4	80.3
Moderate caloric restriction	17.2	75.0	78.7
Weight Watchers	0	2.1	13.1
Advice from a Health Professional	0	4.2	13.1
<u>Unsafe and/or Ineffective</u>			
Fasting/starvation	0	29.2	65.6
SlimFast	4.3	35.4	49.2
Diet Pills	0	10.4	31.2
Self-induced vomiting	0	17.0	29.5
Smoking	0	4.2	26.2
Laxatives	0	0	18.1
Diuretics	0	2.1	13.2

^aSubjects could select more than one method.

weight loss program (VLCD). Stable non-dieters reported using weight control methods to maintain weight, whereas regainers and stable dieters reported using weight control methods for weight loss.

Considering the high prevalence of dieting in this population, it was discouraging to find only 2% (n=3) of the total sample classified as maintainers, i.e., maintaining 25% of ≥ 8 pound weight loss for at least two years.

Hypothesis 1

There will be differences in the number and type of weight control strategies used among college-aged women at MSU who are classified as regainers, stable dieters or stable non-dieters. (H_1 adjusted from original, per results of study classification)

Women classified as regainers, stable dieters and stable non-dieters differed in the number of different weight control strategies used ($p \leq 0.01$) (Table 4.1). Forty-one percent of regainers used six or more different weight loss strategies versus only 12% of stable dieters. Most stable dieters (88%) used five or fewer weight control methods. The majority of stable non-dieters (70%) did not use any type of weight control methods.

Two types of weight control strategies were defined in this study: 1) generally recognized as safe and effective; and 2) generally recognized as unsafe and/or ineffective. The goal of safe and effective methods is to promote healthful eating in the presence of a caloric deficit as

well as a regular exercise program (Technology Assessment Conference Panel, 1992). Unsafe and/or ineffective

Table 4.1. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD), or regainers (R) who have used 0 to 11 different weight loss methods.**

Number of Different Methods Used	Stable Non- Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
0	70	0	0
1-2	17	17	3
3-5	13	71	56
6-11	0	12	41
Total	100%	100%	100%

** $p \leq 0.01$ (Bonferroni X^2 with STND vs. STD; STND vs R; STD vs R)

strategies are characterized by the following: 1) promote short-term rapid or unsupervised weight loss; 2) rely on diet aids such as drinks, prepackaged foods or pharmacologic agents; 3) lack education in and eventual transition to a long-term pattern of healthful eating and exercise (Technology Assessment Conference Panel, 1992).

The types of weight control strategy used among regainers, stable dieters and stable non-dieters were also significantly different ($p \leq 0.01$). Differences in the number

of safe weight loss methods used existed between regainers and stable non-dieters, and stable dieters and stable non-dieters (Table 4.2). The majority of regainers (74%) and stable dieters (69%) used three to five safe weight loss methods, whereas 74% of stable non-dieters used no safe weight loss methods. Regainers and stable dieters did not differ significantly in the number of safe weight loss methods used.

Differences in the use of unsafe dieting methods were also found between all three groups (Table 4.3). Eighty-seven percent of regainers and 65% of stable dieters used between one and six different unsafe dieting methods. Almost none of the stable non-dieters (4%) used unsafe methods to control weight.

Table 4.2. Percentage of women categorized as, stable non-dieter (STND), stable dieters (STD) or regainers (R) who have used 0 to 5 safe and effective weight loss methods.**

Number of safe & effective methods	Stable Non-Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
0	74	0	0
1-2	13	31	26
3-5	13	69	74
Total	100%	100%	100%

** $p \leq 0.01$ (Bonferroni χ^2 with STND vs R; STND vs STD)

Table 4.3. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD) or regainers (R) who have used 0 to 6 unsafe and/or ineffective weight loss methods.**

Number of unsafe & or ineffective methods	Stable Non-Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
0	96	35	13
1-2	4	50	43
3-6	0	15	44
Total	100%	100%	100%

****p $\leq$ 0.01 (Bonferroni X² with STND vs STD; STND vs R; STD vs R)**

Hypothesis 2

There will be differences in dietary and physical activity patterns among women classified as regainers, stable dieters or stable non-dieters. (H₂ adjusted from original, per results of subject classification)

The only difference in nutrient intake among groups was total caloric intake which differed significantly between regainers and stable non-dieters, and stable dieters and stable non-dieters (Table 4.4). Total caloric intake of stable non-dieters was significantly greater than for regainers and stable dieters ($p\leq 0.05$). This difference in caloric intake expressed as kcal/kg body weight remained different between groups ($p\leq 0.01$). Stable non-dieters reported the highest caloric intake per kg body weight

Table 4.4. Daily mean intakes ($\pm$ standard deviation) of nutrients consumed by stable non-dieters (STND), stable dieters (STD), or regainers (R).

Nutrient	Stable Non-Dieters (n=23)	Stable Dieters (n=47)	Regainers (n=61)
Calories	2516 $\pm$ 988*	1977 $\pm$ 636	2003 $\pm$ 774
Kcal/kg body wt	45 $\pm$ 15**	34 $\pm$ 13	32 $\pm$ 13
% Kcal carbohydrate	48 $\pm$ 7	47 $\pm$ 8	50 $\pm$ 10
% Kcal protein	17 $\pm$ 3	18 $\pm$ 4	17 $\pm$ 4
% Kcal fat	34 $\pm$ 5	33 $\pm$ 7	31 $\pm$ 8
Fat (g)	87 $\pm$ 46	76 $\pm$ 31	71 $\pm$ 36
Fr/veg ^a	6 $\pm$ 5	4 $\pm$ 3	5 $\pm$ 3
Alcohol (g)	5 $\pm$ 5	4 $\pm$ 5	7 $\pm$ 9
Fiber (g)	15 $\pm$ 8	12 $\pm$ 7	14 $\pm$ 7
MAR ^b	85 $\pm$ 11	82 $\pm$ 13	81 $\pm$ 14

^a Mean number of fruits and vegetables eaten per day.

^b Mean Adequacy Ratio—a dietary quality score

* $p \leq 0.05$ (Bonferroni t -test with STND vs STD; STND vs R)

** $p \leq 0.01$ (Bonferroni t -test with STND vs STD; STND vs R)

(45 $\pm$ 15 kcal/kg) followed by stable dieters (34 $\pm$ 13 kcal/kg) and regainers (32 $\pm$ 13 kcal/kg) (Table 4.4). The recommended daily caloric intake for women 19-24 years is 38 kcal/kg body weight (NRC, 1990).

Correlation coefficients for nutrient variables

Although not specifically related to the second hypothesis, correlations were run on nutrient variables to

assess relationships between nutrients studied (Table 4.5). Percent of calories from fat and grams of fat in the diet are of interest considering recommendations for Americans to reduce fat in the diet (USDA, 1990) and the importance of a low fat diet as part of a weight reducing and maintenance program (Kendall et al., 1991). The number of fruit and vegetable servings eaten per day and grams of dietary fiber were inversely related to percent of calories from fat ($r=-0.28$, -0.31 , respectively, $p\leq 0.001$). As intake of fruits and vegetables and of fiber increased, percent of calories from fat decreased. However, these same two variables were positively related to grams of fat in the diet ($r=0.32$, 0.28 , respectively, $p\leq 0.001$). This discrepancy likely resulted from the wide range of intake values reported for grams of fat ($X=75\pm 37g$). A positive relation was also found between fruit and vegetable intake and improved nutrient adequacy (MAR) ($r=0.47$, $p\leq 0.001$).

Table 4.5. Correlation matrix of dietary variables (n=153).

	1	2	3	4	5	6	7	8	9
1)Kcals	1.00								
2)% CHO	-.13	1.00							
3)% Pro	.03	-.48***	1.00						
4)% Fat	.18**	-.89***	.11	1.00					
5)Fat g	.84***	-.44***	.01	.53***	1.00				
6)Ft/Veg ^a	.55***	.27***	-.03	-.28***	.32***	1.00			
7)Fiber	.51***	.15	.16	-.31***	.28***	.69***	1.00		
8)MAR ^b	.55***	-.01	.30***	-.16	.38***	.47***	.73***	1.00	
9)Kcal/kg	.94***	-.15	.01	.20**	.79***	.48***	.46***	.53***	1.00

^a Mean servings of fruits and vegetables per day

^b Mean Adequacy Ratio, a dietary quality score for nutritional adequacy of the diet

**p≤0.01

***p≤0.001

There were no statistically significant differences or trends among the women in the number of times they reported eating breakfast (Table 4.6), lunch (Table 4.7) or supper (Table 4.8). The majority of women in all three groups skipped breakfast. Approximately 52-65% of the women consumed breakfast 0 to 2 times per week, making it the most frequently skipped meal. Lunch was consumed more often than breakfast; 64-83% of subjects consumed lunch 5 to 7 times per week. Supper was the most frequently eaten meal, 85-96% of women in all three groups reported having supper 5 to 7 times per week.

Because breakfast eating has been reported as an important part of weight maintenance (Schlundt et al., 1992), daily mean nutrient intakes were compared between breakfast eaters (n=36) and breakfast skippers (n=118) (Table 4.9), even though differences did not exist among the three groups of women in the number of times they reported eating breakfast. Significant differences were found in nutrient intakes with breakfast eaters consuming a greater percentage of calories from carbohydrate, a lower percentage of calories from fat, more fruits and vegetable servings and more fiber. Breakfast eaters also had better diets, as measured by the MAR score. There was no difference in caloric intake between these two groups.

Table 4.6. Percentage of women categorized as, stable non-dieters (STND), stable dieters (STD), or regainers (R) who reported eating breakfast.^a

Breakfast Consumption Frequency	Stable Non-Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
0-2 x/week	52	65	59
3-4 x/week	35	14	12
5-7 x/week	13	21	29
Total	100%	100%	100%

^aBonferroni χ^2 , NS

Table 4.7. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD) or regainers (R) who reported eating lunch.^a

Lunch Consumption Frequency	Stable Non-Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
0-2 x/week	4	12	16
3-4 x/week	13	19	20
5-7 x/week	83	69	64
Total	100%	100%	100%

^aBonferroni χ^2 , NS

Table 4.8. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD) or regainers (R) who reported eating supper.^a

Supper Consumption Frequency	Stable Non- Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
0-2 x/week	4	0	3
3-4 x/week	9	4	12
5-7 x/week	87	96	85
Total	100%	100%	100%

^aBonferroni χ^2 , NS

Table 4.9. Daily mean intakes ($\pm$ standard deviation) of nutrients consumed by breakfast eaters and breakfast skippers^a

Nutrient	Breakfast Eaters (n=36)	Breakfast Skippers (n=118)
Calories	2216 $\pm$ 847	2127 $\pm$ 921
% Kcal carbohydrate	54 $\pm$ 10***	48 $\pm$ 8
% Kcal protein	17 $\pm$ 4	17 $\pm$ 4
% Kcal fat	27 $\pm$ 9***	33 $\pm$ 6
Fat (g)	71 $\pm$ 44	78 $\pm$ 39
Fr/veg ^b	7 $\pm$ 3**	5 $\pm$ 4
Fiber (g)	17 $\pm$ 7**	13 $\pm$ 7
MAR ^c	88 $\pm$ 11**	81 $\pm$ 13

^a Breakfast eater reported consuming breakfast 5-7 x/week;
Breakfast skipper reported consuming breakfast 0-4 x/week

^b Mean number of fruits and vegetables eaten per day

^c Mean Adequacy Ratio—a dietary quality score

**p $\leq$ 0.01

***p $\leq$ 0.001

There were no significant differences among the three groups of women with respect to the total number of meals eaten per day (Table 4.10). The average number of meals consumed per day for all subjects was 2.3 $\pm$.58. Fifty-eight percent of the women reported eating at least two meals per day, 11% reported having three meals per day and 21% consumed 3 meals per day plus snacks. The only significant difference found in snacking frequency was between stable

non-dieters and stable dieters with non-dieters consuming snacks more frequently, $p \leq 0.05$ (Table 4.11). For all subjects, the average number of snacks eaten per day was $1.4 \pm .93$. There were no significant differences among snacking times of the women, however, afternoon and evening snacking was reported to occur most frequently (Table 4.12). Snacking in the evening was most common, followed by afternoon plus evening snacking, and finally afternoon snacking. No one reported snacking only in the morning.

Table 4.10. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD) or regainers (R) who reported consuming 1-5 meals per day.^a

Number of meals eaten per day	Stable Non-Dieters (n=23)	Stable Dieters (n=48)	Regainers (n=61)
1	0	4	6
2	70	63	69
3	30	31	23
4-5	0	2	2
Total	100%	100%	100%

^aBonferroni χ^2 , NS

Table 4.11. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD) or regainers who consumed 0-4 snacks per day.*

Number of snacks eaten per day	Stable Non-Dieters (n=23)	Stable Dieters (n=47)	Regainers (n=61)
0	9	13	13
1-2	74	87	72
3-4	17	0	15
Total	100%	100%	100%

* $p \leq 0.05$ (Bonferroni χ^2 , STND vs STD)

Table 4.12. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD) or regainers (R) who reported eating snacks at various times during the day.^a

Snack Time	Stable Non-Dieters (n=22)	Stable Dieters (n=47)	Regainers (n=60)
Non-snackers	4	2	2
Afternoon only	22	19	25
Evening only	40	42	44
Afternoon and evening	30	33	28
Morning, afternoon, evening combination	4	4	3

^a χ^2 analysis, NS

No significant differences were found in levels of physical activity or minutes per week of physical activity among the three groups of women (Table 4.13). Approximately 41-59% of the women were highly active, 32-41% moderately active and 9-18% were inactive. Mean minutes of reported activity appeared highest among stable non-dieters followed by regainers and stable dieters (NS). Based on exercise categories and minutes per week of physical activity, stable non-dieters appeared to be the most active (NS). This would be the pattern expected, however the variance was large and no significant differences were found.

Table 4.13. Activity of women by weight history categories.

Measure of Activity	Stable Non-Dieters (n=22)	Stable Dieters (n=44)	Regainers (n=58)
Activity Level^a			
Inactive	9%	18%	17%
Moderately Active	32%	41%	41%
Highly Active	59%	41%	42%
Minutes activity/week (X±SD)^b	500±368	369±297	452±404

^a χ^2 analysis, NS

^bBonferroni t -test, NS

Hypothesis 3

There will be differences in body dissatisfaction among women who are classified as regainers, stable dieters or stable non-dieters. (H_3 adjusted from original per results of subject classification)

Significant differences in body dissatisfaction were found among the three groups of women ($p \leq 0.01$) (Table 4.14). Regainers appeared to be the most dissatisfied with their bodies. The majority of regainers (60%) scored in the highest quartile. Most of the stable dieters (64%) fell between the 25th and 75th percentiles, or the second and third quartiles. Those subjects most satisfied with their bodies were stable non-dieters, the majority falling in lowest quartile (61%).

Table 4.14. Percentage of women categorized as stable non-dieters (STND), stable dieters (STD) or regainers (R) based on body dissatisfaction subscale score in quartiles.**

Body Dissatisfaction Score	Stable Non-Dieters (n=23)	Stable Dieters (n=45)	Regainers (n=60)
0 to 3	61	9	0
4 to 8	22	33	13
9 to 14	13	31	27
15 to 27	4	27	60
Total	100%	100%	100%

** $p \leq 0.01$ (Bonferroni X^2 , STND vs STD; STND vs R; STD vs R)

Body Mass Index and Weight Classification

Mean BMI values differed between regainers and stable non-dieters, and stable dieters and stable non-dieters ($p \leq 0.01$). Stable non-dieters had the lowest BMI's ($X=20 \pm 2$) followed by stable dieters ($X=23 \pm 3$) and regainers ($X=24 \pm 4$). Mean weights also differed between regainers and stable dieters, and regainers and stable non-dieters with regainers weighing significantly more ($X=65 \pm 11$ kg) than stable dieters ($X=60 \pm 9$ kg) and stable non-dieters ($X=57 \pm 7$ kg) ($p \leq 0.01$).

Table 4.15 compares actual and perceived weights of stable non-dieters, stable dieters and regainers. Approximately 30% of stable non-dieters were underweight or slightly underweight based on BMI and 39% perceived themselves as underweight. The majority of women (70%) in this group were at a normal weight and 52% classified themselves as so. None of the stable non-dieters were slightly overweight or overweight, however 9% classified themselves that way. Of the three groups, stable non-dieters were the most accurate in classifying their actual weight. Most of the stable dieters (92%) were at a normal weight but only 46% classified themselves this way. Six percent were slightly overweight or overweight but 46% classified themselves as slightly overweight or overweight. The majority (84%) of regainers were at a normal weight but only 28% thought they were. Most of the regainers (72%)

perceived themselves as slightly overweight or overweight, although only 14% actually were by BMI classification. Compared to the other two groups, regainers had the highest percentage of women in disagreement between actual and perceived weight.

Table 4.15. Percentage of women classified as stable non-dieters (STND), stable dieters (STD) or regainers (R) according to body mass index (BMI) and perceived weight (PW) category.**

Weight Category	<u>Stable Non-dieters^a</u>		<u>Stable Dieters</u>		<u>Regainers</u>	
	BMI	PW	BMI	PW	BMI	PW
Underweight	30	39	2	8	2	0
Normal Weight	70	52	92	46	84	28
Overweight	0	9	6	46	14	72

^a Bonferroni χ^2 , NS

** $p \leq 0.01$ (Bonferroni χ^2 for STD and R)

Relations Between Dieting, Weight and Body Dissatisfaction

Although not specifically related to the third hypothesis, correlations were run on variables related to dieting, body weight and body dissatisfaction (Table 4.16). Given the relation between chronic dieting and the development of eating disorders (Story et al., 1991) and negative psychological outcomes (Polivy et al., 1988; Wadden et al., 1988), an assessment of relationships between these

variables is warranted. Body mass index (BMI), the number of different diet strategies used and body weight were positively related to body dissatisfaction ($r=0.42$, 0.54 , 0.36 , respectively, $p \leq 0.001$). As body dissatisfaction increased, BMI and body weight increased as well as the number of different diet strategies used. Both BMI ($r=0.30$, $p \leq 0.001$) and body weight ($r=0.23$, $p \leq 0.01$) were positively related to the number of different diet strategies used. As the number of different weight loss attempts increased, BMI and body weight also increased.

Table 4.16. Correlation matrix of dieting methods, weight and body dissatisfaction (n=128).

	1	2	3	4
1) BMI ^a	1.00			
2) Body Dis ^b	.42***	1.00		
3) Freq ^c	.30***	.54***	1.00	
4) Weight (kg)	.85***	.36***	.23**	1.00

^aBody Mass Index

^bBody dissatisfaction score: 0=satisfied-27=dissatisfied

^cNumber of different dieting methods used

** $p \leq 0.01$; Pearson correlation coefficient

*** $p \leq 0.001$; Pearson correlation coefficient

DISCUSSION

Frequency of dieting

The dieting epidemic in the U.S. reported by the Calorie Control Council (Calorie Control Commentary, 1991) was supported by the results of this study on college women. In this study, 83% of the women in the final sample reported dieting at sometime in their life and 24% described themselves as "always dieting". A similar high prevalence of dieting among college women was reported by Klesges et al. (1987) who found 89% of female subjects had dieted at some time. The success of dieting, i.e., maintaining lost weight, is discouraging considering only 2% of all women in the current study were able to maintain a weight loss.

The mean age reported for the first diet attempt in the present study was 15 years. Similarly, Grunewald (1985) found the average age of the first diet attempt among 166 college females was 16 years. Interestingly, a generation ago Dwyer and colleagues reported that dieting first began between 14 and 15 years of age in a sample of 446 senior high school girls (1967). These findings suggest that the age when females begin to diet has not changed over the past 25 years. However, dieting is certainly evident at younger ages. Maloney et al. (1989) found in a sample of 318 third

to sixth grade boys and girls that 41% had attempted to lose weight.

Use of weight control methods

The three most popular weight control methods used by stable non-dieters, stable dieters and regainers have also been popular among subjects in other studies. A survey done by the Calorie Control Council found the most popular weight loss methods among men and women were cutting down on high-calorie, high-fat foods and exercising (Calorie Control Commentary, 1991). Arrington et al. (1985) and Grunewald (1985) found that hypocaloric diets (ranging from 300 to 1,800 kcals per day) and exercise were the most widely used weight loss methods among 400 female college students. Kayman and colleagues (1990) found that women, 21 to 73 years old, who lost and maintained weight and women who had remained weight stable exercised regularly and used personally developed weight loss strategies to maintain their weight.

Medical experts agree that the best approach for losing weight permanently is slow weight loss and exercise (Brownell et al., 1987b; Green et al., 1991). Although weight loss strategies could not be compared between regainers and maintainers because only three women in this study maintained a weight loss for two years, it is interesting to note that almost all stable non-dieters used

recommended weight control strategies to maintain their weight.

Use of potentially health-threatening weight loss methods appears to be disturbingly high in regainers and stable dieters in this population when compared to other college populations. Table 5.0 compares regainers in the current study to 102 college women (Klesges et al., 1987) and 182 female college athletes (Rosen et al., 1986). Klesges found 69% of females reported using inappropriate or dangerous weight loss strategies. Also, 21% of female students used cigarette smoking and caffeine as weight control strategies. Because athletes go to great lengths to reduce their body fat stores to improve performance, Rosen et al. (1986) tried to identify the type of athlete who uses potentially harmful weight loss strategies. It might be assumed that use of such "quick fix" weight loss methods would be most prevalent among athletes. However, these potentially health-threatening weight loss methods were used by more regainers in the current study than by the college athletes (Rosen et al., 1986) and non-athletes (Klesges et al., 1987). It should be noted that the women in these studies were from different universities and the questionnaires used to obtain dieting practices varied among the three studies.

Use of unsafe and potentially harmful weight loss strategies among women has been reported by other

Table 5.0. Percent of college women from three different studies who used health-threatening weight loss methods.

Method Used	Zimmerman et al., (1992)		Klesges et al., (1987) (n=102)	Rosen et al., (1986) (n=182)
	Total (n=132)	(R) ^a (n=61)		
Starvation	41	(66)	16	NA
Diet pills	18	(31)	23	25
Self-induced vomiting	20	(30)	4	14
Smoking	14	(26)	21	NA
Laxatives	8	(18)	4	16
Diuretics	7	(13)	5	5

NA=Questions were not asked

^aRegainers only

investigators. Grunewald (1985) studied dieting behavior in 166 college women (18-24 years old) and found two of the four most commonly tried weight loss strategies to be unsafe and potentially health-threatening (fasting/starvation and diet pills). Klesges et al. (1988) found that among 618 female college students, 39% reported smoking as a weight loss strategy. A small percentage of female smokers (5%) reported that they started to smoke for weight control. Connor-Greene (1988) reported that among 100 college women, 21% admitted to self-induced vomiting as a weight control strategy. Finally, Kayman et al., (1990) found that more regainers (women who lost and regained weight) lost weight

by taking appetite suppressants, fasting or going of restrictive diets than did maintainers (women who maintained a weight loss).

Much of the failure experienced by dieters (Jequier, 1990) is thought to be due to unrealistic expectations for fad diets, pills, potions or devices to burn away quickly unwanted pounds (Brownell et al., 1987b). Weight reduction methods are usually only effective temporarily, creating a cycle of weight loss and regain (Ernsberger et al., 1987). This is likely true for the regainers in this study who used significantly more weight loss strategies (Table 4.1) and more unsafe weight loss strategies (Table 4.3) to reduce weight as compared to stable non-dieters and stable dieters. This suggests that regainers rely more on unrealistic, "quick fix" products and strategies for weight loss than do weight stable young women.

Nutrient Intake

The finding that stable non-dieters consumed significantly more calories than regainers and stable dieters was similar to that of Laessle et al. (1989). Laessle and colleagues compared eating behaviors, using seven-day food records, of restrained and unrestrained eaters and found the caloric intake of restrained eaters was about 400 calories less than the unrestrained group. Although the present study did not measure dietary restraint, dieters (regainers and stable dieters) reported

on a FFQ eating significantly fewer calories than non-dieters (stable non-dieters). Findings of the current study and those of Laessle appear to contradict those of Kirkley et al. (1988). Kirkley investigated caloric intake and meal and snack consumption (using four-day food records) among restrained and unrestrained eaters and found highly restrained subjects consumed more calories than less restrained subjects. Table 5.1 compares findings of the current study to those of Kirkley and Laessle.

One possible explanation for the differences in caloric intake among the three groups of women in the current investigation may be the flat slope syndrome (Gibson, 1987), where there is a tendency to overestimate low caloric intakes and underestimate high caloric intakes. This may be particularly true of dieters (regainers and stable dieters) who tend to underestimate their food intake in self-report measures (Tuschl et al., 1990). Another explanation for the differences in caloric intake between stable non-dieters, stable dieters and regainers could be due to dieting attempts. Regainers and stable dieters may be consuming regularly fewer calories in an attempt to lose weight or maintain a lost weight, but later binge eat in reaction to chronic low calorie intake. Discrepancies between the present study and Kirkley's likely are due to the biased, self-selected sample of adult women used in Kirkley's study.

Table 5.1. Comparison of caloric intake of women from three different studies.

Group Classification	Zimmerman et al. (1992) (n=131)	Laessele et al. (1989) (n=60)	Kirkley et al. (1988) (n=50)
Stable non- dieters	2516$\pm$988 kcals		
Stable dieters	1977$\pm$636 kcals		
Regainers	2003$\pm$774 kcals		
Unrestrained eaters		Ate more kcals	Ate fewer kcals
Restrained eaters		Ate fewer kcals	Ate more kcals

Interestingly, the stable non-dieters had the highest caloric intake but significantly lower BMI's than regainers and stable dieters. These findings were supported by Tuschl et al. (1990) who compared energy intake of restrained and unrestrained eaters. Restrained eaters had higher BMI's than the unrestrained group although they reported consumption of approximately 250 calories per day less energy. Considering there were no differences between exercise habits of the three groups of women in the present study, physical activity would not appear to explain stable non-dieters lower BMI and higher caloric intake. Physical activity was moderate to high for the group overall. One

possible explanation for this finding may be that women with higher BMI's might have underreported their food intake, possibly by omitting binges. Although in Tuschl's study restrained eaters avoided fat and alcohol, but consumed more carbohydrates, differences in macronutrient composition were not found between groups in the current investigation.

Work by Macdonald and colleagues (1983) revealed some interesting differences between food habits of adolescent girls with poor and good dietary intakes. Canada's Food Guide was used to determine diet quality and a score was assigned based on number of food group servings consumed per day and two groups were formed on the basis of a diet quality score: 1) good diets; and 2) poor diets. More individuals with the poorest diet scores, when compared with the other group, were currently dieting ($p \leq 0.05$), had attempted to diet more in the past ($p \leq 0.001$) and weighed more ($p \leq 0.05$). Although no significant differences were found among the three groups of young adult women in the current study with respect to diet quality (MAR score) (Table 4.4), it is interesting to note that those with the lowest MAR's (regainers) used significantly more weight loss techniques than stable dieters and stable non-dieters ($p \leq 0.01$) and weighed more than stable dieters ($p \leq 0.05$) and stable non-dieters ($p \leq 0.01$).

Correlation coefficients for nutrient variables

Although none of the nutrient intake variables other than kcals differed among the three groups of women, correlation coefficients for some of the nutrient variables showed interesting results. Increasing fruit and vegetable intake was significantly related to reduced percentage of calories coming from fat. Increasing intake of fruits and vegetables may impact beneficially other dietary components. The relation between fruit and vegetable intake and percent of calories from fat is particularly important because increasing these foods can be promoted as a modifiable step in lowering fat in the diet and subsequently supporting weight loss and maintenance.

Total grams of fat consumed and diet quality measured by the MAR score was positively correlated in the current study. This finding conflicts with those showing an improvement in vitamin and mineral status when fat content of the diet is reduced (Haus et al., 1991; Gorbach et al., 1990; Schectman et al., 1990). This discrepancy may be a result of the wide range of intake values for grams of fat (10-210 g) reported by the women in the present study.

Increasing fruit and vegetables was also significantly related to improved diet quality (MAR). This association is not surprising considering the six nutrients (vitamin A, vitamin C, vitamin B-6, calcium, iron and fiber) used to calculate the MAR. Fruits and vegetables are good sources

of most of these nutrients (vitamin A, vitamin C and fiber) and consumption of them would improve dietary scores.

Eating Patterns

Whether due to lack of time or attempts at weight control, many people skip breakfast and this MSU population of women was typical; 77% of the sample reported consuming breakfast 0-4 times per week. Khan et al. (1982) found a lower percentage of breakfast skipping in college men and women, with 24% of undergraduate students skipping breakfast. Schlundt and colleagues examined the role that breakfast eating played in weight reduction in obese adult women and found in the short-term, eating breakfast may be an important component of a weight reduction program (Schlundt et al., 1992). Breakfast eaters had lower fat intakes, higher carbohydrate intakes and a reduction in impulsive snacking. Kayman et al. (1990) found that women classified as relapsers skipped breakfast more frequently than women who were weight maintainers and weight stable. The present investigation also found that breakfast eaters had lower percent fat intakes and higher percent carbohydrate intakes as well as higher intakes of fruits, vegetables and fiber and a higher MAR score. It should be noted that caloric intake did not differ between the two groups indicating breakfast skipping is probably not an effective weight loss behavior. It is uncertain from these data why breakfast skipping was so high in these college

women, however, the findings have implications for breakfast eating relative to weight control later in life.

The average of 2.3 meals eaten per day did not differ among groups in the present study and was similar to the finding of Kirkley et al., (1988) who found both high and low restrained eaters consuming the same number of meals per day.

There were no significant differences among snacking times between regainers, stable dieters and stable non-dieters, however afternoon and evening snacking occurred most frequently. Similar results were reported by Mortenson et al. (1992) who found afternoon and evening snacking most common among 103 MSU college women.

Physical Activity

The majority of stable non-dieters, stable dieters and regainers were moderately or highly active based on exercise categories reported by Blair (1989), and less than 20% were inactive. Although these findings contradict those of Dishman (1988) who found only 10% of American adults are regularly and rigorously active, the MSU campus is large (2,100 acres) and it would be difficult for undergraduates to attend classes and remain sedentary.

It is suggested that exercise plays a crucial role in weight control because it is one of the few factors positively correlated with successful long-term body weight maintenance (Brownell et al., 1986; Stunkard, 1992; Van Dale

et al., 1990). Kayman et al. (1990) found that the majority of women who maintained a weight loss or had remained at a stable weight exercised regularly (at least three times per week for more than 30 minutes) whereas few regainers reported exercising regularly. Unfortunately the current investigation did not have a group of maintainers large enough for comparison of activity patterns (n=3). The fact that overall as a group college women are fairly active and are likely to become less so with increasing age, has grim implications for weight control prognosis later in life for these women.

Body Dissatisfaction

Women have subscribed to a set of standards for physical appearance which have placed them under intense pressure to diet (Garner et al., 1985). While the preferred body shapes of women have become thinner over the past few decades (Rodin, 1992), women's actual body weights have increased creating greater disparity between "real" and "ideal" body size (Garner et al., 1980). Silverstein et al., (1986) hypothesized that given the pressure to be unrealistically thin, some women respond by becoming dissatisfied with their bodies and as a result become chronic dieters. Although the current study did not define "chronic dieters", results did support Silversteins' hypothesis. Dieters (regainers and stable dieters) in this study were more dissatisfied with their bodies than the non-dieters (stable non-dieters).

The high level of body dissatisfaction of the regainers (60%) in the present study was similar to findings by Kayman and colleagues. Kayman et al. (1990) examined body satisfaction in 108 women, 21 to 73 years of age, and found that relapsers were more dissatisfied with their bodies than weight maintainers and controls i.e., those who have always remained at the same weight.

Body dissatisfaction and restrained eating was assessed in MSU college women by Mortenson et al. (1992). Mortenson's findings revealed more body dissatisfied dieters used vomiting and smoking as weight control measures. Although restrained eating was not measured in the current study, more body dissatisfied dieters (regainers) reported smoking and/or vomiting to control weight than did those who were more satisfied with their bodies (stable dieters and non-dieters).

Body Mass Index and Perceived Weight Status

Significant differences were found in mean BMI values between regainers ($BMI=24\pm4$), stable dieters ($BMI=23\pm3$) and stable non-dieters ($BMI=20\pm2$) in the present study. It is uncertain from these findings why differences in BMI and body weight exist among the three groups of women in this study, especially considering that stable non-dieters reported higher caloric intakes from a FFQ than did regainers.

Those with the highest BMI's (regainers) dieted the most and those with the lowest BMI's (stable non-dieters) dieted the least. This finding raises two critical questions regarding the effects of dieting and weight cycling: 1) does repeated weight loss and regain promote weight gain and therefore increase BMI; or 2) do individuals with higher BMI's diet more than those with lower BMI's? The health risks such as increased total mortality, increased mortality and morbidity from coronary heart disease (Lissner et al., 1991) and psychological consequences such as lower self-esteem and self-confidence (Wadden et al., 1988) of weight cycling must be considered prior to weight loss recommendations, if the former question is true.

Comparisons among the three groups of women were made between actual weight class (underweight, slightly underweight, normal weight, slightly overweight and overweight) and perceived weight class because a number of studies have found weight misperceptions and dissatisfaction among young girls and women (Connor-Greene, 1988; Harmatz, 1987; Kayman et al., 1990; Matsuura et al., 1992; Moore, 1988). Some women who are neither overweight nor anorectic nor bulimic, perceived themselves as being overweight, even though their weight is within or below the normal range (Harmatz, 1987).

Moore (1988) found, among adolescent girls, dissatisfaction with body weight in all weight classes with

92% of overweight girls being dissatisfied, 53% of normal weight girls being dissatisfied, and 40% of underweight girls being dissatisfied. Harmatz (1987) found that most (83%) underweight college women indicated they were normal weight and those who demonstrated the greatest misperception about their body weight had significantly lower self-esteem and engaged in eating disordered behaviors such as cycles of bingeing and extreme dieting. Connor-Greene (1988) also found weight misperceptions among 100 college women. These students tended to perceive themselves as overweight when they were not and failed to see themselves as underweight when they actually were. Matsuura et al. (1992) reported similar misperceptions between actual and ideal body shape and weight among Japanese female college students in 1985 and 1990. The percentages of those who overestimated their actual body shapes were 69% in 1985 and 64% on 1990. Finally, Kayman et al. (1990) examined body and weight satisfaction in 108 women between 21 and 73 years of age. The majority (86%) of weight maintainers (those who have maintained a weight loss) and control subjects (94%), i.e., those who have always maintained a stable weight, thought of themselves as thin or average weight or a little "out of shape". Relapsers were mostly dissatisfied with their bodies, more than 70% viewed themselves as heavy or ugly.

The current study found similar misperceptions about weight among the three groups of women as have several other

investigators (Connor-Greene, 1988; Harmatz, 1987; Kayman et al., 1990; Matsuura et al., 1992; Moore, 1988). Of the three groups, stable non-dieters were the most accurate in classifying their actual weight. Stable dieters and regainers were less accurate in classifying their body weight. The majority of the women in these two groups were at a normal weight, however most saw themselves as slightly overweight or overweight.

It appears that the various tables of "average" or "ideal" weights for women are not considered as an appropriate standard by the women themselves. They likely have a subjective set of norms for weight which tell them they are in a heavier weight category than they are in reality (Harmatz, 1987). This may be particularly true of young college women. Physical image is important during this time of life which may account for some of the overconcern with body weight.

Relations Between Dieting, Weight and Body Dissatisfaction

The positive relation found between BMI and body dissatisfaction in this study ($r=0.42$, $p \leq 0.001$) was similar to the association reported by Mortenson et al. (1991) ($r=0.51$) in 249 college women at MSU. Not surprisingly, body dissatisfaction increases as BMI and body weight increase.

In this study, as body dissatisfaction increased, the number of different dieting methods used also increased.

This relation is of concern because chronic dieting practices of young women have psychological implications that can create unnecessary emotional strains on individuals (Brownell et al., 1987b; Wadden et al., 1985) such as negative self-esteem (Polivy et al., 1988). Story and colleagues (1991) found that adolescent male and female chronic dieters were twice as likely as non-dieting students to report binge eating and were more likely to have a poor image and feel overweight. This study suggests that there are negative consequences with using a number of different dieting strategies. In the present study, failure to maintain weight loss which led to further weight loss attempts was related adversely to body satisfaction.

Both BMI and body weight were positively related to the number of different strategies used. It is not surprising that individuals who weigh more attempt to lose weight more frequently. However, as discussed previously, the questions become: 1) does chronic dieting promote weight gain; or 2) do individuals with higher body weights diet more than those with lower body weights? Unfortunately these questions cannot be answered from the current data.

Limitations and Strengths

Limitations of this study should be considered when evaluating the data and results. The sampling procedure for this investigation was based on the interest and availability of individuals in three different undergraduate

psychology courses. Therefore, the results obtained from this sample are generalizable only to other groups with similar characteristics because subjects were not randomly or systematically sampled. However, given the exploratory nature of this study, this type of sample was appropriate. Individuals who participated in this study were assumed to be similar to the population of college students at MSU and other universities. The similarities in some of the results from this study with those from others supports this assumption.

The information gathered from the questionnaire was self-reported which is another limitation. Subjects were informed that they would not be identified in any way. Therefore, they should have had no reason to report false information and were assumed to have answered questions truthfully.

The food frequency questionnaire (FFQ) also had limitations. A FFQ is unable to detect fasting or bingeing episodes. Also, the FFQ in this study used standard, or medium, rather than self-reported portion sizes. The use of standard portion sizes for estimating nutrient intake may underestimate actual intakes of certain nutrients (Clapp et al., 1991).

Assessment of meal and snacking frequency is limited in this study due to the subjective nature of the questions. What constitutes breakfast, lunch, supper or a snack for one

person could differ for another. Also, considering this college population, breakfast skipping percentages may have been high due to the fact that some students may wake late in the morning and may not have time to consume breakfast. For a future study, it would be important to obtain times when meals were eaten and what types of foods or food combinations are considered to be snacks.

Assessment of body composition to estimate percent body fat would have strengthened the current investigation. Also, obtaining a waist to hip ratio may have resulted in interesting findings.

One of the strengths of this study was the review process of the questionnaire. The questionnaire was critiqued by a variety of individuals (faculty and graduate students in nutrition, and working women not linked to the university) which provided valuable information regarding the readability and clarity of the questionnaire. The measurements of actual heights and weights were a strength of the study as was the high response rate of subjects.

Directions for future research

Future research should involve prospective studies to clarify long-term psychological and physical effects of weight loss and regain. Long-term studies evaluating commercial weight loss programs and products are also needed. Findings should be available to consumers so that educated choices about weight control programs and products

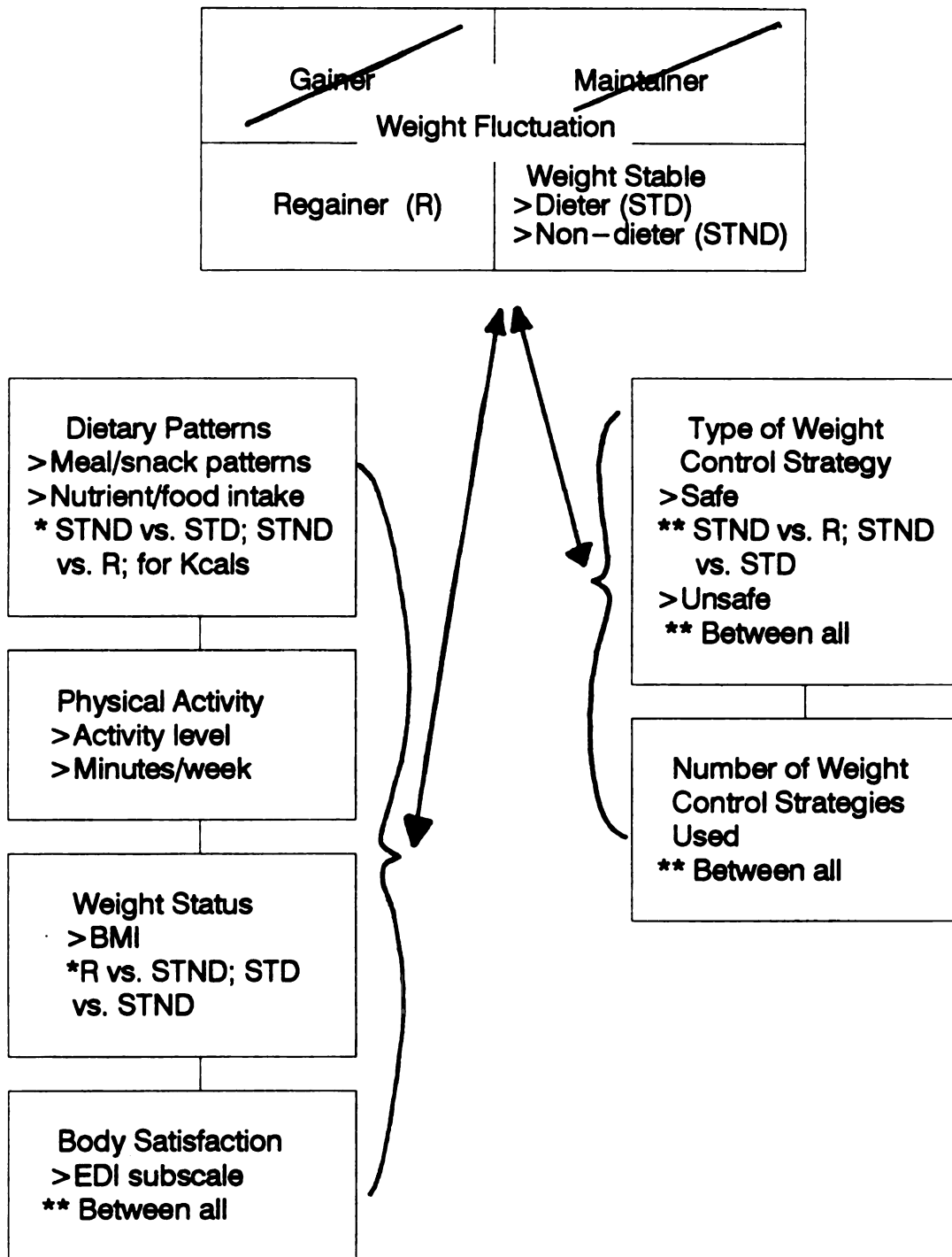
can be made. Data on participant characteristics, attrition rates, amount and duration of weight loss and adverse effects for participants must be known. Better methods to detect bingeing and fasting behavior are needed to accurately assess dietary intake of dieters and non-dieters. Individuals who have successfully lost and maintained weight need to be studied. Evaluation of various methods for voluntary weight loss and weight maintenance is lacking among minorities, particularly low-income women.

SUMMARY

This study provided evidence that physical, behavioral and psychological differences related to dieting and weight control exist among college-aged women who were classified as weight regainers, weight stable dieters and weight stable non-dieters. The dieting prevalence among this population was high, as was the recidivism rate. Only 2% of the entire sample maintained a weight loss ($\geq 25\%$ of an eight pound or more weight loss for at least two years) and therefore could not be examined as a group.

When the three groups of women were compared, weight regainers, weight stable dieters and weight stable non-dieters had unique characteristics (Figure 6.0). Regainers used significantly more dieting methods than stable dieters and stable non-dieters. They also used significantly more unsafe and potentially health-threatening techniques in attempts to lose weight. Regainers consumed significantly fewer calories than stable non-dieters, however, regainers weighed the most and had significantly higher BMI's than stable non-dieters. Regainers were the most dissatisfied with their bodies and stable non-dieters were the most satisfied. Compared to the other two groups, regainers had

Conceptual Model



*p < .05

**p < .01

Figure 6.0. Summary of results based on conceptual model.

the highest percentage of women in disagreement between their actual and perceived body weight. In other words, regainers had the greatest difficulty in classifying their weight appropriately. The majority of regainers were at a normal weight but most classified themselves as slightly overweight or overweight. These findings may suggest that as stable dieters become older and move into positions with less opportunity for exercise, they may be at high risk for becoming regainers with increased chance for greater weight and body dissatisfaction. Finally, breakfast eaters, when compared to breakfast skippers, consumed diets that better reflected the current dietary guidelines for Americans (USDA, 1990). These diets were lower in percent of calories from fat, higher in percent of calories from carbohydrate, higher in fruits and vegetables and fiber, and more nutrient dense.

In light of the poor long-term results of weight loss attempts, weight control programs need to address weight and body preoccupation and discourage restrictive and chronic dieting behavior. Knowledge of past dieting attempts, especially types of strategies used, weight history and likelihood of success should all be considered before recommendations are made for weight reduction. Regularity of food intake, especially eating breakfast, and physical activity should be promoted.

Implications

The long-term effect(s) of unsafe diet product usage must be considered in this population given the association between strenuous dieting and binge eating, anorexia nervosa and bulimia nervosa (Garner et al., 1991). Rosenweig et al., (1987) noted that bulimic-like behaviors were not confined to adolescents and college women. The authors found that more older adult women used extreme weight control practices (fasting, diet pills, diuretics, laxatives and binge eating) with greater frequency than they did as young adults.

Overall, as a group, college women are fairly active and are likely to become less active with increasing age and sedentary lifestyles. Lower activity levels will have grim implications for weight control prognosis later in life. One such implication may be an increase in the use of drastic, unsafe weight control practices. The prognosis for weight maintenance is poor, particularly among the regainers in this study, considering the dieting patterns already established at their young age, their higher BMI's and greater dissatisfaction with body weight shape.

Weight control programs need to focus on discouraging dieting behavior as well as addressing body weight and shape preoccupation. To increase chances for success among those attempting to lose weight, dietitians must consider the following: 1) history of dieting practices used; 2) weight

history; 3) food and snacking patterns; 4) exercise habits; and 5) personal weight goals. In general, successful weight control programs are based on realistic goals that involve a caloric deficit and regular exercise leading to a slow, steady weight loss. Success also requires that the diet be one that can be adhered to long-term (Technology Assessment Conference Panel, 1992).

APPENDICES

APPENDIX A

APPENDIX A

Descriptive data of weight maintainers

Subjects who had regained $\leq 25\%$ of an intentional weight loss of ≥ 8 pounds since the age of 16 and had kept the weight off for at least two years were classified as maintainers. Maintainers were only 2% (n=3) of the entire sample (n=155). These three subjects were omitted from the statistical analysis of data due to the small sample size, however a descriptive summary of these subjects follows.

One subject was dieting at the time of data collection, two were not. The types of weight loss methods used and the percent of subjects who used them were: 1) increasing exercise (100%); 2) increasing exercise plus following a reduced calorie personal eating plan (100%); 3) following a reduced calorie personal eating plan alone (66%); 4) starvation (66%); 5) SlimFast (33%); 6) laxatives (33%); and 7) self-induced vomiting (33%). It should be noted that the same individual used starvation, SlimFast, laxatives and self-induced vomiting as weight loss techniques.

The mean caloric intake of this group was 2191 ± 1186 kcals. Interestingly, all of the women in this group reported skipping breakfast and lunch. Supper was the only

meal consumed during the day on a regular basis. The mean number of snacks consumed per day was 1.3 ± 0.6 .

Two of the maintainers were classified as highly active and one was inactive. The average weight of this group was 55 ± 5 kg and BMI's averaged 20 ± 0.6 . Maintainers appeared to be satisfied with the shape of their body. The average body dissatisfaction score was 10 ± 8 (with a score of 0 being satisfied and 27 dissatisfied). Based on measured BMI, all subjects were at a normal weight and all perceived themselves that way.

APPENDIX B

APPENDIX B

Descriptive data of weight gainers

Subjects who reported a continual weight gain since age 16 were classified as gainers. Only 1% (n=2) of the entire sample (n=155) were classified as gainers and these two subjects were omitted from the statistical data analysis due to the small sample size. A descriptive summary of this group follows.

Neither subject reported ever dieting, so no dieting techniques were ever used. One subject reported trying to gain weight. Daily caloric intake varied greatly with only two subjects (1173 and 6967 kcals/day). Both women reported eating two meals per day. None of the women reported that they ate breakfast, however lunch and supper were eaten most of the time. These women also consumed snacks during the day (2 and 5 snacks/day).

One subject was classified as inactive and the other moderately active. Both of these women appeared to be satisfied with the shape of their bodies as indicated by their body dissatisfaction scores, i.e., 4 and 9. The range of body weights and BMI's were 59-72 kg and 22-26 respectively. Based on measured BMI, both women were

classified as normal weight. One subject perceived herself as normal weight and the other saw herself as being slightly overweight. The subject who classified herself as slightly overweight was less active, consumed fewer calories and had a higher BMI than did the other.

APPENDIX C

APPENDIX C

MICHIGAN STATE UNIVERSITY

OFFICE OF VICE PRESIDENT FOR RESEARCH
AND DEAN OF THE GRADUATE SCHOOL

EAST LANSING • MICHIGAN • 48824-1046

February 24, 1992

Darlene Zimmerman
165 Anthony Hall Annex

RE: THE RELATION OF WEIGHT CONTROL STRATEGIES TO WEIGHT FLUCTUATION AND BODY
SATISFACTION IN YOUNG WOMEN, IRB #92-051

Dear Ms. Zimmerman:

The above project is exempt from full UCRIHS review. The proposed research protocol has been reviewed by another committee member. The rights and welfare of human subjects appear to be protected and you have approval to conduct the research.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval one month prior to February 14, 1993.

Any changes in procedures involving human subjects must be reviewed by UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,



David E. Wright, Ph.D., Chair
University Committee on Research Involving
Human Subjects (UCRIHS)

DEW/deo

cc: Dr. Sharon Hoerr

APPENDIX D

MICHIGAN STATE UNIVERSITY

APPENDIX D

OFFICE OF VICE PRESIDENT FOR RESEARCH
AND DEAN OF THE GRADUATE SCHOOL

EAST LANSING • MICHIGAN • 48824-1046

May 4, 1992

Darlene Zimmerman
165 Anthony Hall Annex

RE: THE RELATION OF WEIGHT CONTROL STRATEGIES TO WEIGHT FLUCTUATION AND BODY
SATISFACTION IN YOUNG WOMEN, IRB #92-051

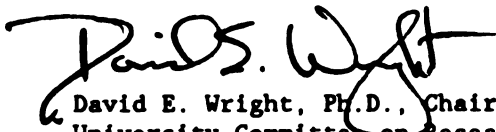
Dear Ms. Zimmerman:

The revision which you have proposed for the above mentioned research protocol, dated April 18, 1992, is approved. However, since this is an approval of your revision only, you are reminded that UCRIHS approval of the parent project is valid for one calendar year. If you plan to continue this project beyond one year please make provisions for obtaining appropriate UCRIHS approval one month prior to February 14, 1993.

Any changes in procedures involving human subjects must be reviewed by UCRIHS prior to initiation of the change. UCRIHS must also be notified promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this revision to our attention. If we can be of any future help, please do not hesitate to let us know.

Sincerely,


David E. Wright, Ph.D., Chair
University Committee on Research
Involving Human Subjects (UCRIHS)

DEW/pjm

cc: Dr. Sharon Hoerr

APPENDIX E

APPENDIX E

Description of worksite population and procedures

Approximately 200 subjects were to be recruited from four major discount retail stores in the Lansing area on a volunteer basis. Approval for the study was secured from the Meijer Company's top management. Volunteers were recruited at their place of employment following manager approval. Recruitment strategies included posters placed in high traffic areas throughout the store and meetings with the store director and department managers to explain the purpose of the study and procedures. An unsuccessful attempt was made to find an employee to serve as a contact person at the worksite that would assist with recruitment of participants and distribution of survey's. Drawert et al., (1992) evaluated methods used to recruit and retain volunteers from three worksites and found key factors to be:

- 1) strong, visible managerial support for their study; and
- 2) obtaining an in-store contact person.

At the pilot study site, the primary researcher explained the purpose of the study, necessary requirements (survey completion and anthropometric measurements) and participation incentive to all department managers. The incentives included a free video rental and diet evaluation.

Subjects completed the survey outside their place of employment. At a scheduled time in the work place the subjects returned their completed surveys and were weighed and measured in a private area.

The study was not carried out in this worksite population due to the poor response rate at the pilot study site. Problems with participation rate may have been due to the following: 1) lack of personal contact by the researcher (DCZ), with eligible employees; 2) the time lag between store approval and readiness of the researchers to enter the store; 3) absence of an in-store contact person; and 4) possibly a free video and diet evaluation was an inappropriate incentive for this population. Strategies to increase the participation rate likely would include: 1) securing an in-store contact person; 2) acting as quickly as possible, being ready to distribute surveys even before contacting the managers for their approval; 3) if possible, allow employees to complete study requirements during work hours; and 4) be sure to have an incentive that would encourage participation.

APPENDIX F

APPENDIX F

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF FOOD SCIENCE AND HUMAN NUTRITION
EAST LANSING • MICHIGAN • 48824-1224

(517) 353-8474
FAX: (517) 353-8963

INFORMED CONSENT FORM

You are being asked to participate in a study being conducted by Darlene Zimmerman RD and Sharon Hoerr RD, PhD from the Department of Food Science and Human Nutrition at Michigan State University. The purpose of this study is to examine dieting practices, body satisfaction and eating and exercise habits of young women. You and your responses to this study will not be identified in any way. All results of this study will be reported as group data. All information collected is strictly confidential and protected to the extent provided under the law.

You will be completing a written questionnaire that will assess your weight history, dieting practices, body satisfaction and eating and physical activities. You will also be weighed and measured in a private area. All measurements will be done individually and confidentially. The questionnaire will take approximately one hour to complete. The height and weight measurements will take about five minutes after you have completed the questionnaire. In appreciation for your participation in this study you will receive extra credit points in your psychology course.

If you decide to participate, you may refuse to answer any questions. You are free to withdraw consent and discontinue participation at any time. By signing this consent form, you will indicate your voluntary agreement to participate. If you do not wish to participate, please return this form and survey to the researcher. If you would like a copy of this consent form, one will be provided for you. If you have any questions regarding this study, you may call Darlene at 332-3409.

THANK YOU!

Date _____

Participant's signature _____

Investigator's signature _____

APPENDIX G

APPENDIX G

PHYSICAL ACTIVITY

Instructions:

The questions on the next 4 pages ask about your leisure-time physical activity. Please respond to each question by placing a mark on the appropriate line.

1) How would you describe your health at the present time?

_____ excellent
_____ good
_____ fair
_____ poor
_____ don't know

2) How satisfied or are you with your level of physical activity?

_____ very satisfied
_____ somewhat satisfied
_____ neither satisfied nor dissatisfied
_____ somewhat dissatisfied
_____ very dissatisfied
_____ don't know

3) Do you participate in one of the following activities?

a) jog or run? Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
_____ per week
_____ per month

On average for how long each time? _____ minutes

b) ride a bike or exercise bike? Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
_____ per week
_____ per month

On average for how long each time? _____ minutes

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

c) **swim?** Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
 _____ per week
 _____ per month

On average for how long each time? _____ minutes

d) **do aerobics or aerobic dancing?** Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
 _____ per week
 _____ per month

On average for how long each time? _____ minutes

e) **do other dancing?** Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
 _____ per week
 _____ per month

On average for how long each time? _____ minutes

f) **do calisthenics or exercises?** Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
 _____ per week
 _____ per month

On average for how long each time? _____ minutes

g) lift weights? Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
 _____ per week
 _____ per month

On average for how long each time? _____ minutes

- 4) In the past month, did you walk a mile or more at a time without stopping?

Yes _____ No _____

If Yes, how many times? _____ time(s) _____ per day
 _____ per week
 _____ per month

Each time (typically) for _____ miles

Each time (typically) for _____ minutes

- 5) In the past month, have you done any other exercises, sports or physically active hobbies not mentioned yet?

Yes _____ No _____

If Yes, what was it? _____

How many times? _____ time(s) _____ per day
 _____ per week
 _____ per month

Each time (typically) for _____ minutes

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

- 6) Are you involved in any other activities? If so, please list here.

- 7) On average how many hours of television do you watch on a typical weekday?

_____ hours per weekday

- 8) On average how many hours of television do you watch on a typical weekend day?

_____ hours per weekend day

- 9) How many hours of sleep do you typically get a night?

_____ hours

- 10) How much time a day do you spend napping?

_____ hours

FOOD FREQUENCY**Instructions:**

This part of the questionnaire is about what you usually eat. Think about how often you usually eat the portion size listed.

Put a number under the day or week heading to show how often you usually eat that amount of food.

If you never eat the food mark (X) in the box under Rarely or never. Please do not skip foods and be careful to place the number in the right box.

EXAMPLE: If you:

- 1) eat 1/2 of a grapefruit about once a week.
- 2) eat a medium hamburger about four times a week.
- 3) never eat liver.
- 4) eat 2 slices of bread once a day.

Here is how you would show how often you eat the food in the portion size listed.

HOW OFTEN?

EXAMPLE	Day	Week	Rarely/never
Grapefruit 1/2		1	
Hamburger, meat loaf 4 oz		4	
Liver 4 oz			X
Bread 1 slice	2		

For each food below, please indicate your usual intake.

DAIRY PRODUCTS	Day	Week	Rarely/never
Cottage cheese (regular and low fat) 1/2 cup			
Other cheeses and cheese spreads 2 slices or 2 oz			
Yogurt, plain or with fruit 1 cup			
Skim milk, 1% milk or buttermilk 1 cup			
2% milk and beverages made with 2% milk 1 cup			
Whole milk and beverages made with whole milk 1 cup			

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

HOW OFTEN?

BREAKFAST FOODS	Day	Week	Rarely/never
Granola, shredded wheat, bran or high fiber cereals 1 med bowl			
Other cold cereals, such as Corn Flakes, Rice Krispies, Frosted Flakes 1 med bowl			
Highly fortified cereals, such as Product 19, Total 1 med bowl			
Cooked cereals 1 med bowl			
Eggs 2 med			
Bacon 2 slices			
Sausage 2 links or patties			

HOW OFTEN?

BREADS/SNACKS/SPREADS	Day	Week	Rarely/never
White bread/rolls, crackers (including sandwiches) 1 slice or 4 crackers			
Rye or pumpernickel bread/rolls, whole wheat bread/rolls 1 slice			
Bagels 1			
Corn bread, corn muffins, corn tortillas 1 med piece			
Chips, all types 2 handfuls or 1 cup			
Popcorn 2 handfuls or 1 cup			
Peanuts, peanut butter 2 Tbsp			
Margarine (added to food) 2 pats			
Butter (added to food) 2 pats			
Light and low fat salad dressing, light mayonnaise 1 Tbsp			
Salad dressing, mayonnaise 1 Tbsp			

HOW OFTEN?

FRUIT & FRUIT JUICES	Day	Week	Rarely/never
Apples, applesauce, pears 1 piece or 1/2 cup			
Bananas 1 med			
Cantaloupe 1/2 med			
Grapefruit 1/2			
Oranges 1 med			
Peaches, apricots, nectarines 1 med			
Grapes 1 handful			
Orange juice, grapefruit juice 1 cup			
Other juices, fortified fruit drinks 1 cup			

HOW OFTEN?

VEGETABLES	Day	Week	Rarely\never
Broccoli or cauliflower 1/2 cup			
Green beans 1/2 cup			
Corn or peas 1/2 cup			
Spinach or cooked greens 1/2 cup			
Carrots or mixed vegetables contain- ing carrots 1/2 cup			
Coleslaw or cabbage 1/2 cup			
Green salad 1 med bowl			
Tomatoes, tomato juice 1 or 1 cup			

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

HOW OFTEN?

MEAT & MIXED DISHES	Day	Week	Rarely/never
Hamburgers, cheeseburgers, meat loaf 1 med serving			
Beef-steaks, roasts 1 med serving			
Beef stew or pot pie with carrots, other vegetables 1 cup			
Pork-chops, roasts 1 med serving			
Fried chicken 2 sm. or 1 lg. piece			
Chicken or turkey, baked or broiled 2 sm. or 1 lg. piece			
Fried fish or fish sandwich 1 med serving or 1 sandwich			
Fish: baked, broiled 1 med serving			
Hot dogs 2 dogs			
Ham, lunch meats 2 slices			
Spaghetti, lasagna, other pasta with tomato sauce 1 cup			
Pizza 1 slice			
Mixed dishes with cheese (such as macaroni and cheese) 1½ cups			

HOW OFTEN?

SIDE DISHES	Day	Week	Rarely/never
Beans such as baked beans, pintos, kidney beans, limas 1/2 cup			
French fries, fried potatoes 3/4 cup			
Potatoes: boiled, baked or mashed 1 med or 1/2 cup			
Sweet potatoes, yams 1/2 cup			
Rice 3/4 cup			

HOW OFTEN?

BEVERAGES	Day	Week	Rarely/never
Soft drinks 12 oz bottle or can			
Diet soft drinks 12 oz bottle or can			
Beer 12 oz bottle or can			
Wine 1 med glass			
Liquor 1 shot			

HOW OFTEN?

SWEETS	Day	Week	Rarely/never
Ice cream 1 scoop			
Sherbet, frozen yogurt 1 scoop			
Doughnuts, cake, pastry 1 piece			
Pies 1 med slice			
Chocolate candy 1 small bar=1 oz			
Hard candy 2 pieces			

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

EATING PATTERNS**Instructions:**

On the next 2 pages are questions about your eating patterns. Please answer completely as possible.

1) How satisfied or dissatisfied are you with your diet?

- ☐ very satisfied
- ☐ somewhat satisfied
- ☐ neither satisfied nor dissatisfied
- ☐ somewhat dissatisfied
- ☐ very dissatisfied
- ☐ don't know

2) How many meals do you usually eat during the day?

_____ meals

3) How often do you typically eat breakfast?

- ☐ 0-2 times per week
- ☐ 3-4 times per week
- ☐ 5-7 times per week

4) How often do you typically eat lunch?

- ☐ 0-2 times per week
- ☐ 3-4 times per week
- ☐ 5-7 times per week

5) How often do you typically eat supper?

- ☐ 0-2 times per week
- ☐ 3-4 times per week
- ☐ 5-7 times per week

6) How many snacks do you usually eat during the day?

_____ snacks

7) When do you snack? (Check all that apply)

_____ Morning
_____ Afternoon
_____ Evening

8) What eating pattern **BEST** describes you?

_____ 1 or 2 meals a day
_____ 3 meals a day
_____ 3 meals a day plus snacks
_____ snacking throughout the day
_____ strict dieting
_____ strict dieting interrupted by binges

9) How often do you buy snacks from a non-refrigerated vending machine?

_____ times per day
_____ times per week
_____ times per month
_____ times per year
_____ never
_____ don't know/not sure

10) If you buy vended snacks, what do you usually buy?

_____ pop/soda
_____ fresh fruit
_____ candy
_____ cookies
_____ snack chips
_____ others (please identify)

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

WEIGHT CONTROL PRACTICES**Instructions:**

Questions on the next 7 pages are about weight control methods you have used. Take your time and answer the questions as accurately as possible. Remember that your responses are confidential.

1) Are you trying to lose weight now?

- ☐ yes
- ☐ no, trying to gain weight
- ☐ (skip to question #3)
- ☐ no, (skip to question #3)

2) About how long ago did you begin your current attempt to lose weight?

- ☐ days
- ☐ weeks
- ☐ months
- ☐ years
- ☐ always trying to lose weight

3) Have you ever been on a diet to lose weight?

- ☐ yes
- ☐ no (skip to question #3)

4) How old were you when you went on your first weight loss diet?

years old

5) What are your typical reasons for wanting to lose weight?
(Check all that apply)

- ☐ concern for your health
- ☐ because everyone else is doing it
- ☐ to feel better about myself
- ☐ recommended by a health professional
- ☐ to have control over my life
- ☐ boyfriend or husband desire my weight loss
- ☐ parent(s) desire my weight loss
- ☐ job related (raise in pay, to get a better job, to save job)
- ☐ to look better
- ☐ Other _____

6) How much weight gain triggers a dieting effort?

_____ pounds

7) What do you look for in a weight loss program?
(check all that apply)

- _____ quick weight loss
- _____ no need for exercise
- _____ prepackaged, easy to prepare foods or drinks
- _____ is affordable
- _____ under supervision of medical professionals, nurses, dietitians, doctors, etc.
- _____ long-term weight maintenance
- _____ healthy eating habits
- _____ conveniently located, readily available
- _____ can do it on my own
- _____ looks easy, no effort needed
- _____ programs or products that friends are using
- _____ supportive weight program (group support)
- _____ appears to be safe
- _____ I do not use weight loss programs
- _____ other _____

8) What usually works well when you try to lose weight?
(Please describe briefly)

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

9) What problems have you had with weight loss attempts, if any?

10) For each weight loss method listed on the next 2 pages:

- * Place an (X) in the **Never Tried** column if you have never used that method.
- * Place an (X) in the **Have Tried** column if you have used that method.
- * If you have used the method listed, tell us **How many different times** you have used that method.

IMPORTANT: Include all methods used since you were 16 years old.

EXAMPLE:

Since I was 16 years:

- 1) I have used diet pills twice, once when I was 17 years old and then again when I was 20 years old.
- 2) I joined Weight Watchers once.
- 3) I have never used NutriSystem.

WEIGHT LOSS METHODS

() **Never Tried**

() **Have Tried**

() **Number of Different Times Tried**

Diet pills		X	2
Attended a group like Weight Watchers		X	1
NutriSystem program	X		

WEIGHT LOSS METHODS	() Never Tried	() Have Tried	() Number of Different Times Tried
Devised personal low calorie eating plan from food I normally buy			
Increased exercise			
Devised personal low calorie eating plan AND increased exercise			
Attended a group like Weight Watchers or TOPS			
Received advice from a health professional			
Attended Overeaters Anonymous			
Joined an exercise club/Jazzercise			
Fasting/starvation			
Liquid or powder meal replacement (SlimFast, Dynatrim, Sego)			
Medically supervised very low calorie diet (Optifast, HMR)			
NutriSystem Program			
Diet pills (Dexatrim, Acutrim)			
Laxatives/Colonics			
Diuretics (water pills)			

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

WEIGHT LOSS METHODS	() <i>Never Tried</i>	() <i>Have Tried</i>	() <i>Number of Different Times Tried</i>
Self-induced vomiting			
Smoking			
Followed a diet book (Fit For Life, Rotation Diet, Beverly Hills Diet) Please identify any book(s) you have used below :			
1.			
2.			
3.			
Figure/Toning salon			
Weight loss camp			
Hypnosis			
Psychoanalysis			
Surgery (bypass or stapling)			
Jaw wiring			
Acupuncture			
Please list any other methods you have tried in the space below :			
1.			
2.			
3.			

- 11) Since you have been 16 years old, think about all the weight loss methods with which you lost weight.

Write that method in the space provided.

Tell us:

- * About how many pounds you lost using that method.
- * About how long you kept the weight off (months or years, whichever ever applies)
- * If you regained any of the weight you lost, tell us about how much. Write 0 if you did not regain weight or write the number of pounds regained.

Strategy You Have Used	Pounds Lost ()	Time weight was kept off (months or years) ()	Did you regain any weight? (yes or no) ()	If yes, how much was regained? (write number of pounds) ()
1. _____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____
9. _____	_____	_____	_____	_____
10. _____	_____	_____	_____	_____

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

- 13) How many times in your life would you estimate you have **LOST** and **REGAINED** the number of pounds seen below? For example, if you have lost and gained back 15 pounds three times, you would put a "3" next to the line 15-19 lbs.
(Please answer each category that applies)

_____ Less than 8 lbs	_____ 30-34 lbs
_____ 8-14 lbs	_____ 35-39 lbs
_____ 15-19 lbs	_____ 40-44 lbs
_____ 20-24 lbs	_____ 45-49 lbs
_____ 25-30 lbs	_____ 50 lbs or more

- 14) Which **ONE** statement best describes you. Read Each One Before You Answer.

_____ Since age 16, I have intentionally lost 8 pounds or more but have regained some or all of the weight I lost.

_____ Since age 16, I have intentionally lost 8 pounds or more and maintained that weight loss for at least two years.

_____ Since age 16, my weight has always remained fairly stable, within a 1 to 8 pound range (not including pregnancy).

_____ Since age 16, I have continually gained weight.

_____ If none of these statements describes you, please describe your weight history.

WEIGHT INFORMATION/HISTORY**Instructions:**

These questions are about your weight history. Please complete these questions as accurately as possible. Your responses will remain confidential.

1) How satisfied or dissatisfied are you with your weight?

- ☐ very satisfied
- ☐ somewhat satisfied
- ☐ neither satisfied nor dissatisfied
- ☐ somewhat dissatisfied
- ☐ very dissatisfied
- ☐ don't know

2) How tall are you without shoes? _____ ft _____ in

3) What do you currently weigh? _____ lb

4) Would you classify yourself as:

- ☐ Underweight
- ☐ Slightly underweight
- ☐ Normal weight
- ☐ Slightly overweight
- ☐ Overweight

5) What is the most you have ever weighed (not including pregnancy) since age 16?

_____ lb

6) What is the least you have ever weighed since age 16?

_____ lb

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

9) As a child would you classify yourself as:

☐ underweight
☐ slightly underweight
☐ average weight
☐ slightly overweight
☐ overweight

10) As a teen would you classify yourself as:

☐ underweight
☐ slightly underweight
☐ average weight
☐ slightly overweight
☐ overweight

11) If you considered yourself overweight in questions 9 & 10,
at what age did you first think you were overweight?

_____ years old

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

BODY SATISFACTION**Instructions:**

This is a scale which measures your attitudes and feelings regarding your body. There are no right or wrong answers. Read each question carefully and place an "X" on the line that best applies to you.

	<i>Always</i> ()	<i>Usually</i> ()	<i>Often</i> ()	<i>Sometimes</i> ()	<i>Rarely</i> ()	<i>Never</i> ()
1) I think that my stomach is too big.	—	—	—	—	—	—
2) I think that my thighs are too large.	—	—	—	—	—	—
3) I think that my stomach is just the right size.	—	—	—	—	—	—
4) I feel satisfied with the shape of my body.	—	—	—	—	—	—
5) I like the shape of my buttocks.	—	—	—	—	—	—
6) I think my hips are too big.	—	—	—	—	—	—
7) I think that my thighs are just the right size.	—	—	—	—	—	—
8) I think that my buttocks are too large.	—	—	—	—	—	—
9) I think that my hips are just the right size.	—	—	—	—	—	—

DEMOGRAPHIC INFORMATION**Instructions:**

Finally, we would like to know a little bit about YOU!

1) When were you born? _____ year

2) Which category best describes your race or ethnic group?

- _____ Asian or Pacific Islander
- _____ Black
- _____ Hispanic-American
- _____ Native American Indian
- _____ White, Non-Hispanic
- _____ Other _____

3) What year are you in school?

- _____ Freshman
- _____ Sophomore
- _____ Junior
- _____ Senior
- _____ Graduate student
- _____ other

4) Do you smoke cigarettes? Yes _____ No _____

If yes, how many cigarettes do you smoke per day? _____

5) When did you begin menstruating?

_____ years old

6) Have you ever been pregnant?

_____ Yes
_____ No (skip to question #10)

PLEASE CONTINUE ON THE BACK OF THIS PAGE ↓

7) Are you pregnant now?

_____ Yes
_____ No

8) How many pregnancies have you had?

9) To how many children have you given birth?

Thank You For Your Participation

This section will be completed when you are weighed and measured.

Height 1 _____

Weight 1 _____

Height 2 _____

Weight 2 _____

APPENDIX H

APPENDIX H

Editing suggestions to improve the original questionnaire.

EATING PATTERNS

3) How often do you typically eat breakfast per week?

_____ times per week

4) How often do you typically eat lunch per week?

_____ times per week

5) How often do you typically eat supper per week?

_____ times per week

WEIGHT CONTROL PRACTICES

3) Have you ever tried to lose weight?

_____ yes
_____ no (skip to question #13)

4) How old were you the first time you tried to lose weight?

_____ years old

5) What are your typical reasons for wanting to lose weight?
(Check all that apply)

- _____ concern for your health
- _____ because everyone else is doing it
- _____ to feel better about myself
- _____ recommended by a health professional
- _____ to have control over my life
- _____ boyfriend or husband desire my weight loss
- _____ parent(s) desire my weight loss
- _____ job related (raise in pay, to get a better job, to save job)
- _____ to look better
- _____ to fit into old clothes
- _____ Other _____

- 11) Since you have been 16 years old, think about all the weight loss methods with which you lost weight.

Write the method(s) in the space provided. If you have used a combination of methods for one weight loss attempt, include all methods used on one line.

Tell us:

- * About how many pounds you lost using the method(s).
- * About how long you kept the weight off (months or years, which ever applies)
- * If you regained any of the weight you lost, tell us about how much. Write 0 if you did not regain weight or write the number of pounds regained.

Strategy You Have Used	Pounds Lost ()	Time weight was kept off (months or years) ()	Did you regain any weight? (yes or no) ()	If yes, how much was regained? (write number of pounds) ()
1. _____	_____	_____	_____	_____
2. _____	_____	_____	_____	_____
3. _____	_____	_____	_____	_____
4. _____	_____	_____	_____	_____
5. _____	_____	_____	_____	_____
6. _____	_____	_____	_____	_____
7. _____	_____	_____	_____	_____
8. _____	_____	_____	_____	_____
9. _____	_____	_____	_____	_____
10. _____	_____	_____	_____	_____

APPENDIX I

APPENDIX I

To Diet or Not to Diet: Straight Talk About Weight Loss

Nearly half of American women are dieting at anytime. Because women are bombarded with weight loss information of varying quality from the media, it is not surprising that many use ineffective and potentially dangerous weight control methods. The vast majority of weight control techniques are generally ineffective as indicated by the 75 to 95 percent failure rate for treatment of obesity. Dieting in many instances is destructive in that it provides individuals with failure experiences and increases feelings of ineffectiveness and inferiority. The California Dietetic Association (CDA) indicates that a weight loss program should: 1) satisfy all nutrient needs except calories, 2) meet individual tastes and habits, 3) minimize hunger and fatigue, 4) be readily obtainable and socially acceptable, 5) promote a changed eating pattern, and 6) promote overall health. Weight loss strategies that typically have a poor outcome include: 1) very low calorie diets which promote rapid weight loss, 2) extreme nutrient restriction (like restricting carbohydrates), and 3) promote reliance on formula diets or special products. Medical experts agree that the best approach for weight management include moderate diet changes that promote slow weight loss and an exercise program.

The survey you have just completed will be used in a study to examine the relation between weight fluctuations and dieting practices, body satisfaction and dietary and activity patterns in young college women. The results will be reported in a master's thesis and a manuscript submitted to scientific journals. Findings should be especially relevant to public health policy toward safe weight loss in Michigan. Feedback pertaining to the results of this study will be available after September 1, 1992. You may contact Darlene Zimmerman at 313-776-1019 to obtain feedback about the study after that date.

Researchers in the Department of Food Science and Human Nutrition would like to thank you for taking part in this study. Your time and interest is greatly appreciated.

APPENDIX J

APPENDIX J

CODEBOOK

<u>VARIABLE NAME</u>	<u>ITEM DESCRIPTION</u>	<u>CODING</u>
<u>SCHEME</u>		
SUBJ	subject record number	
AG	age of subject	
RACE	race of subject	#1 white #2 black #3 Hispanic-American #4 Native American Indian #5 Asian
EDUC	educational level	#1 Freshman #2 Sophomore #3 Junior #4 Senior
SMOKE	smoke cigarettes	#1 Yes #2 No
NUCIGS	number of cigarettes smoked per day	
MENSE	age at onset of menses	
EVPREG	subject ever pregnant	#1 Yes #2 No
PREGNOW	subject pregnant now	#1 Yes #2 No
NUBIRTH	number of births	
ACTHT	measured height	
ACTWT	measured weight	

HT	self-reported height	
WT	self-reported weight	
BMI	body mass index	
PHYSACT	level of physical activity	#1 low #2 moderate #3 high
PAMIN	minutes of physical activity per week	

Weight Variables

SELFCL	self-classification of weight group	#1 regainer #2 maintainer #3 stable #4 gainer
RESCL	actual weight group classification	#1 regainer #2 maintainer #3 stable #4 gainer #5 maintainer ≤1 year #6 trying to gain #-9 unable to classify
RESCLB	actual weight group classification with stable non-dieters and stable dieters	#1 regainer #2 maintainer #3 stable non- #4 stable dieter #5 gainer
WTCLASS	self-description of weight category	#1 underweight #2 slightly underweight #3 normal #4 slightly overweight #5 overweight

WTSTATUS	weight category based on measured BMI	#1 underweight #2 slightly underweight #3 normal #4 slightly overweight #5 overweight
----------	--	---

BODYSAT	body dissatisfaction score
---------	-------------------------------

Dieting Status

DIETNOW	current dieting status	#1 yes #2 no (trying to gain) #3 no
---------	------------------------	--

DIETALW	describes self as always dieting	#0 no #1 yes
---------	-------------------------------------	-----------------

EVDIET	report of ever being on a diet	#1 yes #2 no
--------	-----------------------------------	-----------------

FSTDIET	age of first diet
---------	-------------------

METH1 - METH22	type of weight loss methods used
----------------	-------------------------------------

#1 reduced calorie eating plan	#12 laxatives
#2 ↑ exercise	#13 diuretics
#3 reduced calorie eating plan plus ↑ exercise	#14 vomiting
#4 Weight Watchers	#15 smoking
#5 advice from a health professional	#16 Fit for Life (diet book)
#6 Overeaters Anonymous	#17 Rotation Diet (diet book)
#7 starvation	#18 Hilton Head Diet (book)
#8 SlimFast	#19 Body Rhythm Diet (book)
#9 OptiFast/HMR	#20 Brooke Shield Diet (book)
#10 Nutri/System	#21 toning salon
#11 diet pills	#22 weight loss

SAFMETH	number of safe/effective weight loss methods used
---------	--

UNSAFE	number of unsafe/ineffective weight loss methods used
--------	--

FREQ total number of different
weight loss methods used

Food Intake and Eating Patterns

ALCHO	grams of alcohol intake	
KCALS	total caloric intake	
KCALKG	caloric intake per kg body weight	
PERCHO	percent of calories from carbohydrate	
PERPRO	percent of calories from protein	
PERFAT	percent of calories from fat	
FATGM	total grams of fat	
FRUIT	number of fruit and vegetables servings	
FIBER	grams of fiber	
MAR	Mean Adequacy Ratio	
NUMEALS	number of meals eaten per day	
BREAK	number of times breakfast eaten per week	#1 0-2 times #2 3-4 times #3 5-7 times
LUNCH	number of times lunch eaten per week	#1 0-2 times #2 3-4 times #3 5-7 times
SUPPER	number of times supper eaten per week	#1 0-2 times #2 3-4 times #3 5-7 times
NUSNACKS	number of snacks eaten per day	
BREAKEAT	breakfast eater	#1 5-7 times
BREAKSKIP	breakfast skipper	#2 0-4 times

LIST OF REFERENCES

LIST OF REFERENCES

Allon N. Self-perceptions of the stigma of overweight in relationship to weight losing patterns. Am J Clin Nutr 1979; 32:470-480.

American Dietetic Association Reports. Position of The American Dietetic Association: Optimal weight as a health promotion strategy. J Am Diet Assoc 1989; 89:1814-1817.

American Heart Association Special Report: Recommendations for treatment of hyperlipidemia in adults. Circulation 1984; 69:1065A.

Anonymous. Does weight change in young adulthood influence long-term mortality. Nutr Rev 1989; 47:371-373.

Apfelbaum M, Fricker J, Igoin-Apfelbaum L. Low and very low calorie diets. Am J Clin Nutr 1987; 45:1126-1134.

Arrington R, Bonner J, Stitt KR. Weight reduction methods of college women. J Am Diet Assoc 1985; 85:483-484.

Ashley FW, Kannel WB. Relation of weight change to changes in atherogenic traits: The Framingham Study. J Chronic Dis 1974; 27:103-114.

Atkinson RL. Setting standards for success. In: Methods for Voluntary Weight Loss and Control. NIH Technology Conference, March 30-April 1, 1992.

Atkinson RL. Very low calorie diets: Getting sick or remaining healthy on a handful of calories. J Nutr 1986; 116:918-920.

Bailey S, Goldberg J. Eating patterns and weight concerns of college women. J Am Diet Assoc 1989; 89:95-96.

Ballor DL, Keesey RE. A meta-analysis of the factors affecting exercise-induced changes in body mass, fat mass and fat-free mass in males and females. Int J Obes 1991; 15:717-726.

Becker M, Maiman LA, Kirscht JP. The health belief model and prediction of dieting compliance: A field experiment. *J Health Soc Behav* 1977; 18:348-366.

Begley CE. Government should strengthen regulation in the weight loss industry. *J Am Diet Assoc* 1991; 91:1255-1257.

Bennett EM. Weight-loss practices of overweight adults. *Am J Clin Nutr* 1991; 53:1519S-1521S.

Bennett W. Dietary treatment of obesity. *Ann NY Acad Sci* 1987; 499:250-263.

Bennion LJ, Bierman EL, Ferguson JM. Straight Talk About Weight Control. Mount Vernon, NY: Consumers Union, 1991.

Blackburn GL. Comparison of medically supervised vs. nonsupervised approaches to weight loss and control. In: Methods for Voluntary Weight Loss and Control. NIH Technology Assessment Conference, March 30-April 1, 1992.

Blackburn GL, Wilson GT, Kanders BS, Stein LJ, Lavin PT, Adler J, Brownell KD. Weight cycling: The experience of human dieters. *Am J Clin Nutr* 1989; 49:1105-1109.

Blackburn GL, Kanders G, Brownell KD. The effect of weight cycling on the rate of weight loss in man. *Int J Obes* 1987; 11:448a.

Blair SN. Evidence for success of exercise in weight loss and control. In: Methods for Voluntary Weight Loss and Control. NIH Technology Conference, March 30 - April 1, 1992.

Blair S, Kohl H, Paffenberger R, Clark D, Cooper K, Gibbon L. Physical fitness and all-cause mortality: A prospective study of healthy men and women. *J Am Med Assoc* 1989; 262: 2395-2401.

Block G, Hartman AM, Presser CM, Carroll MD, Gannon J, Gardner L. A data-based approach to diet questionnaire design and testing. *Am J Epidemiol* 1986; 124:453-469.

Block G, Hartman AM. Issues in reproducibility and validity of dietary studies. *Am J Clin Nutr* 1989; 50:1133-1138.

Block G, Thompson FE, Hartman AM, Larkin FA, Guire KE. Comparison of two dietary questionnaires validated against multiple dietary records collected during a 1-year period. *J Am Diet Assoc* 1992a; 92:686-693.

Block G, Subar AF. Estimates of nutrient intake from a food frequency questionnaire: the 1987 National Health Interview Survey. *J Am Diet Assoc* 1992b; 92:969-977.

Borkan GA, Sparrow D, Wisniewski C, Vokonas PS. Body weight and coronary disease risk: Patterns of risk factor change associated with long-term weight change. *Am J Epidemiol* 1986; 124:410-419.

Bray G. Drug treatment of obesity. *Am J Clin Nutr* 1992; 55: 538S-544S.

Briefel RR, Flegal KM, Winn DM, Loria CM, Johnson CL, Sempos CT. Assessing the nation's diet: limitations of the food frequency questionnaire. *J Am Diet Assoc* 1992; 92:959-962.

Brownell KD. Weight cycling. *Am J Clin Nutr* 1989; 49:937.

Brownell KD, Jeffery RW. Improving long-term weight loss: pushing the limits of treatment. *Beh Ther* 1987a; 18:353-374.

Brownell KD, Steen SN. Modern methods for weight control: The physiology and psychology of dieting. *Phys Sportsmed* 1987b; 15:122-137.

Brownell KD, Marlatt GA, Lichtenstein E, Wilson GT. Understanding and preventing relapse. *Am Psychol* 1986a; 41: 765-782.

Brownell KD, Greenwood MRC, Stellar E, Shrager EE. The effects of repeated cycles of weight loss and regain in rats. *Physiol Behav* 1986b; 38:459-464.

Bunnell DW, Cooper PJ, Hertz S, Shenker IR. Body shape concerns among adolescents. *Int J Eat Dis* 1992; 11:79-83.

Calorie Control Commentary. *Spring*, 13:3, 1991.

Centers for Disease Control. Prevalence of overweight - Behavioral Risk Factor Surveillance System. *MMWR* 1987; 38: 421-423.

Clapp JA, McPherson RS, Reed DB, Hsi BP. Comparison of a food frequency questionnaire using reported vs. standard portion sizes for classifying individuals according to nutrient intake. *J Am Diet Assoc* 1991; 91:316-320.

Coates TJ. Theory, research and practices in treating obesity: are they really the same? *Addict Behav* 1977; 2: 95-103.

Collins ME. Weight cycling for profit: Countering the claims of diet clinics. J Sch Health 1989; 59:264-268.

Connor-Greene PA. Gender differences in body weight perception and weight-loss strategies of college students. Women Health 1988; 14:27-43.

Council on Scientific Affairs. Treatment of obesity in adults. J Am Med Assoc 1988; 260:2547-2551.

Crawford DA, Worsley A. Dieting and slimming practices of South Australian women. Med J Aust 1988; 148:325-332.

Department of Psychiatry and Behavioral Sciences, Laboratory for the Study of Behavioral Medicine. Stanford Weight Reduction Questionnaire. Stanford, CA: Stanford University School of Medicine, 1984.

Diagnostic and Statistical Manual of Mental Disorders, DSMIII-R, 3rd Edition, Revised. American Psychiatric Association. Washington, D.C., 1987.

Dishman RK. Exercise adherence research: Future directions. Am J Health Prom 1988; 3:52-56.

Drawert SM, Peters JR, Mullis RM, Hunninghake DB. Recruitment and retention of volunteers in a dietary methodology study. J Am Diet Assoc 1992; 92:221-222.

Drewnowski A, Petersmarck KA (eds). Towards safe weight loss: Recommendations for adult weight loss in programs in Michigan. East Lansing, MI: Michigan Health Council, 1990.

Duchman EG, Williamson DA, Stricker PM. Bulimia, dietary restraint, and concern for dieting. J Psychopath Behav Assess 1989; 11:1-13.

Dwyer JT. Sixteen Popular diets brief nutritional analysis. In: Stunkard AJ (ed) Obesity, pp. 276-291. Philadelphia, PA: WB Saunders, Co., 1980.

Dwyer JT, Mayer J. Potential dieters: Who are they? J Am Diet Assoc 1970; 56:510-514.

Dwyer JT, Feldman JJ, Mayer J. Adolescent dieters: Who are they? Am J Clin Nutr 1967; 20:1045-1056.

Eisele J, Hertsgaard D, Light HK. Factors related to eating disorders in young adolescent girls. Adolescence 1986; 82: 283-290.

Elliot DL, Goldberg L, Kuehl KS, Bennett WM. Sustained depression of the resting metabolic rate after massive weight loss. *Am J Clin Nutr* 1989; 49:93-96.

Emmons L. Dieting and purging behavior in black and white high school students. *J Am Diet Assoc* 1992; 92:306-312.

Ernsberger P, Haskew P. Health implications of obesity: An alternative view. *J Obes Weight Regulation* 1987; 6:59-119.

Fairburn CG, Cooper Z, Cooper PJ. The clinical features and maintenance of bulimia nervosa. In: Brownell KD, Foreyt JP (eds.), Handbook of Eating Disorders: Physiology, Psychology and Treatment of Obesity, Anorexia and Bulimia, pp. 390-404. New York, NY: Basic Books, Inc., 1986.

Fern E. The use of focus groups for idea generation: The effects of size, acquaintanceship, and moderator in response quantity and quality. *J Mark Res* 1982; Feb:1-8.

Feuerstein M, Papciak A, Shapiro S, Tannenbaum S. The weight loss profile: a biopsychosocial approach to weight loss. *Int J Psychiatry Med* 1989; 19:181-192.

Fisher MC, Lachance PA. Nutrition evaluation of published weight reducing diets. *J Am Diet Assoc* 1986; 86:450-454.

Fitzgerald FT. Space-age snack oil. *Postgrad Med J* 1985; 78:231-233.

Flatt JP. Dietary fat, carbohydrate balance, and weight maintenance: effects of exercise. *Am J Clin Nutr* 1989; 45: 296-306.

Foreyt JP, Goodrick GK. Factors common to successful therapy for the obese patient. *Med Sci Sports Exerc* 1991; 23:292-297.

Frank GC, Nicklas TA, Webber LS, Major C, Miller JF, Berenson GS. A food frequency questionnaire for adolescents: defining eating patterns. *J Am Diet Assoc* 1992; 92:313-318.

Garner DM, Garfinkel PE. Socio-cultural factors in the development of anorexia nervosa. *Psychol Med* 1980; 10:647-656.

Garner DM, Olmsted MP, Coscina DV, Rockert W, Johnson C. Psychoeducational Principles in the Treatment of Bulimia and Anorexia Nervosa. In: Garner DM, Garfinkel PE (eds), Handbook of Psychotherapy for Anorexia Nervosa and Bulimia, pp. 513-572. New York, NY: Guilford Publications, Inc., 1985.

Garner DM, Wooley SC. Confronting the failure of behavioral and dietary treatments for obesity. Clin Psych Rev 1991; 11:1-52.

Garner DM. Eating Disorders Inventory-2 (EDI): Professional Manual. Odessa, FL: Psychological Assessment Resources, Inc., 1991.

Gibson RS. Sources of error and variability in dietary assessment methods: a review. Ete 1987; 48:150-155.

Gill J. Michigan State University, East Lansing, MI. Personal communication, July 21, 1992.

Glass GN, Hopkins KD. Statistical Methods in Education and Psychology (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc., 1984, pp:551.

Glimsmann WH, Hyman FN, Sempos E, Saltsman J. Evidence for success of caloric restriction in weight loss and control: summary of data from industry. In: Methods for Voluntary Weight Loss and Control. NIH Technology Assessment Conference, March 30-April 1, 1992.

Goodrick GK, Foreyt JP. Why treatments for obesity don't last. J Am Diet Assoc 1991; 91:1243-1247.

Gorbach SL, Morrill-LaBrode A, Woods MN, Dwyer JT, Selles WD, Henderson M, Insull W, Goldman S, Thompson D, Clifford C, Sheppard L. Changes in food patterns during a low-fat dietary intervention in women. J Am Diet Assoc 1990; 90:803-809.

Green M, Winner K. A heavy issue: dangers and deceptions of the weight loss industry. City of New York, Department of Consumer Affairs, 1991.

Grodner M. "Forever dieting": chronic dieting syndrome. J Nutr Educ 1992; 24:207-210.

Grunewald K. Weight control in young college women: who are the dieters? J Am Diet Assoc 1985; 85:1445-1450.

Hahn DF, Betts N. A survey of weight control methods used by adults in Lincoln Nebraska. *J Am Diet Assoc* 1986; 86: 1406-1407.

Hall SM, Hall RG. Outcome and methodological considerations in behavior treatment of obesity. *Behav Ther* 1974; 5:352-364.

Hamm P, Shekelle RB, Stamler J. Large fluctuations in body weight during young adulthood and twenty-five-year risk of coronary death in men. *Am J Epidemiol* 1989; 129:312-318.

Harmatz MG. The misperception of overweight in normal and underweight women. *J Obes Weight Regulation* 1987; 6:38-54.

Haus G, Hoerr SL, Mavis B, Robinson J. Key factors in weight maintenance: fat intake, exercise and weight cycling. Manuscript, Michigan State University, East Lansing, 1992.

Hernon J, Skinner J, Andrew F, Penfield M. Nutrient intakes and foods selected by college students: comparisons among subgroups divided by energy intake. *J Am Diet Assoc* 1986; 86:217-221.

Hill JO. Evidence for differential success of caloric restriction depending on composition of diet. In: Methods for Voluntary Weight Loss and Control. NIH Technology Assessment Conference, March 30-April 1, 1992.

Hill JO, Sparling PB, Sheilds TW, Heller PA. Effects of exercise and food restriction on body composition and metabolic rate in obese women. *Am J Clin Nutr* 1987; 46: 622-630.

Hoerr SM. Weight status of Michigan adults: overweight, underweight, or just right? *Spectrum Winter* 1989; 2:1-3.

Hollis JF, Carmody JP, Connor SL, Fey SG, Matarazzo JD. The Nutrition Attitude Survey: associations with dietary habits, psychological and physical well-being, and coronary risk factors. *Health Psychol* 1986; 5:359-374.

House Bill 4430. Introduced by Representative Burton LeLand, March 5, 1991.

Jakobovits C, Halstead P, Kelley L, Roe D, Young C. Eating habits and nutrient intakes of college women over a thirty year period. *J Am Diet Assoc* 1977; 71:405.

Jeffery RW, Wing RR, French SA. Weight cycling and cardiovascular risk factors in obese men and women. *Am J Clin Nutr* 1992; 55:641-644.

Jeffery RW, Adlis SA, Forster JL. Prevalence of dieting among working men and women: The healthy worker project. *Health Psychol* 1991; 10:274-281.

Jequier E. Energy metabolism in obese patients before and after weight loss, and in inpatients who have relapsed. *Int J Obes* 1990; 14:59-67.

Johnston MH. Fad dieting: A no-win solution to obesity. *Ala J Med Sci* 1982; 19:380-382.

Kallen DJ, Doughty A. The Relationship of Weight, the Self-Perception of Weight and Self Esteem with Courtship Behavior. In: Kallen DJ, Sussman MB (eds), Obesity and the Family, pp. 93-114. New York, NY: Haworth Press, 1984.

Kayman S, Bruvold W, Stern JS. Maintenance and relapse after weight loss in women: behavioral aspects. *Am J Clin Nutr* 1990; 14:335-346.

Kendall A, Levitsky DA, Strupp BJ, Lissner L. Weight loss on a low fat diet: consequences of the imprecision of the control of food intake in humans. *Am J Clin Nutr* 1991; 53: 1124-1129.

Keys A, Brozek J, Henschel A, Mickelsen O, Taylor HL. The Biology of Human Starvation. Minneapolis: University of Minneapolis, 1950.

Khan M, Lipke L. Snacking and its contribution to food and nutrient intake of college students. *J Am Diet Assoc* 1982; 81:583-586.

Kirk K. The dieter's dilemma. *Ohio Med* 1990; 86:198-199.

Kirkley BG, Burge JC, Ammerman A. Dietary restraint, binge eating, and dietary behavior patterns. *Int J Eat Disorder* 1988; 7:771-778.

Kirkley BG. Bulimia: clinical characteristics, development and etiology. *J Am Diet Assoc* 1986; 86:468-475.

Klesges RC, Klesges LM. Cigarette smoking as a dieting strategy in a university population. *Int J Eat Dis* 1988; 7: 413-419.

Klesges RC, Mizes JS, Klesges LM. Self-help dieting strategies in college males and females. *Int J Eat Dis* 1987; 6:409-417.

Kramer FM, Jeffery RW, Forster JL, Snell MK. Long-term follow-up of behavioral treatment for obesity: patterns of weight regain among men and women. *Int J Obes* 1989; 13:123-136.

Krebs-Smith SM, Clark LD. Validation of a nutrient adequacy score for use with women and children. *J Am Diet Assoc* 1989; 89:775-783.

Krueger RA. Focus Groups: A Practical Guide for Applied Research, pp. 18. Newbury Park, CA: Sage Publications, 1988.

Laessle RG, Tuschl RJ, Kotthaus BC, Pirke KM. Behavioral and biological correlates of dietary restraint in normal life. *Appetite* 1989; 12:83-94.

Larsson B. Obesity, fat distribution and cardiovascular disease. *Int J Obes* 1991; 15:53-57.

Lenfant C. Physical activity and cardiovascular health: special emphasis on women and youth. *Med Sci Sports Exerc* 1992; 24:S191.

Lissner L, Odell PM, D'Agostino RB, Stokes J, Kreger BE, Belanger AJ, Brownell KD. Variability of body weight and health outcomes in the Framingham population. *N Engl J Med* 1991; 324:1839-1844.

Lohman T, Roche A, Martorell R (Eds.) Anthropometric Standardized Reference Manual. Human Kinetics Books, 1988.

Lustig A. Weight loss programs: failing to meet ethical standards? *J Am Diet Assoc* 1991; 91:1252-1254.

Macdonald LA, Wearing GA, Moase O. Factors affecting the dietary quality of adolescent girls. *J am Diet Assoc* 1983; 82:260-263.

Maloney MJ, McGuire J, Daniels SR, Specker B. Dieting behavior and eating attitudes in children. *Pediatrics* 1989; 84:482-489.

Marketdata Enterprises, U.S. Weight Loss and Diet Control Market. Lynbrook NY, 1989.

Marketdata Enterprises, Consumer Guide to Weight Loss and Diet Control Programs, Products, and Services. Lynbrook NY, 1990.

Matsuura K, Fujimura M, Nozawa Y, Iida Y, Hirayama. The body shape preferences of Japanese female students. *Int J Obes* 1992; 16:87-93.

McGinnis JM. The public health burden of a sedentary lifestyle. *Med Sci Sports Exerc* 1992; 24:S196-S200.

Melby CL, Schmidt WD, Corrigan D. Resting metabolic rate in weight-cycling collegiate wrestlers compared with physically active, noncycling control subjects. *Am J Clin Nutr* 1990; 52:409-414.

Michigan Department of Public Health. Safe Weight Loss Guidelines. MDPH: Lansing, MI: 1990.

Miller WC. Obesity: diet composition, energy expenditure and treatment of the obese patient. *Med Sci Sports Exerc* 1991; 23:273-274.

Moore DC. Body image and eating behavior in adolescent girls. *Am J Diseases Child* 1988; 142:1114-1118.

Morbidity and Mortality Weekly Report. Weight-loss regimens among overweight adults. Behavioral Risk Factor Surveillance System, 1987. 1989; Vol 38:519-528.

Morgan SL. Rational weight loss programs: A clinicians guide. *J Am Coll Nutr* 1989; 8:186-194.

Mortenson GM, Hoerr SL, Garner DM. Predictors of body satisfaction in college women. *J Am Diet Assoc* 1992 (in press).

Mortenson GM. "Health Behaviors and Attitudes of College Women Classified According to Body Satisfaction and Unrestrained Eating Behaviors." Master's thesis, Michigan State University, East Lansing, MI 1991.

National Cancer Institute. Health Habits and History Questionnaire: Diet History and Other Risk Factors. pp. 3:1-3:18. Division of Cancer Prevention and Control, National Institutes of Health, 1988.

National Center for Health Statistics, Carroll MD, Abraham S, Dresser CM. Dietary intake source data. Vital and Health Statistics, Series 11, No. 231 (1983). U.S. Government Printing Office, Washington DC [DHHS Pub. No. (PHS) 83-1681].

National Center for Health Statistics, Najjar MJ, Rowland M. Anthropometric reference data and prevalence of overweight, U.S., 1976-80. Vital and Health Statistics. Series 11, No. 238. DHHS Publication No. (PHS) 87-1688. Public Health Service, U.S. Government Printing Office, Washington DC, 1987.

National Center for Health Statistics. Provisional data from the Health Promotion and Disease Prevention Supplement to the National Health Interview Survey: United States, January-March 1985. In: Advance data from vital and health statistics. No. 113: 2-5. DHHS Publication No. (PHS) 86-1250. Public Health Service, Hyattsville, MD, 1985.

National Health and Nutrition Examination Survey III Data Collection Forms. March 1990. United States Department of Health and Human Services. Hyattville MD.

National Institutes of Health consensus development conference statement. Health implications of obesity. Ann Intern Med 1985; 103: 1073-1077.

National Research Council (NRC). Obesity and eating disorders. In: Diet and Health: Implications for Reducing Chronic Disease Risk. Washington, DC: National Academy Press, 1989.

Neuman PA, Halvorson PA. Anorexia Nervosa and Bulimia: A Handbook for Counselors and Therapists. New York: Van Nostrand Reinhold Co, 1983.

Newmark SR, Williamson B. Survey of very-low-calorie weight reduction diets. Arch Intern Med 1983; 143:1195-1198.

Nicholas P, Dwyer J. Diets for weight reduction: Nutritional considerations. In: Brownell KD, Foreyt JP (eds.). Handbook of Eating Disorders, Physiology, Psychology and Treatment of Obesity, Anorexia and Bulimia, pp. 123-143. New York, NY: Basic Books, Inc., 1986.

Norusis M. Statistical Package for the Social Sciences (SPSS/PC+ V4.0). Chicago, IL:SPSS Inc., 1990.

Nutritionist III, dietary analysis software. Version 6.0. N-Squared Computing, 1990.

Pace PW, Bolton MP, Reeves RS. Ethics of obesity treatment: Implications for dietitians. J Am Diet Assoc 1991; 91:1258-1260.

Paffenbarger RS, Hyde RT, Wing AL, Hsieh CC. Physical activity, all-cause mortality and longevity of college alumni. *N Engl J Med* 1986; 314:605-613.

Pavlou KN, Whatley JE, Jannace PW, DiBartolomeo JJ, Burrow BA, Duthie AM, Lerman RH. Physical activity as a supplement to a weight loss dieting regimen. *Am J Clin Nutr* 1989; 49: 1110-1114.

Pi-Sunyer FX. Health implications of obesity. *Am J Clin Nutr* 1991; 53:1595S-1603S.

Polivy J, Heatherton T, Herman P. Self-esteem, restraint and eating behavior. *J Abnorm Psychol* 1988; 97:354-356.

Polivy J, Herman CP. Diagnosis and treatment of normal eating. *J Consult Clin Psychol* 1987; 55:635-644.

Powell KE, Caspersen CJ, Koplan JK, Ford ES. Physical activity and chronic diseases. *Am J Clin Nutr* 1989; 49: 999-1006.

Prewitt TE, Schmeisser D, Bowen PE, Aye P, Dolecek TA, Langenberg P, Cole T, Brace L. Changes in body weight, body composition and energy intake in women fed high and low fat diets. *Am J Clin Nutr* 1991; 54:304-310.

Reed DR, Contreras RJ, Maggio C, Greenwood MRC, Rodin J. Weight cycling in female rats increases dietary fat selection and adiposity. *Physiol Behav* 1988; 42:389-395.

Richards MH, Casper RC, Larson R. Weight and eating concerns among pre- and young adolescent boys and girls. *J Adolesc Health Care* 1990; 11:203-209.

Ries G. Diet industry flourishes without regulation. *Iowa Med* 1984; 74:77-80.

Rock CL, Coulsto AM. Weight-control approaches: A review by the California Dietetic Association. *J Am Diet Assoc* 1988; 88:44-48.

Rodin J. Cultural and psychological determinants of weight concerns. In: Methods for Voluntary Weight Loss and Control. NIH Technology Assessment Conference, March 30-April 1, 1992.

Rodin J, Radke-Sharpe N, Rebuffe-Scrive M, Greenwood MRC. Weight cycling and fat distribution. *Int J Obes* 1990; 14: 303-310.

Romieu I, Willett WC, Stampfer MJ, Colditz GA, Sampson L, Rosner B, Hennekens CH, Speizer FE. Energy intake and other determinants of relative weight. *Am J Clin Nutr* 1988; 47:406-412.

Rosen JC, Gross J, Vara L. Psychological adjustment of adolescents attempting to lose or gain weight. *J Consult Clin Psychol* 1987; 55:742-747.

Rosen LW, McKeag DB, Hough DO, Curley V. Pathogenic weight control behavior in female athletes. *Phys Sportsmed* 1986; 14:79-86.

Rosen LW, Hough DO. Pathogenic weight control behaviors of female college gymnasts. *Phys Sportsmed* 1988; 16:141-144.

Rosenzweig M, Spruill J. Twenty years after Twiggy: a retrospective investigation of bulimic-like behaviors. *Int J Eat Dis* 1987; 6:59-65.

Roughan P, Seddon E, Vernon-Roberts J. Long-term effects of a psychologically based group programme for women preoccupied with body weight and eating behavior. *Int J Obes* 1990; 14:135-147.

Rozin P, Fallon A. Body image, attitudes to weight and misperceptions of figure preferences of the opposite sex: a comparison of men and women in two generations. *J Abnorm Psychol* 1988; 97:342-345.

Saris W. Physiological aspects of exercise in weight cycling. *Am J Clin Nutr* 1989; 49:1099-1104,

Schechtman G, McKinney P, Pleuss J, Hoffman RG. Dietary of Americans reporting adherence to a low cholesterol diet (NHANES II). *Am J Public Health* 1990; 80:698-703.

Schlundt DG, Hill JO, Sbrocco T, Pope-Cordle J, Sharp T. The role of breakfast in the treatment of obesity: a randomized clinical trial. *Am J Clin Nutr* 1992; 55:645-651.

Schwartz NE. Nutritional knowledge, attitudes, and practices of high school graduates. *J Am Diet Assoc* 1975; 66:28-31.

Sheppard L, Kristal AR, Kushi LH. Weight loss in women participating in a randomized trial of low fat diets. *Am J Clin Nutr* 1991; 54:821-828.

Silverstein B, Perdue L, Peterson B, Kelly E. The role of mass media in promoting a thin standard of bodily attractiveness for women. *Sex Roles* 1986; 14:519-532.

Sjostrom L. Morbidity and mortality of severely obese subjects. *Am J Clin Nutr* 1992; 55:508S-515S.

Spielman AB, Kanders B, Kienholz M, Blackburn GL. The cost of losing an analysis of commercial weight loss programs on a Metropolitan area. *J Am Coll Nutr* 1992; 11:36-41.

Steen SN, Oppliger RA, Brownell KD. Metabolic effects of repeated weight loss and regain in adolescent wrestlers. *J Am Med Assoc* 1988; 260:47-50.

Stevens J, Lissner L. Body weight variability and mortality in the Charleston Heart Study. *Int J Obes* 1990; 14:385-386.

Story M, Rosenwinkel K, Himes JH, Resnick M, Harris LJ, Blum RW. Demographic and risk factors associated with chronic dieting in adolescents. *Am J Dis Child* 1991; 145:994-998.

Stunkard AJ. Changes in the indications for treatment of obesity. *Int J Obes* 1992; 16(Suppl):vii.

Stunkard AJ. The dieting depression: untoward responses to weight reduction. *Am J Med* 1957; 23:77-86.

Technology Assessment Conference Panel. Methods for voluntary weight loss and control: Technology Assessment Conference Statement. *Ann Intern Med* 1992; 116:942-949.

Tuschl RJ, Laessle RG, Platte P, Pirke KM. Differences in food choice frequencies between restrained and unrestrained eaters. *Appetite* 1990; 14:9-13.

U.S. Department of Agriculture. Nationwide Food Consumption Survey, Continuing Survey of Food Intakes by Individuals, Women 19-50 Years and Their Children 1-5 Years, 1-Day, 1985. NFCS, CSFII Report No. 85, 1985.

U.S. Department of Agriculture/U.S. Department of Health and Human Services. Nutrition and Your Health: Dietary Guidelines for Americans. Third Edition, Washington, D.C.: U.S. Government Printing Office, 1990.

U.S. Department of Health and Human Services. Healthy People 2000; National Health Promotion and Disease Prevention Objectives. DHHS Publication No (PHS) 91-50212, 1990.

Van Dale D, Saris WHM, Hoor FT. Weight maintenance and resting metabolic rate 18-40 months after a diet/exercise treatment. *Int J Obes* 1990; 14:347-359.

Van Dale D, Saris WHM, Schoffelen PFM, Hoor FT. Does exercise give an additional effect in weight reduction regimens? *Int J Obes* 1987; 11:367-375.

Van Itallie TB. Dietary approaches to the treatment of obesity. In: Stunkard AJ (ed.), Obesity, pp. 249-261. Philadelphia, PA: WB Saunders, Co., 1980.

Van Itallie TB. Paper presented at the International Congress on Obesity. New York, October 5-8, 1983.

Wadden TA, Stunkard AJ. Social and psychological consequences of obesity. *Ann Int Med* 1985; 103:1062-1067.

Wadden TA, Stunkard AJ. Psychopathology and obesity. *Ann NY Acad Sci* 1987; 499:55-65.

Wadden TA, Stunkard AJ, Liebschutz J. Three-year follow-up of the treatment of obesity by a very-low-calorie diet, behavior therapy and their combination. *J Consult Clin Psychol* 1988; 56:925-928.

Wadden TA, Foster GD, Letizia KA, Mullen JL. Long-term effects of dieting on resting metabolic rate in obese outpatients. *J Am Med Assoc* 1990a; 264:707-711.

Wadden TA, Van Itallie TB, Blackburn GL. Responsible and irresponsible use of very-low-calorie diets in the treatment of obesity. *J Am Med Assoc* 1990b; 263:83-85.

Wadden TA. Evidence for success of caloric restriction in weight loss and control: Summary data from clinical research studies. In: Methods for Voluntary Weight Loss and Control. NIH Technology Assessment Conference, March 30-April 1, 1992.

Wakefield L, Miller M. Several factors affecting college coeds' food preferences, habits and intake. *J Home Economics* 1971; 63:45.

Willett WC, Sampson L, Browne MC, Stampfer J, Rosner B, Hennekens CH, Speizer FE. The use of a self-administered questionnaire to assess diet four years in the past. *Am J Epid* 1988; 127:188-199.

Williamson DF, Kahn HS, Remington PL. The 10-year incidence of overweight and major weight gain in US adults. *Arch Intern Med* 1990; 150:665-672.

Wiseman CV, Gray JJ, Mosimann JE, Ahrens AH. Cultural expectations of thinness in women: an update. *Int J Eat Dis* 1992; 11:85-89.

Wood PD, Stefanick ML, Williams PT, Haskell WL. The effects of plasma lipoproteins of a prudent weight-reducing diet, with or without exercise, in overweight men and women. *N Engl J Med* 1991; 325:461-466.

Wooley SC, Garner DM. Obesity treatment: the high cost of false hope. *J Am Diet Assoc* 1991; 91:1248-1251.

Wooley SC, Wooley OW. Should obesity be treated at all? In: Stunkard AJ, Stellar E (eds.), Eating and Its Disorders, pp. 185-192. New York, NY: Raven Press, 1984.