2006

WEIGHT MANAGEMENT IN POST-MENOPAUSAL WOMEN: A MIXED-METHODS APPROACH

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ABSTRACT OF DISSERTATION

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A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Public Health at the University of Kentucky

By
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The percentage of obese adults in the U.S. has more than doubled since the late 1970's. A large percentage of adults, especially women, are trying to lose weight at any given time. Although recommended weight-loss strategies combine reduced caloric intake with physical activity, the actual strategies used can vary.

This dissertation uses a mixed-methods approach to investigate weight, weight loss, and body image in post-menopausal women ages 50 to 64. Quantitative data were analyzed from the National Health and Nutrition Examination Survey (NHANES) and semi-structured interviews with 81 women in Kentucky. Qualitative data was gathered from in-depth interviews with eight Kentucky women focusing on life-course factors that affect weight and perception of weight.

Over 70% of the Kentucky subjects had attempted weight loss in the last year; 47% of the NHANES women had done so. The most common weight-loss strategies of the Kentucky sample were 'ate less food' and 'exercised'; in the NHANES samples, the most common choices were 'ate less food' and 'ate less fat'. In the Kentucky sample, feeling that one is in control of one's own weight was associated with having joined a weight loss program.

Exercise and restaurant frequency and were the most significant predictors of the weight outcomes investigated. Increased exercise was associated with an increased likelihood of being normal weight, gaining less than 10 pounds in the last 10 years, and gaining less than 30 pounds since age 25; decreased restaurant frequency was associated with all of these outcomes in the Kentucky sample.

The in-depth interviews revealed that making good food choices, having others as role models, and the desire to be attractive were seen as positive influences on weight. The consumption of 'bad' foods, stress, health problems that prevent exercise, menopause, and age were seen as negative influences. The qualitative data also strongly suggested that childhood weight, and past reactions of others to one's weight, influence perception of current weight. It is the responsibility of women and the public health sector to make the most of these acknowledged motivators and minimize the perceived barriers to reverse the increasing obesity levels in the U.S.

Jennifer L. Gatz
July 2006

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RULES FOR THE USE OF DISSERTATIONS

DISSERTATION

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Dedicated to Andy

ACKNOWLEDGMENTS

This dissertation benefited greatly from the contributions of faculty at the University of Kentucky (and beyond). My biggest thanks go to my committee co-chair Suzanne Tyas, Ph.D., my mentor from the very beginning of the Gerontology program, whose guidance has been the single biggest influence on the researcher that I have become. I'd also like to thank my committee co-chair John Watkins, Ph.D., for his unwavering support and willingness to listen and provide empathy at any time. I would like to thank my committee members (Maria Boosalis, Ph.D. and Glenn Telling, Ph.D.) and outside examiner (James Anderson, M.D.) for challenging me to make this dissertation as rigorous and thorough as possible.

Any graduate student's experience would be miserable without the support and encouragement of friends, family, co-workers, and classmates; mine has been no different. I would especially like to thank all of those who knew me when I was first contemplating a Ph.D. who did *not* tell me it was a bad idea, and my husband, Andy, for supporting me financially and emotionally through my entire graduate career.

Finally, I would like to thank the women who volunteered to be interviewed for this research project. Going into this study, I had no idea how much I would enjoy conducting the interviews with these women. I thank each one of them for being willing to open up to a complete stranger about their personal lives and histories, and for making this research possible.

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Chapter 1: Introduction

Comparison of Two Women

On the surface, Diane and Gretchen have a lot in common. They are both married white women in their early 60's, with children and grandchildren who live out of state. Both have college degrees, neither of them works, and both are married to men with high-profile careers at a major research university. Both of them moved to their current location in the 1990's to accommodate their husbands' careers, and both of them reside in upscale townhomes within 5 miles of the city's downtown.

The weight histories of these two women, and the way they feel about their current weight, however, are at opposite ends of the spectrum. Diane has a BMI of 33 and a waist circumference of 43 inches; these two measurements put her solidly in the category of 'obese.' Gretchen, on the other hand, has a BMI of 21 and a waist circumference of 28 inches; her weight puts her in the low end of the 'normal' range.

The way these women speak of their feelings about their bodies is also very different. One of these women commented,

> It's much more of a struggle, through menopause and…it just really irks me. It irks me, it bothers me so much that there's not the energy. And I should not be so lazy, I should be doing more and more exercise and I find myself involved doing just other things, whether it's shopping or getting things or going here or there. I just find myself less disciplined that way….It bothers me, it bothers my friends, we get so upset over it – 'Why is this happening?'
>
> I just get mad at myself. I'm just too lazy! It really bothers me, but I'm not really making an effort to do anything, a strong effort. … I'm just mad at myself for being too lazy about it and not doing more. I just wish I had lots more energy to do more.

The other woman said, regarding her weight,

> It isn't something that has caused me a great deal of gnashing teeth. I'm really OK with how I am … It just isn't an issue, other than at times I'd like to be thinner. Especially in a bathing suit [laughs].

While it may seem obvious who stated these words, the first quote is attributed to Gretchen, the normal weight woman, and the second to Diane, the obese woman.

What is it about these two women that makes their body image so divergent? Why does Diane, who weighs 70 lbs more than she did at age 25 and whose weight puts her at risk for a multitude of health problems, say of her weight "I'm really OK with how I am", and "it just isn't an issue" while Gretchen, who is within 10 lbs of her young adult weight and is thin by any objective measure, says of her weight "I just get mad at myself" and "I'm just too lazy"? There are several life course differences between these two women that, alone or in combination, may point to an answer.

Issues of weight and weight management have long been a part of life for women in the western world. The 'feminine ideal' stems from a socially constructed image of what a woman's body should look like. This ideal has changed over time – from the model Renaissance woman, soft and rounded, to the wasp-waisted corseted look of the Victorian age, to the slim and toned look that is favored today. Weight management, which is the behavior that a person adopts to maintain or change his or her physical dimensions, provides individual control over body shape. Through weight management, women can 'invest' time and energy to modify their bodies' shape and bring it closer to the prevailing ideal. What factors influence a woman's ability and willingness to make such an investment in her physical shape? Changing gender roles, food and medical technologies, cultural differences, socioeconomic circumstances, and market forces are some of the societal-level factors that influence this decision. For older women especially, the popular weight management strategies and feminine ideals that they have been exposed to throughout their lifetime influence their body image and personal weight management strategies today.

Purpose and Organization

This study uses a mixed-methods approach to investigate the factors that influence weight, weight-loss strategies, and body image in post-menopausal women. Three sets of data are employed for this study: two quantitative data sets (one a volunteer sample from Kentucky, the other a representative national sample) and one smaller qualitative sample comprising a subset of the Kentucky quantitative sample. The following research questions are addressed through the quantitative samples of this study:

- What are the predictors of attempted weight loss in post-menopausal women?
- What are the predictors of the strategies used in attempting weight loss?
- What lifestyle factors are associated with being normal weight?
- What factors predict weight gain in adulthood?

The overarching *a priori* hypothesis for these research questions is that women who exhibit the outcome under investigation (i.e., those who choose to attempt weight loss, those who have used various strategies for weight loss, those who are normal weight, and those who have gained weight in adulthood) differ in some way, such as their lifestyle characteristics, personality characteristics, weight histories, or body image, from women who do not exhibit these outcomes.

The following research question is addressed through the qualitative sample of this study:

- What life course factors influence body image, perceived weight problems, and the desire to lose weight?

The *a priori* hypothesis for this research question is that life course factors, such as perceived weight in childhood and young adulthood, the reactions of others to a woman's weight throughout her life, and the role of motherhood can affect a woman's body image and desire to lose weight in her post-menopausal years.

The next chapter presents a review of the literature pertaining to obesity in America, body image, attempted weight loss and weight-loss strategies, and the effect of age on weight and body composition. The purpose of this chapter is to establish the societal context and scholarly foundation upon which this dissertation is based. Chapter 3 details the methods used in this dissertation study, both quantitative and qualitative, describes the data sets used, and lists the basic demographics and lifestyle variables from both sets of quantitative data. This chapter is particularly important because of the mixed-methods design and multi-scale nature of this study. Chapter 4 contains the results of the analyses of both sets of quantitative data. Chapter 5 employs the in-depth interviews as a means of adding depth of understanding to the results derived from the statistical models in Chapter 4 and as a way to identify important themes not captured by a quantitative approach. It begins by describing each of the women interviewed for the qualitative component of this study, then delves into the thematic results of those

interviews. Chapter 6 offers a discussion and interpretation of the dissertation's findings and expands on some of the unusual and intriguing results. The final chapter concludes with a summary of findings derived from this research and offers a critical appraisal of how best to direct ongoing research investigating weight management, body image, and a growing older population.

Gerontological Aspects of this Study

"Old age" is often considered to begin, at least by the general population, at the age of 65. This study, although gerontological in nature, will investigate a population of post-menopausal women ages 50 to 64. The detailed reasons for choosing this age range are explained in Chapter 3, but a brief explanation is provided here as to how this dissertation is gerontological even though it focuses solely on women *under* the age of 65. The gerontological nature of this study is evident in two aspects. The first is the life-course approach of this study – investigating how early-life factors affect women in their post-menopausal years. This 'life-course' way of examining health and social outcomes is unique to gerontology. The second aspect is that one's health and productivity in old age (65 or older) is a direct function of how one has lived in the years leading up to old age. Gerontology is the study of aging; although gerontological studies usually focus on people already in their older years, everyone is aging from birth onward. This study looks at women's years following menopause but immediately preceding old age to see what factors affect their weight and weight-loss habits; the weight and weight-loss habits of these women in this critical time period will have a direct effect on how well they will fare once they enter what is considered standard 'old age'.

Operational Definitions

The following definitions of terms and concepts are used throughout this dissertation.

Measures of overweight/obesity: *Body mass index (BMI)*, defined as a person's weight in kilograms divided by the square of their height in meters, is a common way to classify individuals as underweight (BMI < 18.5), normal weight ($18.5 \leq BMI < 25$),

overweight (25 ≤ BMI < 30), or obese (BMI ≥ 30) (NIH, 1998). This standard applies to all adults. As an example, a woman who is 64 inches (5 ft 4 in) tall would be considered underweight if she weighed less than 108 lbs, normal weight if her weight fell between 108 and 145 lbs, overweight if between 146 and 174 lbs, and obese if she weighed 175 lbs or more.

BMI is used as a measure of overweight/obesity because, in general, it is a good marker for adiposity, or level of body fatness (NIH, 1998). However, BMI tends to overestimate body fatness for people who have very high muscle mass (such as professional body builders) and underestimate body fatness for those with very low muscle mass. Because muscle mass tends to decrease with age, some older people in the normal-weight BMI category may have high levels of body fat. Another weakness of BMI is that it does not take into account the location of excess body fat. Body fat located in the abdominal cavity is associated with more health problems than body fat located elsewhere. Because of the increased risk associated with abdominal obesity, *waist circumference* is another measure used to determine adiposity. For women, a waist circumference of more than 35 inches is considered high; for men, this cut-off is 40 inches (NIH, 1998).

Quantitative vs. qualitative data: This study uses a mixed-methods approach, meaning that both quantitative and qualitative data are included. Quantitative data are those that are number-based; averages, standard deviations, frequencies, and statistical modeling can be performed on quantitative data to understand the nature of the observations. In this study, the quantitative data come from 177 women interviewed as part of the National Health and Nutrition Examination Survey (NHANES) and the 81 women interviewed in Central Kentucky as a regionally focused component of this dissertation research.

Qualitative data are word- or image-based; the data are not used to generate statistics. Rather, qualitative data are used to gain a detailed understanding of subjects' perceptions of their lives and surroundings. In this project, the qualitative data come from in-depth interviews of eight women. They are employed to both confirm and extend findings that emerge from the quantitative component.

Statistical terms: The main statistical modeling technique used in this study is logistic regression. In logistic regression, the dependent variable (or 'outcome') is discrete; often, it is dichotomous, meaning it can have a value of either 'yes' or 'no' (Tabachnick & Fidell, 2001). For example, in one of the models contained in this dissertation, I investigate the factors that are associated with currently attempting weight loss. In this case, the possible values of the dependent variable are 'currently attempting weight loss' (i.e., 'yes') and 'not currently attempting weight loss' ('no').

Logistic regression models can contain many independent variables (or 'predictors') that influence the dependent variable, and these independent variables can be a mix of discrete and continuous variables. The data for the predictor values in this study are presented as odds ratios. The odds ratio for each predictor variable is a measure of the influence that predictor variable has on the dependent variable *in the presence of all of the other predictor variables in the model*. If the odds ratio is 1.00, it has no influence on the outcome; if it is greater than one, it has a positive influence, and if it is less than one it has a negative influence.

Two values that act as a measure of significance (i.e., how sure are we that the predictor variable *really* influences the outcome variable) are confidence intervals and p-values. If an odds ratio is the 'best guess' of a predictor variable's influence, a confidence interval is the range of values within which it is *x%* certain the true influence value lies. The *x%* value generally used in epidemiology (and used within this dissertation) is 95%. A p-value is the probability that the observed influence of the predictor variable on the outcome variable could have arisen purely by chance (Gordis, 2000). In this dissertation, a p-value between .05 and .10 (meaning there's a 5-10% chance the observed difference is due purely to chance) is considered 'marginally significant' and a p-value less than .05 is considered 'significant.'

Chapter 2: Background and Significance

This chapter begins by explaining the effect that age has on weight and body composition and detailing the research that has been done on body image in women. I then explore the changes in obesity levels in America in the 20th and early-21st centuries, the health consequences of obesity, and some possible social determinants of changing obesity trends. Finally, the current literature is reviewed on attempted weight loss, weight loss strategies, and the decision to lose weight to determine the current state of knowledge in these domains.

The Effect of Age on Weight and Body Composition
   Fat distribution.

People's bodies naturally change as they enter old age. For women, especially, there is a change in fat distribution, a loss of muscle mass, and often a gain of fat. Older women's body fat tends to shift from a gynoid (lower body) pattern to an android (upper body) pattern (Hamilton, Nonas, & Noll, 2000). One cross-sectional study looked at android versus gynoid fat distributions in non-obese subjects. The results were stratified by gender and, in women, by menopausal status. The postmenopausal women had a significantly higher proportion of android fat than the premenopausal women, but a lower proportion than the age-matched men (Levy, Lees, & Stevenson, 1992). Another survey found that older women (> 50 years old) had similar fat mass to younger women (< 50), but had a higher ratio of android to gynoid fat (Horber, Gruber, Thomi, Jensen, & Jaeger, 1997). In a cross-sectional study evaluating body composition in early postmenopausal women, researchers used years since menopause as a variable, along with age, to see if the observed changes in body composition were due to menopause or age. They found that the women's android fat increased and gynoid fat decreased with age, but that these changes were not related to years since menopause. This suggests that the gynoid to android redistribution is due more to age than to the hormonal changes of menopause (Wang, Hassager, Ravn, Wang, & Christiansen, 1994).

Lean muscle mass.

It is common for women as they age to lose lean tissue mass (Hamilton et al., 2000).   A cross-sectional study (Kyle et al., 2001) showed that women's fat-free mass and skeletal muscle mass were highest in the 18- to 34-year age group, and decreased steadily thereafter. A three-year longitudinal study of a random sample of 70-79 year olds in Hong Kong found that three times as many subjects lost weight as gained weight, and that old age was the only significant predictor of weight loss (Woo, Ho, & Sham, 2001). Another longitudinal study noted a small loss of total body mass (0.3 to 0.4%) in subjects ages 70 to 79 over the two-year study period, with fat-free mass decreasing in women. When the sample was restricted to elders who maintained or gained weight during the follow-up, 15% still lost lean soft-tissue mass (Visser et al., 2003). Wang et al. (1994) found that lean tissue mass decreased significantly with years since menopause but was not related to age. In contrast to changes in fat distribution, this indicates that the loss in muscle mass is caused by hormonal changes due to menopause rather than decreased energy expenditure due to age.

Total body mass.

It is also common for women's total mass to increase in 'young-old' age, then decrease. A cross-sectional study (Kyle et al., 2001) found that fat mass increased with age until age 75, after which it decreased in women. Another cross-sectional survey of older women looked at the women's self-reported average weight in six adult age intervals (20's, 30's, 40's, 50-55, 55-60, 60-65). Nearly 90% of the sample gained weight between the 30's and late 50's, and the average weight gain was 20.5 lbs (Hays et al., 2002).

The Effect of Weight on Health in Older Adults

Data suggest that the thinnest elders are at increased risk of mortality. A longitudinal study performed in Hong Kong (Woo et al., 2001) found that men and women with smaller measurements at baseline (arm circumference, fat-free mass, etc.) were significantly more likely to die during the 3-year follow-up. Another study found that older women in the lowest quintile of body weight had a significantly higher

mortality rate than older women in the middle quintile. However, the researchers found that when they eliminated subjects who had lost 10% or more of their body weight between ages 50 and 70, the association disappeared (Losonczy et al., 1995). Although at first glance it may appear that these results suggest weight loss increases mortality, the authors did not control for unintentional weight loss. Because of this, people who lost weight due to illness are included, and most likely caused the association between low weight in elders and mortality.

Janssen, Katzmarzyk, and Ross (2005) found that mortality rates decreased with increasing BMI in people ages 65 and older in a nine-year longitudinal study. The researchers also found an interaction between BMI and waist circumference in predicting mortality.   Within the overweight and obese BMI categories, the subjects with the largest waist circumferences had the highest mortality rate.   However, within the 'moderate' waist circumference range, the normal-BMI subjects had the highest mortality rate. The researchers hypothesized that the higher muscle mass in heavier older adults might act as a nutritional reserve and protect against mortality; this, in combination with the low levels of abdominal fat in those with low waist circumferences, may produce the ideal body type to protect seniors against mortality.

Obesity in America

Body mass index (BMI), defined as a person's weight in kilograms divided by the square of his or her height in meters, is a common way to classify individuals as underweight (BMI < 18.5), normal weight (18.5 ≤ BMI < 25), overweight (25 ≤ BMI < 30), or obese (BMI ≥ 30) (NIH, 1998). The current government guidelines recommend weight loss for those who are overweight and have two or more comorbidities or a large waist circumference, and for those who are obese (NIH, 1998, p. xxix).

The three major predictors of body weight are genes, nutrition, and physical activity. Genes make up 30 – 40% of inter-individual weight variability by influencing "the resting metabolic rate, appetite and satiety, body fat distribution, and perhaps predisposition to be active or inactive" (Hamilton et al., 2000, p. 7). Together, physical activity and nutrition are the largest contributors to a person's weight. However, the

social and environmental factors that lead to obesity can be complex. Other determinants of weight include socioeconomic status (lower income groups have a higher prevalence of overweight and obesity), tobacco use (smokers tend to weigh less and gain weight when they quit), alcohol (which can contribute to abdominal adiposity), medications, endocrine problems, and emotional stress (which can lead to weight gain, especially of abdominal fat) (Hamilton et al., 2000).

Obesity is caused by excess energy stored in the body in fat cells that can become enlarged, increase in number, or both. This fat can cause problems in two ways: through the physical mass of the excess fat (Bray, 2003) and through the elevated gene expression of pro-inflammatory cytokines (e.g., interleukin-6, tumor necrosis factor-α, C-reactive protein) in the adipose tissue (You, Yang, Lyles, Gong, & Niklas, 2005). The increased mass of the fat can lead to problems such as sleep apnea, osteoarthritis of weight-bearing joints, and functional limitations. The increased pro-inflammaotry cytokines in excess fat tissue can lead to hypertension, heart disease, gallbladder disease, and decreased insulin sensitivity (Bray, 2003; You et al., 2005). This latter mechanism is particularly relevant when the excess fat is distributed around the waist.

The past several decades have experienced remarkable increases in the proportion of the U.S. population with high BMI and consequent reductions in the proportion of those in the normal BMI range (Table 2.1). The proportion of adults with a BMI within healthy limits dropped from about half in 1960 to just over one-third by 2000 (NCHS, 2002). Table 2.2 summarizes the percentage of obesity across the life course in two birth cohorts, 1925-1939 and 1951-1965. The two cohorts represent 15-year spans, with a 12-year age difference between the youngest members of the first cohort and the oldest members of the second. Note that obesity percentages have risen within each cohort as it ages and that the cohort born later has much higher obesity levels at comparable ages than the older cohort.   Also note that, other than the youngest age range of the oldest cohort, women consistently have higher obesity percentages than men, and that this difference is increasing in the younger cohort. As discussed in the next section, the very different life situations experienced by these two cohorts could explain these differences in obesity.

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Table 2.1. Normal weight has decreased and obesity has increased in U.S. adults, 1960-1962 through 1999-2000
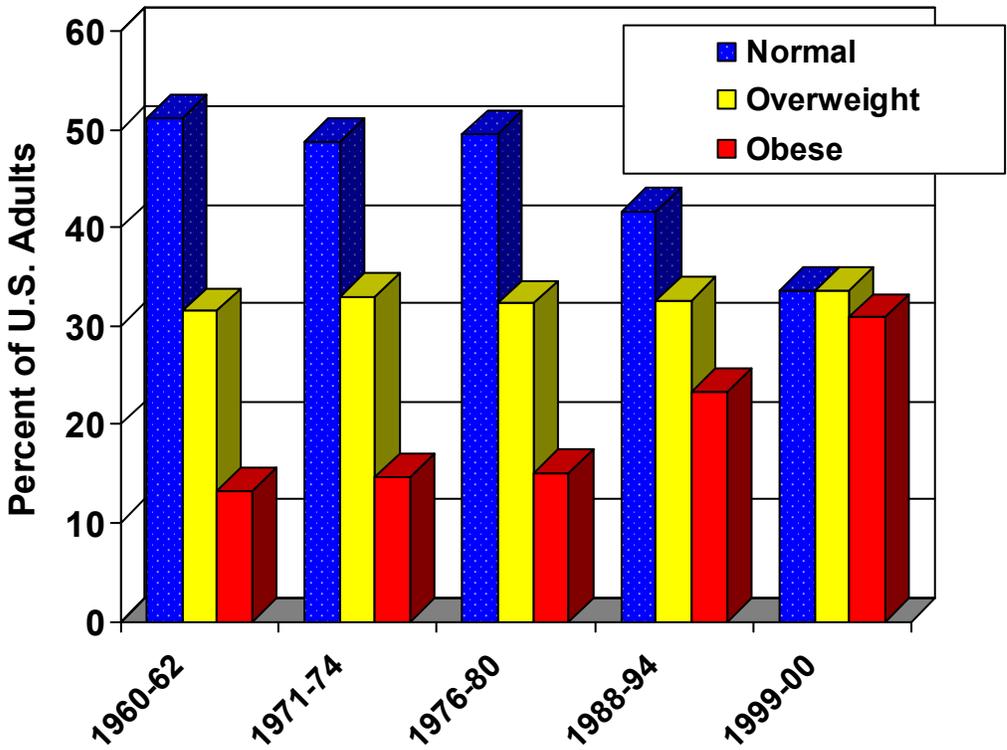
Source: NCHS (2002)

Table 2.2. Cohort comparison of obesity percentages

Age Range	1925-39 Birth Cohort		1951-65 Birth Cohort	
	Male	Female	Male	Female
20-34	9.2	7.2	14.1	18.5
35-44	13.5	17.7	25.2	33.9
45-54	16.7	19.6	30.1	38.1
55-64	27.2	33.7	--	--
65-74	33.4	38.8	--	--

Source: Calculated from NCHS, 2002.
Note: The columns in Table 2.2 represent the approximate percentage of obese individuals in the cohorts in the specified age ranges based on the available obesity data from the National Health Examination Survey (1960-62), and the National Health and Nutrition Examination Surveys (1971-74, 1976-80, 1988-94, 1999-2000).

Social Determinants of Increase in Obesity

What has caused this large change in obesity levels? Americans today are surrounded by cheap and readily available calorie-dense foods. At the same time, labor-saving devices, a post-industrial economy, and a car-friendly culture mean that most Americans do not expend much energy in the course of their daily lives. As Poston and Foreyt (1999) point out, "this environment is completely opposite of the one that shaped human evolution" (p. 203). They have termed this environment that seems to foster weight problems 'obesogenic'.

Television and video technology and changing food technologies have greatly influenced the diets of Americans for the last 50 years. For example, television became nearly ubiquitous during the 1950's: 9% of homes had a television in 1950 compared to 90% in 1960 ("United States (History)", 2004). Television watching is a sedentary activity that replaces physical activity, especially in childhood, thereby increasing the risk for weight gain and obesity beginning in childhood and carrying into adulthood. Prepared frozen foods also became widely available in the 1950's. While frozen foods had been available for some time by the 1950's, Swanson introduced the first TV dinner (turkey, dressing with gravy, peas, and sweet potatoes) in 1953 (Pinnacle Foods Corporation, 2004). This innovation in food technology made it possible to eat a 'complete' meal without much preparation time. Food preparation again changed

dramatically with the widespread use of microwave ovens. In 1967, the first countertop domestic microwave oven was introduced. Sixty percent of U.S. households owned a microwave by 1976 (Gallawa, 2003), and an estimated 95% owned one in 2002 (Remich, 2002).   This appliance even further simplified the process of cooking meals in the home.

In addition to the introduction of quick meals available from home, fast food made its appearance in America in the 1950's and offered food that was cheap and, as the moniker states, fast. The fast food industry traces its beginnings to the first McDonald's franchise, which opened in 1955 (McDonald's Corporation, 2004). While dining outside of the home through the 1940's had been a luxury and a rare treat, fast food introduced frequent dining out to the masses. In the latter part of the 20th century, restaurants in general became much more important in the lives of Americans. Between the late 1970's and mid-1990's, the percentage of calories consumed in meals prepared outside of the home increased from 18% to 32% for all individuals over the age of two (Guthrie, Lin, & Frazao, 2002). Because meals and snacks prepared outside of the home tend to have higher total calories, in addition to more fat and less fiber per calorie, it's likely that this societal trend has contributed to the observed changes in U.S. obesity levels.

Another food technology that affected the diets of Americans in the mid-20th century was the rapid growth in the snack foods market. In 1960, Little Debbie snacks were first introduced; that year, this brand was the first to offer a 'family-pack' of multiple individually wrapped snack cakes (McKee Foods, 2003). Snack chips also became more popular in this time period; in 1964, Doritos were first introduced to the market and in 1970 the sale of potato chips surpassed $1 billion annually (Snack Food Association, 2004). This boom in the snack food industry continued to affect caloric intake in the later years of the 20th century, especially in children. The daily frequency of snacking among children increased significantly between 1977 and 1996, as did the total calories consumed in snacks per day. Teenagers in particular consumed more calories in snacks. In 1977, those aged 12-18 years consumed an average of 460 calories per day in snacks; in 1996, this had increased to 612 calories per day (Jahns, Siega-Riz, & Popkin, 2001).

Activity levels have also changed since the early half of the 20th century. The types of jobs held by those in the workforce, and the amount of physical labor required for those jobs, changed dramatically as the U.S. moved towards a post-industrial service-based economy. Today, the service industry, which generally requires much less physical labor than traditional industries, accounts for a larger share of the U.S. Gross Domestic Product than it did in the 1960's (US Department of Commerce, 1996), and has been the fastest-growing source of employment since 1980 (US Census Bureau, 2003).

Another facet of the labor force that may influence obesity levels is the percentage of women in the work force, which increased from 43% in 1970 to 60% in 2000. This increase was especially dramatic among women with small children; 37% of married women with children under age 6 were in the work force in 1975 compared to 61% in 2002 (US Census Bureau, 2003). Working women may be more likely to use convenience, snack, and fast foods to feed themselves and their families, which could lead to increases in overweight and obesity.

In addition to a general lack of occupational physical activity, a large percentage of Americans do not pursue any leisure-time physical activity. The Behavioral Risk Factor Surveillance System found that approximately 25% of American adults reported no leisure-time physical activity in 2002 ("Prevalence of no leisure-time physical activity", 2004).

Body Image

While obesity is linked to many physical problems, it can cause psychological and social problems as well. There is a stigma associated with being overweight; people tend to harbor implicit biases and assign negative traits to those who are overweight or obese (Teachman, Gapinski, Brownell, Rawlins, & Jeyaram, 2003). These biases can affect the quality of life of people who carry excess weight. In a 1992 nationwide survey analyzed by Levy and Heaton (1993), 29% of women and 18% of men reported appearance as their primary motivation for attempting to lose weight, followed by concerns about future health (21% of women, 29% of men), general fitness

(16% of women, 23% of men), and concerns about present health (16% of both men and women).

Women, especially, can suffer psychological consequences of their excess weight. "In the last few decades, there has been a marked trend toward an increasingly thin ideal in women's beauty" (Rodin, 1993, p. 643). The way that people internalize the ideal and their perception of how their body compares to the ideal is called body image. "Body image represents an individual's subjective experience with his or her body and the way he or she organizes this experience" (p. 644).

Evidence suggests that body image begins early in life. In one study, five-year-old girls were asked open-ended questions about dieting, being thin, and concerns about their weight. Their ideas about dieting or being thin and concepts about their own weight were compared to their parents' dieting history and weight concerns. Little girls whose mothers were currently on a diet or had recently dieted were twice as likely to have ideas about dieting as those whose mothers were not on a diet. In addition, girls' concerns about their own weight were significantly related to their mothers' weight concerns. The fathers' dieting histories were not predictive of the girls' ideas about dieting even though all of the girls lived with both parents (Abramovitz & Birch, 2000).

Some have suggested that body image undergoes long-term changes due to a woman's experiences as she ages (Hurd, 2000). However, women's body image remains lower than their male peers' throughout life. One cross-sectional survey looked at body image in 132 undergraduate students (mean age = 19.4 yrs) and 142 elders (mean age = 73.6 yrs). The survey consisted of thirty-five questions on the women's body parts and functions answered on a 5-point scale ranging from 'have strong negative feelings' to 'have strong positive feelings.' For both young and old, there were no items on which women scored higher (more positively) than men (Franzoi & Koehler, 1998).

Research suggests that older women have an imagined ideal body shape that is approximately the same margin smaller than their current shape as the margin between younger women's ideal and current shapes. Thus, as women get older and bigger, their ideal body shifts to the larger end of the scale, but the difference between actual and ideal remains approximately constant. A cross-sectional study used the Stunkard Body

Shape Figures (SBSF) Scale to compare younger men and women (average age = 20) to older men (average age = 53) and women (average age = 47) (Lamb, Jackson, Cassiday, & Priest, 1993). The SBSF scale has five line drawings of successively larger men and women, and the figures are numbered two to six. The subjects were asked about their current body shape and the shape they would like to have. This study found that younger women wanted a body that was an average of 0.86 points below their actual shape (2.55 vs. 3.41), and the older women wanted a body that was an average of 1.04 points below their current shape (3.26 vs. 4.30). While the shape the older women chose was bigger than the shape chosen by the younger women, it was still quite a bit thinner than their actual shape. Another study on this topic (Stevens & Tiggemann, 1998) used nine drawings that represented body shapes from very thin (scored as 10) to very fat (scored as 90). The women in this study, ages 18-59, chose the shape that represented them now and the shape they would like to have. Women of every age group chose an ideal shape that was smaller than their current shape (6.9 points, on average); there was no significant correlation between age and discrepancy between current and ideal. However, ideal shapes increased with age: the ideal shape for 18-29 year olds was 3.2 points lower than the ideal shape for 50-59 year olds (30.9 vs. 34.1).

One cross-sectional study in Australia looked at body dissatisfaction and body esteem across a wide age range of women (ages 20 to 84). The researchers found no significant correlations between age and body dissatisfaction or body esteem; the women in the study wanted to be thinner, regardless of age. While the older women chose heavier ideals, the ideals stayed an approximately constant distance away from the women's actual shape (Tiggemann & Lynch, 2001).

Another cross-sectional study used a convenience sample of older (mean age 67.3) and younger (mean age 20.9) women to compare the two groups' ideas on ideal body weight and dieting. The two groups of women in the study both had an average ideal weight that was 10 lbs less than their current weight, even though all of the subjects were of normal weight for height. There were no significant differences between the percentage of older and younger women who had dieted (Hetherington & Burnett, 1994).

A cross-sectional study of Italian women, ages 7 to 65, measured body dissatisfaction in two ways: using the Body Cathexis Scale (BCS) and using the Distorting Television Image Method (DTIM). The BCS asks people to rate how they feel about specific body parts on a seven-point scale. In the DTIM method, women are shown their bodies on film and allowed to distort the horizontal and vertical axes until they think the image resembles their body or the body they wish they had, with the difference between those two shapes calculated as body dissatisfaction (Guaraldi, Orlandi, Boselli, & Tartoni, 1995). Using the DTIM method of ascertaining body dissatisfaction, the researchers reported no correlation between age and body dissatisfaction. However, using the BCS, body dissatisfaction increased significantly with age. The authors hypothesized that the two measures of body dissatisfaction were measuring different phenomena. The DTIM measured body dissatisfaction from a purely aesthetic standpoint, and found no differences with age. The BCS, however, measured both aesthetic dimensions and bodily function dimensions of body dissatisfaction. Because bodily functions (strength, breathing, etc.) tend to decline with age, it makes sense that older women would be less satisfied with these functions.

Across ages, women underestimate the body shape that men find desirable. One study (Lamb et al., 1993) had a section in which the men were asked to select the shape they found most attractive, and the women were asked to choose the shape that they thought men their age would find most attractive. The young women chose a shape that was 0.47 points smaller than the shape the young men chose (2.73 vs. 3.20 on a scale of 2 to 6), and the older women chose a shape that was 0.52 points smaller than the shape the older men chose (3.23 vs. 3.75). Older and younger women underestimated men's preferred female shape by nearly identical margins. In this same study, younger women chose an ideal shape that was thinner than the shape they thought men their age found most attractive (2.55 vs. 2.73). The older women chose an ideal shape that was very near the shape they thought men preferred (3.26 vs. 3.23). From these results, it seems that some factor is influencing the younger women's ideal beyond attractiveness to men, but that this influence is less important to older women.

Although women report ideals that are smaller than their current bodies, research suggests that the importance of a woman's own appearance decreases with age. One

qualitative study involved 100 hours of semi-structured interviews with 22 women from the ages of 61 to 92. The author asked the women how they felt about their aging bodies and what they thought of the current beauty standards. The women generally used negative terms to describe their own aging bodies and those of other older women. Most of the women, however, followed their negative comments with remarks of their good fortune to have health and independence (Hurd, 2000). A cross-sectional study using a survey found that the importance of appearance was greater for women than men across all age groups (ages 10 to 79), but that the importance of appearance to women decreased with age (Pliner, Chaiken, & Flett, 1990).

Fredrickson and Roberts (1997) describe objectification as "the experience of being treated *as a body* (or collection of body parts) valued predominately for its use to (or consumption by) others" (p. 174). They say that women in our society are objectified on a regular basis and internalize these experiences in the form of self-objectification (taking an observer's perspective of the body), habitual body monitoring, and body shame. However, women experience this internalization at different levels, and they suggest that it is this level of internalization that can predict a woman's risk of eating disorders or other negative consequences of body image.

One cross-sectional study (Tiggemann & Lynch, 2001) used objectification theory as a framework for looking at body dissatisfaction, body esteem, body monitoring, body shame, appearance anxiety, eating disorders, dietary restraint, and self-esteem in women ages 20 to 84. Self-objectification, appearance anxiety, eating disorders, and dietary restraint all decreased with age. "Overall, the results are consistent with the suggestion that whereas the level of dissatisfaction with the body remains constant, the importance of the body [as an object] decreases as women get older" (p. 249). The authors suggested that "the stable levels of body dissatisfaction are a function of two opposing changes with age: an increase in BMI and a decrease in self-objectification" (p. 251). As there are differing levels of self-objectification in young women, even if self-objectification decreases with age, some older women will still experience significant levels of appearance anxiety and body shame. It may be this residual level of self-objectification that would predict which older women are attempting to lose weight.

Attempted Weight Loss in America

Attempted weight loss is a common state for adults in this country today. The 2000 Behavioral Risk Factor Surveillance System (BRFSS), an annual telephone survey, found that 33% of men and 46% of women were trying to lose weight at the time of the survey (Bish, Blanck, Serdula, Marcus, Kohl, & Khan, 2005). In both women and men, the prevalence of trying to lose weight increased with increasing BMI category, but women were more likely to be attempting weight loss at each BMI category. In women, 29% of normal-weight, 60% of overweight, and 70% of obese women were trying to lose weight. In men, these percentages were 10%, 36%, and 63%, respectively. Black women were significantly less likely to be trying to lose weight than white women; this was especially true within the normal BMI category. Former smokers were more likely than current smokers and those who never smoked to be attempting weight loss in the normal-weight and overweight BMI categories. Women with more than a high school education were more likely to be attempting weight loss than high school graduates in the normal-weight and overweight categories; those with less than a high school education were less likely to be attempting weight loss at all BMI levels.

Weight-Loss Strategies

Although 'fad' diets come and go, eating a variety of foods and avoiding too much dietary fat have been recommended by the U.S.D.A. since 1980 as the best way to stay healthy and avoid disease. In 1995, the U.S.D.A. added physical activity to its dietary guidelines as a way to maintain or lose weight (Davis & Saltos, 1999). Data from the National Weight Loss Registry suggest that 'successful losers,' or overweight people who lose 30 lbs or more and maintain the weight loss for at least one year, have some similarities in the methods they use to lose weight and maintain the weight loss (Wing & Hill, 2001). Nearly 90% of the participants in this dataset "reported modifying both diet and exercise to achieve their successful weight loss" (p.326). In addition, a majority of the participants used the same three strategies to maintain their weight loss, namely eating a low-fat diet (participants' mean fat intake was 24% of total calories), frequently monitoring their food intake and weight (75% report weighing themselves at

least once a week), and getting frequent physical activity (91% report that physical activity is important to their weight maintenance).

While the recommended weight loss strategies are to control caloric intake and increase physical activity, the strategies that people use to lose weight can vary widely. While 'eat fewer calories,' 'don't eat before going to bed,' and 'increase activity' were the top three choices of 'best way to lose weight' reported by a random sample of adults in 1990, 'grapefruit,' 'use diet pills,' and 'eat no fat' were chosen by 0.5%, 0.6%, and 2.5% of the respondents, respectively (Horm & Anderson, 1993). The 1992 Weight Loss Practices Survey found that, of a nation-wide sample of women trying to lose weight, diet and exercise were the two most common weight loss practices used (each over 80% in women; 68% of all women reporting using both). However, 15% of women attempting to lose weight reported using meal replacements, 14% reported using diet pills, 6% reported fasting, and 3% reported using laxatives (Levy & Heaton, 1993).

Data from the 2000 BRFSS (Bish et al., 2005) reveal that the likelihood of choosing physical activity as a way to lose weight decreased with age: in women, 80% of 18 to 29-year-olds, 60% of 50 to 59-year-olds, and 44% of those ages 70 or older reported using physical activity as a weight-loss practice. The likelihood of choosing 'eating fewer calories' as a way to lose weight was more stable at 51-60% across age groups. Only 19% of the women who were trying to lose weight reported both eating fewer calories and exercising at least 150 minutes per week.

Attempted weight loss in normal-weight women has been found to be very common. One study found that even though over two-thirds of their sample was normal weight, 71% of the women expressed a desire to lose weight, with 73% of those wanting to lose weight being of normal weight. Of the women in the sample who were over age 65, 62% wanted to lose weight even though most of the women (65%) were of normal weight. The researchers found that the older women wanted to weigh less, but their desired body weight was more moderate than the desired body weight of the younger subjects (Allaz, Bernstein, Rouget, Archinaud, & Morabia, 1998).

One large study looked at over 10,000 women between the ages of 45 and 69. The women were asked their height, weight, and current weight change attempts ('No,' 'Yes, I want to put on weight,' 'Yes, I want to lose weight'). The researchers found a

non-linear relationship between percentage of women trying to lose weight and BMI, with the steepest increase in the span of BMI's in the normal range. Less than 1% of the women at the lowest end of 'normal' BMI, approximately 65% of those at the highest end of 'normal', 80% of the overweight women, and 90% of the obese were trying to lose weight. Overall, 52% of the subjects were trying to lose weight even though only 39% were overweight or obese. In the 'normal weight' BMI category, 32% of the women were trying to lose weight. The authors concluded that "it is a public health challenge to encourage and support weight loss among overweight and obese subjects on the one hand and prevent unnecessary emphasis on leanness on the other" (Hjartaker, Laake, & Lund, 2001, p. 145).

The Decision to Lose Weight

Studies have found that a significant number of normal weight women are among those trying to lose weight but not all obese women are trying to lose weight (Bish et al., 2005). Why do women, of differing weights, decide to attempt to lose weight? How do these women decide which weight management strategies to use?

A qualitative study performed in England consisted of semi-structured interviews with 16 women who had enrolled in a commercial weight-loss program, or 'slimming club,' to investigate the factors that had led the women to make this decision (Tod & Lacey, 2004). As a decision-making framework, the researchers used the five 'stages of change' proposed by Prochaska and DiClemente (1983): pre-contemplation, contemplation, preparation, action, and maintenance. The women reported having spent quite some time in the pre-contemplation and contemplation stages before finally taking action. Some reported triggers to change, including their children entering school, embarrassing remarks by others, social shame, worsening health or the realization that health could worsen, and critical events (such as viewing unflattering photographs and celebrating milestone birthdays). The two biggest barriers to joining the weight loss program were denial (by dressing in loose clothing or not self-weighing), and bad experiences with previous weight-loss attempts. Similarly, a study performed in Canada in 1998 included interviews with 162 people ages 21 to 81 who had lost weight; the purpose of the interviews was to determine which factors led them to make

the decision to lose weight (Brink & Ferguson, 1998).   The researchers discovered many themes that emerged as motivators of weight loss, including using weight loss as a mood enhancer, being motivated by the death of a loved one, experiencing life transitions, preparing for upcoming events, being concerned about appearance, feeling competition with peers, being stung by others' comments, viewing unflattering pictures, and celebrating milestone birthdays.

In a study conducted in England in 1999 and 2000, researchers interviewed 72 men and women who were normal weight or overweight (but not obese) between the ages of 35 and 55 (Ziebland, Robertson, Jay, & Neil, 2002). The researchers asked questions about views on weight change in adulthood and attempted weight loss in middle age. Nearly 90% of the women and 60% of the men reported attempting weight loss in adulthood, and 58% of the women and 47% of the men reported at least one successful weight loss episode. As in the Tod and Lacey study (2004), many respondents named a specific event (such as a wedding) as their motivation for short-term weight loss. "Few of our respondents were confident that it was possible to lose weight without major effort and sacrifice. Successful weight loss was thought to be short-term and yo-yoing weight was viewed as the norm…" (p. 1087).

Researchers in Scotland interviewed 91 overweight or obese men, ages 18 to 55, who had signed up for a weight loss program at their work (Hankey, Leslie, & Lean, 2002). When asked their primary motivation to lose weight, the men in their 30's listed appearance first, followed closely by health. Men ages 40 to 55, on the contrary, listed health first, followed by fitness; appearance ranked fourth, following well-being.   The older men felt that their appearance was much less of a motivator for weight loss than the younger men.

Summary

Americans, in general, are growing increasingly more obese. People tend to gain weight with age, and, in women especially, the fat tends to redistribute in older age from the lower body to the upper body. Body image, however, tends to stay relatively stable as women age, and women continue to carry mental 'ideals' with them throughout their lives. These trends have led to huge numbers of people attempting

weight loss through various strategies. Knowledge of what leads people to choose their weight-loss strategies and how body image affects attempted weight loss is incomplete. This study will investigate the weight management strategies used by post-menopausal women and the life-course factors that affect their body image and perceptions of weight.

Chapter 3: Methods

Description and Justification of Mixed-Methods and Mixed-Dataset Design

   The objective of this research project was to elucidate the factors associated with attempted weight loss in post-menopausal women. To meet this research objective, a mixed-methods and mixed-dataset approach was used. The datasets employed included quantitative data from a national data source (the National Health and Nutrition Examination Survey [NHANES]) and from locally conducted semi-structured interviews, and qualitative data from locally conducted in-depth interviews. The Kentucky semi-structured interviews were designed to include selected questions from NHANES. Follow-up questions to the NHANES items were also asked; height, weight, and waist circumference were measured; and three psychological scales were administered. By using both NHANES and Kentucky quantitative data, I was able to compare my local sample to a national sample to gauge generalizability, to set my local results in a national context, and to provide more analytical detail than could be afforded by NHANES.

   I recruited a subset of eight women from the larger Kentucky component for follow-up in-depth narrative interviews. The purpose of these narrative interviews was to obtain rich qualitative data regarding the women's life course factors that affected their weight, their perception of their current weight, and influences on their past and current weight control behaviors.

   This study focused on white women ages 50 to 64. A controversy centers on whether being overweight is 'bad' for women's health after the age of 65, or if intentional weight loss in this age group lowers mortality (Stevens et al., 1998; Dyer, Stamler, Garside, & Greenland, 2004). A recent longitudinal study found that intentional weight loss in people over the age of 70 increased the risk of incident mobility limitations in overweight and obese subjects (Lee et al., 2005). Another study found that intentional weight loss in elderly women nearly doubled their risk of hip fracture (Ensrud, Ewing, Stone, Cauley, Bowman, & Cummings, 2003). Consequently, the age range of 50 to 64 can be seen as the 'last best chance' to set oneself up for a healthy old age. I focused on white women because both perceptions of weight (Greenberg & LaPorte, 1996; Padgett & Biro, 2003) and health consequences of weight (Calle, Thun, Petrelli, Rodriguez, & Heath, 1999;

Fontaine, Redden, Wang, Westfall, & Allison, 2003) are known to vary among women of different cultures and ethnicities. Included were women who had gone at least one year without a menstrual period (the standard definition of menopause) or who had had a complete hysterectomy (including removal of both ovaries). I chose to only interview women who were not currently on hormone replacement therapy (HRT); studies have shown that women on HRT do not experience the gynoid to android fat distribution shift of post-menopausal women not taking HRT (Reubinoff et al., 1995). In line with the 'last best chance' hypothesis, I chose to only include women who were able to walk without special equipment and were therefore physically able to do moderate exercise. I also chose to only include women who had never been diagnosed with diabetes. Losing weight and increasing physical activity are treatments for type 2 diabetes, and have most likely been recommended by the physicians of women with diabetes. These women may have skewed the results away from the weight loss strategies of "normal" women, so I did not include them in my sample.

This chapter describes each of the three phases of the study: NHANES, Kentucky semi-structured interviews, and Kentucky in-depth narrative interviews. The basic demographics from the NHANES and Kentucky semi-structured interview samples are also included. The two components of this study that were performed in Kentucky were approved by the University of Kentucky Institutional Review Board in October of 2004.

Phase I: National Health and Nutrition Examination Survey

The first phase of my study involved using secondary data from NHANES. NHANES is a program conducted by the Department of Health and Human Services' National Center for Health Statistics. It combines detailed interviews and several types of physical examinations on a large representative sample of U.S. residents for the purpose of monitoring the health and nutrition of the U.S. population (Lee & Nieman, 2003).

NHANES is a cross-sectional study, meaning that subjects are interviewed and examined at one point in time. The surveys are carried out annually, with approximately 5000 participants interviewed each year and with data released in 2-year groupings. The latest full data available at the time of these analyses were from NHANES 1999-2000 (with 9,965 subjects) and NHANES 2000-2001 (with 11,039 subjects).

The interview section of NHANES includes many modules, such as weight history, a 24-hour dietary recall, a food frequency questionnaire, cognitive functioning, and social support. The physical examination module includes medical examinations (such as cardiovascular fitness tests, blood pressure readings, and muscle strength measurements), dental examinations, and hearing tests. NHANES also includes extensive laboratory tests (Lee & Nieman, 2003).

NHANES uses "complex, multi-stage, stratified, clustered samples of civilian, non-institutionalized populations" (NCHS, 1996, p.13). In the first stage of sample selection each year, up to 15 primary sampling units (mostly counties) are randomly chosen. The second stage of the sample selection involves identifying city blocks or other area segments within each primary sampling unit, the third stage involves identifying individual households, and the fourth stage involves identifying individual people. The selection of subjects within the primary sampling units is not simply random, but is weighted by sex, age, and race. Neither primary sampling units nor year of interview are included in the publicly available dataset. In addition, subject anonymity is protected by recoding some variables (such as education, race, and ethnicity) into more general categories than those that are initially collected.

The NHANES data are publicly available through the National Center for Health Statistics website (http://www.cdc.gov/nchs/nhanes.htm). The data for each module are available in SAS (SAS Institute Inc., Cary, North Carolina) format; a unique identifier is assigned to each subject and is used to link data across modules.

Phase II: Kentucky semi-structured interviews

The second phase of this study involved semi-structured interviews with post-menopausal women in Central Kentucky. The purpose of this phase was to allow greater geographic specificity and to add detail and follow-up items to the data available from NHANES. The entire Kentucky semi-structured interview instrument is in Appendix A.

Development of instrument.

I chose to take many of the questions in my semi-structured interview from the NHANES 1999-2000 interview (the last NHANES data release available at the time I was designing my instrument). I chose *a priori* the general categories I wanted to address in my interviews (such as weight history, smoking history, education, and marital status) and selected the relevant questions from NHANES.

The physical activity module of NHANES was too detailed for my purposes; it listed dozens of activities and asked participants which activities they performed and for how long. I wanted to get a more general 'exercise' measure, so I looked at the 'physical activity' sections of other national studies to see if items from their instruments would better suit my purpose. The National Health Interview Survey (NHIS) 2004 (http://www.cdc.gov/nchs/nhis.htm) had a shorter, simpler physical activity section, which was thus adopted for use in my Kentucky instrument.

Although I selected most of the questions on my instrument from NHANES or the NHIS, I also added follow-up questions throughout my interview. For instance, the NHANES weight history module asks about attempted weight loss in the past 12 months, but does not ask if the subject is *currently* trying to lose weight. I felt that this was important information because the weight self-assessment question is phrased in the present tense ("Do you feel you are overweight, underweight, or about the right weight?").

I also included three psychological scales at the end of the survey: the Dieting Beliefs Scale (Appendix B), the Self-Objectification Questionnaire (Appendix C), and the Self-Esteem Scale (Appendix D). The Dieting Beliefs Scale is a measure of weight locus of control, or "…the expectancy that one can affect or control, at least in part, one's own weight" (Stotland & Zuroff, 1990, p. 195). An internal weight locus of control is defined as "the belief that one's own behavior or attributes determine one's weight" (p. 195). An external weight locus of control, on the other hand, is defined as "the belief that one's weight is due to factors outside his or her own control, such as luck, genes, fate, or social support" (p. 195). The scale consists of 16 items (eight internal factors and eight external factors) that are rated on a scale of one to six, giving a possible range of scores of 16 to 96. A higher score on the DBS indicates a more internal weight

locus of control. In an overwhelmingly normal-weight sample of undergraduate women, Cronbach's alpha (a measure of internal consistency) was .68 and test-retest reliability (which measures how stable an instrument is across time) was .81 (Stotland & Zuroff, 1990).

The Self-Esteem Scale (Bachman & O'Malley, 1977) was used to measure global self-esteem. This scale consists of 10 items rated on a 5-point Likert scale (from "Almost always true" to "Never true"); six of the items are reverse-scored. A higher score indicates higher self-esteem. The original research behind this scale was performed on high school and college-age boys; I altered the wording of one of the questions for this female sample ("I am a useful guy to have around" was changed to "I am a useful person to have around."). Others, too, have used this scale on older female samples. Tiggemann and Lynch (2001) used this scale in a sample of women ages 20 to 84 in a study measuring body image across the lifespan. They found a Cronbach's alpha of .87 in a sample of adult women. Webster and Tiggemann published a study in 2003 using this scale in a sample of women ages 20 to 65; they found a Cronbach's alpha of 0.92.

The concept of self-objectification deals with an individual's tendency to view his or her body from an outsider's perspective (Fredrickson & Roberts, 1997). The Self-Objectification Questionnaire measures a person's self-objectification; the questionnaire contains ten items that the subject ranks in order from most to least important. Five of the items are appearance-based (including weight and physical attractiveness) and five are competence-based (including strength and energy level). Total scale scores range from -25 to 25, with higher scores indicating more self-objectification (Fredrickson, Roberts, Noll, Quinn, Twenge, 1998). The Self-Objectification Questionnaire is copyrighted and not in the public domain; I e-mailed Barbara Fredrickson, the creator of the questionnaire, to ask permission to use it in my study. In her reply, Dr. Fredrickson granted permission for the scale's use, but asked that I use an updated version of the scale. This updated version differed only in the wording of the instructions and the layout of the items. This updated version was used in my Kentucky semi-structured interview.

Sample size calculation for Kentucky sample.

The NHANES data was previously collected, so I did not have control over final sample size. However, I was able to determine *a priori* how large a sample I would recruit for the Kentucky semi-structured interviews. I had several research questions that I wanted to investigate with the semi-structured Kentucky interviews. One of my hypotheses was that a woman's total score on the Dieting Beliefs Scale (DBS), a measure of weight locus of control, would influence whether or not she was attempting weight loss. Therefore, I decided to base my sample size calculation on 1) the total score from the DBS and 2) whether weight loss had been attempted in the last 12 months. I hypothesized that the total DBS score would be a strong predictor, among those who would like to weigh less, of which women chose to attempt weight loss. The main hypothesis to be tested was as follows: *among women who want to weigh less, the DBS score will differ in women who have tried to lose weight compared to those who have not tried to lose weight.* The null hypothesis (H_0) is no difference in DBS score between women who have tried to lose weight and women who haven't.

The anticipated direction of association between total score on the DBS and attempted weight loss was undetermined. If it is a general, life-long measure, then I would hypothesize that those women who have a higher DBS score would be more likely to attempt weight loss–they feel they have control over their weight, so they try to exert that control. Those who feel it is all genetics or society or fate, however, would not bother to attempt weight loss. However, because weight loss attempts are often ongoing and "yo-yo" dieting is common, the success or failure of previous weight-loss attempts could influence the DBS score of women who tried to lose weight. For example, if a woman went on two diets over the past year and failed at both of them, she may be more likely to think her weight is not under her control and therefore score lower on the DBS.

Sample size calculations require estimates of several factors, including means and standard deviations of the scales to be used. I chose to use an Australian study conducted by Bryan and Tiggemann (2001) for the estimates in my sample size calculation. In this study, obese women (average age = 49 years) were split into a Diet group and a Control group. The Diet group followed a 15% fat diet and met with a

dietician every two weeks. At the beginning of the trial, the DBS scores of the Diet group and Control group were similar (67.9 vs. 68.6, respectively). At the end of 12 weeks, the average DBS score for the Diet group had increased to 69.3 (std. dev = 9.3) and the average DBS score for the Control group had decreased to 63.2 (std. dev. = 8.4). This indicates that those who were on the diet had a more internal weight locus of control.

Among articles that list means and standard deviations for the DBS, this study had the most similar sample to my population (older women, some of whom have been on diets and some of whom have not). The big difference was that, in this study, the Diet group was assigned to a diet and given help – all of the women in the Diet group were counseled and, after 12 weeks, all of them lost at least some weight. In my observational study, I asked women if they had attempted weight loss in the last 12 months. Despite this difference, these were the best estimates for DBS mean scores and variances I could obtain.

Because my hypothesis was only relevant to women who said they would like to weigh less, I did a preliminary calculation using data from NHANES 1999-2000 (the last years that were available at the time of my sample size calculation) and determined that 85% of the white women who met my criteria would like to weigh less.

With a sample size calculator provided on-line by the UCLA Department of Statistics (http://calculators.stat.ucla.edu/powercalc/normal/n-2-unequal/n-2-uneq-var-samp.php) and assuming a normal distribution and unequal variance, I used the following estimates (Bryan and Tiggemann, 2001) to calculate the sample size for my study:

mean of group 1 (μ_1) = 69.3, standard deviation of group 1 (σ_1) = 9.3, and

mean of group 2 (μ_2) = 63.2, standard deviation of group 2 (σ_2) = 8.4.

Choosing a standard 5% probability of rejecting the null hypothesis if it were true (Type I error rate, α =.05) and 20% probability of accepting the null hypothesis if it were false (Type II error rate, $\beta = 0.8$) yielded a group 1 sample size (n_1) of 36 and a group 2 sample size (n_2) of 32, giving a total sample size (n) of 68. Dividing this by my estimate of the proportion of women who will want to weigh less (.85 of total population) yields n = 80.

Double-checking this result using a simpler equation assuming equal variance:

$$n = 2(s)^2(Z_\alpha + Z_\beta)^2 / (MDC)^2$$

Where:

n = the sample size estimate;

s = pooled standard deviation = 9.0 (weighted average of the two groups from Bryan and Tiggemann);

Z_α = Z-coefficient for the Type I error rate (α = 0.05)= 1.96;

Z_β = Z-coefficient for the Type II error rate (1-β=0.2) =0.84;

MDC = Minimum detectable change size = 69.3-63.2 = 6.1 (the difference between the Control and Diet groups seen in Bryan and Tiggemann (2001))

Yields,

n = 34 (each group), 2n = 68, 2n/.85 = 80

Based on these two estimates, I decided to set my final sample size at 80 women.

Subject recruitment.

Once I settled on a sample size goal and inclusion criteria for my subjects, I set about recruiting women into my study. I created a flyer for subject recruitment (Appendix E), and attached this flyer to e-mail messages sent to listservs (including University of Kentucky (UK) Staff and UK College of Health Sciences faculty) and put the text of the flyer in newspapers and newsletters (including the Lexington Herald-Leader, the UK Women's Club monthly newsletter, the UK College of Public Health weekly e-newsletter, the Commerce Lexington weekly e-newsletter, and the UK Donovan Scholars monthly newsletter). In addition, this flyer was posted through the UK Clinical Research Organization on the "Volunteer Opportunities" walls in a local clinic. I also addressed formal groups to personally ask for volunteers, including the UK Women's Club, the UK Donovan Scholars (a program in which people over the age of 65 can take classes at the University of Kentucky for free), and a weight-loss class through the UK Health and Wellness program.

When potential recruits responded to my announcements, either through e-mail or by telephone, I explained my study and set up a time and place to meet. If the

women did not specifically address the inclusion criteria listed in the flyer when making contact with me, I assessed them with a short screening interview over the phone to be sure that they met all of these criteria. I indicated to the women that the location of the interview was up to them, but, because I would be weighing and measuring them, I recommended somewhere with privacy. The most common locations chosen for the interviews were the subject's home, my office in the Graduate Center for Gerontology, and the subject's office. I had planned on mailing reminder letters to the women several days before their appointment; however, the majority of the appointments were made for the few days following the initial phone call, so mailing reminder letters was not feasible. Instead, for those women whose appointments were made for two or more days following the initial contact, I phoned the women the day before our scheduled meeting to remind them of our appointment.

Conducting semi-structured interviews.

The subjects and I met one-on-one to conduct the semi-structured interviews. Informed consent was obtained before the start of the interview and subjects were given a copy of the consent form (Appendix F).

The interview consisted of approximately 60 multiple-choice and open-ended questions read aloud by me; Appendix A contains the entire interview instrument. At the end of this set of questions, the subjects were weighed on a scale (Taylor Lithium Electronic Scale; model number 7007 4804 V1584). While electronic scales are not considered as accurate as balance beam scales, they are recommended when portability is needed (Lee & Nieman, 2003). Before weighing, subjects were asked to remove their shoes and heavy outer garments (jackets, cardigans, vests, etc.), and so were weighed without shoes in light indoor clothing. I also measured the subjects' height and waist circumference. To measure height, I asked subjects to stand without shoes against a wall or doorframe, and I placed a marker on the wall at the level of the top of their head. I then asked the subjects to step away from the wall and I measured from the floor to the marker with a carpenter-style tape measure. Waist circumference was measured with a seamstress-style tape measure at the smallest point between the subject's ribs and iliac crest; if a subject did not have a waist that was narrower than her

hips, I measured at the level of the umbilicus (Canoy et al., 2004). After the measurements, I handed the participant a clipboard containing three one-page personality scales (the Self-Esteem Scale, the Dieting Belief Scale, and the Self-Objectification Questionnaire), which each subject filled out on her own. Once these were completed and turned in to me, I handed the subjects a sheet of paper containing University of Kentucky resources (Appendix G) that the subject could contact if she felt the need to speak with a professional about the potentially sensitive issues (i.e., weight, body image) we had discussed in the interview.

Quantitative Data Analysis

SAS, version 9.1 (SAS Institute Inc., Cary, North Carolina), was the statistical software used to analyze both the NHANES and Kentucky semi-structured interview data. Frequencies were run on all data elements in both data sets to check for missing or unusual data and to see the distributions of each data element. Eighty-three women completed the Kentucky semi-structured interviews. Two of these women had had a menstrual period in the previous twelve months and had not had hysterectomies; these two women were excluded from the final analyses, leaving a final sample size of 81. One hundred and seventy-nine women met all of the inclusion criteria in the NHANES data set; two of these women had incomplete measured height or weight and were excluded, leaving a final sample size of 177.

For each research question, I first ran bivariate (two-variable) analyses to identify any potential relationships between the outcome under investigation and a host of predictor variables. Then, each variable that had a significance level (p) less than or equal to 0.20 in the bivariate analyses was further analyzed using multivariate logistic regression models. Multivariate regression is a statistical method used to determine if there are relationships between an outcome variable and a predictor variable while controlling for the effects of other variables of interest. In standard binary logistic regression, the outcome variable can have one of two values – "yes" or "no".

For each variable that showed potential to be related to the outcome variable, two backwards elimination logistic regression models were run. The first backward elimination model included interaction terms; the main effects variables were forced in,

but the interaction terms were allowed to be eliminated at a significance level of 0.05 (Tyas, Koval, & Pederson, 2000). If an interaction term was significant, the model was stratified by one of the variables in the interaction term and re-run. The second backward elimination model forced in age and education, but allowed the other predictor variables to be eliminated at a level of p=0.15. Hosmer and Lemeshow (1989, p.108-109) recommend, in a stepwise logistic regression model, a significance level for entry of 0.15 – 0.20 and a significance level for exclusion slightly higher. Backwards elimination models, because they begin by including all variables in the model and "kick out" variables that don't meet a pre-determined level of significance, allow more variables to be included in the final model compared to forward or stepwise logistic regression models. For this reason the lower end of the range of significance levels recommended by Hosmer and Lemeshow was chosen for the backward elimination models. The remaining predictor variables were considered the "final model" for this research question. Variables that had a significance level less than 0.05 are reported as "significant;" those that had a significance level greater than or equal to 0.05 and less than 0.10 are reported as "marginally significant."

Once a final model was established, the predictor variables were checked for collinearity using PROC REG with the option COLLIN. Influential outliers were determined using the INFLUENCE and IPLOTS options of PROC LOGISTIC. Subjects with a CBAR, C, or DFBETA value greater than 2 were considered to be influential outliers; these subjects were removed from the final model and the models were re-run to see if there was a difference in the Hosmer-Lemeshow Goodness of Fit (calculated through the LACKFIT option of PROC LOGISTIC) and the odds ratios of the predictor variables.

Demographics and Frequencies, Quantitative Data

Table 3.1 lists the demographic and lifestyle characteristics of the women included in the two data sets. Table 3.2 lists the weight-related characteristics of these two samples.

The demographics of the NHANES sample were quite different from the demographics of the Kentucky sample (see Table 3.1). To adjust for differences in

these two samples, two demographic variables, age and education, were included (or "controlled for") in each of the multivariate models, when possible.

Table 3.1. Characteristics of Kentucky semi-structured and NHANES participants

	Kentucky (n=81)			NHANES (n=177)		
	Avg.	± Std. Dev	Range	Avg.	± Std. Dev	Range
Age (years)	57.4	± 4.2	50 – 64	57.9	± 4.2	50 – 64
Height* (in)	63.4	± 2.3	58.5 – 70.5	63.8	± 2.7	57.6 – 72.4
Years since last menstrual period**	8.2	± 5.9	0.25 – 31	11.2	± 8.4	0 – 38
Exercise (min/week)	226.9	± 282.9	0 – 1260	193.7	± 349.6	0 – 2695
Restaurant (meals/week)	2.95	± 2.74	0 – 14	2.13	± 1.96	0 – 14
Psychological scales:						
Dieting Beliefs Scale	71.2	± 7.7	52 – 89			
Self-Esteem Scale	44.4	± 4.4	34 – 50			
Self-Objectification Questionnaire	-15.1	± 9.3	-25 – 25			

	Kentucky (n=81) Percent of total	NHANES (n=177) Percent of total
Highest educational level		
Less than High School	0%	16%
High School/GED	12%	32%
Some College/Associate Degree	17%	53%
Bachelor's Degree	28%	
Master's Degree	33%	
Doctorate/Professional Degree	9%	
Smoking status		
Has smoked in the last 30 days**	5%	23%
Has smoked 100+ cigarettes in life	43%	51%

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	Kentucky (n=81) Percent of total	NHANES (n=177) Percent of total
Self-rated health*		
Excellent	40%	26%
Very Good	36%	32%
Good	22%	29%
Fair	2%	11%
Poor	0%	2%
Marital status*		
Married	65%	64%
Divorced	20%	17%
Separated	0%	1%
Never Married	10%	4%
Widowed	3%	13%
Living with Partner	1%	2%
Alcohol frequency*		
Never	23%	34%
Less than once per week	33%	39%
Once per week or more	43%	27%
Muscle strengthening **	**Once per week**	**Four times in last 30 days**
	49%	18%

* p < .10 between Kentucky and NHANES datasets; ** p <.05 between Kentucky and NHANES datasets

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Table 3.2. Weight characteristics of Kentucky semi-structured interview and NHANES participants

		Kentucky (n=81)		NHANES (n=177)	
	Avg. ± Std. Dev	Range		Avg. ± Std. Dev	Range
Weight (lbs)	166.6 ± 37.9	110 – 296		167.6 ± 38.0	97.7 – 282.2
BMI (m/kg²)	28.4 ± 6.4	18.9 – 53.3		29.0 ± 6.5	18.4 – 59.9
Waist Circumference (in)[a]	35.3 ± 6.1	26.5 – 56.5		37.8 ± 5.9	25.9 – 55.2

Weight category	BMI Range	Kentucky (n=81) Percent of total	NHANES (n=177) Percent of total
Underweight	<18.5	0%	1%
Normal	18.5 – 24.9	38%	32%
Overweight	25.0 – 29.9	27%	27%
Obese	30.0 +	35%	41%
Obese I	30.0 – 34.9	23%	25%
Obese II	35.0 – 39.9	5%	10%
Obese III	40.0 +	6%	6%
Would like to weigh			
More		0%	1%
Less		86%	82%
About the Same		14%	18%
Attempted Weight Loss			
in last 12 months**		72%	48%

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Table 3.2, continued

Weight history	Kentucky (n=81)			NHANES (n=177)		
	Avg.	± Std. Dev	Range	Avg.	± Std. Dev	Range
Weight gain (lbs) since age 25:	36.9	± 32.7	-17 – 135	36.4	± 28.9	-30 – 135
Weight gain (lbs) in last 10 years*:	9.6	± 17.8	-63 – 62	14.5	± 22.9	-78 – 110
Difference, minimum and maximum weight since age 18[b].	60.1	± 35.4	10 – 192	56.5	± 34.7[c]	15 – 223

* p < 0.10 between Kentucky and NHANES datasets; ** p < 0.01 between Kentucky and NHANES datasets;
[a]Waist circumference was measured at the narrowest point between the ribs and iliac crest in the Kentucky sample and at the lateral border of the ilium in the NHANES sample.
[b]Minimum weight since age 18 was only asked in the 1999-2000 wave of the NHANES; [c]three NHANES participants were missing this data.

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Basic descriptors.

The average age of the women in the Kentucky sample was 57.4 years, and the average number of years since their last period (YSLP) was 8.2 years. The average age of the women in the NHANES sample was 57.9 years, which was very similar to the Kentucky sample. However, their average YSLP was 11.2 years, nearly three years higher than the Kentucky sample's average. The Kentucky sample was highly educated; all of the women had at least a high school diploma or GED, and 70% had a Bachelor's degree or higher. The NHANES sample was not as well-educated: 16% did not have a high school diploma or GED, and only 53% had more than a high school education. The two most common marital categories in both samples were married (64% in NHANES; 65% in Kentucky sample) and divorced (17% in NHANES, 20% in Kentucky sample); the third most common NHANES marital category was widowed (13% in NHANES vs. 2% in Kentucky sample) and the third most common category in the Kentucky sample was never married (10% in Kentucky vs. 4% in NHANES).

Lifestyle factors.

The women in the Kentucky semi-structured sample consumed significantly more alcohol, on average, than the women in the NHANES sample. Only four of the women in the Kentucky sample (5% of total) reported being current smokers (smoking on one or more of the last 30 days), whereas forty-one (23%) of the women in the NHANES sample reported being a current smoker. In the Kentucky sample, 31 women (38%) indicated that they had smoked at least 100 cigarettes in their lifetime but had not smoked in the last 30 days (former smoker), and 46 women (57%) reported that they had not smoked at least 100 cigarettes in their lifetime (never smoker). In the NHANES sample, 49 women (28%) were former smokers and 87 women (49%) were never smokers.

The women in the Kentucky sample reported an average of 227 total (moderate plus vigorous) minutes of exercise per week, and the women in the NHANES sample reported an average of 194 total (moderate plus vigorous) minutes of exercise per week. The NHANES and Kentucky samples were asked about muscle strengthening

frequency in slightly different ways: the NHANES women reported muscle strengthening frequency in the previous 30 days and the Kentucky sample was able to give a frequency by month, week, or day. Forty-nine percent of the Kentucky sample reported doing strength-related exercises at least once per week, but only 32 (18%) of NHANES participants reported doing strength-related exercises at least four times in the last 30 days.

Weight-related data.

The average body mass index (BMI) of the women in the Kentucky sample was 28.4; for the NHANES women, this average was 29.0. Both of these averages are in the standard "overweight" range set forth by the U.S. government. The average waist circumference was 35.3 inches in the Kentucky women and 37.8 in the NHANES women; however, these measurements were made in different locations in the two samples, so direct comparison cannot be made. In the NHANES sample, the waist was measured at the lateral edge of the ilium (NHANES, 2002). In the Kentucky sample, the waist was measured at the narrowest point between the iliac crest and the lower rib cage (the 'natural waist') or at the level of the umbilicus if the natural waist was not narrower than the hips.

The women were asked how much they weighed now, 10 years ago, and at age 25. There was no significant difference in the average self-reported weight gain since age 25 in the Kentucky and NHANES sample (36.9 vs. 36.4 lbs). The average weight gain in the last 10 years was significantly lower in the Kentucky sample (9.6 pounds) compared to the NHANES sample (14.5 lbs). The question "What is the least you have weighed since age 18 (excluding pregnancy)?" was asked of all of the Kentucky women and of women who participated in the 1999-2000 wave of NHANES; all participants were asked their lifetime highest weight (again excluding pregnancy). The average difference between lifetime minimum and lifetime maximum weight was not significantly different between these two groups (60.1 pounds in the Kentucky sample and 56.5 lbs in the 1999-2000 NHANES participants).

Phase III: Kentucky In-Depth Interviews

The final phase of the study involved in-depth interviews with a subsample of the women who completed the Kentucky semi-structured interviews. The purpose of these interviews was to obtain rich, in-depth qualitative data regarding the women's life course factors that affect their weight, their perception of their current weight, and influences on their past and current weight control behaviors.

Development of interview guide.

An interview guide was created (Appendix H) that listed topics that were covered with all of the women. However, I anticipated that the specific topics addressed during the interview sessions would be unique to each woman. Furthermore, the wording used in presenting topics would necessarily vary among women. Consequently, as is standard in in-depth qualitative interviews, the interview guide was only used as a reminder to ensure coverage of key topics during each interview.

Selecting subjects for Kentucky in-depth interviews.

All data collected from the Phase II semi-structured interviews were entered into Microsoft Access. Basic frequencies were computed to determine variation in the sample. I discovered, for example, that the women I interviewed had a wide range of adult weight histories, education, and marital status. Before selecting the subjects for the in-depth interviews, I determined that I wanted a purposive sample containing women who had a variety of these elements. I also determined that I wanted to include women from both ends of the age range (50 to 64). I chose to interview eight women because this allowed me to get a range of the characteristics I was looking for and was also feasible to the scale of this study.

In my initial analyses of the Kentucky semi-structured data, I found eleven women who had a BMI in the "normal" range but who described themselves as "overweight". I was interested in re-interviewing some of these women to gain insight into how their perceptions of their weight were formed. To do so, I invited the three women with the lowest BMI's who described themselves as "overweight" to do a follow-up interview with me.

Once these three were chosen, I chose an additional five women who would contribute to a range of ages, educational levels, marital statuses, and adult weight ranges. The sample of eight contained women from ages 50 to 63, and contained at least one subject in each of five different educational levels (high school, some college, bachelor's degree, master's degree, and doctoral degree), two different marital statuses (married and divorced), and three different adult weight gain ranges (less than 30 lbs, 30-60 lbs, and 61 lbs or more).

Each of the eight women chosen for my follow-up sample was contacted either by phone or e-mail (depending on how she had originally contacted me to volunteer for the semi-structured interview) and asked to participate in a one-hour follow-up interview. Because of the longer format of this interview, I suggested that we conduct it in the subject's home. All eight women agreed to participate in the follow-up in-depth interview.

Conducting the in-depth interviews.

I met each of the eight women who had agreed to participate in the follow-up interview in her home at a time of her choosing. Informed consent was collected (Appendix I) and the subjects received a copy of the consent form. I tape-recorded each interview.

An interview guide (Appendix H) was used for each subject, and each subject was asked about each topic on the guide. However, the interviews varied in that different topics that were brought up in the course of the interview were explored; in this way, no two of the eight interviews were identical. On average, the interviews took around 30 minutes.

I later used the audio tapes to spot transcribe each interview. In doing so, I did not include false starts, repetitions, and filler noises in the final transcription. I also did not include in the transcription conversation that was not relevant to my study.

Analysis of qualitative data.

The in-depth interviews were first transcribed into a text file. The transcripts were then imported into Microsoft Access, with each sentence fragment constituting one data

element. Each sentence fragment was then coded based on the topic and thought behind the fragment (see the Coding Guide, Appendix J); each fragment could be coded under multiple themes. This confirmatory textual analysis led to several themes that emerged from one or more of the interviews.

This chapter detailed the analytical techniques used on the quantitative and qualitative data collected and used in this dissertation. The following two chapters describe the results of these analyses.

Chapter 4: Results – Quantitative Data

This chapter details the results from the quantitative portion of the dissertation research project. The subjects included in this project are white non-Hispanic post-menopausal women, ages 50 to 64, who do not have diabetes, do not have difficulty walking without equipment, and have never received a diabetes diagnosis.   Data from the 81 women in the Kentucky semi-structured interview sample and the 177 women in the NHANES sample were used to answer the following research questions:

- What are the predictors of attempted weight loss?
- What are the predictors of the strategies used in attempting weight loss?
- What lifestyle factors are associated with being normal weight?
- What factors predict weight gain in adulthood?

Predictors of Attempted Weight Loss

To answer the first research question, I wanted to identify women who had attempted weight loss (attempters) and women who had not (non-attempters) to see if there were any factors that predicted attempted weight loss among women who wanted to lose weight. I felt it was important to narrow the initial field of women who could be determined as attempters or non-attempters to only those women who wanted to weigh less; a woman who thinks her weight is fine and is happy with it has no reason to attempt weight loss, and therefore should not be included in the group of women who want to lose weight but for some reason have not tried.

Attempted weight loss in the last 12 months.

When I initially looked at the best way to investigate predictors of attempted weight loss, I intended to use the NHANES question "Would you like to weigh more, less, or about the same?" to narrow my field down to women who would like to weigh less, and the NHANES question "During the past 12 months, have you tried to lose weight?" to identify attempters and non-attempters. This definition of attempters is used in Table 4.1. In running the statistical models to identify predictors of attempted weight loss in the last 12 months, I chose *a priori* to include measured BMI in the final model.

This is because I thought that BMI would be a strong predictor of this outcome, and I wanted to see if, at a given BMI, any *other* variables predicted current attempted weight loss.

Table 4.1. Predictors of attempted weight loss in last 12 months in those who would like to weigh less

Variables in model	p-value	OR	95% CI
NHANES sample, all ages (n=145)			
High School education or less			
Age	0.29	1.06	0.95-1.19
BMI	0.46	0.97	0.89-1.05
More than a high school education			
Age	0.54	0.96	0.85-1.09
BMI	0.02	1.12	1.02-1.25
NHANES sample, ages 60 and over (n=60)			
High School education or less			
Age	0.14	1.48	0.90-2.56
BMI	0.78	0.98	0.87-1.10
More than a high school education			
Age	0.93	1.04	0.40-2.84
BMI	0.19	1.17	0.95-1.56
Number of close friends	0.02	0.76	0.57-0.93
Kentucky sample (n=70)			
Age	0.03	0.83	0.69-0.97
Education	0.87	0.86	0.13-5.99
BMI	0.01	1.27	1.07-1.56
Smoking history	0.07	4.29	0.96-24.78

In the NHANES sample, the interaction term between education and BMI was significant, so the model was stratified by education (high school or less vs. more than high school). For women with more than a high school education, BMI was predictive of having attempted weight loss in the last 12 months; for every 1-unit increase in BMI, women were 12% more likely to have attempted weight loss in the past year.

The number of close friends a woman had was predictive in the bivariate analyses. This variable was only collected in NHANES for women ages 60 and over, so

I separated out these women for a separate analysis. Within the subset of women ages 60 and over, the interaction term between number of close friends and education was significant, so I stratified this model by education. For women ages 60 to 64 with more than a high school education, number of close friends was significantly predictive of attempted weight loss in the last year; for each one-person increase in her number of close friends, a woman was 27% less likely to be attempting weight loss.

In the Kentucky sample, age and BMI were significant in predicting which women had attempted weight loss in the past year and smoking history (have ever smoked 100 cigarettes) was marginally predictive. The likelihood of having attempted weight loss in the last year decreased with age and increased with increasing BMI. Women who had smoked were over four times more likely to have attempted weight loss in the last 12 months than never smokers.

Attempted weight loss at the time of the interview.

I decided to use an additional approach for the Kentucky semi-structured sample to identify those attempting weight loss for two reasons. The first reason involved the small numbers of women who had **not** attempted weight loss in the Kentucky semi-structured sample. In the NHANES data, 145 of 177 women (82%) said they would like to weigh less; 79 (54%) of the women who would like to weigh less had attempted weight loss in the last 12 months. However, in the Kentucky semi-structured data, 55 (79%) of the 70 women who would like to weigh less had attempted weight loss in the last year, leaving only 15 who had not. Having this few subjects in one of the two comparison groups reduces substantially the statistical power of the analyses, making it less likely that any significant results could be found. Thus I included the question "Are you *currently* trying to lose weight?" in the Kentucky semi-structured interviews; 38 of the 70 women who would like to weigh less (54%) were currently attempting weight loss. This 38 attempter vs. 32 non-attempter split had more power for the logistic regression modeling.

The second reason to use a non-NHANES question to identify attempters and non-attempters was that the lifestyle, demographic, and personality questions were all phrased in the present tense, but the NHANES weight loss attempt question was about

weight loss attempts in the past year. I felt that a weight-loss attempt question posed in the present tense would be a better fit to all of the potential predictor variables that were included. For these two reasons, I chose to use the question "Are you currently trying to lose weight?" to categorize the sample as attempters and non-attempters. Because this question was not asked in NHANES, only the Kentucky semi-structured sample was analyzed to answer this question.

In running the statistical models to identify predictors of current attempted weight loss, I chose *a priori* to include measured BMI in the final model. This is because I thought that BMI would be a strong predictor of this outcome, and I wanted to see if, at a given BMI, any *other* variables predicted current attempted weight loss. Table 4.2 contains the results of the statistical model for current attempted weight loss in the Kentucky semi-structured sample.

Table 4.2. Predictors of current attempted weight loss in those who would like to weigh less, Kentucky sample (n=70)

Variables in model	p-value	OR	95% CI
Age	0.89	1.01	0.90-1.13
Education	0.61	1.44	0.35-6.41
BMI	0.03	1.11	1.02-1.23

The odds ratio for measured BMI in predicting current attempted weight loss was 1.11, meaning that for every 1-unit rise in BMI, subjects were 11% more likely to be currently attempting weight loss. Of those who would like to weigh less (n=70), 35% of normal-weight women, 59% of overweight women, and 64% of obese women were currently attempting weight loss.

Predictors of Weight-Loss Strategies

   I investigated strategies used by the women who had attempted weight loss to identify any lifestyle, personality, or demographic factors that influenced the strategies chosen. During the NHANES and Kentucky semi-structured interviews, women who said they had tried to lose weight in the last 12 months (regardless of whether they currently want to weigh less or not) were given a list of strategies from which to choose the methods they had used. Frequencies were run on the subset that had attempted weight loss in the last 12 months (n=58 in the Kentucky semi-structured sample, n=83 in the NHANES sample). Table 4.3 contains the percent of women who indicated the following strategies when asked "How did you try to lose weight during the past 12 months?"

Table 4.3. Weight-loss strategies, Kentucky and NHANES samples

Weight Loss Strategy	Kentucky (n=58) Percent	NHANES (n=83) Percent
Ate less food	77.6	68.7
Exercised*	77.6	45.8
Switched to foods with lower calories*	65.5	45.8
Ate less fat	56.9	56.6
Drank a lot of water to lose weight*	39.7	21.7
Joined a weight loss program*	37.9	9.6
Followed a special diet*	36.2	4.8
Ate diet foods or products*	25.9	10.8
Used a liquid diet formula	12.1	10.8
Skipped meals	12.1	10.8
Took other pills, medicines, herbs, or supplements not needing a prescription	10.3	7.2
Took prescription diet pills	3.4	0.0
Took laxatives or vomited	1.7	2.4

* $p \leq 0.05$, Fisher's exact test comparing data sets. Women could choose more than one weight-loss strategy that they had used in the previous 12 months.

   For both samples, 'ate less food' was the most popular weight loss strategy. In the NHANES sample, 'ate less fat' was the second most popular strategy; this method was fourth most popular in the Kentucky sample. This may be a result of the time

period in which these interviews took place: the NHANES sample was interviewed between 1999 and 2002 and the Kentucky sample was interviewed in 2005. Mainstream diet trends change rapidly, and it is likely that the three years between the last of the NHANES interviews and the Kentucky interviews saw a big change in the popular notion of fat as 'bad' for one's weight. The difference may also be due to a regional or cultural factor specific to women from central Kentucky.

Six weight-loss strategies differed significantly between the two samples in the percent of women who had used them in the past year: exercised, switched to foods with lower calories, drank a lot of water to lose weight, joined a weight loss program, and followed a special diet. In all six cases, the Kentucky women chose the strategy significantly more often than the women in the NHANES sample. One reason may be that the Kentucky women chose significantly more total strategies than the NHANES sample: an average of 4.6 strategies for the Kentucky women versus 3.0 strategies for the women in the NHANES sample (p< 0.001).

For each weight loss method, bivariate analyses were performed with many predictor variables from the interviews. As detailed in Chapter 3, variables that had significance levels suggestive of a relationship with the strategy under investigation (p ≤ .20) were included in a backwards elimination logistic regression model with the weight loss strategy (Yes/No) as the outcome. Age and education were included as potential confounders. Tables 4.4a – 4.4e contain the final models for each strategy using both the Kentucky and NHANES samples. I chose to group the results by the following categories of weight loss strategies: exercise, reduced intake, switching products consumed, supplementing intake, and formal diet strategies.

Exercise.

In the Kentucky sample, weight gain in the last 10 years was marginally significant (p=0.10; OR= 0.97, 95%CI=0.93-1.01) in predicting exercise as a weight-loss strategy in a model controlling for age and education.

In the NHANES sample, marital status (married/living with partner vs. never married vs. divorced/separated/widowed) had a significance level that was suggestive of a relationship with exercise as a weight loss strategy (p< 0.20 in the chi-square analysis). However, when marital status was included in a logistic regression model with exercise as the outcome, the model did not converge due to the small number (n=3) of 'never married' subjects in the sub-sample of NHANES subjects who had attempted weight loss. When the logistic regression model was run excluding these three 'never married' subjects, the p-value for marital status was a non-significant 0.18. Because this p-value would have led to elimination in the backwards elimination model, I chose to not include marital status in the final model.

In the NHANES sample, both BMI and waist circumference had significance levels that were suggestive of a relationship with exercise (p<0.20 in the bivariate analyses). However, these two variables were highly correlated (Pearson correlation, p<0.001), so including them both in the final model could produce misleading results. Because BMI was more significant than waist circumference (i.e., had a lower p-value) in bivariate analyses with 'exercise,' I chose to include BMI and exclude waist circumference from this model. BMI was marginally significant in predicting exercise as a weight loss method; for each one-unit increase in BMI, women were 8% less likely to choose exercise as a weight-loss strategy.

Table 4.4a. Logistic regression models for exercise as a weight-loss strategy

Strategy	Variables[a]	p-value	OR (95% CI)
Exercise	Kentucky sample (n=58)		
	Age	0.94	0.99 (0.84-1.17)
	Education	0.13	0.23 (0.03-1.59)
	10-yr weight gain	0.10	0.97 (0.93-1.01)
	NHANES sample (n=83)		
	Age	0.36	0.95 (0.85-1.06)
	Education	0.20	0.54 (0.21-1.37)
	BMI	0.09	0.93 (0.86-1.01)

Age and education were forced in to each model.
[a]Education: More than high school vs. High school or less.

Strategies of reduced intake.

Ate less food: The final model using the Kentucky sample contained age (which was forced in) and 'owns scale' (p=0.13); education was not included because it caused the model to have fit problems. No predictor variables were significant.

In the NHANES data set, three variables (years since last period [YSLP], smoking history, and current smoker) had a p≤ 0.20 in the bivariate analyses. YSLP and age were highly correlated (Pearson correlation, p<0.001) as were smoking history and current smoking (Fisher's exact test on a chi-square analysis, p<0.001). Because I had decided to include age in all models, I decided to not include YSLP in this model. There were too few smokers in the Kentucky semi-structured sample to analyze; for this reason, and because smoking history and smoking status were highly correlated, I chose to include smoking history and exclude current smoking status when both were potentially predictive of an outcome in the NHANES models. When age, education, and smoking history were put in a backwards elimination model with the interaction terms, no interaction terms were significant. In this model, smoking history was marginally significant, with women who had smoked at least 100 cigarettes in their lives less likely to choose 'ate less food' as a weight loss strategy.

Ate less fat: In the Kentucky data set, age and education were forced in to the model and weighing frequency was included in the final model but was not significant

(p=0.15). In the NHANES data set, age was the only significant predictor of choosing 'ate less fat' as a weight loss strategy. In a model with education, the odds ratio for age was 0.86; this means that for every increase in year of age, women were 16% (1/0.86) less likely to report using this strategy.

Skipped meals: In the bivariate analyses of the Kentucky sample, waist circumference, BMI, and weight gain since age 25 all had a significance level (p<0.20) that was suggestive of a relationship with choosing 'skipped meals' as a weight loss strategy. However, these three variables were highly correlated, so only waist circumference, which had the lowest p-value, was included in the final model. Due to the very small number of women who chose 'skipped meals' as a weight-loss method (n=7), forcing education and age into the model caused the model to have fit problems, so these variables were not included. In the final model, self-esteem score was significant and waist circumference was marginally significant in predicting this strategy. For every one-point increase on the Self-Esteem Scale, women were 23% (1/0.81) less likely to skip meals as a weight loss method. Every one-inch increase in a woman's waist circumference led to a 20% (1/0.83) decrease in the likelihood of her skipping meals for weight loss.

In the NHANES sample, age significantly predicted this weight loss strategy; with each one-year increase in age, women were 20% (1/0.83) less likely to choose 'skipped meals'.

Table 4.4b. Logistic regression models for strategies of reduced intake

Strategy	Variables[a]	p-value	OR (95% CI)
Ate less food	Kentucky sample (n=58)		
	Age	0.97	1.00 (0.86-1.16)
	Owns scale	0.13	0.19 (0.01-1.11)
	NHANES sample (n=83)		
	Age	0.52	1.04 (0.92-1.18)
	Education	0.16	0.49 (0.18-1.33)
	Smoking history	0.09	0.42 (0.15-1.14)
Ate less fat	Kentucky sample (n=58)		
	Age	0.30	1.08 (0.94-1.26)
	Education	0.39	2.34 (0.37-20.95)
	Weighing frequency	0.15	*six categories*
	NHANES sample (n=83)		
	Age	0.01	0.86 (0.76-0.96)
	Education	0.82	1.12 (0.42-2.99)
Skipped meals	Kentucky sample (n=58)		
	Waist circumference	0.09	0.83 (0.66-1.00)
	Self-Esteem score	0.03	0.81 (0.65-0.97)
	NHANES sample (n=83)		
	Age	0.04	0.83 (0.68-0.99)
	Education	0.50	1.66 (0.37-7.20)

In each model, age and education were initially forced in; however, education caused fit problems in the 'ate less food' and 'skipped meals' models of the Kentucky sample, and thus was not included, and age caused fit problems in (and was excluded from) the 'skipped meals' model of the Kentucky sample.
[a]Education: More than high school vs. High school or less; Smoking History: Ever smoked 100 cigarettes vs. Never smoked 100 cigarettes.

Strategies of switching products consumed.

Switched to foods with lower calories: As in the 'skipped meals' model, both BMI and waist circumference had significance levels that were suggestive of a relationship with this weight loss strategy. Again, waist circumference had the lower p-value and was thus included in this model. The final model using the Kentucky data set included age (which was forced in), measured waist circumference, and years since last period;

education caused the model to fail to converge and was thus not included. Measured waist circumference was a significant predictor of this weight loss method (p=0.03; OR=0.90; 95% CI=0.81-0.98) and years since last period was marginally significant (p=0.07; OR=1.13; CI=1.01-1.31). Age and years since last period measure similar things and are significantly correlated (p = 0.04), but there was no multicollinearity in this model (the highest condition index was over 30, but only one of the variables' proportion of variation was greater than 0.5).

In a model with age and education using the NHANES data set, women who went to restaurants more frequently were more likely to use 'switched to foods with lower calories' as a weight loss strategy. For each visit to a restaurant per average week, women were 53% more likely to choose this method for attempted weight loss.

Drank a lot of water to lose weight: Frequency of alcohol consumption, Dieting Beliefs Scale total score, age, and education were included in the final model of the Kentucky sample.   Alcohol frequency was a three-category variable including 'never drinks,' 'drinks less than one time per week,' and 'drinks one or more times per week.' Compared to 'drinks one or more times per week,', 'drinks less than one time per week' significantly predicted this weight-loss strategy (p=0.02; OR = 3.82; 95% CI= 0.97-17.18). Total Dieting Beliefs Scale score was marginally significant in predicting this weight-loss strategy (p=0.07; OR=1.08; 95% CI=1.00-1.17).

In the NHANES data set, age was significant in predicting 'drank water to lose weight' as a weight loss strategy; older women were less likely to use this method. Marital status as a whole was significant in predicting this strategy. Divorced, separated, and widowed women were five times more likely to choose 'drank a lot of water to lose weight' than married women. There were only three women in this sample who were 'never married'; this small number led to a very large confidence interval for this category. Removing 'never married' subjects from the model caused the marital status category to become even more significant (p=0.01); however, the odds ratio and 95% confidence interval for 'Divorced/separated/widowed vs. Married/living with partner' did not appreciably change, nor did the effects of age and education on the model.

Ate diet foods or products: No variables significantly predicted this strategy in the Kentucky data set. In the NHANES data set, marital status was significant in

predicting the strategy as a weight loss method. Divorced, widowed, and separated women were nearly eight times more likely to choose 'ate diet foods or products' than married women. There were too few women in the 'never married' group to generate an odds ratio or confidence interval for this category. Excluding these women (n=3) from the model changed the p-value for 'divorced/widowed/separated vs. married living with partner' to 0.01, but did not appreciably change the odds ratio or 95% confidence interval.

Used a liquid diet formula: Weight gain in the last 10 years was marginally significant in predicting this strategy in the Kentucky data set in a model including age and education. For every pound gained in the last 10 years, women were 4% more likely to use a liquid diet formula as a weight-loss strategy.

In the NHANES data set, total exercise minutes per week (moderate plus vigorous) significantly predicted this weight loss strategy. While the odds ratio (1.002) was very close to one, it is important to remember that this variable was measured in minutes. Every minute of exercise per week increased a woman's odds of choosing liquid diet formulas by 0.2%; therefore, for example, an additional 150 minutes of exercise per week (i.e., an average of 30 minutes per day, five days per week) increased the likelihood of using a liquid diet formula by 150 * .002 = 0.3, or 30%.

Table 4.4c. Logistic regression models for strategies of switching products consumed

Strategy	Variables[a]	p-value	OR (95% CI)
Switched to foods with lower cal.	Kentucky sample		
	Age	0.54	0.95 (0.81-1.09)
	Waist circum.	0.03	0.90 (0.81-0.98)
	YSLP	0.07	1.13 (1.01-1.31)
	NHANES sample		
	Age	0.62	1.03 (0.91-1.17)
	Education	0.25	1.80 (0.66-5.00)
	Rest. freq	0.03	1.53 (1.07-2.33)
Drank water	Kentucky sample		
	Age	0.78	1.02 (0.89-1.18)
	Education	0.36	2.33 (0.36-15.38)
	DBS	0.07	1.08 (1.00-1.17)
	Alcohol Freq.	0.07	
	Never vs. 1+/wk	0.14	0.71 (0.15-3.13)
	<1/wk vs. 1+/wk	0.02	3.82 (0.97-17.18)
	NHANES sample		
	Age	0.04	0.86 (0.74-0.99)
	Education	0.30	1.89 (0.56-6.44)
	Marital Status	0.02	
	Previously married vs. Married	0.25	5.46 (1.58-18.85)
	Never married vs. Married	0.60	4.63 (0.34-62.50)
Ate diet foods or products	Kentucky sample		
	Age	0.99	1.00 (0.87-1.16)
	Education	0.86	1.17 (0.15-6.82)
	NHANES sample		
	Age	0.41	0.93 (0.78-1.11)
	Education	0.76	0.78 (0.14-3.64)
	Marital Status	0.03	
	Previously married vs. Married	0.97	7.92 (1.81-42.73)
	Never married vs. Married	0.96	*too few subjects for OR*

Table 4.4c continued

Strategy	Variables[a]	p-value	OR (95% CI)
Used a liquid diet formula	Kentucky sample		
	Age	0.46	1.08 (0.88-1.35)
	Education	0.51	2.37 (0.10-27.16)
	10-yr Weight gain	0.10	1.04 (0.99-1.09)
	NHANES sample		
	Age	0.59	1.05 (0.88-1.27)
	Education	0.92	1.09 (0.20-5.24)
	Exercise (min/wk)	0.04	1.002 (1.000-1.004)

In each model, age and education were initially forced in; however, education caused fit problems in the 'switched to foods with lower calories' model of the Kentucky sample, and thus was not included. [a]Education: More than high school vs. High school or less; Marital Status: Previously married = Divorced, widowed, or separated; 'Married' includes those subjects living with a partner.

Strategies of supplementing intake.

Took prescription diet pills: No predictor variables were significant in the Kentucky sample. No women in the NHANES sample chose this weight-loss strategy.

Took other pills, medicines, herbs, or supplements not needing a prescription: In the Kentucky sample, restaurant frequency was marginally significant in predicting this weight-loss strategy in a model with age and education; for every one-meal increase in the number of meals eaten at restaurants per week, women were 26% more likely to choose this strategy. In the NHANES sample, age was marginally significant in predicting this weight-loss strategy. For every one-year increase in age, women were 25% less likely (1/0.8) to take over-the-counter drugs for weight-loss.

Took laxatives or vomited: No predictor variables were significant in the Kentucky or NHANES samples.

Table 4.4d. Logistic regression model for strategies of supplementing intake

Strategy	Variables[a]	p-value	OR (95% CI)
Took prescription diet pills	Kentucky sample		
	Age	0.38	1.18 (0.84-1.86)
	None in NHANES chose this strategy		
Took other pills, OTC	Kentucky sample		
	Age	0.98	1.00 (0.80-1.25)
	Education	0.64	0.83 (0.08-19.56)
	Restaurant freq.	0.08	1.26 (0.96-1.69)
	NHANES sample		
	Age	0.06	0.80 (0.61-0.99)
	Education	0.94	0.93 (0.12-5.40)
Took laxatives or vomited	Kentucky sample		
	Age	0.99	1.00 (0.57-1.73)
	NHANES sample		
	Age	0.66	1.09 (0.75-1.58)
	Education	0.79	1.49 (0.08-26.54)

In each model, age and education were initially forced in; however, education caused fit problems in the 'Took prescription diet pills,' and 'took laxatives or vomited' models of the Kentucky sample, and thus was not included. [a]Education: More than high school vs. High school or less.

Formal diet strategies.

Joined a weight loss program: In the Kentucky sample, the final model for this weight-loss strategy included age, education, and Dieting Beliefs Scale total score. Dieting Beliefs Scale score was significant and age was marginally significant in predicting the women who joined a weight-loss program as a strategy for weight loss. For each one-point increase in the Dieting Beliefs Scale score, women were 9% more likely to have joined a weight loss program.   For every one-year increase in age, women were 13% more likely to have joined a weight loss program.

In the NHANES sample, restaurant frequency was a marginally significant predictor of this strategy. For every one-meal increase in number of meals eaten at a

restaurant per week, there was a 51% increase in the likelihood of joining a weight loss program as a weight-loss strategy.

Followed a special diet: For the Kentucky sample, the final model included age and Dieting Beliefs Scale total score (education caused fit problems in the model and was not included). Dieting Beliefs Scale score was significant and age was marginally significant in predicting this strategy. For the NHANES sample, age was marginally significant in predicting this strategy. For every one-year increase in age, women were 35% (1/0.74) less likely to follow a special diet as a weight-loss method.

Table 4.4e. Logistic regression model for formal diet strategies

Strategy	Variables[a]	p-value	OR (95% CI)
Joined a weight loss program	Kentucky sample		
	Age	0.10	1.13 (0.98-1.31)
	Education	0.31	2.72 (0.39-20.47)
	DBS	0.03	1.09 (1.01-1.19)
	NHANES sample		
	Age	0.80	1.03 (0.84-1.27)
	Education	0.56	0.60 (0.08-2.98)
	Restaurant Freq.	0.08	1.51 (0.94-2.46)
Followed a special diet	Kentucky sample		
	Age	0.10	0.89 (0.76-1.02)
	DBS	0.01	0.89 (0.81-0.97)
	NHANES sample		
	Age	0.07	0.74 (0.49-0.98)
	Education	0.58	1.83 (0.19-17.33)

In each model, age and education were initially forced in; however, education caused fit problems in the 'Followed a special diet' model of the Kentucky sample, and thus was not included. [a]Education: More than high school vs. High school or less; DBS = Dieting Beliefs Scale.

Predictors of Being Normal Weight

While it is common to look at data to see what predicts the 'bad' outcome, I chose to look at the quantitative data sets to see what predicted the 'desirable' outcome: what characteristics did the women who were normal weight have in common compared to the women who were overweight or obese?

In the Kentucky data set, several predictor variables showed a potential relationship ($p \leq 0.20$) with the outcome of 'normal weight' (Yes/No) in bivariate analyses. After checking for any significant interaction terms ($p < .05$) and performing the backwards elimination procedure ($p=0.15$ level), the variables in the final model were age, education (more than high school vs. high school or less), restaurant frequency, marital status, total exercise minutes per week, and whether the subject had a scale in her home. However, the INFLUENCE subcommand under PROC LOGISTIC revealed that there was an influential outlier in this model (Confidence Interval Displacement, C = 2.5); in addition, the Hosmer-Lemeshow Goodness-of-Fit p-value was marginally significant ($p=0.07$), which indicated that the model was a borderline bad fit to the data.

The influential outlier is a woman who exercises three hours per day but is overweight. This woman began an intensive workout regimen and had lost 80 pounds in the year before the interview. She is a married high school graduate who weighs herself daily, drinks alcohol an average of twice a week, and eats at a restaurant an average of twice a week. Removing this woman increased the Hosmer-Lemeshow Goodness-of-Fit p-value to 0.80. Therefore, I chose to exclude this subject from the final model, leaving a sample size of 80. Table 4.5 shows the final logistic regression model.

Table 4.5. Predictors of normal weight, Kentucky sample (n=80)

Variables in model	p-value	OR	95% CI
Age	0.72	1.03	0.89-1.18
Education	0.61	0.62	0.08-3.41
Restaurant frequency	0.06	0.75	0.52-0.97
Exercise min/week	0.01	1.01	1.00-1.01
Own Scale (yes/no)	0.06	0.26	0.06-1.01
Marital Status	0.05		
Married/living w partner vs. never married	0.05	0.38	0.05-2.69
Divorced/widowed vs. never married	0.12	1.93	0.23-16.63

With the outlier removed, marital status (married/living with partner vs. never married) and exercise were significant predictors of being normal weight. Women who were married or living with a partner were over two and a half times less likely (1/0.38) to be normal weight than women who had never married. For every one minute of exercise per week, women were 1% more likely to be normal weight; as an example, women who exercised 150 minutes per week (i.e., an average of 30 minutes per day, five days per week) were 150 * .01 = 1.50, or 150% more likely to be normal weight than those who did not exercise at all. Restaurant frequency and whether the woman owned a scale were marginally significant in predicting being normal weight. For each one-meal increase in the number of meals eaten at a restaurant per week, women were 33% less likely (1/0.75) to be normal weight. Women who owned a scale were nearly four times less likely (1/0.26) to be normal weight than women who did not own a scale.

To investigate the predictors of normal weight using the NHANES data set, I created an outcome variable specifying whether the woman was normal weight or overweight/obese. The one subject who was underweight was not included in this model, so the total sample size was 176.

The interaction terms 'age by alcohol frequency' and 'smoking status by alcohol frequency' were significant (p< .05). Therefore, the final model (Table 4.6) was stratified by alcohol frequency ('never,' 'less than weekly,' 'weekly or more').

Table 4.6. Predictors of normal weight, NHANES sample (n=176)

Alcohol Frequency	Variables in model[a]	p-value	OR	95% CI
Never	Age	0.03	1.25	1.05-1.57
(n=61)	Education	0.98	0.98	0.23-4.51
	Smoking	0.03	6.19	1.29-34.94
Less than weekly	Age	0.86	0.97	0.86-1.15
(n=69)	Education	0.02	0.23	0.06-0.76
	Smoking	0.01	7.59	1.92-36.54
	Strength exercise	0.12	3.35	0.76-16.83
Weekly or more	Age	0.06	0.84	0.69-1.00
(n=47)	Education	0.87	0.89	0.18-4.01
	Total exercise			
	(min/wk)	0.13	1.001	1.000-1.003
	Strength exercise	0.08	0.28	0.06-1.16

Age and education were forced in to the model. The other variables were allowed to leave the model at a significance level of 0.15.
[a]Education: More than high school vs. High school or less; Current smoking status: Smokers vs. non-smokers; Strength exercise: Did muscle-strengthening activities four times or more in the last 30 days.

When stratified by alcohol frequency, smoking was significantly predictive of being normal weight in the subjects who never drank or drank less than once per week. In subjects who never drank, smokers were six times more likely to be normal weight than non-smokers. In those who drank less than once per week on average, smokers were more than seven times more likely to be normal weight than non-smokers. Current smoking status was not predictive of normal weight in those who drank at least once per week on average.

Age was predictive of normal weight in both those who never drank alcohol and in those who drank weekly or more often; however, the effect of age on normal weight was reversed in these two groups of subjects. This appears tp represent a kind of dose-response relationship. For those who never drank, each one-year increase in age increased the likelihood of being normal weight by 25%. In those who drank alcohol less than once a week, age was not predictive of being normal weight. In those who drank weekly or more often, each one-year increase in age decreased the likelihood of being normal weight by 19%.

Doing muscle-strengthening exercises at least four times in the last 30 days was marginally significant in predicting normal weight in those who drank alcohol once per week or more often. Those who did strength exercises were 3.5-times less likely (1/0.28) to be a normal weight than those who did not do strength exercises.

Predictors of normal weight in women 60 and older.

In the bivariate analyses, number of close friends was marginally significant in predicting normal weight. However, in NHANES, this variable was only collected for women ages 60 and over. I ran a second model for only women ages 60 and older, and included this variable in the backwards elimination model.

For women 60 and older, several interaction terms (education by smoking status, age by exercise, exercise by close friends, and age by strengthening exercises) were significant (p<0.05). I first stratified the model by smoking status and re-ran the backwards elimination model with the interaction terms. No interaction terms were significant within each smoking status; therefore, the final models were stratified by smoking status (Table 4.7).

Table 4.7. Predictors of normal weight, NHANES subjects 60-64 years (n=75)

Current Smoking Status	Variables in model	p-value	OR	95% CI
Non-smoker (n=61)	Age	0.97	0.99	0.59-1.67
	Education[a]	0.07	0.30	0.07-1.09
	Total exercise (min/wk)	0.12	1.002	1.000-1.005
Smoker (n=14)	Age	0.54	0.78	0.33-1.73
	Education[a]	0.11	8.19	0.77-209.33

Age and Education were forced in to the model.
[a]Education: High school or less vs. More than high school.

For women over the age of 60 who were not smokers, education was marginally significant in predicting normal weight; women with only a high school education or less were over three times less likely to be normal weight than those with more than a high

school education. The number of close friends a woman had was not significant in predicting normal weight in either smokers or non-smokers over the age of 60.

Predictors of Weight Gain in Adulthood

Weight gain in two time periods, from the age of 25 to the time of the interview and from ten years ago to the time of the interview, was assessed for both the Kentucky semi-structured and NHANES samples. Weight gain in the last 10 years was divided into two categories, 'Lost weight or gained less than 10 lbs' (n=38 in the Kentucky sample; n=66 in the NHANES sample) and 'Gained 10 lbs or more' (n=43 in the Kentucky sample; n=108 in the NHANES sample). Weight gain in the last 25 years was also divided into two categories: 'Lost weight or gained less than 30 lbs' (n=40 in the Kentucky sample; n=76 in the NHANES sample) and 'Gained 30 lbs or more' (n=41 in the Kentucky sample; n=95 in the NHANES sample). The cut-points for both time frames were chosen because they most evenly divided the Kentucky sample.

Table 4.8 shows the final model for predictors of gaining ten or more pounds in the last ten years; Tables 4.9 and 4.10 show the final models for predictors of gaining 30 or more pounds since age 25. In the Kentucky sample, restaurant frequency significantly predicted weight gain in the last ten years; every one-meal increase in meals eaten at restaurants per week led to a 39% increase in the likelihood of gaining ten or more pounds in the last ten years (Table 4.8). In the NHANES sample, total minutes of exercise per week were marginally significant in predicting weight gain in the last 10 years. Every minute exercised per week decreased a woman's likelihood of gaining 10 pounds or more in the last 10 years by 0.1%; therefore, for example, an increase of 150 minutes of exercise per week decreased a woman's chances of gaining 10 pounds or more by 150 * .001 = .150, or 15%.

Table 4.8. Predictors of weight gain in last 10 years

	Kentucky Data (n=81)			NHANES Data (n=177)	
Variable[a]	p-value	OR (95% CI)	Variable[a]	p-value	OR (95% CI)
Age	0.64	1.03 (0.92-1.16)	Age	0.55	1.02 (0.95-1.11)
Education	0.64	0.71 (0.16-3.04)	Education	0.82	0.93 (0.50-1.75)
Rest. Freq.	0.01	1.39 (1.10-1.84)	Exercise	0.10	0.999 (0.998-1.000)
DBS	0.13	0.95 (0.89-1.01)			

[a]Education: More than high school vs. high school or less; Rest. Freq: Restaurant frequency (meals per week); DBS: Dieting Beliefs Scale; Exercise: Total exercise minutes per week.

In the Kentucky semi-structured sample, the variables restaurant frequency, total exercise minutes per week, and alcohol frequency ('less than once per week' [but not including never drinkers] vs. 'more than once a week') significantly predicted gaining 30 lbs or more in the last 25 years (Table 4.9). Every one-meal increase in weekly restaurant frequency led to a 46% increase in the likelihood of gaining 30 or more pounds since age 25. Every one-minute increase in weekly exercise led to a 0.3% decrease in the likelihood of gaining 30 or more pounds since age 25, so, for example, 150 minutes of weekly exercise would lead to a decrease of 150 * .003 = 0.45, or 45%. Women who drank an average of less than once per week (but were not abstainers) were over five times more likely to have gained 30 pounds or more since age 25 than those who drank one or more times per week.

Table 4.9. Predictors of weight gain since age 25, Kentucky sample (n=81)

Variables in model	p-value	OR	95% CI
Age	0.27	1.08	0.94-1.24
Education	0.40	0.45	0.06-2.67
Restaurant Frequency	0.01	1.46	1.12-2.03
Exercise	0.04	0.997	0.992-0.999
Alcohol Frequency	0.03		
Never vs. 1+/wk	0.49	1.55	0.41-6.02
<1/wk vs. 1+/wk	0.01	5.73	1.60-23.40

Age and education were forced in to the model.
*Education: More than high school vs. high school or less; Restaurant frequency: meals per week; Exercise: Total exercise minutes per week.

In the NHANES data set, the interaction term 'total exercise by strengthening exercises' was significant ($p < .05$); therefore, the final model was stratified by those who did muscle strengthening exercises and those who did not (Table 4.10). For those women who did muscle strengthening exercises at least four times in the 30 days prior to the interview, no variables significantly predicted gaining 30 or more pounds since the age of 25. For women who had not done strength exercises at least four times in the prior 30 days, every minute exercised per week decreased a woman's likelihood of gaining 30 pounds or more by 0.3%; therefore, for example, an increase of 150 minutes of exercise per week decreased a woman's chances of gaining 30 pounds or more since the age of 25 by 150 * .003 = 0.45, or 45%. Smoking history was marginally predictive of gaining 30 pounds or more in those who did not do muscle strengthening exercises; women who had smoked at least 100 cigarettes in their lifetime were two times less likely to have gained 30 pounds or more since the age of 25.

Table 4.10. Predictors of weight gain since age 25, NHANES sample (n=177)

	Variables in model*	p-value	OR	95% CI
Muscle strengthening 4 times or more in last 30 days (n=32)	Age	0.19	0.88	0.72-1.06
	Education	0.74	0.73	0.09-4.71
Muscle strengthening fewer than 4 times in last 30 days (n=145)	Age	0.68	1.02	0.93-1.12
	Education	0.98	0.99	0.48-2.04
	Exercise	0.003	0.997	0.995-0.999
	Smoking History	0.06	0.48	0.22-1.01

Age and education were forced in to the model.
*Education: More than high school vs. high school or less; Exercise: Total exercise minutes per week; Smoking history: Smoked 100 cigarettes in life vs. have not smoked 100 cigarettes in life.

Summary

The results detailed in this chapter make it apparent that much is different between the women interviewed in Kentucky and the national sample from NHANES. This is likely due to both regional differences and the volunteer bias in the Kentucky sample. None of the models for weight-loss strategies contained the same predictor variables (or p-values for age and education, which were forced in) in both the Kentucky and NHANES samples (Tables 4.4a-4.4e). Likewise, none of the same predictors were significant in the model predicting normal weight (Tables 4.5 and 4.6), or weight gain in last 10 years (Table 4.8). Weight gain since age 25 did share one predictive variable, exercise, between women in the Kentucky sample and NHANES women who did not do regular muscle strengthening exercises.

In the Kentucky sample, restaurant frequency came out as related to adult weight in several models; it was a predictor of weight gain in both the last 10 years and since age 25 and was a marginal predictor (p=.06) of not being normal weight. Exercise was also a predictor of being normal weight, and weight gain since age 25 in the Kentucky sample. A surprising finding was that women who were married were much less likely to be normal weight than women who had never married in the Kentucky sample. A possible reason for this, the fact that single women try to maintain their appearance for social reasons, was uncovered in the qualitative component of this study.

Chapter 5: Results – Qualitative Interviews

The qualitative interviews conducted for this dissertation add a different layer of information and understanding to what emerged from the quantitative analyses, which were based on statistical modeling to identify the predictors of particular outcomes. This additional analytical layer seeks to identify themes involving women's self-image and perceptions of weight across the life course. The qualitative component of this study is included for two purposes. First, in-depth interviews offer rich detail describing influential factors and relationships examined in the quantitative phase of the research, thereby enhancing the understanding of these factors and relationships. Second, the in-depth approach taken in the interviews allowed women to more carefully re-examine their life experiences, thus leading to the identification of new influential factors or relationships that could not have been discovered by way of survey-based data. It is important to note that qualitative results are not meant to be representative of or generalizable to all women in this study. Rather, the purpose is to establish a deeper appreciation of the complexities behind the quantitative findings and to identify new themes in our understanding of body weight and self-image among post-menopausal women.

The first part of this chapter will introduce the eight women who participated in the in-depth interviews. Pseudonyms are used and some identifying characteristics have been changed to protect anonymity. The second part will discuss the factors that the women perceived to affect their weight and weight-control behaviors. The third will identify themes that emerged as being important to the women's self-image.

Introducing the Women

The eight women with whom I conducted follow-up interviews were a subset of the Kentucky in-depth interview sample: white women, between the ages of 50 and 64, who were post-menopausal, not on hormone replacement therapy, able to walk without special equipment, and had never been diagnosed with diabetes. Although they shared all of these characteristics, the eight women with whom I conducted follow-up interviews

varied considerably in several demographic dimensions. Table 5.1 lists some basic

characteristics of these women.

Table 5.1. Characteristics of in-depth interview subjects

Subject	Age	YSLP[a]	Marital Status[b]	Lives with…	Children	Grand-children	Edu-cation[c]	Work[d]	BMI	WC[e]	Considers self[f]
Alice	61	6	Div	Alone	2	No	HS	PT	32.7	38.5	Overweight
Beth	62	14	Marr	Husband	0	No	M	No	22.3	31	Overweight
Claire	52	6	Div	Alone	1	No	B	FT	34.2	39	Overweight
Diane	62	16	Marr	Husband	2	Yes	M	No	32.6	43	Overweight
Gretchen	63	10	Marr	Husband	4	Yes	M	No	21	28.25	Overweight
Marilyn	53	1	Div	Alone	0	No	D	FT	23.9	33.5	About the right weight
Rita	57	7	Marr	Alone	0	No	M	FT	34.3	41	Overweight
Tammy	50	2	Marr	Husband + 2 children	2	No	HS	FT	22.6	29	Overweight

[a]YSLP = Years since last period;
[b]Div = Divorced, Marr = Married;
[c]HS = high school, B = Bachelor's degree, M = Master's degree, D = Doctoral degree;
[d]FT = Full time, PT = Part time, No = No paid employment;
[e]Waist circumference (inches);
[f]The subject's answer to the question "Do you consider yourself now to be overweight, underweight, or about the right weight?"

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Claire is a 52-year-old woman, six years post-menopause, who has been divorced for nine years and lives alone in a small apartment in a minority-dominated neighborhood. Her only child, a 25-year-old son, lives with her ex-husband and his second wife in the home that the subject and her ex-husband once shared. She has a Bachelor's degree, which she earned in her 40's, and is pursuing her Master's while working full-time as a librarian. Her current self-reported weight is 42 pounds higher than her weight at age 25, but she has lost 20 pounds in the last year or so. Her measured BMI is 34.2 and her waist circumference is 39 inches. When asked, "Do you consider yourself to be overweight, underweight, or about the right weight," she replied "overweight."

Rita is a 57-year-old woman, seven years post-menopause, who has been married to her second husband for 17 years but lives separately from him for work-related reasons. Her home is in an older, established neighborhood, and she shares it with a dog she found at a state park. She does not have children. She has a Master's degree and works full-time in a museum. Her current self-reported weight is 71 pounds higher than her weight at age 25, although she has lost six pounds in the last few months. Her measured BMI is 34.3 and her waist circumference is 41 inches. She describes herself as "overweight."

Marilyn is a 53-year-old woman, one year post-menopause, who has been divorced for over 20 years and lives alone in a large old house that she has recently completed remodeling. She does not have children. She has a doctoral degree and works full-time as a consultant. Her current self-reported weight is 33 pounds higher than her weight at age 25. Her measured BMI is 23.9 and her waist circumference is 33.5 inches. She describes herself as "about the right weight."

Beth is a 62-year-old woman, 14 years post-menopause, who is retired and lives with her husband of nearly 40 years, who is also retired. They live in a home that they have owned since the 1970's; their front and back yards contain many beautiful flower gardens. She has no children. She has a Master's degree, and worked as a teacher and school counselor before her retirement. Her current self-reported weight is 15 pounds higher than her weight at age 25; most of that weight gain occurred in the last

year following knee surgery. Her measured BMI is 22.3 and her waist circumference is 31 inches. She describes herself as "overweight."

Alice is a 61-year-old woman, six years post-menopause, who has been divorced since the age of 40 and lives alone in a modest apartment. She has attended college but does not have a degree, and works 20 hours per week as a computer clerk. She has two grown children, a son and a daughter, who live in the same city as she does; she has no grandchildren. Her current self-reported weight is 80 pounds higher than her weight at age 25; most of this gain occurred in the last three years, after she quit smoking. Her measured BMI is 32.7 and her waist circumference is 38.5 inches. She describes herself as "overweight."

Diane is a 62-year-old woman, 16 years post-menopause, who has been married for 43 years and lives with her husband in a large, up-scale town home they have owned for about 10 years. She has a Master's degree and is retired; before her retirement, she worked as a volunteer coordinator at a large university hospital. She has two daughters who live out-of-state, and several grandchildren. Her current self-reported weight is 60 pounds higher than her weight at age 25; this weight gain has been slow and steady since her mid-30's.   Her measured BMI is 32.6 and her waist circumference is 43 inches. She describes herself as "overweight."

Tammy is a 50-year-old woman, two years post-menopause, who has been married for 24 years. She lives in an immaculate home with her husband and two closely spaced teenage children, the youngest of whom is preparing to go away to college. She has a high school diploma and works full-time as an office manager. Her self-reported weight is 15 pounds higher than her weight at age 25; most of this weight gain occurred after age 40. Her measured BMI is 22.6 and her waist circumference is 29 inches. She describes herself as "overweight."

Gretchen is a 63-year-old woman, 10 years post-menopause, who has been married to her second husband for 10 years. They live in a cavernous luxury town home in an expensive neighborhood. She moved from the East Coast to be with her husband when they married. She has four children who live out-of-state, and several grandchildren. She has a Bachelor's degree but does not work. Her self-reported

weight is 8 pounds higher than her weight at age 25. Her measured BMI is 21 and her waist circumference is 28.25 inches. She describes herself as "overweight."

Perceived Influences on Weight and Weight Control

I asked each of the eight women to tell me about the current influences on their weight. Several women answered that their metabolism or genetics influenced them, either in a good or bad way. In addition, several other factors, which will be discussed in turn, came up as influences on weight and as motivators for weight control.

Genetic and metabolic influences.

Three of the women interviewed (Marilyn, Beth, and Gretchen) used the word "metabolism" during the course of our interview to describe an influence on their past or current weight. All three described themselves as "skinny" in young adulthood and had BMI's in the normal range at our interview. Each described themselves as having more energy than others, either presently or in the past. When I asked Marilyn why she was thin as a young adult, she said, "I think it's… just my metabolism. I am not very 'stand-still-ish'." Beth also felt that her "energy" contributed to her low weight when she was younger: "I think metabolism has something to do with it. I've always had a nervous energy effect, and I think that's bound to burn calories."

Gretchen credits her energy with her ability to maintain a low weight in childhood, young adulthood, and mid-adulthood. When speaking about her childhood weight, she said "I was maybe a child that worried a lot, so I used a lot of energy worrying. That was sort of the 'go, go, go' system I had." She also indicated that in mid-adulthood she would regularly gain small amounts of weight over the summer, "but I could lose it with my energy afterwards." While Marilyn and Beth talk about their metabolism in the present tense, Gretchen specifically cites her slowing metabolism as the reason she has to struggle to maintain her weight; and laments, "If I could find something to get my metabolism going strong again….."

Although she didn't use the word "metabolism," Rita also pointed to her energy as the reason she was normal weight as a child: "When I was a child, I was really, really energetic. My dad called me 'Dynamite'. And I was kind of, like, sturdy, but I wasn't fat."

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The concept of genes or family history influencing body size and shape, either positively or negatively, came up in a few interviews. Gretchen says that "genes" are a positive influence on her weight, and says of obesity, "it just wasn't in my family anyway, you know, that type of body." Claire, on the other hand, sees her genetic legacy in a more negative light: "In my family, when the women hit puberty, they start putting on weight." She also describes her father's side of the family as "Hefty people, all of them…The side I take after [laughs], all built like fireplugs basically." When I asked Beth why she thought she was small as a child, she replied "I think it's just in the family. I had a brother who's four years younger than I was, he was a small kid. Just genes."

During our interview, Rita volunteered that she has four sisters who are overweight, and that six of her eight siblings struggle with their weight like she does. She also stated that "Heart disease is very strong in my family." However, she herself never brought up the idea that being overweight "ran in the family" or was genetic in origin. When I asked her, late in the interview, "Do you think that it's genetics that have something to do with that…Or is it more something about how your childhood was?," she replied noncommittally "I think it's probably both," and described the two non-overweight siblings in this way:

> My oldest sister who's thin doesn't work. And she belongs to a spa and a health club and plays tennis, and you know, she doesn't sit at a desk all day and work, and I think that makes a difference too. And that other brother who's thin, I don't know, he's just hyper.

This quote implies that Rita thinks her normal-weight sister has an unusual lifestyle and her normal-weight brother has an unusual personality, therefore making them the two odd siblings and the other seven, the overweight ones, the normal siblings. This may be why she doesn't point to genetics or metabolism as a root cause of her weight problem; she sees her thin brother as having a metabolism outside of the norm, her thin sister as having a lifestyle that overrides a "normal" metabolism, and herself and her other six overweight siblings as having a normal metabolism and a normal lifestyle.

Positive influences on current weight and motivators of weight control.

I asked each of the eight women to describe what influenced her current weight. The following factors were mentioned as positive influences on weight or motivators for weight control.

Foods/food behaviors: Several of the women I interviewed mentioned that they made conscious choices about the food they eat in an effort to control their weight, and that this positively influenced their current weight. French fries, bread, and soda were some of the specific food items that the women mentioned avoiding. Other women had general strategies that influenced their weight positively: "I've really tried to watch my portions"; "I'd just rather make sure I get a certain amount of things to eat every day"; "…what I do is I just stop eating foods that I think are bad for me."

Former diet plans: Two of the women interviewed said that, although they weren't currently following a diet plan, the knowledge gained from diet plans they had previously followed was useful to them in making food choices and was a positive influence on their current weight. One woman, speaking of Weight Watchers, said "I eat smaller portions now too. I guess that was another by-product of weighing and measuring all of your food for a while." Another said, in reference to knowledge about weight loss, "So I'm really familiar with things, between my personal experience and then sitting in on lots of [classes]…and even in [a structured diet] program we had dietitians that advised us and so forth."

Other people: Two of the women cited a friend as a positive influence; Marilyn credited a friend with encouraging her to walk in the evenings more often than she otherwise would, and Rita said that she and a co-worker weigh themselves every Monday as motivation to lose weight. While the presence of someone else was cited as a positive influence, Rita also cited the absence of someone as a positive influence. Because her husband lives out of state, she eats out less often than she would if he lived with her, and she thinks that eating out less often positively influences her weight.

Several subjects mentioned that seeing others with health problems associated with weight motivated them to try to lose weight or eat more healthfully. Claire said,

Everybody I know that's this big [gestures to indicate very large] has *huge* health problems. My dad – he was sedentary and did nothing but put on weight over the years and he eventually developed adult diabetes. By the time he was my age, he was well into it.

The first reason that Rita mentioned when asked why she personally wants to control her weight was "Because I have four sisters with diabetes." Tammy said that after her mother had a heart attack she and her siblings started watching their cholesterol intake.

While Marilyn did not mention any health problems her mother had, she did consider her mother to be a "round woman"; she said she worked to maintain her weight because "I didn't want to be the 'round woman'." On the other hand, she has a very active former mother-in-law about whom she says "…she's 78 and I guess she is my mentor as far as she's always been active and her family lives to be 99 and 100, so I'm always thinking 'If Martha can do all this I should be able to keep going'."

Appearance: The desire to be attractive was listed as a main reason for wanting to control weight by several women. Diane said "…I like being more attractive and I think you're generally more attractive when you're thinner." Gretchen said "I want to look healthy, look good, and be attractive to my husband." Alice said "Everybody gets concerned about their appearance, I don't care how old you are. I'd like to be able to go out and buy little flippy things to wear, you know." When I asked Tammy why she wanted to control her weight, she first listed health reasons, then added "And I guess a little bit of appearance, I mean I'm not above wanting to look my best."

Several women said the desire to fit into their clothes was a motivator for them to keep their weight controlled. Claire said "I like it when my clothes hang loose," Marilyn said "budget-wise, I don't want to have to change clothing and stuff," and Beth said "if I can't get into my clothes, it really frustrates me…. I hate to shop, and I don't want to have to go out and do it again."

Certain weight reached: Two of the women I interviewed said that they decided to take action and lose weight when the number on the scale reached a certain point. Claire said "When I got to 210, that was it. When I hit the scale, I just said 'that's enough. I'm fed up with this, some of this is going to go away.'" Rita also explained

that she had taken action because her weight had reached a certain point: "I started a diet in January because I was at 224."

Physical activity: Physical activity, both intentional exercise and normal daily activities, was cited by several women as a positive influence on their current weight. Alice said "I've started walking, and I've noticed it's helped me out on my weight a little bit." Other women mentioned walking the dog, going to a health club, and yard work as activities that helped them control their weight. While none of the women I interviewed indicated that the tasks required of her job were a positive influence on her weight, Alice indicated that her sedentary job makes her want to be physically active outside of the office: "And the work I do, I sit at the computer for four hours a day, so it [walking] feels really good."

No pregnancies: Marilyn and Beth did not have children, and both of them credit this with helping them maintain their weight in adulthood. On that topic, Marilyn joked, "Of course, now I have no excuse!"

Health problems/physical functioning: Several women cited a health problem or physical functioning as a motivator to lose or maintain their weight. Gretchen stated this as a motivation: "When you reach my age and you have grandchildren, you want to be able to do things with your grandchildren, I really do. You know, take walks with them, and lift them up, swing them, whatever." Diane said "I like to be able to work in the garden and not have much trouble doing it." Beth, who has had knee problems in the past few years and will soon have surgery, says "I have tried to drop a few pounds leading up to surgery." Claire says of the time that she decided to lose weight a year before our interview, "Because by that time, I was hauling myself up and down stairs, puffing before I even got up one flight of stairs. And my knees were killing me." When I asked Claire why it is important to her to control her weight, she replied "Because I hurt less when I lose weight. Over the last year and a half I've managed to drop 20 pounds. And I feel more flexible, my knees aren't bothering me as much. With any luck maybe I can dodge knee replacement."

Alice had a cancer scare a few years ago that led her to make some positive changes in her life, including taking up exercise and quitting smoking: "Because I had that cancer scare, that sort of wakes you up. You think something like that happens to

you, you think 'oh God!' But a positive thing came out of it, you know, because I started taking better care of my health."

Life events: Only one subject mentioned a life event as a motivating factor. Gretchen mentioned that she had worked hard to lose weight for her daughter's wedding a few years ago. Alice remarked that this type of motivation is bad for long-term weight loss:

> I think the best way, it has to be a lifetime thing, it's not a diet. Because if you say it's a diet, you're going to stop. You have a beginning and you have an end date. Like 'I want to lose 2 lbs to go to my son's wedding' or whatever. It has to be, what I've found out, it's going to have to be every day watching, sensible eating.

Future concerns about weight: Although the majority of my interviews with these eight women focused on their past and current lives, the future was brought up by a few women as a motivator for weight control. As mentioned before, Claire hoped to avoid future knee surgery, saying that "…stiffness is starting to creep up a little more every year." A couple of the women named a vague "living longer" when asked why people should control their weight; Alice mentioned that controlling one's weight "…could lead to a longer life, you know," and Tammy replied "I think you live longer…"

Tammy had a specific future-related idea of why she personally should control her weight: "Because I'd like to live to see grandchildren. I had children late in life. And I definitely don't want to have any illnesses that I could control brought on by overweight." A follow-up question revealed that Tammy's youngest child was born when she was 32, which is hardly considered "late in life" anymore. When I pointed this out, she said,

> I thought I would be an older mother, but a lot of people in my generation did wait that long. And then there are some that are grandmothers when I'm just having kids graduate from high school. It's all a trade off. I lived a lot of life before I became a mother.

Negative influences on current weight and barriers to weight control.

On the flip side of the factors that promote weight control are factors that the women saw as negative influences on their weight or as barriers to weight control.

Foods/food behaviors: Just as several women said that avoidance of certain foods was a positive influence on their weight, several said that their consumption of certain foods was a negative influence. When I asked Claire what influenced her current weight, she quipped "I've never met a doughnut I didn't like." She also mentioned that chocolate and "goodies" are ever-present in her place of work. Rita thinks that her consumption of white potatoes is preventing her from losing weight: "…I didn't lose any weight last week. I ate a couple of white potatoes last week, so I guess that's it." Gretchen said "I love chocolate. Chocolate's a problem."

In addition to certain foods being mentioned as problems, some subjects mentioned that their food behaviors were negative influences on their weight. Diane pointed to snacking and eating treats as her "biggest problem." Gretchen said that she tries to control her eating, "…but sometimes I just don't have any control. If it's really good I lose it." Likewise, Alice mentioned overeating: "My problem is portion control – if I have something that I like I'll eat a lot of it." She also mentioned that nighttime is a particularly bad time for her ("...at night it seemed like I'd load up") and that she had the habit of mindless snacking while reading ("you're sitting there eating and you don't even take notice of it. You get interested in your reading.")

Work/stress: Three subjects believed that elements of their work environments were negative influences on their weight. Rita mentioned that her career often compels her to attend dinners and receptions. Alice said that food is a big topic of conversation at her work: "…well we talk about it all the time. 'Did you see that recipe on Food Network?' 'Hey, I pulled something off the computer, you want to make it?'" Claire spoke of a sort of junk food culture at her work:

> And there is a lot of goodies brought in. And at Christmas the customers shower us with cookies and homemade candy and all sorts of things. And we love it…. And then here lately, the director drops in and she brings pizza and that sort of thing. And then they have a children's program, and here's three dozen doughnuts left over.

Several subjects mentioned their work as a negative influence on their weight in ways that were not food-related. Rita and Tammy said that their sedentary jobs made controlling weight more difficult; Rita also said "I've gained over the last two years, I think because I'm at a new job. I've gained, like, 10 pounds. I've got a new job and it's really a lot of stress." Though not specifically work-related, the generalized concept of "stress" was mentioned as a barrier to weight control by Claire and Beth. A busy life was also named as a problem by Gretchen; she said that she has difficulty finding time to exercise because "I can just find too many things to take up my time." She also complained of her frustration of not having energy to exercise.

Health problems: Three subjects mentioned specific health problems that were a negative influence on their weight. Rita said that she had a back problem that prevented her from exercising for a year, and that a bout of bronchitis a few months before our interview had hindered her desired weight loss. Beth had surgery on her arthritic knee a year ago, and said "I carry about 10 pounds more than what I am used to. It basically happened when I developed the bad knee, because I just don't keep up the activity level." Diane says that, because of her "atrial fib," her doctor recommended that she refrain from aerobic activity. While she regularly participates in a water aerobics class, "… it isn't good for me to get into serious exercise, like jogging or something like that."

Menopause/age: Four of the interviewees specifically mentioned menopause as a source of weight gain or shifting body weight. Alice said that she gained weight with menopause, and Gretchen said that menopause made her metabolism slow down. Marilyn said "I do say that menopause has made a little bit of difference. I really do feel thicker than I used to be." Similarly, Beth remarked that "Menopause did put on some pounds, but nothing drastic. It shifted more than anything else…I used to have a real waistline, now I don't have a real waistline."

Age was brought up as a cause of weight gain or difficulty with weight loss by three subjects. Gretchen said of dieting "It just seems that if I try, it just doesn't work as easily as it did when I was younger," and of her weight frustrations, "It's just turning this age." Tammy said of her weight gain "Maybe after 40, it caught up with me." And Alice said that her recent weight gain might have something to do with her age.

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Lack of physical activity: Lack of exercise was mentioned by several subjects as a negative influence on their weight. Beth mentioned her lack of activity due to knee pain as a cause of weight gain. Marilyn said "I'm sure mine [weight gain] is directly related with less exercise and what I put in my mouth. I mean, that's for sure." Two subjects used "should" in relation to exercise: Tammy said "… I don't do it [exercise] as I should. I feel guilty," and Gretchen said "And I should not be so lazy, I should be doing more and more exercise."

Complacency and boredom: Complacency and boredom were two factors the women mentioned as problems in terms of weight control. Beth said that she had recently lost weight, but did not keep it off: "And I actually did drop about 5 pounds. And then I felt so complacent about it that I just started doing my bad things again." She also mentioned that boredom led her to eat: "And boredom, when you can't get involved in the things that you want to get involved in, you're kind of held back and you're frustrated…I'm wanting to feed my face. I want something in my mouth." Alice, who works part-time and lives alone, shared a similar sentiment when asked what influenced her current weight: "Definitely boredom, definitely having something to do, because the weekends are bad…" Alice also said, "'You have more time, I think, when you get older to eat, to think about food…It seems to me I talk about it a lot more than I used to."

Quitting smoking: None of the eight women I interviewed was a current smoker, and only one was a former smoker. Alice, the sole former smoker, felt strongly that quitting smoking was a major cause of her weight gain. She said that she had put on about 15 pounds per year since she quit smoking three years prior to the interview, and that her weight was low and stable before that. To explain this sudden gain, she said "But it [weight] was never a big deal until after I quit smoking, and then I think I replaced one bad habit with another, eating."

Childhood Weight vs. Perception of Current Weight

While the statistical analyses of the quantitative data can demonstrate relationships between predictor variables and outcomes, the qualitative interviews I conducted with eight women allowed me to delve deeper into my subjects' feelings about their own weight and the causes of their weight control issues. Such added insight holds the potential to explain relationships that were identified in the quantitative analysis and to uncover influences that cannot feasibly be addressed in survey approaches. The following themes emerged in the Kentucky in-depth interviews.

In the semi-structured interviews that I administered to 81 post-menopausal women, I asked them "Do you consider yourself now to be overweight, underweight, or about the right weight?" Sixty of the women (74%) responded "overweight." Using BMI as a measure, 11 of the women who considered themselves "overweight" were actually normal weight (BMI < 25.0); most of these women were in the upper end of "normal," but some of the women who thought they were "overweight" had a BMI less than 23. I chose to interview the three women with the lowest BMI's who considered themselves "overweight" to explore any life course factors that could explain their overestimation of their weight.

One factor that all three share is that they considered themselves to be "skinny" or "too thin" in childhood and young adulthood. When I asked Gretchen to describe her weight from as early as she could remember, she began with "I was always skinny. I was *always* skinny. I could eat tons of food." She also talks about being hurt by other people's comments: "…and I was called skinny for so long that it was hurtful…later on, when they were saying this in college, they were trying to be complimentary. But I took it as the old childhood hurtful thing. 'Skinny' and 'funny legs.'"

Beth, who has a BMI of 22.3, shared this story when I asked her to tell me about her weight from as early as she could remember:

The very first thing that I remember ever about my weight was my 4th-grade teacher, she came by my table where I was eating lunch, and commented that I wasn't eating my lunch and no wonder I was such a skinny little thing. That was the first inkling I had that anybody paid any attention to weight. I had never thought of myself as skinny, but I guess from that point on, I did. And I don't know if people just started saying more things – probably because I was growing up – but I started getting

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more feedback from people that I was skinny, and that I was tiny. I kept hearing those kind of evaluations. So, by the time I was a teenager, my issue was gaining weight. Up through college, that was really my issue, was gaining weight.

Tammy, who has a BMI of 22.6 but considers herself to be overweight, shared the following: "I was too thin and would drink milkshakes at night hoping to gain weight. Because I didn't want to look like a 4th-grader when I was in 10th grade." She later shared that "…people would talk about, 'Gosh, you're so skinny.' And it wasn't 'in' to be skinny back then… I just wanted to look like Barbie, and I didn't…She had curves and I didn't, I was just a stick."

Not all of the women that I interviewed who are normal weight now and were skinny as children described themselves as "overweight." Marilyn, who has a BMI of 23.9, said this when I asked her about her weight from as early as she could remember:

> I guess I remember being teased by my brother as being real skinny. And then just noticing in middle school and high school that I was always skinnier looking than everybody else. And everybody …it just seemed like they were more shapely and I felt so gawky.

While this aspect of her story is very similar to the three normal-weight women who consider themselves overweight, she answered "about the right weight" to describe her current body. However, even though she chose that answer in the semi-structured interview, she did say some negative things about her weight and body during our longer interview:

- "So I've spent more of my life before I was 20 being too thin.…That's not my problem now [laughs]."
- "…there might have been a picture that I took, now that was when I was in my 40's, when I looked at the picture and I thought 'Oh my gosh! Your arms are *fat*!' You know? And even today, it's like, these are *fat arms*, you know?"
- "So, even though I feel good in the range of 'OK, no I haven't gained as much as other women', some of them have had children and some not, but I still feel like I wish I were thinner."

Thus, even though Marilyn answered that she is "about the right weight" on the semi-structured interview, her quotes from the longer interview suggest that she is not completely comfortable with her post-menopausal body.

In the sample of eight women interviewed, four (Beth, Tammy, Gretchen, and Marilyn) described themselves as skinny in childhood and had a BMI in the normal range at the time of our interview. Two other women (Alice and Diane) described themselves as skinny in childhood but now have a BMI that classifies them as obese. The final two interviewees (Claire and Rita) describe themselves as "normal" and "sturdy, but I wasn't fat" in childhood; both of these women are currently obese.

Diane and Gretchen were introduced in the first chapter of this dissertation. These two women differ dramatically in how they describe their feelings about their current weights; they also differ dramatically in how they describe their childhood and young adulthood weights. When I asked Diane to describe her weight from as early as she could remember, she began with "Childhood, I was very normal." At other points in the interview, she said "Childhood, it [weight] was never a problem" and "Now, all through my high school years and on, I never had a weight problem." It is clear from the interview that Diane sees her early self as "normal weight" and "didn't have a weight problem."

Diane, who is obese but says her current weight doesn't bother her much, grew up thinking that her body was normal. Gretchen, who is normal weight but is very hard on herself about her minor weight gain, grew up thinking that she was skinny. It is possible that the reinforcement these women received regarding their weight throughout their life course has played a huge role in the development of their body image and, subsequently, in the way that they feel about their adult weight. The lack of negative reinforcement about weight that while Diane was growing up led her to not consider weight in her self-concept, and to therefore not be overly worried about late-adulthood weight gain. Conversely, because the self-concept of Gretchen has always had a weight-related component, any weight gain may be a threat to that self-concept, causing her to worry intensely over her late-adulthood weight.

The differences in feelings towards weight gain between Gretchen and Diane illustrate that self-image, the beginnings of which are formed in childhood interactions, can affect health outcomes in late adulthood. Gretchen, who has a BMI of 21 and has the same weight now as she did a year ago, has used six weight loss methods in the past year, including the relatively "drastic" strategies of skipping meals, drinking a

commercial liquid diet formula, and taking diet pills prescribed by her doctor. While Diane has also attempted weight loss, she only reported three strategies ("ate less food," "switched to foods with lower calories," and "exercised"), all of which would generally be considered healthy. The way that Gretchen internalized the reactions that she got from others throughout her life course may have caused her to become very focused on her weight in her postmenopausal years and to try weight loss methods that are much more drastic than recommended.

Social Pressures and Influences, Past and Present

The eight women who participated in follow-up interviews spoke eloquently about the social pressures and influences that they have felt regarding weight and food throughout their lives. They also often related the pressures they felt in their youth to the social forces they feel are in effect today.

Childhood/young adulthood.

Peer/Sibling Reactions: Claire thinks that she grew up in a time when the pressure to be thin was much lower than it is now:

> There wasn't any of that pressure on me and my friends that there is nowadays. We didn't talk about it [weight], we didn't care about it. I had thin friends, I had fat friends. That's the way they were. It wasn't important. It was what we were doing that was important. We didn't do any of this 'shopping' thing and hanging out, there really wasn't anywhere to hang out at. So we were at each other's friends', and of course any time you were at a friend's house, their mom had food. So it just wasn't a worry.

At the same time, however, she definitely did not feel that she was part of the "in" crowd in school. She had this to say when I asked her if people had ever treated her differently because of her weight:

> Probably. Especially in school. Junior high was, ugh, that's got to be the worst period of anybody's life, everybody's an animal at that age. Herd instinct rules. But it was also because I was a nerd. I mean, it was part of the package. And I didn't dress right, didn't have the right friends, didn't

hang out with the right people, didn't go to the right places, didn't say all the right cool things, didn't listen to all the right cool songs. So it was all part of the package. Oh, and I dressed in hand-me-downs, I left that part out. So it's hard to tell if weight had any real serious effect on that, or if it was all part of the one.

Similarly, Rita did not worry about her weight when she was in school:

I went to a school where we had an hour of sports every day. They definitely emphasized sports. It was a girls' school. But I didn't really worry about my weight. I wore clothes I liked, I had a boyfriend. I didn't worry about it, I was fine.

Weight was a factor in how she related to two of her sisters:

Now my sisters – my sister older than me and my sister younger than me – were both heavy. And I just felt superior, like I didn't have those problems. They were so delighted when I was fat [in my 30's]. I don't blame them, looking back.

Marilyn felt that weight played a negative role in her self-image growing up:

Well I grew up in the age of Twiggy, which was extremely thin…and I was very thin myself, so really I identified with 'yeah, she is thin, and boy it's not easy, you know, when you're that thin'. So I've spent more of my life before I was 20 being too thin. So maybe I identified with her, I don't know.

She also felt that her brother and the people at school thought of her as being too skinny: "…I can remember going to my 10th reunion of high school and a classmate saying something about 'well you look a lot better now, you don't look like you're so underfed.' So, I guess it's true that even in high school they felt that way."

Beth said that, in childhood, she began "getting more feedback" about her small stature, and that she tried to gain weight through her college years. Alice also felt skinny in childhood and young adulthood, but she describes it in a more positive light:

Well, I always wanted to have a fuller figure. I guess every woman wants to have a nice figure. But I was pretty well happy with it because of the compliments I'd get, people'd say 'Wow you ate all that and you don't have to worry?' It was fun, it was fun being … naturally skinny.

Like Marilyn, Tammy did not feel that she fit into the societal ideal because of her small size: "…people would talk about, 'Gosh, you're so skinny.' And it wasn't 'in' to be

skinny back then." She also mentioned that Barbie was her body role model, and that she never even felt close to that ideal. As it did with Rita, weight also played a part in how Tammy defined her role in her relationship with one of her sisters:

> I have a sister who's 15 months younger than me, and she thought she was heavy because she always compared herself to me. But, she was also shorter than me, all her life, still is 5 inches shorter. She commented, 'I looked back at our pictures, and I was *not* overweight. I don't know where I got that in my mind. You were just so skinny.' But she wasn't that much overweight at all.

Gretchen felt defined by her low weight throughout her childhood and even into her college years:

> And I got to college and my fellow sorority sisters would pass me down the desserts because they did not want to eat them ….and I was called skinny for so long that it was hurtful. I thought 'they should be called fat if they're calling me skinny.' But, I think I was just too sensitive a child.

Parental/authority figure influence: Rita went into detail about how her mother disapproved of her eating habits as a child:

> …my mom always got mad at me because I was always going and eating meat and eating fruit. In fact, she took me to the doctor one time and said 'She eats too much. She always wants to eat.' He said, 'No, she's just high-strung. She's really not eating too much.' And my mom was like, 'Yes, she is eating too much!' [laughs]

Rita also mentioned that other adults in her young life noticed the large quantity of food that she ate, saying, "I really ate a lot, and I loved to eat, and I was thin. One time in college I stayed at a friend's house, and I was sick and I thought I was eating nothing. And her mother said to me, 'You know, you really eat a lot.' I was so embarrassed."

Marilyn describes her parents' influence on her present-day eating habits by describing what her family didn't have:

> I don't know if I really established family traditions. I don't really feel like I've pulled anything from my mom – she just cooked – and we didn't have family, being an army brat I never lived around grandparents. You know, I'd visit them a few times in my life. So really I don't think I have "normal" family traditions with meals that other people have.

She also says that one part of her body image is defined by what she doesn't want to become: the "'round woman" that she considered her mother to be.

Several adults figure prominently in Beth's recollection of her weight history. One is the elementary-school teacher who called her a "skinny little thing" one lunch period. Beth also remembered an adult neighbor making comments about her size when she was 16:

> I can remember a fellow across the street from my grandmother carrying on because I was driving a car, and he just couldn't believe that. Now, at this age, when I see my neighbors' children driving cars, I'm thinking, 'I probably shouldn't have taken him so seriously at the time because I feel the same way about these kids starting to drive.' [laughs]

Beth heard her extended family, who were "country people," making comments about her size from a very early age:

> I had a cousin I grew up with who was six months younger than I was, and she was always a big girl. And the family always thought that something was wrong with me because I wasn't as hefty as – well, she wasn't hefty, she was just a big girl, and I was just a tiny little girl. And my poor mother said she took a lot of heat from the family because, 'Are you feeding that child right?' …When I was growing up, that's what country people thought was healthy, they wanted to put weight on. I don't know why…I guess because they had to work so hard they needed something to fall back on.

When I asked Diane about a diet she undertook as a teenager, she said

> … my mother decided I was putting on weight, and she, you know, kind of harassed me to do it, and I did. ... I was up to 145 pounds. She liked me at 135, I think. It was 10 lbs she thought I should lose. And I did, I mean my mother was always right, so I did what she said. Ah, the good old days. [laughs]

While Gretchen did not mention her mother commenting on her weight, she recalled that her mother was concerned with her sister's and her nutrition: "We always were given vitamins. My mother insisted we have… it's called a 'poly-B syrup,' it tasted very much like molasses, but it had all these vitamins, B-vitamins and everything. Maybe that's what helped keep us skinny [laughs]."

Adulthood

Peer influence/reactions: Claire feels that her concern about her weight began when she was influenced by her new sister-in-law:

> Claire: And it [weight] really didn't get to be a thing until I guess I got married. My ex-sister-in-law, she's been fighting her weight all her life. And she always stays about the same size. Permanent member of Weight Watchers, never really gets any smaller or bigger. His sister is one of the worst for yo-yo dieting I've ever seen. She has gotten to the point where she can't lose any more weight. And I think she's more or less resigned herself to it too.
> Interviewer: So was it that sort of influence that made you start thinking you wanted to lose weight too for the first time?
> Claire: Yeah. Having somebody to go in with you. I hear from other people that that's been a big motivation for them.

In her 50's now, Claire does not feel that other people influence her feelings about her weight any longer: "Where I'm at now, it doesn't really make any difference at work. My boss is overweight. Some of my co-workers are… I've gotten to the point where I don't really give a rat's what anybody else thinks of me."

Rita felt that her first experiences with trying to lose weight were directly influenced by her peers:

> It started out in college – I wasn't really fat. In fact, I wasn't fat at all. I was probably the weight I should be according to my height. I was maybe 145. But everyone was going on a diet, so I went on a diet. And I got so tired I had to stay in bed all day. And then I got appendicitis. I was really thin, but I didn't feel good.

She also commented on some encounters she's had with other women regarding her weight:

> Now, I know a woman in Dallas who worked for me who is very thin and very attractive. And one day we were talking about exercise, and I said 'well, I exercise four or five times a week'. And she goes, 'You exercise? I can't believe that. I never exercise – I really should.' And I thought, well, how come? She loved food, she was a very gourmet kind of person, she didn't exercise, and she's thin as a stick.

> …when I worked at [a certain museum], I had a particularly bitchy boss who looked at me one day and said, 'Have you always been fat?' I thought that was sort of rude. Usually people didn't say anything.

And, she again commented on her sisters finding joy in her adulthood heaviness: "My sisters were always heavy, and now I'm heavy, and they love that. They love that I was thin and now I'm not. That makes everybody happy. OK."

Rita also mentioned comments that both of her husbands made regarding her weight:

> I had an appendectomy, an emergency one, when I was 18. And I was thin. But after that, my stomach, which had been pretty flat, just pooched out a little. And so my [first] husband always called me 'fat belly'. And it made me so mad because I wasn't fat at all. And I thought, 'Why is he focusing on that, that has a perfect explanation?

> …my [current] husband said to me one time, 'You know, you would have gotten a lot further in your career if you weren't overweight.' And I thought, 'I've gotten pretty far.' I've gotten where I wanted to go, let's put it that way.

Marilyn mentioned that others became concerned with her weight during a difficult time in her life: "When I divorced at 29, I know it [my weight] was 99 pounds. I mean, I know that because people were fussing at me."

Marilyn, who is normal weight, credits her lack of major weight gain to her desire to look appropriate for two of her social roles, namely "professional woman" and "single woman":

> I think being a single woman and still trying to date, which is almost a hopeless cause there, but being the fact that I am still trying to date, I think that influences me to still try to be slim. I've almost given up on the men part but at least I haven't given up on me. I feel like, OK, I've got to make sure I still look fairly presentable. Now, being in a profession, I feel like I also need to be presentable because of my job. As far as I have to have the energy, the long hours and the things that I try to do, it'd be terrible if I had 50 more pounds to carry around or something.

Though she currently lives alone, Marilyn has had two serious relationships in her life. She recognizes that the way she eats now is different than the way she ate when she shared a home with someone else:

I know that when I was married for 12 years and when I was in a relationship for 10 years, that I ate on a more consistent basis. I know as a single woman, I might just say 'oh, cheese and crackers are fine', or 'peanut butter is fine tonight', I won't make the real deal. So actually I think I eat better when I'm in a relationship and am making a meal for someone else…. I think it's much more fun to cook for others than for myself. Doesn't seem hardly worth it.

Alice observed that many of the social situations in which she participates revolve around food:

And it seems like at work or any kind of organization you're in, like I belong to a Bible study group, and it seems like everybody's conspiring against you. It's food every day, it's somebody's birthday, it's Christmas, it's whatever and there's a food day, and 'Let's have food' or 'Let's go out and eat'… It's because it's a group of women, I guess…. You don't ever see a bunch of men sitting around talking about their weight, I don't think, do you? [laughs]

Diane, who has gained 60 pounds since young adulthood, acknowledges that people have treated her differently throughout her life, but says, "Well, it's hard to know that it was because of weight or lack of weight. I mean, it's different when you're younger. And once I got married and that's a whole other world." Diane, who is "happily married" and doesn't work outside the home, did not make any other mention of peer reaction or influence in her adult years.

Tammy, who at 50 is the youngest woman I interviewed, has gained 15 pounds since young adulthood but is well within the "normal" BMI range. When I asked her if others noticed that she's gained weight, she replied, "Just me. I still get recognized [laughs] from years back. I haven't blown up or anything. But no. My husband doesn't comment. I think it's just me."

Gretchen mentioned that her sister was a big influence on the way that Gretchen thought about weight gain during pregnancy: "I had an older sister who had children…I would see what she gained and how hard it was for her to take it off…She said 'It can happen', and I said 'I don't want it to happen', so I kind of said, 'Well, I can't eat that much.'"

<u>"Shut up and stop complaining"</u> vs. "we're in the same boat": My interviews with four of the women brought out a sharp contrast in the way that their peers treat them. Two of the women, Marilyn and Beth, feel a little like outsiders because they have maintained normal weights while their social circles have grown overweight. Two other women, Alice and Gretchen, feel that they are "in the same boat" as their peers, but in very different ways.

Although she is not overweight now, Marilyn has gained about 30 pounds since young adulthood and has concerns about her weight. However, she says, her social circle doesn't feel much sympathy for her: "Well I know that when I'm with my peers which are my age, many of them will always say 'well you're not fat, you're thin; look at us'…. just kind of like 'shut up and stop complaining. You're still thin compared to us.'" This reaction does little to change the way Marilyn ultimately feels about her weight:

> …so I still feel that I'm thinner than some my age, but I also know that I'm not as thin as I'd like to be. So, even though I feel good in the range of 'OK, no I haven't gained as much as other women'… but I still feel like I wish I were thinner.

Similarly, Beth, who was considered "skinny" as a child and has only gained 15 pounds since young adulthood, has some concerns over her weight gain in the last year. However, she feels that being picked on because of her weight has continued into her 60's, and that she is not able to share her weight concerns with her friends:

> Beth: …my hairdresser's wife is his receptionist. And I wore something around Christmastime, and she said it was very becoming to me, that sometimes I look too skinny.
> Interviewer: That's a back-handed compliment, my goodness!
> Beth: [laughs] Oh definitely! And, you know, I have fussed at people about this. I have a good friend, we eat out about once a month, and she's very conscious about her weight, especially now - she's developed diabetes - but she's always been conscious about her weight. But I never say a word to her about her weight. But she's always, like, picking at me, making fun of what I choose to eat. If I'll say anything about health concerns, about my weight, she goes ballistic. People feel freer to say things about my weight because it's underweight than I would dare feel free to say to them about the opposite problem.

Alice seems to confirm Beth's feeling that being thin can make women outsiders of sorts. Both Beth and Alice describe themselves as skinny through young adulthood.

However, Alice has gained 80 pounds since age 25, putting her in the "obese" category now. When I asked her if people treated her differently because of her weight gain, she laughed and said,

> Actually, they treat me better because we're in the same boat. You get a lot of resentment if you're real skinny. It works the other way, right? Because you have something to talk about …you know, they're always trying diets or talking about [food]…seems like our main conversation focuses on food, I don't know why.

When speaking of her current circle of friends, Gretchen uses some of the exact same words that Alice used: "I think we're all pretty much in the same boat." However, the "same boat" of Gretchen's social circle is apparently much thinner than Alice's, as Gretchen, who has gained eight pounds since young adulthood, goes on to say, "Everybody looks good in their clothes, yet we all worry. We all worry." At another point, she said, regarding her changing body, "It bothers me, it bothers my friends, we get so upset over it – 'Why is this happening?'"

The experiences of these four women suggest that a woman's weight in relation to her peers has a huge effect on how she is treated by her peers: whether she is told to "shut up and stop complaining," or whether they can all commiserate and bond over their shared weight concerns.

Influence of motherhood: Several of the women mentioned that having children influenced the way that they prepared meals. Alice said she put more thought into her meal preparation when she had a young family:

> And of course when you have kids you have to cook for them so that they'll eat. So you have to buy something that they like…When your kids are little, you try to give them something good too. Try to be more careful about what you cook because they're growing up, and they need this or that or the other.

Alice has mixed feelings about her influence on her children's health. She says "I tried to keep them away from sodas and stuff like that. But it's not always successful."

Diane also noted that she tried to feed her children in a healthful way, but that apparently they have not carried on that tradition with their own children: "I always gave

them [the kids] two vegetables, meat and potatoes, and they kid me about that now because they don't do that." She also feels that she deserves some blame for her daughters' adult weight problems:

> You know, I'm not going to take full credit for their, whatever weight problem they have, but certainly some of it I'm sure. I know [my oldest daughter] said one time, 'I'll always remember coming home and you'd bake cookies and we could smell it, and it was so nice.' Well, that's a nice memory, but it probably wasn't the best thing to do for them. But at the time, neither one of them was especially heavy, so until they hit adulthood, that's when they started having problems.

Tammy, who has two teenagers living at home, has noticed a difference in how she and her husband eat now compared to when her children were younger. When I asked her if having children at home influences how she eats, she replied,

> Well, it used to. I was more conscientious about doing a balanced meal. As teenagers, it's become sad….we don't sit down for dinner anymore. My husband and I maybe do three meals a week here at home, that you have your meat and your veggies. But we've gotten away from what I think is proper eating habits. We will order a pizza, or we will go out… If they were younger, we would definitely still be on our routine of a balanced meal.

However, Tammy felt that her "ideal" of eating with the children was broken long before they became teenagers:

> …they've always been involved in sports, and that was a tough time too – when they were 7 'til they got their license – they were always involved in baseball and tennis and swimming. We were always driving around. It was real hard to get them proper meals.

So while Tammy feels that the idea of "young kids at home" leads to "proper eating habits," she also admits that her family's experience has been very different.

Gretchen mentioned young motherhood as a time that she didn't have to worry about her weight: "When you're a young mother, of course, you're running after kids. So, you're keeping your weight down." She also mentioned that a "family meal" was very important to her when her children lived at home.

Conclusions

  The in-depth interviews with the eight women in this subsample yielded many insights into influences, both positive and negative, on the women's weight and weight-control behaviors. Going beyond the quantitative results in Chapter 4, these interviews also revealed that life course factors, from interactions with childhood peers to relationships with current peers, have a strong effect on how the women view their own weight and bodies, and that these personal views have an impact on whether the women attempt weight loss. Women who felt judged as "skinny" as children seemed to judge their weight gain in adulthood more harshly than women who did not feel judged by their weight as children.

Chapter 6: Discussion

The women in the Central Kentucky sample are very weight conscious and seem to know what is recommended to lose weight: 72% had attempted weight loss in the last year, and the two most popular weight-loss strategies (each chosen by over three-quarters of the sample) were 'exercised' and 'ate less food.' Despite these encouraging findings, less than 40% of the sample was in the normal BMI range. The NHANES sample had lower rates for these measures: 48% had attempted weight loss and 32% were in the normal BMI range.

The NHANES percentages are similar to the percentages seen in the 2000 BRFSS, in which 46% of women were trying to lose weight (Bish et al., 2005). The Kentucky sample was much higher than this percentage; this is likely due to the volunteer bias of the sample. Hays et al. (2002) found that women reported an average gain of 20.5 lbs between their 30's and late 50's. In this study, the women in both data sets reported a gain of approximately 36 lbs between age 25 and the time of the interview (when they were between 50 and 64). Because the lower end of this range is extended (from the 30's to age 25), the findings of this study are in line with the Hays et al. study.

Fifty-eight of the Kentucky women said that they had attempted weight loss in the last year, and 91% of those women reported that they had been successful in losing weight. Yet only half of the women who had attempted weight loss in the last year actually weighed less than they did a year ago. For this sample, weight loss doesn't seem to be the problem as much as maintaining weight loss. The women in the NHANES sample were not asked if they had been successful in their weight loss, but only 32% of those who had attempted weight loss in the last year weighed less than they did a year ago.

Influences on Weight

What factors influence women to be too heavy for optimal health? The Kentucky data (Table 4.5) show a strong and significant connection between exercise and the odds of being normal weight: for every 150 minutes (2.5 hours) of exercise per week

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(i.e., 30 minutes, five times per week), women were 150% more likely to be normal weight. The data also show a marginally significant relationship between restaurant frequency and being normal weight: for each additional meal eaten at a restaurant in an average week, women were 33% less likely to be normal weight. In addition, women who were never married were over 2.5-times more likely to be normal weight than married women.

One interesting finding is that owning a scale negatively influenced the Kentucky women's chances of being normal weight. Women who owned scales were nearly four times *less* likely to be normal weight than those who did not own a scale. This is likely due to the fact that women who are trying to lose weight are more likely to own a scale than women who are not concerned about their weight rather than due to a cause-and-effect relationship.

An interesting finding in the NHANES model looking at predictors of normal weight (Table 4.6), is that smoking was highly predictive of normal weight, but only in people who drank less than once a week or not at all. One explanation may be that smoking and drinking alcohol are clustered behaviors, and that smokers who do not drink at least weekly behave differently in other ways than smokers who are regular drinkers.

Restaurant frequency was predictive of normal weight, weight gain in the last 10 years, and weight gain since age 25 in the Kentucky data but not the NHANES data. This may be because the women in the Kentucky sample had a higher socioeconomic status (using education as a proxy) than the national sample, and thus may have had more discretionary income to spend on restaurant meals. However, the number of restaurant meals reported per week was not significantly different between the Kentucky and NHANES sample. Is it possible that the restaurants in Kentucky are worse for weight management than restaurants in the rest of the nation? Further research on the effect of restaurant food consumption on weight needs to be carried out in several regions to see if this could be the cause.

Another interesting finding from the NHANES data is that exercise strongly reduced the likelihood of gaining 30 or more pounds since age 25 (with the most significant p-value of any of the models), but only in women who did not do muscle

strengthening at least four times in the past 30 days (Table 4.10). Table 6.1 lists the average BMI, waist circumference, and weight gain since age 25 by muscle strengthening. Women who did muscle strengthening regularly gained 10 pounds less since age 25 than women who did not. The average BMI of women who did muscle strengthening was 3.0 units lower than that of women who did not do muscle strengthening; for a 64 inch (5'4") woman, that is a difference of 17.5 lbs. This may suggest that, for long-term (i.e., 25 years or more) weight control, regular muscle strengthening exercise is the most important factor in a fitness program. However, the NHANES women who did muscle strengthening exercises did significantly more total exercise than those who did not (365 vs. 156 minutes per week). Only nine (28%) of the muscle strengtheners did no cardiovascular exercise per week; the other women ranged from 91 to over 1000 minutes per week. Perhaps there was not enough variation within this group of heavy exercisers to see an effect of cardiovascular exercise on weight gain since age 25. It is also possible that the women who did muscle strengthening differed in other ways (especially in their health behaviors) from women who did not, and that these unmeasured differences are what may have caused the differing results in the logistic regression models.

Table 6.1. Average BMI, waist circumference, and weight gain since age 25, by muscle strengthening, NHANES sample

	Muscle Strengtheners[a] (n=32)	Non-Muscle Strengtheners[b] (n=145)	p-value
BMI	26.5	29.5	0.006
Waist circumference (in.)	35.8	38.2	0.04
Weight gain since age 25 (lbs)	27.9	38.3	0.07

[a]Muscle Strengtheners= Reported muscle strengthening activities four or more times in the past 30 days.
[b]Non-Muscle Strengtheners = Reported muscle strengthening activities three or fewer times in the past 30 days.

What did the eight women who were interviewed in a more in-depth manner feel influenced their weight? Some of the things they mentioned were things they had no control over - three of the women mentioned metabolism as a cause of their weight or weight problems, and several alluded to body type as a family trait that they inherited –

but several influences were under their control. A 1992 survey (Levy & Heaton) found that appearance, future health, general fitness, and present health were the biggest motivators for weight loss. In this study, the results were similar; the positive influences and motivators for weight loss that the women discussed included eating certain foods or eating in a certain way (such as watching portions), the knowledge that they gained while previously enrolled in weight loss programs (such as Weight Watchers), having other women as positive role models, wanting to be attractive, their unhappiness at reaching a certain weight, health problems that they had or wanted to avoid, events that they wanted to look their best for, exercise, and the fact that they never were pregnant. These reasons differ from the findings of a British study (Tod & Lacey, 2004), which looked at reasons for joining a weight loss program. Some reported motivations were having children entering school, hearing embarrassing remarks by others, experiencing social shame, worsening health or the realization that health could worsen, viewing unflattering photographs, and celebrating milestone birthdays. The motivators may differ because the British study only looked at women who entered a weight loss program; these women likely have different motivators than most women who choose to attempt weight loss.

Two of the positive influences perceived by the women in the in-depth interviews, exercise and lack of pregnancies, can be investigated quantitatively in the Kentucky semi-structured and NHANES data sets. The association that the women perceived between physical activity and weight was seen in both data sets. Total exercise minutes per week (moderate plus vigorous activities) were significantly correlated with both BMI (NHANES: $r=-.221$, $p=.003$; Kentucky: $r=-.281$, $p=.011$) and waist circumference (NHANES: $r=-.243$, $p=.001$; Kentucky: $r=-.345$, $p=.002$); women who exercised more tended to have lower BMI's and waist circumferences. When dividing the Kentucky sample's self-reported total exercise minutes per week into thirds, the women who were in the top third (240-1260 minutes of moderate to vigorous exercise per week) had an average BMI of 25.1 and an average waist circumference of 32.0 inches; those in the bottom third (0 to 75 minutes of exercise per week) had an average BMI of 29.2 and an average waist circumference of 36.1 inches. For a 5'4" woman, that is a difference of 24 lbs.

While it is reasonable to think that women who have not given birth will have an easier time with weight control (as was mentioned by Marilyn and Beth in the in-depth interviews), the NHANES data set does not reflect this. (This question was not asked in the Kentucky semi-structured data set.) In the NHANES data set, 10% of the women interviewed had never given birth. Compared to the women who had had one or more live births, the women who had not given birth did not differ significantly in BMI (p=0.80 in a t-test) or waist circumference (p=0.75).

The influences that the eight women discussed as making weight control difficult included eating certain foods or having certain eating habits, work, stress, health problems that prevented healthy behaviors, menopause, age, lack of physical activity, boredom, and quitting smoking. Although some women in the in-depth interviews felt that their work was a negative influence on their weight, this was not seen in the Kentucky data. In the Kentucky semi-structured data, there was no significant difference (p=0.76 in an ANOVA) in BMI between women who work part-time, full-time, and those who did not have paid employment (NHANES does not have occupation data for all subjects.)

While the women felt that age and menopause play a role in their weight gain, is this borne out in the data? All of the subjects in this study had already gone through menopause and were in a very narrow age range (50-64 years), so comparisons are difficult. In the Kentucky semi-structured data set, there was no correlation between BMI and age (r=-.102, p=0.36), BMI and years since last period (r=.068, p=0.55), waist circumference and age (r=-.048, p=0.67), or waist circumference and years since last period (r=.074, p=0.51). In the NHANES data set, waist circumference and age were marginally correlated (r=.123, p=0.10); none of the other above correlations were significant.

Three of the women interviewed for the qualitative component of this study (Marilyn, Beth, and Gretchen) mentioned their "energy" as a reason they have always been thin. Indeed, this idea seems to be related to the concept of non-exercise activity thermogenesis, or NEAT. NEAT, or calories burned while fidgeting or through other normal daily activities, was first introduced in the late 1990's as an explanation for why some people gained less weight than others when intentionally overfed in experiments

(Levine, Eberhardt, & Jensen, 1999). It has since been discovered that NEAT can vary between individuals by up to 2000 kilocalories per day (Levine, Vander Weg, Hill, & Klesges 2006). This level of increased calorie burn could certainly explain why some people have an easier time with weight maintenance than others.

In both the Kentucky semi-structured and NHANES data sets, there was a trend for women who had smoked but quit to have a higher BMI than women who had never smoked; there were only four current smokers in the Kentucky data (Table 6.2). In the NHANES data set, BMI and waist circumference were significant between former and current smokers and between current smokers and women who never smoked. There were no statistical differences in the NHANES data set between the women who never smoked and the former smokers. Waist circumference and BMI were significantly lower in current smokers in the NHANES data set than in the former smokers and those who had never smoked.

Table 6.2. Average BMI and waist circumference comparison by smoking status

Kentucky semi-structured data set

	Never Smoked (n=46)	Former Smoker (n=31)	Current Smoker (n=4)
BMI	27.90	29.24	27.48
Waist Circum. (in)	34.42	36.31	37.13

NHANES data set

	Never Smoked (n=87)	Former Smoker (n=48)	Current Smoker (n=41)
BMI[a,b]	29.65	29.98	26.40
Waist Circum. (in)[a,c]	38.06	38.79	36.19

[a]p<.05 between former and current smokers
[b]p<.05 between never and current smokers
[c]p<.10 between never and current smokers

Weight-Loss Strategies

The women from Kentucky were significantly more likely to have attempted weight loss in the last year (Table 3.1) and identified significantly more weight-loss strategies that they had used in the past year than the NHANES sample. Part of the explanation for the higher rate of attempted weight loss may be volunteer bias. The women in the Kentucky sample volunteered for a study on "women's weight and health" (Appendix E); they may be more likely than the general population to be concerned about their weight. The women of the Kentucky sample were more educated than the NHANES sample (Table 3.1), which may explain why they used a higher number of methods: perhaps they have access to more health- and weight-related information than the general population, leading them to have a broader knowledge of the available weight-loss strategies.

Total score on the self-esteem scale was significant in predicting which women in the Kentucky semi-structured sample skipped meals as a weight loss strategy; this was the only strategy for which self-esteem remained in the final model. For every one-point increase on the self-esteem scale (which had a range of 34-50 in this sample, with a higher score indicating higher self-esteem), women were 23% less likely to skip meals. This could be because skipping meals is seen as 'unhealthy' by the women, so those who feel better about themselves are less likely to choose it.

The only two weight-loss strategies for which the Dieting Beliefs Scale (DBS) was significant were 'Followed a special diet' and 'Joined a weight-loss program,' both formal diet strategies (Table 4.4e). Interestingly, the influence of DBS was opposite on these two strategies. DBS had a positive influence on 'Joined a weight loss program,' meaning that people with a more internal weight locus of control were more likely to choose this strategy. People with a more internal weight locus of control were *less* likely to choose 'Followed a special diet.' The average DBS score of those who joined a weight loss program was 7.3 points higher than those who followed a special diet; as a point of reference, the DBS score difference between the diet and control group was 6.1 in the study that served as the basis for the sample size calculation (Bryan & Tiggemann, 2001). What are the potential causes of this large difference in weight locus of control between women who join weight loss programs and those who follow special diets? It is likely that the formal weight loss programs include classes or counseling sessions in which participants are given weight loss information and told "you are in control of your weight." Perhaps this teaching influences the participants to score higher on the DBS, rather than high internal weight locus of control leading women to seek out these programs. Because this is a cross-sectional study, there is no way of analyzing the cause-and-effect relationship in associations such as this.

The women in the Kentucky semi-structured sample were given three psychological scales to complete – the Self-Esteem Scale, the Dieting Beliefs Scale, and the Self-Objectification Questionnaire. Surprisingly, these scales were not predictive of most outcomes that were investigated in this study. None of these psychological aspects were associated with being normal weight or with weight gain in adulthood.

Influences on Body Image

In both the NHANES and Kentucky samples, over 80% of the sample would like to weigh less. For most of these women, losing weight would be medically recommended, but several women in the 'normal' BMI category would like to weigh less too. A few of the women interviewed in the qualitative component of this study give us some insight into how women's perceptions of their own weights are established.

Gretchen, Beth, and Tammy were the three women with low BMI's (less than 23) who consider themselves 'overweight,' and they all express that they felt skinny as children and wanted to weigh more. Why, then, do they now consider themselves *overweight* even though they do not fit that category by any objective measure? One reason may be that these three women were conditioned early in life to believe that there is a female 'ideal', and that, as children and teenagers, they did not fit that ideal. So, these women developed a sensitivity to the fact that their bodies are being compared by others to this ideal, and this sensitivity has carried into their post-menopausal years.

These three women, along with Marilyn who answered that she was 'about the right weight' but then made several negative comments about her body, illustrate that childhood experiences strongly influence adult self image. This is in line with a study by Abramovitz & Birch (2000), which found that five-year-old girls whose mothers were dieting were twice as likely to have ideas about dieting, and that girls' concerns about their own weight were significantly related to their mothers' weight concerns. Both positive and negative reinforcements in childhood can lead women to judge their bodies more harshly as adults than they might have otherwise. This self image, in turn, can affect the decision to lose weight (even when not medically necessary), which can affect a woman's health status.

Limitations of Current Study

As mentioned before in this discussion, the Kentucky women were a volunteer sample and not a representative sample of the general population. They were significantly more educated, had better self-rated health, were much less likely to smoke, drank alcohol more frequently, and were more likely to have attempted weight

loss than the NHANES sample (Table 3.1). This difference most likely arose because women associated with the University of Kentucky made up a large portion of my sample; nearly half of my subjects were University of Kentucky students, employees, or spouses of University employees. Another likely cause is that people who volunteer for a 'weight and health' study are more likely to be concerned about their weight. Despite this volunteer bias, several weight measures, including BMI, weight gain since age 25, and whether the women would like to weigh less, were not significantly different between the Kentucky and NHANES samples. Another limitation to the generalizability of this study is that none of the women in the Kentucky sample had less than a high school education, meaning that the sample does not include the education category of women most at risk for negative health-related outcomes.

When I prepared the questionnaire, I knew that asking women about their weight could be an uncomfortable situation for them, so I tried to minimize the other sensitive topics that I raised. To this end, I did not include any questions on socioeconomic status or the number of children they had given birth to. Income is a notoriously 'touchy' subject for interviewees, and it seemed like asking women how many children they had could bring up some painful memories (i.e., I did not want to include adoptions or late-term miscarriages, but I did want to include children who died soon after birth). However, upon performing the interviews, I found the women to be very open and willing to share with me. In retrospect, I don't think asking either of these questions would have derailed any of my interviews and would have provided valuable information.

The waist circumferences of the women in the two quantitative samples were measured in different ways. In the NHANES sample, the waist was measured at the lateral edge of the ilium; in the Kentucky sample, the waist was measured at the 'natural waist' or at the level of the umbilicus if the natural waist was not narrower than the hips. Because of this difference, direct comparison of this variable between the two samples was not possible.

The design of this study is cross-sectional, meaning that predictors and outcomes were measured at one point in time. This design makes it more difficult to tease out cause and effect relationships. This is especially true in investigating the

factors associated with weight gain in the last 10 years and since age 25; the assumption is that the behaviors the women reported at the time of the study (such as exercise and restaurant frequency) had been stable throughout their adult lives and accounted for differences in weight gain over these long time frames. It may be, however, that these lifestyle factors were not present throughout their adult years to affect weight gain. Also, the women reported their own weights 10 years ago and at age 25; it would be understandable if the women romanticized their weight in their younger days, and thus reported lower weights than they actually had.

The two quantitative components of this study, the data from NHANES and the Kentucky semi-structured interviews, were conducted in different time periods. NHANES data from 1999-2002 were used, but the Kentucky interviews were performed in 2005. This could especially have skewed the relationship between the two datasets related to weight-loss strategies (Table 4.3), as popular notions of the "best" ways to lose weight tend to come and go quickly.

Strengths of Current Study

All of the interviews performed in the Kentucky components of this study, along with all of the transcription and analyses, were performed by one person. This makes it unlikely that differences in interview style or transcription method led to observed results. Feelings about weight are highly dependent on ethnicity; this study removed that variability by only including women who identified themselves as non-Hispanic white. In addition, only women who did not have physical limitations and theoretically *could* control their weight through exercise were included, meaning that any observed barriers and influences were not completely related to physical functioning. By comparing the Kentucky sample to the representative sample in NHANES, I was able to see how volunteer and regional bias affected my sample in relation to the general population. This study was also mixed-methods in design; this allowed investigation of life course factors affecting weight on both a large scale (surveys with dozens of women) and small scale (in-depth interviews with eight women).

Chapter 7: Conclusions and Suggestions for Future Research

The final chapter of this dissertation concludes with a summary of findings derived from this research and offers a critical appraisal of how best to direct ongoing research investigating weight management and body image in a growing older population.

Summary of Findings

The purpose of this study was to use a mixed-methods approach to investigate the factors that influence weight, weight-loss strategies, and body image in post-menopausal women ages 50 to 64. Quantitative data from both a national representative sample (NHANES) and a sample from Central Kentucky were investigated. Qualitative interviews were performed on a subset of the Central Kentucky sample.

The factors that predicted attempted weight loss in the post-menopausal women in one or both samples included BMI, number of close friends, age, and smoking history. Number of close friends was only significant in predicting attempted weight loss in the NHANES women over age 60 who had more than a high school education; in this subset, each one-person increase in number of close friends reduced a woman's likelihood of attempting weight loss by nearly one-third. The women in the qualitative sample spoke eloquently of their relationships to their peers and bonding over shared weight concerns ("we're all in the same boat"). Perhaps these bonds reduce a woman's feelings that she needs to lose weight to be accepted.

In both data sets, one of the most common strategies in both data sets for attempting weight loss was 'ate less food.' This was tied with exercise as the most common strategy in the Kentucky data set; in the NHANES dataset, 'ate less fat' was the second most common weight loss strategy, with 'exercised' and 'switched to foods with lower calories' tied for third. These most common strategies are consistent with the government's recommendations for weight loss. Approximately 10% of each sample skipped meals to lose weight. In the Kentucky sample, self-esteem was a significant predictor of this strategy, with each one-point increase in a self-esteem scale score

(indicating higher self-esteem) lowering the likelihood of choosing this strategy by 23%. The women in the Kentucky sample completed the Dieting Beliefs Scale, which is a measure of weight locus of control. Dieting Beliefs Scale score positively predicted choosing to join a weight loss program (meaning that the women who felt most in control of their weight were more likely to choose this method) but negatively predicted following a special diet for weight loss (meaning that the women who felt that their weight control was out of their hands were more likely to choose this method).

The factors associated with being normal weight included exercise and frequency of eating meals prepared in restaurants; these were also among the factors that most strongly predicted weight gain in the last 10 years and since age 25. This confirms the well-documented link between physical activity and weight, and also validates the link between eating out (where one is likely to eat more fat, salt, and overall calories than at home) and the women's size in their early post-menopausal years.

The women in the qualitative component of this study discussed life course factors that influence body image and the desire to lose weight dating back to their childhood. Several of the women interviewed felt skinny as children, but now consider themselves too heavy even though they have a normal BMI. From interactions with authority figures who called them "tiny little things" to sisters who negatively compared themselves to the subject, these interactions cemented the idea early within some of these women that there is a feminine ideal and that they don't meet it. Now that they are grown and perceive themselves to be heavier than the ideal, they are quicker to judge themselves and attempt weight loss to bring themselves closer to the ideal that they have been carrying around since childhood than some of the women who never incorporated body size into their self images.

Suggestions for Future Research

The women who had joined a weight loss program in the past 12 months tended to have a higher Dieting Beliefs Scale score (i.e., they felt in control of their weight). Because this was a cross-sectional study, the cause and effect relationship of weight locus of control and joining a weight loss program cannot be established. It is possible that the classes the participants attend and the counseling they receive raise their

feelings of control over their weight. Conversely, perhaps women who feel they are in control are more likely to choose these programs in the first place. It would be very interesting to administer the Dieting Beliefs Scale to women just signing up for a weight loss program, then to longitudinally follow them for six months, recording both their weight and Dieting Beliefs Scale score after they have been in the program for some time. This would establish the cause-and-effect relationship, plus allow us to see if successfully losing weight is a factor in having an internal weight locus of control.

Several of the women in the qualitative component of this study expressed that they felt others judged them for their weight in childhood, and several mentioned that their interactions with their peers in adulthood influenced how they feel about their weight. It would be interesting to perform these same types of interviews with African-American women to compare their thoughts on their bodies and weight control to the white women in this study. It is well-documented that ethnicity plays a large role in how women feel about their bodies; it may be that African-American women do not feel the weight pressures in childhood and young adulthood, and so do not have the same kinds of body image issues in adulthood as the women in this study.

The statistical model that looked at the predictors of weight gain since age 25 in the NHANES sample had to be stratified by muscle strengthening frequency because the interaction between muscle strengthening and total exercise was significant. For women who regularly did muscle strengthening exercises, total exercise was not significant in predicting weight gain; for those who did not do regular muscle strengthening, total exercise was highly significant ($p=.003$) in negatively predicting weight gain. There were a relatively small number of women in the NHANES sample who did regular muscle strengthening (n=32, or less than 20% of the total), and they did, on average, much more total exercise per week than the non-muscle strengtheners. It would be interesting to investigate this question further in a larger sample, perhaps also including how long the women have been regularly doing strength exercises, to see if muscle strengthening exercises are an integral part of an overall fitness routine for preventing weight gain in adulthood.

In the Kentucky sample, frequency of eating at restaurants was negatively predictive of being normal weight, weight gain in the last 10 years, and weight gain

since age 25. In the national representative NHANES sample, there was no association between restaurant frequency and any of these outcomes. It is possible that this is a regional difference. It would be interesting to investigate this relationship in several communities throughout the U.S. to see if they differ, and then to investigate the restaurant businesses in those communities to see which factors contribute to any associations.

If money and time were unlimited, it would be very interesting to treat the Kentucky quantitative component of this study as the baseline for a longitudinal study of weight and aging. The data gathered in this first phase of the study could be used to see what predicts weight gain in post-menopausal women as they transition to ages 65 and older, the traditional definition of 'old age'. The longitudinal design would mean that cause-and-effect relationships could be established between factors in early post-menopausal years and those in later post-menopausal years.

Conclusions

The findings in this dissertation regarding attempted weight loss and body image in post-menopausal women show that women's weight concerns and the decision to attempt weight loss are not straightforward (i.e., need to lose weight, so will attempt weight loss, so will lose weight) but much more tangled and complicated. Women in general understand the public health messages on weight loss and weight-loss strategies and tend to use the recommended strategies when they attempt weight loss. Despite this, the majority of white women ages 50-64 are overweight or obese. Women perceive many barriers to weight loss and healthy habits, but also recognize that there are certain things in their lives that are motivators for weight loss. It is the responsibility of women and the public health sector to make the most of these acknowledged motivators and minimize the perceived barriers to reverse the increasing obesity levels in the U.S.

Appendix A: Kentucky Semi-Structured Interview Instrument

Respondent ID #:_____

Date:_____

Introduction Thank you for taking the time to speak with me. I'm going to be asking you some questions in the general area of weight and health. Some of the questions are multiple choice and others are open-ended. At the end of this interview, I'll ask you to fill out three 1-page personality scales. If there are any questions that you feel uncomfortable answering, you can skip that question and go on to the next one.

Your information will be combined with information from other people taking part in the study. When I share this information with other researchers, I will communicate the combined information I have gathered and you will not be identified. I may publish the results of this study; however, I will keep your name and other identifying information private. Do you have any questions for me before we begin?

(The first five categories involve causes for exclusion – will also be collected in initial phone screening)

Physical Functioning
1. Because of a health problem, do you have difficulty walking without using any special equipment? (Prompt: This would include a cane, a walker, or a wheelchair.)

1 -	Yes *(cause for exclusion)*	9 –	Don't know
2 -	No		

Menopausal status
2. Have you gone through menopause?

1 -	Yes	9 -	Don't know
2 -	No		

3. When was your last menstrual period? (Prompt: about how many months or years ago was it?)
   - 1 - Within the last 12 months (*cause for exclusion*)
   - 2 - Prior to the last 12 months
   - 9 - Don't know (Prompt: was it more than a year ago? If "Don't Know", *cause for exclusion*)

Hormone Replacement Therapy
4. Are you currently taking hormone replacement therapy (Prompt: such as Premarin, Prempro, or Provera)?

1 -	Yes *(cause for exclusion)*	9 -	Don't know
2 -	No		

Diabetes
5. Other than during pregnancy, have you ever been told by a doctor or health professional that you have diabetes or sugar diabetes?

1 -	Yes *(cause for exclusion)*	9 -	Don't know
2 -	No		
3 -	Borderline		

Ethnicity
6. Do you consider yourself to be Hispanic or Latino? (If yes, probe for specific category)
   - 1- Yes – Mexican-American *(cause for exclusion)*
   - 2 - Yes – Other Hispanic *(cause for exclusion)*
   - 3 - Not Hispanic

7. What race to you consider yourself to be?
   - 1 - American Indian or Alaska Native *(cause for exclusion)*
   - 2- Asian *(cause for exclusion)*
   - 3- Black or African-American *(cause for exclusion)*
   - 4- Native Hawaiian or Other Pacific Islander *(cause for exclusion)*
   - 5- White
   - 6 - Other *(cause for exclusion)*

Weight Module
8. Do you consider yourself now to be…

1 -	Overweight,	9 -	Don't know
2 -	Underweight, or		
3 -	About the right weight?		

9. Would you like to weigh…
       1 -   More,   9 -   Don't know
       2 -   Less, or
       3 -   About the same?

10. During the past 12 months, have you tried to lose weight?
       1 -   Yes (Skip to question 12)   9 -   Don't know (Skip to question 19)
       2 -   No

11. What prevented you from trying to lose weight? _____

_____

(Skip to Question 19)

12. What made you decide to try to lose weight? _____

_____

13. Now I'm going to hand you a piece of paper with several weight loss methods on it. What methods did you use to try to lose weight? (Hand a card with all options listed. Code all that apply.)
       A -   Ate less food
       B -   Switched to foods with lower   calories
       C -   Ate less fat
       D -   Exercised
       E -   Skipped meals
       F -   Ate diet foods or products
       G -   Used a liquid diet formula such   as Slimfast or Optifast
       H -   Joined a weight loss program such as   Weight Watchers, Jenny Craig, Tops, or Overeaters Anonymous
       I -   Took diet pills prescribed by a doctor
       J -   Took other pills, medicines, herbs, or supplements not needing a prescription
       K -   Took laxatives or vomited
       L -   Drank a lot of water to lose weight
       M -   Followed a special diet
       N -   Other (specify)

14. How did you choose these methods to lose weight?_____

_____

15. Were you successful in losing weight using these methods?
       1 -   Yes   9 -   Don't know
       2 -   No

16. How much did you lose? _____

17. Have you gained back any of that weight? If so, how long did the weight stay off?_____

_____

18. Are you currently trying to lose weight?
       1 -   Yes   9 -   Don't know
       2 -   No

Weight History
Now I'm going to ask you some questions about your weight history.

19. How much do you weigh without clothes or shoes? _____ lbs

20. How much did you weigh a year ago? _____ lbs

21. How much did you weigh 10 years ago? [If you don't know your exact weight, please make your best guess.]
_____ lbs

22. How much did you weigh at age 25? [If you don't know your exact weight, please make your best guess.]
_____ lbs

23. Up to the present time, what is the most you have ever weighed? [Do not include weight during pregnancy.]
_____ lbs

24. How old were you then? [If you don't know your exact age, please make your best guess.]
_____ years

25. What is the least you ever weighed since you were 18?
_____ lbs

26. How old were you then? [If you don't know your exact age, please make your best guess.]
_____ years

27. Have the things that influence your desire to lose weight changed since young adulthood?_____
_____
_____
_____

28. Is there anything else you'd like to tell me about your weight history?_____
_____
_____

Weighing Frequency

29. Do you have a scale in your home on which you can weigh yourself?

1 -	Yes	9 -	Don't know
2 -	No		

30. About how often do you weigh yourself or get weighed by others?

1-	Daily	9 -	Don't know
2-	2-6 times per week		
3-	Weekly		
4-	2-3 times per month		
5-	Monthly		
6-	Less than once a month		

Health Status

31. Would you say your health in general is …

1 -	Excellent	9 -	Don't know
2 -	Very good		
3 -	Good		
4 -	Fair, or		
5 -	Poor?		

32. Do you have any health problems that you think are affected by your weight?

1 -	Yes	9 -	Don't know (Skip to Question 35)
2 -	No (Skip to Question 35)		

33. What are these health problems?_____
_____

34. How much weight do you think you would have to lose to see improvement in these problems?_____
_____

Diagnosis of Overweight

35. Has a doctor ever told you that you were overweight?

                  1 -   Yes   9 – Don't know

                  2 -   No

The next set of questions I'm going to ask you is about your background and current lifestyle.

Age

36. What is your birthdate? (MM/DD/YY)   _____/_____/_____

Height

37. How tall are you without shoes?   _____ft _____ inches

Education

38. What is the highest grade or level of school you have completed or the highest degree you have received?

            0 -   Never attended/Kindergarten only

                 1 -   1st grade

                 2 -   2nd grade

                 3-   3rd grade

                 4 -   4th grade

                 5 -   5th grade

                 6 -   6th grade

                 7 -   7th grade

                 8 -   8th grade

                 9 -   9th grade

                 10 -   10th grade

                 11 -   11th grade

                 12 -   12th grade, **No Diploma**

                 13 -   **High School Graduate**

                 14 -   GED or equivalent

                 15 -   Some college, no degree

                 16 -   Associate Degree: Occupational, Technical, or Vocational program

                 17 -   Associate Degree: Academic program

                 18 -   Bachelor's Degree (Example: BA, AB, BS, BBA)

                 19 -   Master's Degree (Example: MA, MS, MEng, Med, MBA)

                 20 -   Professional School Degree (Example: MD, DDS, DVM, JD)

                 21 -   Doctoral Degree (Example: PhD, EdD)

                 77 -   Refused

                 99 -   Don't Know

Marital Status

39. Are you now …

                 1-   Married,   7 -   Refused

                 2-   Widowed,   9 -   Don't know

                 3-   Divorced,

                 4-   Separated,

                 5-   Never Married, or

                 6-   Living with Partner?

Physical Activity

The next questions are about physical activities (such as exercise, sports, and physically active hobbies) that you may do in your leisure time.

40. How often do you do vigorous leisure-time physical activities for at least 10 minutes that cause heavy sweating or large increases in breathing or heart rate?

(If "never", code '0' and skip to question 42)

         _____ times **per**   (choose one)   1 -   Week   7 -   Refused

                                                         2 -   Month   9 -   Don't

                                                          3 -   Year   know

41. About how long do you do these vigorous leisure-time physical activities each time?

_____ (choose one) 1 - Minutes 7 - Refused
                             2 - Hours   9 - Don't know

42. How often do you do light or moderate leisure-time physical activities for at least 10 minutes that cause only light sweating or a slight or moderate increase in breathing or heart rate?
(If "never", code '0' and skip to question 44)

_____ times **per** (choose one) 1 - Week   7 - Refused
                                           2 - Month 9 - Don't know
                                           3 - Year

43. About how long do you do these light or moderate leisure-time physical activities each time?

_____ (choose one) 1 - Minutes 7 - Refused
                             2 - Hours   9 - Don't know

44. How often do you do leisure-time physical activities specifically designed to strengthen your muscles, such as lifting weights or calisthenics? (Include all such activities even if you have mentioned them before)

_____ times **per** (choose one) 1 - Week   7 - Refused
                                           2 - Month 9 - Don't know
                                           3 - Year

Occupation
45. How many hours did you work last week at all jobs or businesses? (Prompt: By work I mean any paid or unpaid work, including at a family farm or business)

_____ hours

46. Do you usually work 35 hours or more per week in total at all jobs or businesses?
1 - Yes
2 - No
9 - Don't know

47. What is your primary occupation?_____
(If no occupation given, skip to question 50)

48. What types of activities do you engage in for your occupation? (Prompt: For example, do you sit at a computer most of the day? Do you stand at a bench? Are you walking around the city?)

_____
_____
_____
_____

49. How do you think your occupation affects your weight?

_____
_____

Smoking Status
50. Have you smoked at least 100 cigarettes in your entire life?
1 - Yes   9 - Don't know
2 - No

51. On how many of the past 30 days did you smoke a cigarette? _____ days (if 0, skip to Question 53)

52. During the past 30 days, on the days that you smoked, about how many cigarettes did you smoke per day?
_____ cigarettes

116

Restaurants

53. On average, how many times per week do you eat meals that were prepared in a restaurant? (Prompt: This includes eat-in restaurants, fast food restaurants, carry out restaurants and restaurants that deliver food to your house). _____ times per week

Alcohol Use

54. In the past 12 months, how often did you drink any type of alcoholic beverage?(Probe: How many days per week, per month, or per year did you drink?) (If "never", code '0' and skip to question 56)

_____ times **per** (choose one)

1 -	Week	7 -	Refused
2 -	Month	9 -	Don't
3 -	Year		know

55. In the past 12 months, on those days that you drank alcoholic beverages, on the average, how many drinks did you have? (If less than 1 drink, code '1') _____ drinks

Social Support

56. Can you count on anyone to provide you with emotional support such as talking over problems or helping you make a difficult decision?

- 1 - Yes
- 2 - No
- 3 - Respondent does not need help
- 9 - Don't know

57. In general, how many close friends do you have? By "close friends", I mean relatives or non-relatives that you feel at ease with, can talk to about private matters, and can call on for help. _____ close friends.

Measured Weight and Height

58. May I measure your height, weight, and waist circumference with the scale and tape measure that I brought with me?

- 1 - Yes
- 2 - No   (Skip to Question 62)

(For 59 – 61, code '9999' if refused)

59. Measured weight _____ lbs

60. Measured height _____ inches

61. Measured waist circumference _____ inches

County of Residence

62. What county do you live in? _____

Scales (Self-administered – Self-esteem, Self-objectification, Dieting Beliefs)

I'm now going to ask you to fill out these three 1-page personality scales. If you have any questions while you're filling these out, feel free to ask me. You may skip any questions that you'd rather not answer.

Hand out scales; Collect finished scales.   Thank you very much for your time. I have a referral sheet here that lists two UK health resources that you may not be aware of; I'm making this list available to everyone that I interview. Would you like a copy of this list of resources?

Appendix B: Dieting Belief Scale

Instructions:
Please respond to the following statements by indicating how well each statement describes your beliefs. Place a number from 1 (*not at all descriptive of my beliefs*) to 6 (*very descriptive of my beliefs*) in the box to the right of each statement.

Not at all descriptive of my beliefs					*Very descriptive of my beliefs*
1	2	3	4	5	6

1. By restricting what one eats, one can lose weight. ☐

2. When people gain weight, it is because of something they have done or not done. ☐

3. A thin body is largely a result of genetics. ☐

4. No matter how much effort one puts into dieting, one's weight tends to stay about the same. ☐

5. One's weight is, to a great extent, controlled by fate. ☐

6. There is so much fattening food around that losing weight is almost impossible. ☐

7. Most people can only diet successfully when other people push them to do it. ☐

8. Having a slim and fit body has very little to do with luck. ☐

9. People who are overweight lack the willpower necessary to control their weight. ☐

10. Each of us is directly responsible for our weight. ☐

11. Losing weight is simply a matter of wanting to do it and applying yourself. ☐

12. People who are more than a couple of pounds overweight need professional help to lose weight. ☐

13. By increasing the amount one exercises, one can lose weight. ☐

14. Most people are their present weight because that is the weight level that is natural for them. ☐

15. Unsuccessful dieting is due to lack of effort. ☐

16. In order to lose weight, people must get a lot of encouragement from others. ☐

Appendix C: Self-Objectification Questionnaire

Instructions:

I am interested in how people think about their bodies. The questions below identify 10 different attributes. I would like you to rank order these body attributes from that which has the greatest impact on your physical self-concept, to that which has the least impact on your physical self-concept.

> NOTE: It does not matter how you describe yourself in terms of each attribute. For example, fitness level can have a great impact on your physical self-concept regardless of whether you consider yourself to be physically fit, not physically fit, or any level in between.

Please first read over all of the attributes. Then, record your rank by writing the letter of the attribute.

When considering your physical self-concept, how important is…

a. physical coordination?

b. health?

c. weight?

d. strength?

e. sex appeal?

f. physical attractiveness?

g. energy level (e.g. stamina)?

h. firm/sculpted muscles?

i. physical fitness level?

j. measurements
    (e.g. chest, waist, hips)?

Letter of attribute

Most Important	_____
Second Most Important	_____
Third Most Important	_____
Fourth Most Important	_____
Fifth Most Important	_____
Sixth Most Important	_____
Seventh Most Important	_____
Eighth Most Important	_____
Ninth Most Important	_____
Least Important	_____

Appendix D: Self-Esteem Scale

Instructions:

Using the following 5-point scale, please indicate how often each of the items below is true for you.

        1 = Almost Always
        2 = Often
        3 = Sometimes
        4 = Seldom
        5 = Never

1. I feel that I am a person of worth, at least on an equal plane with others. ☐

2. I feel that I have a number of good qualities. ☐

3. I am able to do things as well as most other people. ☐

4. I feel I do not have much to be proud of. ☐

5. I take a positive attitude towards myself. ☐

6. Sometimes I think I am no good at all. ☐

7. I am a useful person to have around. ☐

8. I feel that I can't do anything right. ☐

9. When I do a job, I do it well. ☐

10. I feel that my life is not very useful. ☐

Appendix E: Recruitment Flyer

Research Participants Needed for Women's Health Study

Caucasian women, ages 50 – 64, are needed as volunteers for a research study on women's weight and health.

You may qualify to participate if you are a Caucasian woman between the ages of 50 and 64 and

- are post-menopausal,

- are not currently on hormone replacement therapy,

- do not have diabetes, and

- can walk without using special equipment.

The study will involve a 30-minute interview at a location of your choice.

For more information, please call:

Jennifer Gatz (Ph.D. Candidate)
Graduate Center for Gerontology
(859) 257-1450 ext. 80160

UK
UNIVERSITY OF KENTUCKY

An Equal Opportunity University

Consent to Participate in a Research Study

Weight Management in Post-Menopausal Women
Semi-structured interviews

WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are being invited to take part in a research study about women's weight management because you are a post-menopausal Caucasian woman between the ages of 50 and 64 years. If you volunteer to take part in this study, you will be one of about 80 people to do so.

WHO IS DOING THE STUDY?

The person in charge of this study is Jennifer Gatz of the University of Kentucky Graduate Center of Gerontology. She is being guided in this research by Suzanne Tyas, Ph.D., and John Watkins, Ph.D. There may be other people on the research team assisting at different times during the study.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to examine the lifetime factors that influence women's decisions to attempt weight loss.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research procedures will be conducted at one time at a location of your choosing. This visit will take about 30 minutes. You may be asked for a follow-up interview that will take about 1 hour.

WHAT WILL YOU BE ASKED TO DO?

If you participate in this study, you will be given a survey that will take approximately 10 to 15 minutes to complete. Your height, weight, and waist circumference will also be measured. At the end of the survey, you will be given three short psychological tests that will take a few minutes each.

ARE THERE REASONS WHY YOU SHOULD NOT TAKE PART IN THIS STUDY?

If you have not gone through menopause, if you require special equipment to assist you in walking, if you are taking hormone replacement therapy, if you have ever been diagnosed with diabetes, or if you are under the age of 50 or over the age of 64, you should not take part in this study.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There is a risk of psychological discomfort from participating in this study. At the end of the survey, the investigator will make available to you a list of University of Kentucky resources for referral.

WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

You will not get any personal benefit from taking part in this study.

DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. If there are any questions in the survey that you would rather not answer, you can skip those questions and continue with the survey.

IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you do not want to be in the study, there are no other choices except not to take part in the study.

WHAT WILL IT COST YOU TO PARTICIPATE?

It will not cost you anything to participate in this study.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

We will keep private all research records that identify you to the extent allowed by law.

Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be identified in these written materials. We may publish the results of this study; however, we will keep your name and other identifying information private.

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. For example, your name will be kept separate from the information you give, and these two pieces of information will be stored in different places under lock and key. You should know, however, that there are some circumstances in which we may have to show your information to other people. For example, the law may require us to show your information to a court or to tell authorities if we believe you have abused a child, or you pose a danger to yourself or someone else.

Representatives from the University of Kentucky may review your records for oversight purposes. Every effort will be made to protect your confidentiality.

CAN YOUR TAKING PART IN THE STUDY END EARLY?

If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study.

The individuals conducting the study may need to withdraw you from the study. This may occur if you are not able to follow the directions they give you, or if they find that your being in the study is more risk than benefit to you.

WHAT HAPPENS IF YOU GET HURT OR SICK DURING THE STUDY?

If you believe you are hurt or if you get sick because of something that is done during the study, you should call Jennifer Gatz at 859-257-1450 x 80160 immediately. It is important for you to understand that the University of Kentucky will not pay for the cost of any care or treatment that might be necessary because you get hurt or sick while taking part in this study. That cost will be your responsibility. Also, the University of Kentucky will not pay for any wages you may lose if you are harmed by this study.

Medical costs that result from research-related harm can not be included as regular medical costs. The University of Kentucky is not allowed to bill your insurance company. You should ask your insurer if you have any questions about your insurer's willingness to pay under these circumstances. Therefore, the costs related to your care and treatment because of something that is done during the study will be your responsibility.

WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

You will not receive any rewards or payment for taking part in the study.

WHAT IF YOU HAVE QUESTIONS?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions about the study, you can contact the investigator, Jennifer Gatz, at 859-257-1450 x 80160. If you have any questions about your rights as a volunteer in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428. We will give you a copy of this consent form to take with you.

WHAT ELSE DO YOU NEED TO KNOW?

You will be told if any new information is learned which may affect your condition or influence your willingness to continue taking part in this study.

_____   _____
Signature of person agreeing to take part in the study   Date

_____
Printed name of person agreeing to take part in the study

_____   _____
Name of person providing information to subject   Date

_____
Signature of Investigator

Appendix G: University of Kentucky Resource Referral List

UK Health Connection (859) 257-1000 or (800) 333-8874.

This phone number is staffed by nurses that can assist you in choosing a primary care physician at Kentucky Clinic, Kentucky Clinic North, or Kentucky Clinic South. Also, patients with urgent care needs may call Health Connection, and the staff will assist in scheduling an appropriate appointment. http://www2.mc.uky.edu/primarycare/

Counseling Psychology Services Center (859) 257-4159

CPS is a non-profit counseling center staffed by counseling psychology faculty and advanced graduate students. Individual, couple, group, and family therapy formats are available, and the service fees are based on a sliding scale. http://www.uky.edu/Education/EDP/cpsindex.html

Appendix H – Narrative Interview Guide

Why should people control their weight?
Why is it important to you to control your weight?
How have you learned about weight control throughout your life?
       How do you decide which information is worth listening to?

Tell me about your weight from as early as you can remember to now.
       <Weight history: current weight, lifetime max, lifetime minimum>
How did you feel about your weight at different times in your life?
       How do you feel that people treated you because of your weight?

What kinds of things influenced your weight…?
       …when you were a child?
       …when you were a teenager or young adult?

What types of things influence your weight now?
What types of things influence your *feelings about* your weight now?

Tell me a little about your family growing up:
- What did you all do for mealtimes?
- Did your family often have people over for dinner or parties?

What kinds of things do you like to do in your free time (travel, clubs, volunteer, etc.)?
How have these changed since your young adulthood?

What are your favorite things to eat?
Do you enjoy cooking? Has your opinion of cooking changed throughout your life?

Consent to Participate in a Research Study

Weight Management in Post-Menopausal Women
Narrative Interviews

WHY ARE YOU BEING INVITED TO TAKE PART IN THIS RESEARCH?

You are being invited to take part in a research study about women's weight management because you are a post-menopausal Caucasian woman between the ages of 50 and 64 years. If you volunteer to take part in this study, you will be one of about 10 people to do so.

WHO IS DOING THE STUDY?

The person in charge of this study is Jennifer Gatz of the University of Kentucky Graduate Center of Gerontology. She is being guided in this research by Suzanne Tyas, Ph.D., and John Watkins, Ph.D. There may be other people on the research team assisting at different times during the study.

WHAT IS THE PURPOSE OF THIS STUDY?

The purpose of this study is to examine the lifetime factors that influence women's decisions to attempt weight loss.

WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?

The research procedures will be conducted at one time at a location of your choosing. This visit will take about one hour.

WHAT WILL YOU BE ASKED TO DO?

If you participate in this study, you will be interviewed for approximately one hour. This interview will be tape recorded. If you are uncomfortable being tape recorded, or if you decide at any time that you no longer wish to be tape recorded, the tape recorder will be turned off.

ARE THERE REASONS WHY YOU SHOULD NOT TAKE PART IN THIS STUDY?

If you have not gone through menopause, if you require special equipment to assist you in walking, if you are taking hormone replacement therapy, if you have ever been diagnosed with diabetes, or if you are under the age of 50 or over the age of 64, you should not take part in this study.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There is a risk of psychological discomfort from participating in this study. At the end of the survey, the investigator will make available to you a list of University of Kentucky resources for referral.

WILL YOU BENEFIT FROM TAKING PART IN THIS STUDY?

You will not get any personal benefit from taking part in this study.

DO YOU HAVE TO TAKE PART IN THE STUDY?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering. If during the interview you do not feel comfortable answering any specific questions, you can skip that question and continue with the interview.

IF YOU DON'T WANT TO TAKE PART IN THE STUDY, ARE THERE OTHER CHOICES?

If you do not want to be in the study, there are no other choices except not to take part in the study.

WHAT WILL IT COST YOU TO PARTICIPATE?

It will not cost you anything to participate in this study.

WHO WILL SEE THE INFORMATION THAT YOU GIVE?

We will keep private all research records that identify you to the extent allowed by law. The cassette tapes containing the recording of your interview will be stored by the investigator until the end of this study, or approximately two years.

Your information will be combined with information from other people taking part in the study. When we write about the study to share it with other researchers, we will write about the combined information we have gathered. You will not be identified in these written materials. We may publish the results of this study, and these publications may include direct quotes from you; however, we will keep your name and other identifying information private.

We will make every effort to prevent anyone who is not on the research team from knowing that you gave us information, or what that information is. For example, your name will be kept separate from the information you give, and these two pieces of information will be stored in different places under lock and key. You should know, however, that there are some circumstances in which we may have to show your information to other people. For example, the law may require us to show your information to a court or to tell authorities if we believe you have abused a child, or you pose a danger to yourself or someone else.

Representatives from the University of Kentucky may review your records for oversight purposes. Every effort will be made to protect your confidentiality.

CAN YOUR TAKING PART IN THE STUDY END EARLY?

If you decide to take part in the study you still have the right to decide at any time that you no longer want to continue. You will not be treated differently if you decide to stop taking part in the study. If you withdraw from the study, you may request to receive the cassette tape containing a recording of your interview or you may request to have the tape destroyed.

The individuals conducting the study may need to withdraw you from the study. This may occur if you are not able to follow the directions they give you, or if they find that your being in the study is more risk than benefit to you.

WHAT HAPPENS IF YOU GET HURT OR SICK DURING THE STUDY?

If you believe you are hurt or if you get sick because of something that is done during the study, you should call Jennifer Gatz at 859-257-1450 x 80160 immediately. It is important for you to understand that the University of Kentucky will not pay for the cost of any care or treatment that might be necessary because you get hurt or sick while taking part in this study. That cost will be your responsibility. Also, the University of Kentucky will not pay for any wages you may lose if you are harmed by this study.

Medical costs that result from research-related harm can not be included as regular medical costs. The University of Kentucky is not allowed to bill your insurance company. You should ask your insurer if you have any questions about your insurer's willingness to pay under these circumstances. Therefore, the costs related to your care and treatment because of something that is done during the study will be your responsibility.

WILL YOU RECEIVE ANY REWARDS FOR TAKING PART IN THIS STUDY?

You will not receive any rewards or payment for taking part in the study.

WHAT IF YOU HAVE QUESTIONS?

Before you decide whether to accept this invitation to take part in the study, please ask any questions that might come to mind now. Later, if you have questions about the study, you can contact the investigator, Jennifer Gatz, at 859-257-1450 x 80160. If you have any questions about your rights as a volunteer in this research, contact the staff in the Office of Research Integrity at the University of Kentucky at 859-257-9428 or toll free at 1-866-400-9428. We will give you a copy of this consent form to take with you.

WHAT ELSE DO YOU NEED TO KNOW?

You will be told if any new information is learned which may affect your condition or influence your willingness to continue taking part in this study.

_____   _____
Signature of person agreeing to take part in the study   Date

_____
Printed name of person agreeing to take part in the study

_____   _____
Name of person providing information to subject   Date

_____
Signature of Investigator

Appendix J - Qualitative Analysis Codes

TVN – Then vs. Now (Open Code-1)
A perception that things now are different than they were at some time in the past.

Societal Level: TVN-1
a: Knowledge/Medical advice
b: Societal pressures/ideals
c: Sports/Physical Activity
d: Leisure activities
e: Technology
f: Food preferences/choices
g: Body weight
h: Food availability
i: Smoking
j: Family planning/timing

Personal Level: TVN-2
a: Food preferences/choices
b: Health choices
c: Personal knowledge
d: Leisure activities
e: Pers. Appearance/weight
f: Reaction of others
g: Sport/physical activity
h: Body image
i: Influences on body image/weight
j: Physical ability/illness/energy
k: Work/occupation
l: Attitude towards food
m: Cooking/meal habits
n: Food availability
o: Ability to lose weight

STS – Stayed the Same (Open Code-1)
Perception that things have not changed over the years

Societal Level: STS-1
a: Knowledge
b: Societal pressures
c: Sports/Physical Activity
d: Leisure activities
e: Technology
f: Food preferences
g: Body weight

Personal Level: STS-2
a: Food preferences/choices
b: Health choices
c: personal knowledge
d: Leisure activities
e: Personal Appearance/ weight
f: Reaction of others
g: Sports/ physical activity
h: Relationships
i: Body image
j: Attempted weight loss
k: Location
l: Influences on body image/ weight
m: Personality
n: Occupation
o: Cooking/meal habits

MOT – Motivators (Open Code-2)
Events/experiences that motivated the women to lose weight or make a positive change at some point.

Motivation to Change Weight/eating/exercise: MOT-1
a: Health reasons
b: Physical pain/limitations
c: Saw someone with problems
d: Life event
e: Other person's example/encouragement
f: Specific weight reached
g: Appearance
h: Weight loss program
i: General unhappiness w/weight
j: Pets
k: Safety
l: Social issues (i.e., dating, comments from others)
m: Work
n: Clothing
o: Getting older
p: Death of a loved one
q: Enjoys exercise

Motivation to change life circumstances (job, education): MOT-2
a: Life event
b: Work circumstances

INF - Influences on Current Weight (Open Code-3)
Circumstances that are perceived to affect subjects' current weight

Positive influences: INF-1
a: Food behaviors/choices
b: Diet plans
c: Other people
d: Clothing
e: Physical Activity
f: Things that prevent eating out
g: Never had kids
h: Metabolism/personality/genes
i: Weighs self
j: Health issues/functioning
k: Social forces
l: Work
m: Wants to be attractive

Negative influences: INF-2
a: Others are overweight
b: Genetics/metabolism
c: Food (Specific /love of)
d: Social pressures
e: Stress/Work/Busy
f: Illness/health issues
g: Doing all she can, not enough
h: Fatigue
i: Lack of knowledge
j: Menopause
k: Lack of physical activity
l: Complacency
m: Boredom/not enough to do
n: Quit smoking
o: Age
p: Leisure time activities
q: No longer eats with children
r: Lack of self-discipline/laziness

FAM – Family History (Open Code-4)
Subject mentioning members of her family with regards to weight, food choices, body image, physical activity, or weight-related health problems

Family of origin (parents/grandparents/siblings): FAM-1
a: Physical activity
b: Weight
c: Feelings about own weight
d: Dieting
e: Food choices/preferences
f: Mealtime habits/patterns
g: Health problems associated with weight
h: Knowledge -Nutritional/weight control/cooking
i: Attitude towards subject's weight/food selection/physical activity
j: Food availability (including junk food)

Other family (husband/children/in-laws): FAM-2
a: Physical activity
b: Weight
c: Feelings about own weight/appearance
d: Dieting
e: Food choices/preferences
f: Mealtime habits/patterns
g: Health problems associated with weight
h: Knowledge -Nutritional/weight control/cooking
i: Attitude towards subject's weight/food selection/Physical activity
j: Food availability
k: Subjects' attitude towards others' nutrition/weight/food selection/ Physical activity

OTH – Others' perceptions of subject (non-family), weight-, activity-, or food-related (Open Code-4)
a: Positive
b: Neutral
c: Negative

WGT – Weight History (Open Code-5)
Subject's recollections of her personal weight (lbs) and weight loss attempts

a: Dieting for weight loss
b: Weight loss
c: Weight gain
d: Weight/size at a certain point
e: Genetic influence on weight
f: Weight stayed the same
g: Exercising for weight loss
h: Future weight concerns
i: Attempting to gain weight

LTA – Leisure Time Activities (Open Code-6)
Things the subject does or did in her leisure time (other than dieting)

       Things subject did in past: LTA-1
       a: Solitary
       b: Social

       Things subject currently does: LTA-2
       a: Solitary
       b: Social

PER– Perceptions of self (Open Code-7)
Subject's perception of self, currently or in past

       a: Weight
       b: Body image
       c: Eating patterns (weight-related)/diets
       d: Physical abilities/coordination/limitations
       e: Social status
       f: Illness/lack of illness
       g: Perception of own personality/skills/knowledge/beliefs/ desires/metabolism
       h: Things subject enjoys (specifically used positive language)
       i: Things subject does not enjoy (specifically used negative language)
       j: Exercise/physical activity
       k: Perception of self in occupation/ volunteer work
       l: Other weight control behaviors
       m: Relationships with others
       n: Smoking status
       o: Parenting skills/style
       p: Leisure time activities/hobbies

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Vita

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EXPERIENCE

1999 – 2006   Programmer Systems Analyst, University of Kentucky Research &
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1998 – 1999   Programmer, Keane, Inc., Charlotte, NC

1997   Lab Research Assistant, Center for Applied Energy Research,
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PUBLICATIONS

Gatz, Jennifer L., Watkins, John F., Tyas, Suzanne L. Weight management in post-menopausal women: A mixed-methods approach. American Journal of Epidemiology. 2006; 163 (Suppl): S153.

Gatz, Jennifer L., Tyas, Suzanne L., St. John, Philip, Montgomery, Patrick. Do depressive symptoms predict Alzheimer's disease and dementia? Journal of Gerontology Series A: Biological Sciences and Medical Sciences. June 2005; volume 60A, number 6, pages 744-747.

Gatz, Jennifer L., Rowles, Graham D., Tyas, Suzanne L. Health Disparities in Rural Appalachia: A case study. In: <u>Critical Issues in Rural Health</u>, Nina Glasgow, Lois Wright Morton, and Nan Johnson, eds. Ames, IA: Blackwell Publishing, 2004.

Allen, Jan L., Gatz, Jennifer L., Eklund, Peter C. Applications for activated carbons from used tires: butane working capacity. Carbon. 1999; volume 37, issue 9, pages 1485-1489.

AWARDS and HONORS

2004   The Research Excellence Award of the Kentucky Extension Association for Family and Consumer Science (with Elizabeth Hunter, Denise Lewis, Kim Stansbury, and Laura Stephenson)

                The Program Excellence through Research Award of the National Extension Association of Family and Consumer Sciences (with Elizabeth Hunter, Denise Lewis, Kim Stansbury, and Laura Stephenson)

1994 – 1998   National Merit Scholarship, BellSouth Merit Scholarship, University of Kentucky Honor's Program

INVITED PRESENTATIONS

June 2006   "Weight Management in Post-Menopausal Women: a Mixed-Methods Approach." Poster session. With Suzanne L. Tyas and John F. Watkins. Second Annual North American Congress of Epidemiology. Seattle, WA.

April 2005   "Changing Obesity Levels in Two Cohorts: Causes and Consequences." Poster session. With John F. Watkins. Kentucky Public Health Association Annual Convention. Louisville, KY.

November 2004   "Redefining a Healthy Weight Among Seniors: Cohort Patterns and Implications." Poster session. With John F. Watkins. Gerontological Society of America's Annual Conference, Washington, DC.

April 2004   "Health Disparities in Rural America: Widening Horizons". Paper presentation by Graham Rowles (co-authors on paper: Jennifer Gatz and Suzanne Tyas). Southern Gerontology Society's Annual Conference. Atlanta, GA.

January 2003   "Planning for Changing Demographics: A partnership between the University and the community". Paper presentation. With Elizabeth Hunter, Denise Lewis, Kim Stansbury, Laura Stephenson. Kentucky State Extension Conference 2003, Lexington, KY

November 2002 "Is depression a risk factor for dementia?" Poster session. With Suzanne Tyas, Philip St. John, and Patrick Montgomery. Gerontological Society of America's Annual Conference, Boston, MA.

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Jennifer L. Gatz
July 2006

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