

DISSERTATION

ASSOCIATION OF PET OWNERSHIP WITH EATING, EXERCISE,
NUTRITIONAL STATUS, AND HEART HEALTH OF SENIORS

Submitted by

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ABSTRACT OF DISSERTATION

ASSOCIATION OF PET OWNERSHIP WITH EATING, EXERCISE,
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The familiar adage "pets are good for your health" is an interesting but largely untested theory. Numerous anecdotal remarks on the health benefits of companion animals to the elderly refer to eating and exercise. Research is needed to examine if any health benefits result from pet ownership, and, if so, models must be developed to explain the reasons.

An early empirical study found increased survival rate of heart patients due to pets (Freidmann et al., 1980). A theoretical framework is developing based on pet attachment and substitute social support (Stallones et al., 1990). Recent research investigated the effects of pets on risk factors for cardiovascular disease (Anderson et al., 1992).

A new model was developed, based on pet ownership leads to better self care, to show possible associations between pet ownership with eating, exercise, nutritional status, and specific cardiovascular risk factors. The major hypotheses tested were pet owners have significantly lower serum total cholesterol, low-density lipoprotein cholesterol, and triglycerides, and higher high-density lipoprotein

cholesterol than non-owners and these differences are explained by diet and physical activity.

The experimental design was a cross-sectional, observational study of a self-selected convenience sample. Seniors aged sixty and above were solicited at senior congregate meals program sites in north-central Colorado (n=127). Instruments used were questionnaires on eating and exercise, emotional and physical health, social support, and pet attachment, biochemical analyses of diet and blood, and anthropometric and physiological measures. Statistical procedures included two-tailed t-tests, Chi-square, multivariate analysis, correlation coefficients and partial coefficients, and analysis of covariance; a value of $p < 0.05$ was considered significant.

There were few significant differences in diet, nutritional status, and risk factors for cardiovascular disease and no significant differences in number of exercise activities and duration of walking between pet and non-owners. Dog owners walked significantly longer than non-owners. Pet owners had significantly lower triglycerides than non-owners. It could not be concluded that pet ownership is associated with better diet and nutritional status, greater physical activity, and reduced cardiovascular risk compared to non-ownership in seniors.

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DEDICATION

This dissertation is dedicated to my mother Dorothy, who is 73, and to her mother Florence, on the 106th anniversary of Florence's birth, October 13, 1888, and on the day of the successful defense of this dissertation, October 13, 1994.

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CHAPTER I: INTRODUCTION

Statement of The Problem

The familiar adage "pets are good for your health" is a theory that has not been adequately tested. Research is needed to examine whether or not any health benefits result from pet ownership, and, if so, models must be developed in an attempt to explain the reasons for such benefits.

Many researchers in the field of companion animals admit that there is an abundance of information based on folklore and anecdotes but a lack of theory-based scientific studies based on theory. Of the few scientific studies, findings have been mixed, partly as a result of problems related to the variables measured and the methods used. However, studies do point to the benefits of companion animals, especially to the elderly (Boldt & Dellmann-Jenkins, 1992; Garrity, Stallones, Marx & Johnson, 1989; Lago, Delaney, Miller & Grill, 1989). A suggested theory is that pet companionship substitutes for human support and thus buffers stress and, in turn, benefits health.

Some of the anecdotal remarks on the health benefits of companion animals to the elderly refer to eating and exercising habits, and often appear in nursing notes.

A plausible theory is that pet ownership leads to improved self care. Two important components of self care are eating and exercising. However, very few empirical studies have even suggested that the relationship of pet ownership to health in the elderly is through the mechanism of eating and exercising habits.

It appears in the relatively short time of the last fifteen years when human/animal interaction studies became popular, scientific research on the subject has come full circle: from measuring blood pressure and survival of cardiac patients, to measuring pet attachment and social support variables, to measuring risk factors for cardiovascular disease again. However, no study has included all of the above.

Purpose of the Study

The purpose of the study was to observe and evaluate any associations of pet ownership with the eating and exercising habits of seniors (aged sixty and above) and, in turn, their nutritional status and specific cardiovascular risk factors. A new model, based on pet ownership leads to better self care, was developed to show these associations. The first objective was to determine if there were any significant differences in dietary intake and exercise activities between pet owners and non-owners. The second objective was to determine if there were any significant

differences in nutritional status and specific risk factors for cardiovascular disease between pet owners and non-owners. The third objective was to determine if the significant differences in dietary intake and exercise activities were related to the significant differences in nutritional status and specific risk factors for cardiovascular disease.

The hypotheses tested were as follows:

- (1) Pet owners demonstrate significantly higher dietary quality, as measured by the Recommended Dietary Allowances and Dietary Guidelines, than non-owners;
- (2) Pet owners eat more regularly than non-owners;
- (3) Pet owners are significantly more physically active than non-owners;
- (4) Pet owners have significantly lower body mass indices than non-owners;
- (5) Pet owners have significantly lower waist to hip ratios than non-owners;
- (6) Pet owners have significantly lower blood pressure than non-owners;
- (7) Pet owners have significantly lower serum total cholesterol, low-density lipoprotein cholesterol, and triglycerides than non-owners;
- (8) Pet owners have significantly higher serum high-density lipoprotein cholesterol than non-owners;

- (9) The differences in blood lipids between pet owners and non-owners are explained by diet and physical activity; and
- (10) The differences in nutritional status between pet owners and non-owners, as measured by anthropometrics and blood chemistry, are explained by diet and physical activity.

Definitions

Before a discussion of the topic begins, the words pet ownership and companion animals should be clarified. It appears that popular and scientific literature use pet ownership and companion animals interchangeably. It also appears that laymen, in general conversation, use the word pet. However, researchers in the literature reviewed, for the most part, use the words companion animal. They do this to imply the animal is more than just a pet that is owned for protection or pleasure; the animal has more functions than just these two. The animal is a pet that is attached or bonded to its owner—it is a companion. It should be noted that animals used specifically to aid the blind, deaf, or disabled (physically or mentally), such as guide dogs, hearing dogs, and service or therapy animals, will not be discussed. The benefits of these animals are obvious and well documented.

Delimitations

This study was delimited to participants residing in north-central Colorado. Participants were mainly recruited at senior congregate meals program sites. The participants were required to be at least sixty years of age, a resident of Colorado, and independently living in a house or apartment. The participants were also required to be literate.

The study was conducted only during the Spring of 1994. This may affect dietary intake due to seasonal variation in food availability.

Limitations

The limitations of this study were noted. It was a cross-sectional study using a convenience sample. The participants who were recruited at congregate meals program sites were mobile and healthy enough to go there.

The questionnaire was 44 pages in length. The responses to the questionnaires, the diet record, and the anthropometric and physiological measures were all self reported. The diet record used was a twenty-four hour food diary.

The response rate was low and the sample size was small with 127 people in the total sample and only 32 people in the blood chemistry subsample. The demographic

characteristics of the sample were not similar to the general populace of similar age.

Assumptions

It was assumed that all self-reported responses were valid. In addition, it was assumed that the twenty-four hour food diary captured habitual diet.

CHAPTER II: LITERATURE REVIEW

Introduction

The nature of this cross-sectional observational study was to evaluate any associations of pet ownership with eating and exercising habits, nutritional status, and risk factors for cardiovascular disease of seniors. Participants were mainly solicited at senior congregate meals program sites.

Literature has been reviewed on the topics of pet ownership, risk factors for cardiovascular disease, eating habits and dietary assessment, and senior congregate meals programs. Research studies were arranged according to topic and presented in chronological order where possible.

Pet Ownership

Plausible Theories

Most people are probably familiar with the adage pets are good for people (Staufer, 1982) or pets are good for your health (American Association of Retired Persons, 1987). This is a plausible theory or possible explanation that may or may not be based on empirical fact.

In 1987, the National Institutes of Health reported on the health benefits of pets and stated pet exposure should be considered as a possible protective factor in scientific studies of human health. It pointed out that research is needed to test explanatory models for understanding the health benefits of human/animal interactions in older persons (National Institutes of Health, 1987). The National Institutes of Health also pointed out that first cross-sectional, descriptive studies are needed to suggest hypotheses for testing (cited in Stallones, Marx, Garrity & Johnson, 1990).

Many researchers in the field of companion animals admit that there is an abundance of information based on folklore and anecdotes (interesting and amusing comments) but a paucity of scientific studies based on theory (Marx, 1984; Robb & Stegman, 1983; Rowan, 1991; Siegel, 1990). Of these few scientific studies, findings have been mixed, partly as a result of problems related to the variables measured and the methods used (Boldt & Dellmann-Jenkins, 1992; Katcher, 1982; Serpell, 1991). However, it appears studies do point to the benefits of companion animals, especially to the elderly (Boldt & Dellmann-Jenkins, 1992; Garrity et al., 1989; Lago et al., 1989).

Some of the anecdotal remarks on the health benefits of companion animals to the elderly refer to eating and exercising habits, and often appear in nursing notes. In a

case study reported by Brickel (1981), a man of 72 whose wife had died recently was not eating enough to stay healthy. His son gave him a cat. The man was delighted with the pet with the result, as reported by Brickel (1981), that he ate more than formerly. In a service project, Ryder (1985) reported on birds that were given to pensioners living alone in Edinburgh. The retirees remarked it was easier to get up in the morning when their chirping friends told them it was time for breakfast, and it was more fun to eat breakfast when tidbits were shared with their birds. In nursing notes reported by Rosenkoetter (1991), a patient remembered to take an early morning medication at the time the dog went out or agreed to have dinner when the cat did.

In summary, pets may become a time clock for people with no obligation or scheduled activity (Erickson, 1985). Pets require care and exercise and they need to be fed; thus, care of a pet becomes a forced activity (Rosenkoetter, 1991). A working hypothesis is that pet care leads to self care. Two important components of self care are eating and exercising.

Previous Research

It has only been within the last fifteen years that the benefits of companion animals have developed from folklore and anecdotes to theory based empirical research. In that short time, it appears the scientific research on the subject has come full circle: from measuring blood pressure

(Baun, Bergstrom, Langston & Thoma, 1983) and survival of cardiac patients (Friedmann, Katcher, Lynch & Thomas, 1980), to measuring pet attachment and social support variables (Lago, Knight & Connell, 1982; Lago et al., 1989; Stallones, Marx, Garritty & Johnson, 1988, 1990), to measuring risk factors for cardiovascular disease again (Anderson, Reid & Jennings, 1992; Serpell, 1991).

Curious Early Experiments

In 1975, Mugford and M'Comisky observed the effects of giving a begonia (plant) or a budgerigar (bird) to elderly people living alone, who had or did not have a television set (Katcher, 1982). It was believed that television watching might lower the effectiveness of the bird's presence (Bustad, 1980). They assessed personality and social adjustment and found that the pet owners were "better off emotionally" than the plant owners. That is, the pet owners had more friends, more visitors, and were more involved with the community (Wilson & Netting, 1983).

Robb, Boyd, and Pristash (1980) observed the effects of a wine bottle, a plant, or a caged puppy on selected social behaviors of elderly people living in a long-term care facility. They found that the residents talked and smiled more during the time when the caged puppy was present (Robb & Stegman, 1983).

Katcher, Beck, Friedmann, and Lynch (1983) observed the effects of an aquarium without fish or an aquarium with fish

on patients prior to surgery at a dental school. They found that patients were more relaxed after contemplating the aquarium with the fish (Robb & Stegman, 1983).

Hendy (1984) observed the effects of no pets, stuffed pets, videotaped pets, or live pets on nursing home residents. He found that the live pets elicited higher levels of alertness and smiling (Edney, 1992).

Baun, Bergstrom, Langstom, and Thoma (1984) observed the effects of quiet reading, petting a strange dog, or petting one's own dog on the blood pressure of free-living, adult (age 24 to 74), dog owners. Their surprising results were contrary to the popular belief that petting an animal reduces one's blood pressure.

Baun et al. (1984) found that there is a greeting response when petting one's own dog during which one's blood pressure is initially significantly higher than the response to the other two protocols. However, when petting one's own dog for a certain length of time, one's blood pressure had the greatest decrease over time. The decrease in one's blood pressure while petting one's own dog paralleled the relaxation effect of quiet reading. It was noted all three protocols had the effect of reducing one's blood pressure.

Hendy (1987) observed the effects of visits by pets alone, people alone, or people and pets together on nursing home residents. She found that all three visiting programs increased smiling and alertness (Kalfon, 1991).

Methodologically Strong Empirical Studies

Siegel (1990) reported that "a rich anecdotal lore exists in the support of pets as companions to the elderly, although *methodologically strong empirical studies* are few" (p. 1081). The following are a few of the methodologically strong empirical studies.

Friedmann, Katcher, Lynch, and Thomas (1980) studied the survival rate of 92 heart patients (age 37 to 79) with a diagnosis of MI (myocardial infarction) or AP (angina pectoris) on admission to a coronary care unit. Within one year of diagnosis, 11 of the 39 patients who did not own pets died, while only 3 of the 53 pet owners died. This was statistically highly significant and pet ownership was found to be the single most common factor to surviving patients.

It was thought the better survival rate might be related to the protective effect of the physical activity of walking a dog, but this was not found to be the case. Owners of pets other than dogs had a better survival rate than non-owners. It was thought that pet ownership might reflect health rather than influence it. That is, healthier individuals might own pets and therefore skew the results. To check this, Friedmann constructed an index of heart disease severity and could not find any correlation with pet ownership.

Extensive psychosocial data were collected in addition to the physiological data. It was discovered that the

positive effect of pets was independent of marital status and social support. These early findings on companion animals and social support (Friedmann et al., 1980) are just the opposite of later findings (Stallones, Marx, Garrity & Johnson, 1990). The important thing is the formulation of a theoretical framework, if somewhat nascent: the interaction of pet ownership and the variables of human social support.

It should be pointed out that Friedmann found no effects of pet ownership on survival of heart patients who were Black. Also, the degree of attachment between Black patients and their pets was significantly lower than that of White patients and their pets.

In 1982, Lago, Knight, and Connell presented their project called PACT (People and Animals Coming Together). The purpose of this project was to conduct longitudinal research on pet ownership and the health of rural elderly. Lago and colleagues planned an intervention of actual pet placement with the elderly as a test of the theory that affection for a pet promotes and maintains improved health and well-being. The results of the health study were later reported in 1989 by Lago, Delaney, Miller, and Grill.

It should be noted that Lago et al. (1982) reported that a cross-sectional national survey of pet owners revealed only 27% of dog owners and only 20% of cat owners could be classified as attached. Thus, different species elicit different levels of human attachment.

In 1989, Lago, Delaney, Miller, and Grill presented their Companion Animal Project which evaluated PACT. It was a longitudinal study which followed a sample of rural older persons ($n = 355$) for four years. Telephone and in-person interviews were used. Participants were asked about pet ownership status, physical health, social activities, perceived social support, emotional well-being, and demographic changes. A Pet Relationship Scale that was developed by Lago in 1988 was used to evaluate pet attachment. They found owner attitudes towards pets and pet ownership became significant predictors of maintaining higher levels of both health and morale over the four years.

Lago et al. (1989) also noted that early reports showed that PACT attracted impaired elderly. Therefore, attached relationships with pets were associated cross-sectionally with poorer, not better, health. However, in the longitudinal study, initial health status was controlled. Again, like in the Friedmann study, there is the concern whether pet ownership reflects health or influences it.

In 1990, Stallones, Marx, Garritty, and Johnson reported on their results of a cross-sectional national telephone survey ($n = 1,300$). They examined the relationship of pet ownership and attachment to self-reported illness and emotional distress. They looked at this in three stages of life: early adulthood (21 to 34 years of age), early middle age (35 to 44 years of age), and late middle age (45 to 64

years of age). The dependent variables were emotional distress and illness behavior, and the three important independent variables were intensity of attachment, presence of stressful life events, and availability of human support.

Stallones and colleagues noted that previous researchers have found that "social support from humans has been shown to buffer the adverse effects of great stress in a way that reduces health problems" (Stallones et al., 1990, p. 101). They also noted there is a theoretical framework forming that relates animal support to human support, and that the quality of animal support depends on the level of attachment. Therefore, it would follow that attached pets—pets bonded to their owners—would buffer the adverse effects of great stress in a way that reduces health problems.

The results were that in all three stages of life, pet attachment was negatively associated with human support. That is, the higher the pet attachment, the lower the human support. This may be beneficial if there is no, or not much, human support available and great stress present. However, this may be detrimental if pet attachment replaces available human support.

It was also found that, in early middle age, pet attachment was positively associated with emotional distress. That is, the the higher the pet attachment, the higher the emotional distress. This is because, according

to Medley (cited in Stallones et al., 1990, p. 108), early middle age "is a period of high stress and...the addition of another stressor such as a pet may serve to increase rather than decrease emotional distress."

In early adulthood and in late middle age, pet attachment was not associated with emotional distress. These findings differed from those found among the elderly aged 65 and older by Garrity, Stallones, Marx, and Johnson (1989) where pet attachment was negatively associated with emotional distress. Stallones and colleagues (1990) also found that pet attachment was not associated with illness behavior or negative life changes.

The results of this cross-sectional study showed that pet attachment does not necessarily have beneficial effects across all stages of life. Different age cohorts experience different effects of pet attachment. It would have been interesting if this cross-sectional study could have included a longitudinal study so that those in the younger stages of life could have been followed as they passed into the later stages of life.

Pet attachment scales.

It should be noted that several investigators have gone beyond recording pet ownership to measuring emotional attachment of owners to their pets. Measuring pet attachment has evolved from a single-item attitude question by Robb and Stegman in 1983 to a psychometric evaluated

multi-item attitude scale by Johnson, Garrity, and Stallones in 1992.

The single-item attitude question was "do you prefer people or pets?" (Robb & Stegman, 1983). Preference for pets over people characterized high-bond owners; preference for people over pets characterized low-bond owners.

The psychometric evaluated multi-question attitude scale was a 23-question instrument called the Lexington Attachment to Pets Scale (LAPS) (Johnson et al., 1992). It was based on a review of previous attachment scales and was guided by theoretical considerations. It emphasized questions that were indicative of respondent affection for their companion animal.

The 23 questions ranged from such statements as "my pet means more to me than any of my friends" to "I consider my pet to be a friend." The response choices were strongly disagree, somewhat disagree, somewhat agree, or strongly agree, coded from zero to three, respectively (reversed for two statements worded in a negative direction). The responses were collected using telephone interviews of a random representative sample of 412 pet owners of dogs and/or cats. A total score was calculated for each pet owner based on their favorite pet. Pet owners with a higher score were considered to have a higher level of pet attachment.

Johnson and colleagues (1992) found that female pet owners, Black pet owners, and older pet owners tended to be more highly attached to their favorite pets. Friedmann et al. (1980) found just the opposite results with Black pet owners. Johnson et al. (1992) also found that pet owners with less education and pet owners with lower income also tended to be more highly attached.

Pet owners who were never married, divorced, or co-habiting had the highest attachment while pet owners who were married had the least attachment. Similarly, pet owners who had smaller social networks were more attached to their pets. Pet owners from smaller households and those households with no children also were found to be more attached to their pets.

In addition, pet owners who had grown-up with pets had higher attachment. Pet owners who indicated a dog was their favorite pet were found to have higher attachment than pet owners who reported a cat was their favorite pet.

Johnson et al. (1992) concluded that pet attachment is higher among those with fewer social ties. This lends support to the "substitute" hypothesis that pets can be a substitute for human support.

It should be noted that LAPS was shown here to have excellent reliability with a high degree of internal consistency (coefficient alpha = 0.928). LAPS also measured for content and construct validity.

Johnson and colleagues (1992) pointed out that the validity and reliability of LAPS in self-administered and in-person interviews had yet to be established. Also, there was no baseline information regarding responses from rural inhabitants because this was conducted in the city of Lexington, Kentucky.

Pet ownership and risk factors for cardiovascular disease.

In 1991, Serpell conducted a 10-month prospective health study on 71 adult subjects following the acquisition of a new pet (dog or cat). A group of 26 subjects without pets served as a comparison. He examined changes in physical and psychological health and exercise levels.

The pet-owning group reported a highly significant reduction in minor health problems during the first month following pet acquisition. This was maintained through 10 months for dog-owners. Also, dog-owners did considerable more physical exercise while walking their dogs than the cat-owners or non-owners. It should be noted, again, that different species have different effects.

Serpell mentioned several methodologic problems in animal companionship research. The effects of pet acquisition "cannot be investigated using conventional double-blind, placebo-controlled trials. Also, people voluntarily acquiring pets, and agreeing to participate in research, are not a randomly-selected sample" (Serpell,

1991, p. 719). In addition, the reduction of minor health problems during the first month of study may be partly "attributed to the novelty value of pet acquisition" (Serpell, 1991, p. 720).

Serpell mentioned a useful variable that could be used for future research. He noted that increases in daily physical activity due to dog walking could have long-term implications such as beneficial changes in levels of high-density lipoprotein cholesterol.

In 1992, Anderson, Reid, and Jennings researched pet ownership and certain risk factors for cardiovascular disease in a clinic population ($n = 5,741$) aged 20 to 60 years. They noted that, previously, "there has been no evidence that pet ownership has a public health benefit in the prevention of cardiovascular disease" (Anderson et al., 1992, p. 298). They found that pet owners had significantly lower systolic blood pressure and plasma triglycerides than non-owners. Also, male pet owners had significantly lower plasma cholesterol levels than male non-owners.

Anderson and colleagues found there were no differences in socio-economic status, body mass index (BMI), and smoking habits between the pet owners and non-owners. On self-reported risk behaviors, pet owners ate more meat and drank more alcohol, and were significantly more active than non-owners.

Anderson et al. (1992) noted that drinking more alcohol, as reported by the pet-owners, might raise rather than lower triglycerides. However, just the opposite was discovered.

Again, it was thought that lower risk factors in pet owners were attributed to exercise among dog owners. However, there were no significant differences in blood pressure, plasma triglycerides and cholesterol, smoking habits, and exercise in dog owners compared to those who only owned other pets.

Anderson and colleagues pointed out that such studies as theirs are limited in that they only describe correlations which may be only fortuitous; the causality cannot be determined. However, with their results that pet ownership was associated with certain risk factors for cardiovascular disease, Anderson et al. (1992) believed pet ownership could "legitimately be urged as a community health strategy for cardiovascular disease prevention" (p. 298).

Risk Factors For Cardiovascular Disease

Definitions, Incidence, and Parameters

Cardiovascular disease (CVD) is a general term for all diseases of the heart and blood vessels. Atherosclerosis is the main form of cardiovascular disease and is characterized by an accumulation of lipid plaque within the arterial wall, as defined by Whitney, Cataldo and Rolfes (1987).

In the United States, cardiovascular disease is the leading cause of death (Centers for Disease Control and Prevention, 1993). Artherosclerosis, the principal cause of heart attacks and strokes, is responsible for the majority of these deaths (Ross, 1986).

The four risk factors most consistently associated with the increased incidence of cardiovascular disease are hypercholesterolemia (high serum cholesterol), hypertension (high blood pressure), cigarette smoking (American Heart Association Exercise Committee, 1992; Chernoff, 1991; National Cholesterol Education Program Expert Panel, 1993; Whitney et al., 1987), and lack of exercise (both a primary and secondary risk factor) (American Heart Association Exercise Committee, 1992). The National Cholesterol Education Program Expert Panel (1993) considers all four modifiable.

Serum cholesterol levels of less than 200 mg/dL, a systolic pressure of less than 140 mm Hg, and a diastolic pressure of less than 90 mm Hg are desirable (Zeman & Ney, 1988). However, what is considered high for these depends on age, gender, and various combinations of risk factors.

In addition to the top four risk factors for cardiovascular disease are the following non-modifiable risk factors: age (being older); gender (being male); heredity (having a family history of cardiovascular disease or having a family history of diabetes mellitus); and race (being

Black) (American Heart Association Exercise Committee, 1992; Chernoff, 1991; National Cholesterol Education Program Expert Panel, 1993; Whitney et al., 1987). There are additional modifiable risk factors of weight (being obese); diet (certain nutrient excesses); exercise (being sedentary); and stress levels (being high) and certain personality characteristics (being Type A) (American Heart Association Exercise Committee, 1992; American Heart Association Nutrition Committee, 1993; Chernoff, 1991; National Cholesterol Education Program Expert Panel, 1993; Whitney et al., 1987). The presence of multiple risk factors are thought to have a synergistic effect (Zeman, 1991).

Serum Cholesterol and Lipoproteins

Not only the level of total serum cholesterol is an important risk factor, but also the levels of the types of lipoprotein that transport the serum lipids are important risk factors.

Low-density lipoprotein (LDL) is the major cholesterol transport lipoprotein. Low-density lipoprotein cholesterol (LDL-C) is positively related to cardiovascular disease (Kris-Etherton, Krummel, Russell, Dreon, Mackey, Borchers & Wood, 1988). According to the National Cholesterol Education Program Expert Panel (1993), a low-density lipoprotein level of less than 130 mg/dL is desirable while higher levels can be a risk factor for cardiovascular disease.

High-density lipoprotein (HDL) is involved in reverse cholesterol transport. High-density lipoprotein cholesterol (HDL-C) is negatively related to cardiovascular disease (Kris-Etherton et al., 1988). According to the National Cholesterol Education Program Expert Panel (1993), a high-density lipoprotein cholesterol level of less than 35 mg/dL can be a risk factor for cardiovascular disease. Females have higher high-density lipoprotein cholesterol than males, as do non-smokers compared to smokers and individuals in the process of losing weight (Whitney et al., 1987).

Moderate exercise may both raise high-density lipoprotein cholesterol and lower low-density lipoprotein cholesterol (Castelli, 1979; Streja & Mymin, 1979). Even infrequent alcohol intake raises high-density lipoprotein cholesterol (Kris-Etherton et al., 1988).

A high ratio value of low-density lipoprotein cholesterol to high-density lipoprotein cholesterol is strongly associated with an increased risk of cardiovascular disease (Kris-Etherton et al., 1988). The ratio of total serum cholesterol to high-density lipoprotein cholesterol has been shown to be a consistent and important indicator of risk for cardiovascular disease (Castelli, Garrison, Wilson, Abbott, Kalousdian & Kannel, 1986).

Chylomicron is involved in transport of dietary triglyceride. Very low-density lipoprotein (VLDL) is involved in transport of endogenous triglyceride.

Triglyceride (TG) is positively related to cardiovascular disease (Castelli, Wilson, Levy & Anderson, 1989). According to the National Cholesterol Education Program Expert Panel (1993), a serum triglyceride level of less than 200 mg/dL is classified as normal while higher levels can be a risk factor for cardiovascular disease.

Exercise appears to decrease serum triglyceride levels, as reported by Cooper (cited in Perlmutter & Hall, 1985). A high intake of alcohol increases serum triglyceride levels (Shrapnel, Calvert, Nestel & Truswell, 1992).

Clinical measurement of serum total cholesterol is the sum of the cholesterol carried by very low density lipoprotein, low-density lipoprotein, and high-density lipoprotein. High-density lipoprotein cholesterol is measured by automated precipitation methodology (Zemen, 1991). Very low-density lipoprotein cholesterol can be estimated as 20 percent of the triglyceride value for levels of serum triglyceride less than 400 mg/dL. Low-density lipoprotein can be estimated from the following equation:
$$\text{LDL Cholesterol} = \text{Total Cholesterol} - \text{HDL Cholesterol} - 0.2 \text{ TG}$$
 (Friedewald, Levy, & Frederickson, 1972).

Serum total cholesterol and high-density lipoprotein cholesterol can be measured any time of day in the non-fasting state. This is because after a fat containing meal, serum total cholesterol does not change appreciably and high-density lipoprotein cholesterol drops only slightly

(National Cholesterol Education Program Expert Panel, 1993). However, because low-density lipoprotein cholesterol is estimated from measurements that include triglyceride, blood should be collected from patients who have fasted at least twelve hours (National Cholesterol Education Program Expert Panel, 1993).

Certain Diet Risk Factors

Shrapnel and colleagues (1992) reviewed key points of the research into the links between diet and cardiovascular disease. Their findings concerning dietary cholesterol, total fat, saturated fatty acids, sodium, alcohol, and obesity will be noted.

These researchers stated total fat may contribute to obesity, and its association with cardiovascular disease is mediated through saturated fatty acids. Saturated fatty acids are strongly associated with increased serum cholesterol and low-density lipoprotein cholesterol and increased risk for cardiovascular disease. Dietary cholesterol increases serum cholesterol in some people and may increase risk for cardiovascular disease. High salt intake is related to hypertension. High intake of alcohol increases serum triglyceride and blood pressure and increases mortality from cardiovascular disease. However, light alcohol consumption reduces the risk of cardiovascular disease. Abdominal obesity increases the risk of cardiovascular disease.

According to the American Heart Association Nutrition Committee (1993), the major sources of saturated fatty acids are whole milk dairy products, fatty meats and poultry, and baked goods that predominantly contain dairy products, shortening, and tropical oils (coconut, palm, and palm kernel).

The main point of Shrapnel and colleagues is that "as diet has the greatest influence on serum cholesterol levels, it is probable that habitual diet is the essential environmental factor determining population susceptibility to coronary heart disease" (Shrapnel et al., 1992, p. S9). This is a population or public health approach, as opposed to a medical or individual approach. However, an individual can make personal choices based on public health information.

A Preventive Diet

The Nutrition Committee of the American Heart Association issued a position statement called "Dietary Guidelines for Healthy Americans" in 1986 and re-issued them in their "Diet-Heart Statement" in 1993. It proposed an optimal preventive diet for cardiovascular disease and a possible modification of risk factors.

The main points are as follows. Total fat intake should be less than 30 percent of calories. Saturated fat should be less than 10 percent of calories. Polyunsaturated fat should provide up to 10 percent of calories.

Monounsaturated fat should provide 10 to 15 percent of calories. Cholesterol intake should not exceed 300 mg/day. Protein intake should be approximately 15 percent of calories. Carbohydrate intake should be approximately 55 percent of calories. Sodium intake should not exceed 3 g/day. Alcohol intake, if consumed, should not exceed two drinks a day (one drink is 1.5 ounces of ethanol) (American Heart Association Nutrition Committee, 1993).

This corresponds to the "Step-One Diet" (National Cholesterol Education Program Expert Panel, 1993). Following the "Step-One Diet" can result in a 10% to 15% reduction in blood cholesterol levels, which in turn is expected to lead to a 20% or greater reduction in cardiovascular disease (Frankle & Owen, 1993). The "Step-Two Diet" is further reduction in saturated fat to 7 percent of calories and in cholesterol to less than 200 mg/day (National Cholesterol Education Program Expert Panel, 1993).

Diet therapy is the first line of treatment of high blood cholesterol, while drug therapy is reserved for patients considered at high risk for cardiovascular disease; appropriate use of physical activity and modification of other risk factors are also considered essential elements (National Cholesterol Education Program Expert Panel, 1993). One other important goal of diet therapy is weight control because obesity is an important contributor to increased total serum cholesterol (Denke, Sempos & Grundy, 1993),

increased triglycerides, increased low-density lipoprotein cholesterol, and decreased high-density lipoprotein cholesterol (National Cholesterol Education Program Expert Panel, 1993).

Obesity and Abdominal Fat as Risk Factors

Abdominal or central obesity increases the risk for cardiovascular disease (Jern, Bergbrant, Björntorp & Hansson 1992; Shrapnel et al., 1992). Abdominal obesity is frequently associated with raised blood pressure and serum lipid abnormalities, such as increased portal free fatty acids, very low-density lipoprotein triglyceride, and low-density lipoprotein cholesterol, and decreased high-density lipoprotein cholesterol (Deprés, 1991; Jern et al., 1992; Björntorp, 1990a, 1990b).

Obesity can be estimated by body mass index (BMI). Body mass index or Quetelet's index expresses weight relative to a power function of height: weight in kilograms is divided by height in meters squared (kg/M^2) (Gibson, 1990). A body mass index greater than 27 is indicative of obesity; a body mass index of 24 to 27 for females or 24 to 25 for males is considered to indicate excess weight (Zeman & Ney, 1988); a body mass index of 19 to 24 is considered acceptable (Zeman, 1991).

Abdominal fat accumulation can be defined by waist hip ratio (WHR). Waist/hip ratio is the waist circumference divided by the hip circumference (Gibson, 1990).

A waist hip ratio of greater than 0.8 for females or 1.0 for males is associated with increased risk of mortality and morbidity (Björntorp, 1987).

Cardiovascular Disease and Risk Factors in the Elderly

Cardiovascular disease is the leading cause of death in the elderly (45 percent of all deaths) and is the main reason for seeking medical care (Perlmutter & Hall, 1992). During the next 50 years, the proportion of people over 65 years of age will increase from 11% to more than 20% of the total population (Brody, Brock & Williams, 1987).

Prevention or delay of heart disease in the elderly has two important public health goals: "to improve the quality of the last years of life and to reduce the social and economic burden of increased use of health care resources by an expanding, elderly population" (Benfante & Reed, 1990, p. 393).

There are different patterns for blood lipids in elderly men and women. In women, serum cholesterol rises until age 70 and exceeds that in men; in men, serum cholesterol and low-density lipoprotein cholesterol tend to level off after age 60 (Kannel, 1988). After menopause in women, low-density lipoprotein levels rise more rapidly probably because of loss of estrogens (National Cholesterol Education Program Expert Panel, 1993). Premature menopause without estrogen replacement therapy is considered a risk

factor in women (National Cholesterol Education Program Expert Panel, 1993). In women, high-density lipoprotein cholesterol decline slightly as they age but remain higher than that in men; in men, high-density lipoprotein cholesterol remains stable from age 40 to age 80 (Chernoff, 1991).

It should be noted that hypertension in the elderly is generally classified in three ways (Kannel, 1985). First, there is isolated hypertension defined as systolic pressure greater than 160 mm/Hg with a diastolic pressure less than 95 mm/Hg. Second, there is predominant systolic hypertension defined by a disproportionate elevation in systolic pressure compared with a slightly elevated diastolic pressure. Third, there is essential hypertension defined by a proportional increase in both systolic and diastolic pressures. Hypertension, extremely common among the elderly, triples cardiovascular mortality (Wilking, Belander & Kannel, 1988).

There are different patterns for systolic and diastolic blood pressure in elderly men and women. In women, there is a linear rise in systolic pressure with age, with obesity being a contributing factor; there is a rise in diastolic pressure until the early sixties and then there is a decline (Chernoff, 1991). In men, there is a rise in systolic pressure until middle age and then levels off; there is a

rise in diastolic pressure until the mid-fifties and then there is a decline (Kannel, 1988).

In 1989, Castelli and colleagues emphasized their findings that serum total cholesterol is a primary risk factor for cardiovascular disease in patients older than 65 years. In 1990, Benfante and Reed noted similar findings when they reported that serum total cholesterol is an independent predictor of cardiovascular disease among men older than 65 years.

Castelli et al. (1989) identified a new and significant subgroup with high levels of triglyceride and low levels of high-density lipoprotein cholesterol who also have high cardiovascular disease rates. They also pointed out this diagnosis is most often missed in clinical practice.

Castelli and colleagues found that those with low total serum cholesterol generally thought to be safe are now being identified as being at high risk if they also have low levels of high-density lipoprotein cholesterol. Also, those with somewhat high levels of serum total cholesterol and low-density lipoprotein cholesterol and a high level of high-density lipoprotein cholesterol are at only moderate or even low risk.

In 1993, Stevens, Gautam, and Keil looked at body mass index and waist hip ratio as correlates of lipids and hypertension ($>140/ >90$ mm/Hg) in the elderly ($n = 786$, mean age = 73 years). They noted the association of these

anthropometric measures of fat patterning and risk factors for cardiovascular disease. They also noted that older adults tend to have more abdominal fat distribution.

Stevens and colleagues found that body mass index was inversely correlated with high-density lipoprotein cholesterol and positively correlated with hypertension. Body mass index tended to be positively associated with total serum cholesterol, although not significantly. After controlling for the effects of body mass index, waist hip ratio was also inversely associated with high-density lipoprotein cholesterol and positively associated with total serum cholesterol. Waist hip ratio was not associated with hypertension even when the effects of body mass index was held constant.

Chernoff (1991) discussed whether dietary modification for cardiovascular risk reduction in the elderly should be considered. In the elderly, there are the problems of low energy intakes and the risk of nutrient deficiencies. Frankle and Owen (1993) pointed out that there is little evidence that moderate decreases in dietary fat intakes are harmful to the elderly if diets remain adequate in energy and other nutrients. For weight reduction in the elderly, it is more reasonable to suggest increased physical activity rather than decreases in calorie intake (Chernoff, 1991).

The relationship of obesity to increased risk for cardiovascular disease in the elderly remains controversial,

with increased risk at both extremes of the weight distribution curve (Jarret, 1986). In fact, very low total serum cholesterol levels (below 150-160 mg/dL) are associated with increased morbidity and mortality (Frankle & Owen, 1993).

According to Watson (1994), the decrease in lean body mass with aging tends to be offset by an increase in body fat which continues until at least age 65 to 70, with the increased body fat becoming more centralized. The end result of these changes is that body weight tends to peak during the fifties and sixties, remains stable until age 65 to 70, and then slowly decreases after age 70 to 75 (Watson, 1994).

Protein-calorie malnutrition (PCM) and weight loss have been cited as common problems in the elderly (Constans, Bacq & Lamisse, 1992; Fischer & Johnson, 1990; Sullivan, Walls & Lipschitz, 1991). Robbins (1989) summarized commonly implicated causes of weight loss as the "nine D's": disease (acute and chronic), depression, dementia, diarrhea, dysphagia (difficulty swallowing), dysgeusia (altered taste and smell), dentition, drugs, and dysfunction.

Therefore, higher weight and thus higher BMI than considered ideal or normal, although potential risk factors for cardiovascular disease, may actually be a buffer against morbidity and mortality in the elderly (A. Sparks, personal communication, July 20, 1994). Of the disease states, it

should be noted that severe cardiovascular disease has been associated with catabolic states that cause weight loss (Watson, 1994). Wellman (1994) pointed out that the Dietary Guidelines acknowledge "people can be a little heavier as they grow older without added risk to health. Just how much heavier is not yet clear" (p. 4-5).

Eating Habits and Dietary Assessment

According to Haines, Popkin, and Guilkey (1990), the primary reasons for defining eating patterns is the determination of dietary differences and the identification of related factors that may contribute to differences in health risk.

Haines and colleagues (1990) reported that multiple factors influence the foods that people eat. They found that daily decisions and behaviors tend to be habitual and can be characterized. Daily eating habits can be characterized by such information as type and amount of foods consumed and time and location of food consumption.

For type and amount of food consumed, there are many different dietary assessment techniques that can be used. The four most widely used methods of data collection are food record (diary), twenty-four-hour food recall, food frequency, and diet history. After food estimates are collected, then nutrient composition of these foods are obtained from food composition data bases such as the U.S.

Department of Agriculture (USDA) Nutrient Data Bank. The calculated food composition then can be compared to some standard such as the Recommended Dietary Allowances (RDA), the American Heart Association Dietary Guidelines, and/or the U.S. Department of Agriculture-Department of Health and Human Services (USDA-DHHS) Dietary Guidelines and Food Guide Pyramid.

It should be noted that Recommended Dietary Allowances are based on data collected mainly from men aged 20 to 30 years and provide reasonable protection for generally healthy people who eat a variety of foods (Chernoff, 1991). In addition, almost all Recommended Dietary Allowances only go up to age 51+; the noted exception is for energy which has 51-75 and 76+ age categories.

According to Chernoff (1991), "the RDA committee concluded that data were insufficient to establish separate RDAs for people over age 70 years, because of the disparities between chronologic and physiologic aging and the higher prevalence of chronic disease with advancing age" (p. 459).

Hegsted (1989) further expanded that because the large majority of elderly have one or more diagnosed diseases and high drug consumption, it is unlikely specific dietary standards for such a group could be developed or would be useful.

Wellman (1994) summarized dietary guidance for the elderly with the following:

To date, the most commonly used guides for assessing food and nutrient intakes have not been tailored to the special needs of the elderly. Nevertheless, the U.S. Dietary Guidelines, the Food Guide Pyramid, Daily Values on food labels, and Recommended Dietary Allowances (RDAs) form the basis for recommendations regarding food and nutrient requirements in the elderly. (p. 1)

Wellman (1994) also pointed out that "RDAs are most appropriately used to evaluate the dietary adequacy of groups of people" (p. 11).

Van Staveren, De Groot, Blauw, and Van Der Wielen (1994) discussed problems and approaches in assessing diets of elderly people. They also reported that, in the elderly, there is a large degree of heterogeneity in food patterns. They pointed out that the decline in short-term memory with age makes the 24-hour recall particularly unreliable in elderly people. Better results have been obtained with a food diary.

Because the food diary was the dietary assessment technique used in this study, its strengths and weaknesses will be discussed.

According to Pao and Cypel (1990), the strengths of the twenty-four hour food diary are as follows. The respondent

does not rely on memory. The time period is defined. Portions can be measured to increase accuracy. Food intakes are quantified so nutrient contents can be calculated. Omission of foods is minimal. For elderly people, records may be more accurate than recalls.

According to Pao and Cypel (1990), the weaknesses of the twenty-four hour food diary are as follows. The respondent must be highly cooperative and literate, and thus may introduce bias of over-representation of more highly educated individuals. Food consumed away from home may be less accurately reported. Usual eating pattern may be influenced or changed by the recording process. Record keeping increases respondent burden and may adversely affect response rate. Self-administered records require more call-backs and editing than interviewer-administered reports. One-day records may provide an inadequate indication of usual intake for individuals but not for groups.

"Assessing dietary intake is difficult, for no perfect method now exists or may ever exist" (Mahajan & Schafer, 1993, p. 31). Choice of dietary assessment technique depends on such factors as purpose of the study, population to be studied, cost and length of time of study, and precision of measurement required (Pao & Cypel, 1990). The twenty-four food diary can be useful in assessing groups (Block, 1982), and in working with the elderly, as it was used in this study.

In 1993, Mahajan and Schafer discussed the influence of selected psychosocial factors on dietary intake in the elderly. They reported that generalizations about diet in the elderly are likely to be inaccurate because the elderly are a heterogeneous population. Mahajan and Schafer pointed out that the wide interindividual variations in nutrient intake are due to physical, social, economic, and psychological factors.

An important psychosocial factor influencing dietary intake in the elderly may be eating alone. Tucker (1993) stated that eating alone is the most common factor behind poor nutrition among older people. Other studies also have reported a negative influence of living and eating alone (Davis, Randall, Forthofer, Lee & Morgan, 1985; McIntosh & Shifflett, 1984; Walker & Beauchene, 1991). McIntosh, Shifflett, and Picou (1989) reported that companionship serves as a buffer against the negative effects of poor appetite on dietary intake.

Senior Congregate Meals Programs

In 1965, the Older Americans Act was passed by Congress and led to the formation of the Administration on Aging. In 1972, Title VII of the Act, the National Nutrition Program for Older Americans, was enacted. It established the Congregate Meals Program and the Home-Delivered Meals Program (Frankel & Ownen, 1993).

In 1978, an amendment to the Older Americans Act, consolidated under Title III the social services, nutrition, and multipurpose senior citizen programs previously authorized under Titles III, V, and VII (LeClerc & Thornbury, 1983). Title III, Part C, deals with Nutrition Service; Subpart 1 is specifically related to Congregate Nutrition Services and Subpart 2 is specifically related to Home Delivered Nutrition Services (Committee on Education and Labor, 1993).

The U.S. Department of Agriculture provides funding and commodities for local senior nutrition congregate meals and home-delivered meals programs through its Nutrition Program for the Elderly (NPE). The Department of Health and Human Services distributes federal funds to state Area Agencies on Aging which contracts with local organizations to provide congregate and home-delivered meals.

Participants in the Congregate Meals Program must be 60 years or older; their spouse may participate regardless of age. A nominal fee is usually charged. Congregate meals are usually served once a day around the noon hour anywhere from one to five days a week, Monday through Friday. Congregate meals are usually served at a local site such as a senior center, community recreation center, or neighborhood church.

The major goal of the nutrition program is to supply seniors with low-cost, nutritious meals which are to provide

one-third of the Recommended Dietary Allowances for 51+. Other goals include social interaction, referrals for health and social services counseling, nutrition education, and transportation to and from the meal site.

Few studies have been done on the dietary intakes of nutrition program participants. However, in 1990, Stanek and Sempek found that there were no significant differences in the quality of the diet between participants and non-participants.

Summary

In the literature that has been reviewed, it was shown that there is an abundance of anecdotal references about pets being good for your health but limited theory-based empirical research. However, studies do point to the benefits of companion animals, especially to the elderly. A suggested theory is that pet companionship substitutes for human support and thus buffers stress and, in turn, benefits health.

Some of the anecdotal remarks on the health benefits of companion animals to the elderly refer to eating and exercising habits. Very few empirical studies have investigated eating and exercising habits as the explanatory mechanism for the relationship of pet ownership to health. Although some scientific research on human/animal interactions have examined various aspects of cardiovascular

disease risk factors and pets as substitutes for social support, none have included all of the above.

A new model was developed, based on the theoretical framework that pet ownership leads to better self care, to show possible associations between pet ownership with eating, exercise, nutritional status, and specific cardiovascular risk factors.

CHAPTER III: METHODS

Introduction

Problem

The familiar adage "pets are good for your health" is an interesting but largely untested theory. There are numerous anecdotal remarks on the health benefits of companion animals to the elderly that refer to eating and exercising habits. Research is needed to examine whether or not any health benefits result from pet ownership, and, if so, models must be developed in an attempt to explain the reasons for such benefits.

A plausible theory is that pet ownership leads to improved self care. Two important components of self care are eating and exercise. A new model was developed, based on pet ownership leads to better self care, to show possible associations between pet ownership with eating, exercise, nutritional status, and specific cardiovascular risk factors. A simplistic schema of this model is presented in Figure 3.1.

Previous investigators of the association of pet ownership with health did not present any models in this way nor did they use improved self care through eating and

exercise. They showed a direct line from pet ownership to health without any explanatory mechanisms. A simplistic schema of their "supposed" models is presented in Figure 3.2.

The notable exceptions among previous investigators were Garrity and colleagues and Stallones and the same colleagues in two related studies in 1989 and 1990 and Anderson and colleagues in 1992. Garrity et al. (1989) and Stallones et al. (1990), in researching the relationship of pet ownership and pet attachment to illness and emotional distress, used the developing theoretical framework that relates animal support to human social support. Anderson et al. (1992), in researching pet ownership and its association with cardiovascular risk factors, examined diet and exercise.

Experimental Design

The experimental design was a cross-sectional, observational study of a self-selected convenience sample. Seniors aged sixty and above were mainly solicited for participation at senior congregate meals program sites. Seniors with pets made up the pet owners group and seniors without pets made up the non-owners group.

The purpose of this study was to observe and evaluate any associations of pet ownership with eating and exercising habits, nutritional status, and specific risk factors for cardiovascular disease of seniors. Ten hypotheses were

tested. A detailed schema of the proposed model is presented in Figures 3.3 and 3.4. The independent variables were pet ownership (pet attachment) and certain demographic descriptors such as age, gender, race, income, and education and the dependent variables were eating and exercising habits (see Figure 3.3). These dependent variables, in turn, became independent variables and the new dependent variables were nutritional status and specific risk factors for cardiovascular disease (see Figure 3.4).

Previous investigators examined pet ownership and, sometimes, various demographic descriptors as the independent variables and various indicators of health, such as minor health problems, illness behavior, and emotional distress, as the dependent variables. A detailed schema of previous models is presented in Figure 3.5.

The notable exceptions among previous investigators were Garrity and colleagues and Stallones and the same colleagues in two related studies in 1989 and 1990 and Anderson and colleagues in 1992. Garrity et al. (1989) and Stallones et al. (1990) also examined social support and recent life events as independent variables. Anderson et al. (1992) used independent and dependent variables similar to this study but in a younger sample. It should be noted that in their cross-sectional, observational study, Anderson and colleagues (1992) could only show associations and not causation.

Sample Selection

Participants were mainly solicited at both urban and rural senior congregate meals sites throughout Larimer and Weld Counties in north-central Colorado (see Figure 3.4) during the four month period of Spring (March, April, May, and June) in 1994. During that time period, a total of 26 congregate meals program sites were visited and an estimate of over 1,000 seniors were individually talked to by the investigator (see Table 3.1 and Figure 3.5).

Participants were also solicited by three additional methods. This included the appearance of two newspaper advertisements in the "Volunteers" section of the Fort Collins Coloradoan newspaper, the placement of posters at veterinarian offices throughout Larimer and Weld counties, and by word-of-mouth.

Each participant was required to be at least sixty years of age, a resident of Colorado, and independently living in a house or apartment. Participants were not required to be a pet owner.

Cooperation was secured from the specific State and local government agencies involved. This included the Nutrition Program Specialist, Aging and Adult Services Division, Colorado Department of Social Services, in Denver, the Larimer County Nutrition Director in Fort Collins, the Weld County Nutrition Director in Greeley, and local Senior Nutrition Site Supervisors. Approval was secured from the

Human Research Committee at Colorado State University on July 21, 1992 (see Appendix A).

Instrument Development

The questionnaire packet was developed from a literature review and from suggestions provided by seniors, the doctoral committee of the investigator, a statistical consultant, and the Human Research Committee at Colorado State University. It consisted of twelve questionnaires, labelled A through L, on forty-four numbered pages; three of these questionnaires, J, K, and L, were for pet owners only. Each questionnaire was printed in large, fourteen-point, type on one of five, alternating, colored sheets of paper (yellow, blue, pink, green, and white). Numerous clip art illustrations of interest to seniors on the various topics of the questionnaires appeared on most pages. The questionnaire packet, as it appears in Appendix B, was reduced in size to 80% of the original.

Questionnaire A of the packet was on the topic of social support. This questionnaire was taken from a study by Johnson et al. (1992). The study was on the psychometric evaluation of the Lexington attachment to pets scale (LAPS). The questionnaire on social support was used in telephone interviews of a random, representative sample of pet owners, aged eighteen and older. In this study, responses to each question were given a numeric value starting with one. A

total score could range from 6 to 17. A higher score indicated more social support.

Questionnaire B of the packet was on the topic of eating and exercising habits. This questionnaire was developed by the investigator specifically for this study. If a question could have only one response, the response was numbered consecutively starting with one. If a question could have multiple responses, zero was entered for not chosen and one was entered for chosen. Some responses were open-ended.

Questionnaire C of the packet was on the topic of lifestyle and exercise. This questionnaire was taken from the resource data book developed by the National Institute on Aging for epidemiologic studies of the elderly using in-person interviews (Corroni-Huntley, Brock, Ostfel, Taylor & Wallace, 1986). In this study, responses to each question were given a numeric value starting with zero. A total score could range 0 to 80. A higher score indicated a more active lifestyle.

Questionnaire D of the packet was on the topic of emotional distress. This questionnaire, called the CES-D Scale (Center for Epidemiologic Studies Depression Scale) was taken from a study by Radloff (1977). It was developed by the National Institute of Mental Health for use in the general population. This questionnaire was tested in household interview surveys and in self-reported mail-backs.

It was found to have high internal consistency and adequate reliability with established validity. In this study, responses to each question were given a numeric value starting with zero. Responses for questions four, eight, twelve, and sixteen were given a reverse numeric value starting with three. A total score could range from 0 to 60. A higher score indicated more emotional distress.

Questionnaire E of the packet was on the topic of recent life events. This questionnaire was taken from a study by Garrity et al. (1989) on pet ownership and attachment as supportive factors in the health of the elderly. They used it in telephone interviews of a random, representative sample of U.S. residents, aged 65 or older. It was highly consistent in test-retest reliability. In this study, responses to each question were given a numeric value starting with zero. A total score could range from 0 to 12. A higher score indicated more negative events.

Questionnaire F of the packet was on the topic of illness behavior. This questionnaire was taken from a study by Stallones, Marx and Garrity (1990) on depressive symptoms among older adults. They used it in telephone interviews of a random, representative sample of U.S. residents, aged 65 or older. In this study, responses to each question were given a numeric value starting with zero. A total score could range from 0 to 8. A higher score indicated more illness.

Questionnaire G of the packet was on the topic of minor health problems. This questionnaire was taken from a study by Serpell (1991). He used it in take-home, self-reported, mail-back, questionnaires given to adult pet owners and non-owners. In this study, responses to each question were given a numeric value starting with zero. A total score could range from 0 to 20. A higher score indicated more health problems.

Questionnaire H of the packet was on the topic of demographic descriptors with additional specific descriptors. Questions one to eleven, on age, gender, race, income, education, etc., were taken from a study by Auld et al. (1993) on dietary fat and fiber. In this study, if a question could have only one response, the response was numbered consecutively starting with one. If a question could have multiple responses, zero was entered for not chosen and one was entered for chosen. Some responses were open-ended.

Also in Questionnaire H, questions twelve and thirteen were on smoking habits. They were taken from the resource data book developed by the National Institute on Aging (Cornoni-Huntley et al., 1986) and modified by the investigator specifically for this study. These questions could have only one response. In each question, the response was numbered consecutively starting with one. Some responses were open-ended.

Question thirteen in Questionnaire H was on functional status. It combined some Activities of Daily Living (ADLs) and some Instrumental Activities of Daily Living (IADLs) among older Americans. It was taken from a report on nutrition screening by the Nutrition Screening Initiative (1991) and modified by the investigator specifically for this study. It had multiple responses; zero was entered for not chosen and one was entered for chosen.

Also in Questionnaire H, questions fifteen to twenty were on pet ownership and residence characteristics in relation to a pet. These questions were developed by the investigator specifically for this study. If a question could have only one response, the response was numbered consecutively starting with one. If a question could have multiple responses, zero was entered for not chosen and one was entered for chosen. Some responses were open-ended.

Questionnaire I was on the topic of eating habits. Questions one to eleven were taken from "The Right Byte - Nutrition Evaluator" of Nutritionist IVTM software for Windows (N-Squared Computing, 1993). Questions one through ten could have only one response; the responses in each question were numbered consecutively starting with one. Question eleven was open-ended. The twenty-four hour food diary form included lines for recording food intake and diagrams of portion sizes of food and a checklist of type of food and information needed about the food (Zeman & Ney,

1988). This form also included lines for recording participant name, address, telephone number, gender, age, height, and weight. Body mass index was later calculated by the investigator.

Questionnaire J was on the topic of pet information, such as name of pet, species, breed, sex, and size. More than one pet could be listed. This questionnaire was developed by the investigator specifically for this study and was used mainly for conversing with participants when necessary. It included limited choices and open-ended questions. The responses were not coded and not used for statistical analysis.

Questionnaire K was on the topic of pet attitude. This questionnaire, called the Lexington Attachment to Pets Scale (LAPS) was taken from a study by Johnson et al. (1992) on the psychometric evaluation of LAPS. They used it in telephone interviews of a random, representative sample of pet owners aged eighteen and older. It was found to have excellent reliability with a high degree of internal consistency (coefficient alpha = 0.928). It also appeared to have content and construct validity as well. In this study, responses to each question were given a numeric value starting with zero. Responses for questions eight and twenty-one were given a reverse numeric value starting with three. A total score could range from 0 to 69. A higher score indicated more pet attachment.

Questionnaire L was on the topic of pet care, such as feeding and exercising habits. If more than one pet was owned, the participant was asked to pick a favorite pet to answer this questionnaire. All these questions could have multiple responses; zero was entered for not chosen and one was entered for chosen. Also, all these questions could have open-ended responses. Because of the open-ended questions, this questionnaire was not used for statistical analysis.

In summary, most of the questionnaires used in this study were questionnaires that were used in other studies similar to this one and have established validity and reliability. Face and content validity were assessed. Reliability was difficult to determine on Questionnaires B (Eating and Exercising Habits), H (Demographic Descriptors), and I (Eating Habits) because of open-ended questions.

Chronbach's alpha was used to test split-half reliability and establish the internal consistency of the questionnaires with total scores: A (Social Support), C (Lifestyle and Exercise), D (Emotional Distress), E (Recent Life Events), F (Illness Behavior), G (Minor Health Problems), and K (Pet Attachment) (see Table 3.2). Questionnaires D (Emotional Distress), G (Minor Health Problems), and K (Pet Attachment) had Chronbach's alphas above or near the value of 0.8, which indicates high reliability. Questionnaires A (Social Support), E (Recent

Life Events), and F (Illness Behavior) had Chronbach's alphas near 0.6, while Questionnaire C (Lifestyle and Exercise) had the lowest Chronbach's alpha at 0.54.

Pilot Study

The initial questionnaire packet and data collection method was tested at one senior congregate meals program site in Berthoud, Larimer County, in September of 1993 (see Table 3.1 and Figure 3.5). At that time, pre-stamped, self-addressed, postcards soliciting volunteers were distributed. The postcard had to be returned to the investigator to request a questionnaire packet. Because of the poor return, the postcard step was eliminated in the subsequent larger study.

Fourteen people returned completed questionnaire packets and nine of those people had a sample of their blood drawn. None of the participants in the pilot study were included in the subsequent larger study. Based on the results of the returned questionnaires in the pilot study, a few questions and/or response choices were re-worded or re-ordered for face and content validity and use in the subsequent larger study.

Data Collection

During solicitation of participants, the investigator went to a pre-arranged senior congregate meals program site. First, the investigator visited individually with the

seniors before lunch. At that time, the investigator mentioned conducting a health study on seniors and an interest in recruiting volunteers to participate. The investigator also mentioned her willingness and availability, during the visit and after, to answer any questions the seniors might have on their eating and exercising habits in particular or nutrition and health in general. The investigator ate the lunch being served at the site with the seniors and continued to visit.

During the entire time of the visit, the investigator, a trained anthropologist, used the participant-observer anthropological technique. The concept of participant observation fieldwork was first fully articulated by Malinowski in the 1920's (Pelto, 1981). In discussing anthropological contributions to nutrition education research, Pelto (1981) pointed out that "Malinowski stressed the need for long term residence in a community and a sufficient degree of community life to understand situations from the 'native's perspective'... We are all participant-observers in our own culture" (p. S6).

Although this study did not involve long term residence in each community that was visited, it did involve an average of a three hour visit in each community setting. During that time period, the investigator became as much of a participant of that particular community as possible while still being a trained, outside observer.

Just before or just after eating lunch, the investigator was formally introduced to the seniors as a group by the site supervisor or activities leader and asked to briefly describe the study and recruit participants. The investigator stated that the project was a health study on seniors that involved questions about eating and exercising habits. Additional information was provided on an individual basis, and the questionnaire packet was distributed only to those seniors who indicated an interest in participating in the study.

These seniors were told it would take from one to two hours of their time to answer the questions; however, the food diary would be recorded a few minutes at a time during various mealtimes throughout the course of one day. Potential participants were offered the incentives of a free diet analysis and informational brochures on nutrition and the opportunity to obtain a free blood analysis and cookbook, if they returned the completed questionnaire packet. A time of two weeks for completion was suggested. A turn-around time of one month for the diet analysis was promised.

Those seniors who did take a questionnaire packet were encouraged to take it home and fill it out in private, to insure confidentiality. It was distributed in a pre-stamped, return-addressed envelope containing a letter of introduction explaining the study and two duplicate letters of informed consent. Each participant was to voluntarily

sign one letter of informed consent and return it with the questionnaire packet in the included envelope. Each participant was to keep the other letter of informed consent for his or her records. Instructions were given in the letter of introduction.

After the completed questionnaire packet was returned and the 24-hour food diary was analyzed, the results of the diet analysis were mailed to the participant. This mailing included additional nutritional information: a brochure called "Healthy Choices After Sixty" (Growers of Washington Apples, 1992) which discussed the Dietary Guidelines, and a Colorado State University Cooperative Extension Service in Action Publication called "Nutrition and Aging" (Anderson, 1989).

This mailing had a cover letter which thanked the participant for returning the completed questionnaire packet and asked for continued participation in the study by having a sample of their blood drawn. Also included in this mailing were a MetWest Laboratories General Test Requisition, a list of MetWest Laboratories Patient Service Centers, two duplicate letters of informed consent for testing, and a pre-stamped, return-addressed envelope. Each participant was to voluntarily sign one letter of informed consent for testing and return it in the included envelope. Each participant was to keep the other letter of informed

consent for testing for his or her records. Instructions were given in the cover letter.

Participants who did volunteer to have a sample of their blood drawn were instructed to visit the MetWest Laboratories Patient Service Center nearest their home or request to have the investigator, trained in blood draw, visit their home. They were also instructed to fast for 12 hours before a sample of their blood was drawn.

After the sample of the blood draw was analyzed, the results of the blood analysis were mailed to the participant. This mailing included additional blood analysis information: a booklet called "Your Blood Tests" (MetWest Laboratories, 1992) which explained results, and a card called "My Personal Guide To A Healthy Heart" (MetWest Laboratories, 1992) which was to be used for recording personal data.

This mailing had a cover letter which thanked the participant for having blood drawn. Included in this mailing were two free gifts for participating: a cookbook and a 60-inch plastic tape measure. The participant was asked to use the tape measure to measure their waist and hips and write down that information on the enclosed, pre-stamped, return-addressed, coded postcard. The participant was also asked to write down their blood pressure, as reported by their doctor, on the same postcard. Instructions were given in the cover letter. Self reported

measurements were used because there was no funding to finance at home visits by additional personnel, which was sorely needed, or by the investigator.

Data Analysis

The 24-hour food diary was analyzed using the Nutritionist IV™ computer software for Windows by N-Squared Computing, which is based on nutrient values established by the U.S. Department of Agriculture (USDA). It consisted of the following: nutrient values for average daily intake for micro-nutrients, based on the percent of Recommended Dietary Allowances for age and gender (Appendix C); nutrient values individually calculated for average daily intake for macro-nutrients based on the Harris-Benedict equations and daily activity levels self-reported on question nine in Questionnaire I (Eating Habits) for energy, with percent of kilocalories for protein, carbohydrates, and fat calculated at 15, 60, and 25, respectively (Appendix C); number of items in each food group—food exchanges or servings—based on actual amounts consumed (compared to the new USDA Food Guide Pyramid); and percent of kilocalories for macro-nutrients based on actual amounts consumed (compared to the American Heart Association recommendation for fat intake).

Each 24-hour food diary was entered into the computer software by the investigator. The data were entered by name of participant. This was without any coding for

confidentiality because the results needed to be mailed to the participant. Also, if there were any problems with missing information in the diary, several attempts were made to contact the participant by phone and/or mail. However, the data was entered without reference to pet ownership to avoid any bias. After the diet results were mailed to the participant, the diet results were then coded for confidentiality and used for additional data entry and analysis. Data entry was performed by Colorado State University Statistics Laboratory personnel and verified by the investigator.

The questionnaire packet was initially checked for any problems with missing information soon after it was received. If there were a problem, several attempts were made to contact the participant by phone and/or mail. The questionnaire packet was separated from the 24-hour food diary after the food diary was entered and analyzed and the diet results were sent to the participant. At the time of separation, each questionnaire packet received the same code number as its matching diet results. The questionnaire packets were then used for data entry and analysis. Data entry was performed by Colorado State University Statistics Laboratory personnel and verified by the investigator.

The blood draw samples were analyzed using chem-screen profile #3001-9 (see Appendix D). It consisted of the following: values and reference ranges for glucose, blood

urea nitrogen (BUN), sodium, potassium, magnesium, calcium, phosphorus, albumin, iron, cholesterol, triglycerides, high-density lipoprotein cholesterol, low-density lipoprotein cholesterol, and coronary risk ratio (cholesterol/high-density lipoprotein cholesterol). The low-density lipoprotein cholesterol/high-density lipoprotein cholesterol ratio was later calculated by the investigator. Values outside of reference ranges were noted.

The cholesterol method provided results standardized to the Lipid Research Center Method. The reference range for cholesterol was based on a national percentile for age and gender with American Heart Association recommendations.

All blood analyses were performed by MetWest Laboratories in Denver. Participants had their individual blood draws taken at MetWest Laboratories Patient Service Centers nearest their homes. The blood samples were then shipped to MetWest Laboratories in Denver and blood analyses were performed the next morning.

After the blood analysis results were mailed to the participant, the blood analysis results received the same code number as its matching diet results and questionnaire packet. At the same time the blood analysis results were mailed to the participant, a postcard with the same code number was included for the participant to record blood pressure and hip and waist measurements. The hip and waist measurements were used to calculate waist hip ratio by the

investigator. The blood analysis results, along with the blood pressure and waist hip ratio, were then used for additional data entry and analysis. Data entry was performed by Colorado State University Statistics Laboratory personnel and verified by the investigator.

The particular code numbers that were used served three purposes: confidentiality; ease of reference for later analysis; and ease of reference for later contact by participants concerning diet and blood analysis results. A three-digit numeric code from 101 to 499 was available for participants with pets and a three-digit numeric code from 501 to 599 was available for participants without pets. A three- or four-digit alpha code was attached to the numeric code: F for female or M for male; Y for young-old (60-79 years) or O for old-old (80 years and older); and D for dog ownership, or C for cat ownership, or B for bird ownership, or DC if both dog and cat were owned without a favorite pet selected.

The code numbers were assigned in the order that the questionnaire packets were received and the data were analyzed, as described above. Two confidential lists were generated to manage the data and for ease of reference: one alphabetical list by participant name and matching code number; one numeric list by participant code number with participant name, address, and telephone number.

Statistical Analysis

For the statistical analysis, the Statistical Package for the Social Sciences™ (SPSS) computer software was used, with data entered into the interface program called Edit. All statistical analyses were performed at the Colorado State University Statistics Laboratory.

The statistical procedures used for various data were as follows: two-tailed t-tests (one-way analysis of variance, ANOVA); Chi-square tests; multivariate analysis of variance (MANOVA); Pearson product-moment correlation coefficient and partial coefficients adjusting for body mass index and adjusting for waist hip ratio; analysis of covariance (ANCOVA), testing homogeneity of variance and of slope; and Chronbach's alpha split-half reliability tests. A value of $p < 0.05$ was considered significant.

The t-tests were used with quantitative data in comparing means scores of pet owners and non-owners to determine if significant differences exist between pet owners and non-owners. Two-tailed t-tests were used because direction was to be determined. Chi-square tests were used with qualitative data in comparing percent distribution of responses of pet owners and non-owners to determine if significant differences exist between pet owners and non-owners. Multivariate analysis of variance was used because it differs from the univariate t-test in terms of the number of dependent variables that can be tested at the same time.

Correlation coefficients were used to describe relationships between various independent and dependent variables, which could be positive, negative, or no correlation. Analysis of covariance was used to test that certain underlying assumptions do exist in order to be able to perform correlations. Chronbach's alpha was used on total score questionnaires to establish the internal consistency of the questionnaires.

The types of data analyzed were as follows: questionnaires (including demographics, eating and exercising habits, and special topic questionnaires); biochemical analyses (diet and blood); anthropometric measurements (weight, body mass index, and waist hip ratio); and physiological measurements (systolic blood pressure and diastolic blood pressure).

Data were statistically analyzed for three sample sets: total sample ($n = 127$), blood chemistry subsample ($n = 32$), and female subsample ($n = 103$). There was a blood chemistry subsample because blood analysis was importantly related to diet and exercise; and because there were only 32 blood sample participants, the data on diet and exercise was limited to these 32 participants in order to better observe direct relationships. There was also a female subsample because there were very few male participants, and thus this subsample eliminated influences due to gender.

Figure 3.1. Proposed Model

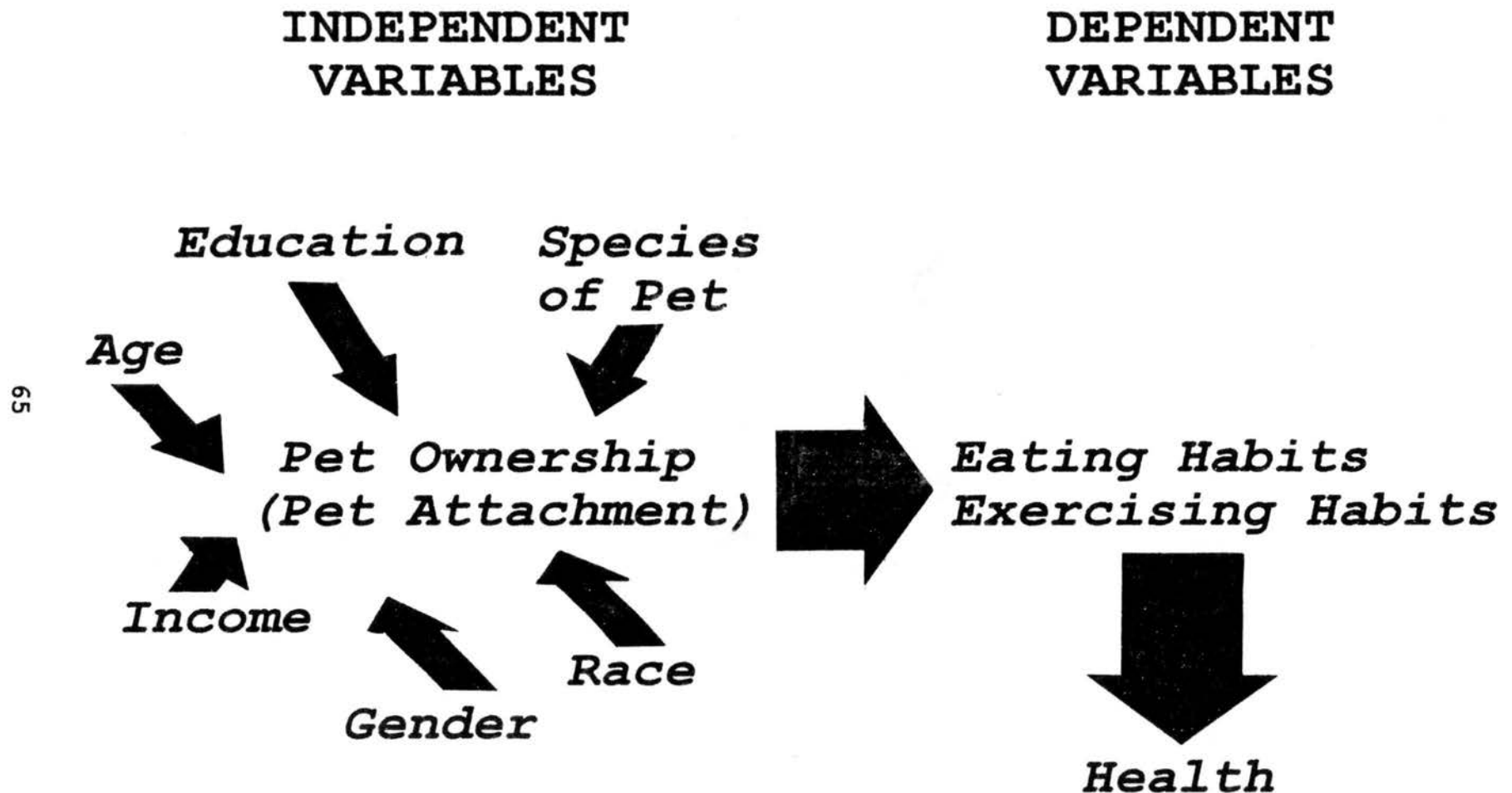


Figure 3.2. Previous Models

INDEPENDENT
VARIABLES

DEPENDENT
VARIABLES

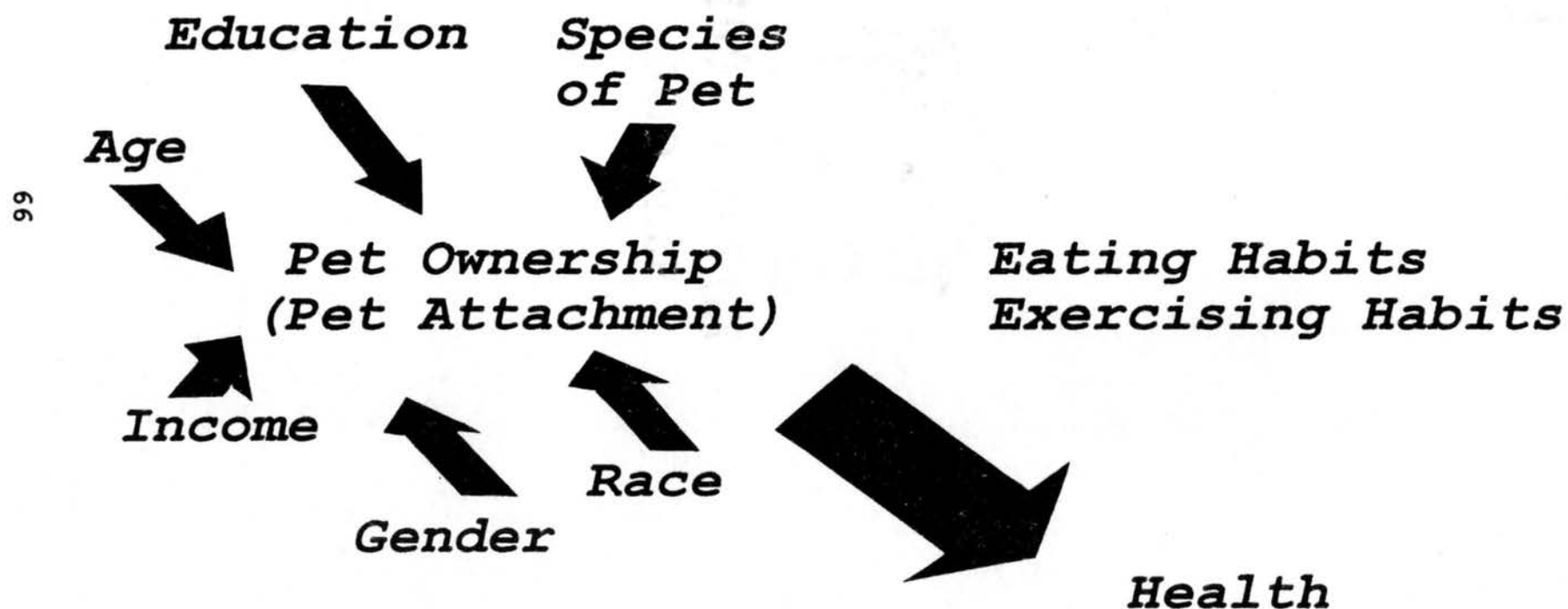


Figure 3.3

Proposed Model Tables 4.30-4.32, 4.40-4.45

Independent Variables → Dependent Variables

Pet Ownership
Questionnaires H, J, L
(Pet Attachment)
Questionnaire K



Demographic Descriptors:
Questionnaire H
Age*
Gender*
Race*
Education
Income
Tables 4.1-4.3, 4.24-4.26

Eating Habits* Tables 4.17-4.19
Questionnaires B, I
Dietary Intake

Questionnaire I
24-Hour Food Diary
as determined by:
Biochemical -Diet
(Nutritionist IV)

Hypothesis 1

Hypothesis 2

Exercising Habits* Tables 4.20-4.23,
4.27-4.29
Exercise Activities/Levels
Questionnaires B, C

Hypothesis 3

* Other risk factors for
cardiovascular disease

Figure 3.4

Proposed Model Tables 4.33-4.36, 4.40-4.45

Hypothesis 9
Hypothesis 10

Independent Variables → Dependent Variables

Eating Habits* Tables 4.17-4.19

Questionnaires B, I

Dietary Intake Tables 4.4-4.9

Questionnaire I,
24-Hour Food Diary

as determined by:

Biochemical -Diet

(Nutritionist IV)

Health

as defined by:

Nutritional Status

Certain Risk Factors for

Cardiovascular Disease

as determined by:

-Blood

(Chemical-Screen)

Tables 4.10-4.11

Anthropometric-Weight

Body Mass Index

Waist Hip Ratio

Tables 4.12-4.14

Physiological-Blood Pressure

Tables 4.15-4.16

Exercising Habits* Tables 4.20-4.23,
4.27-4.29

Exercise Activities/Levels

Questionnaires B, C

* Other risk factors for
cardiovascular disease

Hypothesis 4
Hypothesis 5

Hypothesis 7
Hypothesis 8
Hypothesis 6

Figure 3.5

Previous Models *Tables 4.37-4.39*

Independent Variables —————> Dependent Variables

Pet Ownership
(Pet Attachment)

Demographic Descriptors:

Age
Gender
Race
Education
Income

Social Support

Questionnaire A
Tables 4.27-4.29

Recent Life Events

Questionnaire E
Tables 4.27-4.29

Health

Minor Health Problems

Questionnaire G

Illness Behavior

Questionnaire F

Emotional Distress

Questionnaire D

Tables 4.27-4.29

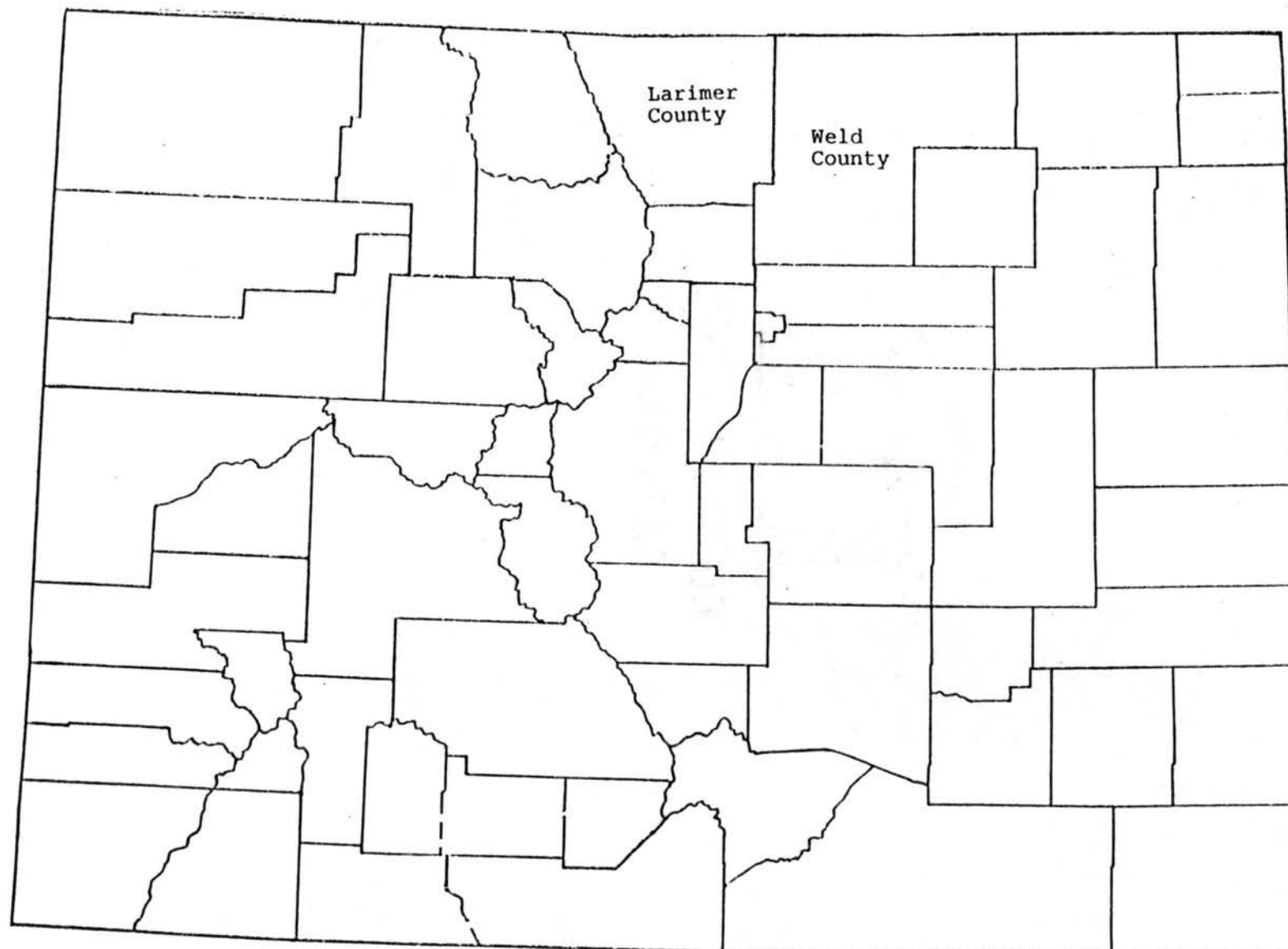


Figure 3.6. Map of Larimer County and Weld County in the State of Colorado.

Table 3.1

Senior Congregate Meals Program Sites Visited

Map Location	Site Name	County	Date Visited
A	Berthoud Senior Center Berthoud	Larimer	Sept. 3, 1993
1	Fort Collins Senior Center Fort Collins	Larimer	Mar. 7, 1994
2	Shepherd of the Hills Fort Collins	Larimer	Mar. 9
3	Oakbrook II Fort Collins	Larimer	Mar. 10
4	Oakbrook I Fort Collins	Larimer	Mar. 11
5	Bellvue Senior Center Bellvue	Larimer	Mar. 14
6	Chilson Senior Center Loveland	Larimer	Mar. 15
7	Wellington Senior Center Wellington	Larimer	Mar. 16
8	Silver Leaf II Loveland	Larimer	Mar. 17
9	Silver Leaf I Loveland	Larimer	Mar. 18
10	Greeley Senior Center Greeley	Weld	Mar. 28
11	Birchwood Apartments Greeley	Weld	Mar. 30
12	Greeley Manor Greeley	Weld	Apr. 1
13	Windsor Park Building Windsor	Weld	Apr. 6
14	University Plaza Greeley	Weld	Apr. 7
15	Milliken Senior Center Milliken	Weld	Apr. 8
16	Evans Senior Center Evans	Weld	Apr. 12
17	Kersey Senior Center Kersey	Weld	Apr. 19

Table 3.1 (continued)

Senior Congregate Meals Program Sites Visited

Map Location	Site Name	County	Date Visited
18	Broadview Greeley	Weld	Apr. 26
19	Hill N' Park Greeley	Weld	May 4
20	Pierce Senior Center Pierce	Weld	May 5
21	Platteville Community Recreation Center Platteville	Weld	May 9
22	Mead United Methodist Church Mead	Weld	May 19
23	Ault Senior Center Ault	Weld	May 24
24	Erie United Methodist Church Erie	Weld	May 26
25	Eaton Senior Center Eaton	Weld	June 3
26	Johnstown Senior Center Johnstown	Weld	June 8

Table 3.2

Questionnaire Analysis (Total Sample). n=127
Results of Split-Half Reliability Tests.

	Chronbach's Alpha
Questionnaire A:	
Social Support	0.59
Questionnaire C:	
Lifestyle and Exercise	0.54
Questionnaire D:	
Emotional Distress	0.86
Questionnaire E:	
Recent Life Events	0.58
Questionnaire F:	
Illness Behavior	0.57
Questionnaire G:	
Minor Health Problems	0.75
Questionnaire K:	
Pet Attachment	0.94

CHAPTER IV: RESULTS

Introduction

The results of the data analysis and statistical analysis were used to evaluate the associations of pet ownership with eating and exercising habits, nutritional status, and specific risk factors for cardiovascular disease of seniors. Participants were mainly solicited at senior congregate meals program sites.

Study Participation

Twenty-six congregate meals program sites were visited by the investigator in this study and four-hundred nine questionnaire packets were handed out. One-hundred twenty-seven questionnaire packets were returned in useable form, that is, without missing data that could not be filled in by follow-up phone call or mail. The return rate was 31% for a forty-four page questionnaire packet with one-hundred nineteen items (for non-owners) or one-hundred forty-eight items (for pet owners). The number of items does not include multiple responses within an item and does not include the 24-hour food diary entries.

Thirty-two people of the total one-hundred twenty-seven people who returned questionnaire packets, or 25%, agreed to have a sample of their blood drawn. Twenty-six people out of the thirty-two people who had a sample of their blood drawn, or 20.5% of the total one-hundred twenty-seven people, reported their waist and hip measurements. Twenty-six people out of the thirty-two people who had their blood drawn, or 20.5% of the total one-hundred twenty-seven people, reported their blood pressure measurements; however, they were not necessarily the same twenty-six people who reported their waist and hip measurements.

Statistical Presentation Format

The statistical results are presented as percent frequencies in Chi-square tests, or means with plus and minus standard deviations in two-tailed t-tests, for the pet owners group and for the non-owners group. The results are also presented as F values in multivariate analysis of variance. The results are presented as r values in correlation coefficients. Significant differences with $p < 0.05$ are reported.

The results are presented by type of data in each sample set (where available) as follows: Demographics (Total Sample, Blood Chemistry Subsample, and Female Subsample); Diet Analysis, Nutrient Values (Total Sample, Blood Chemistry Subsample, Female Subsample); Diet Analysis,

Food Exchanges and Percent of Kilocalories (Total Sample, Blood Chemistry Subsample, and Female Subsample); Blood Analysis (Blood Chemistry Subsample and Female Subsample); Anthropometric Analysis (Total Sample, Blood Chemistry Subsample, and Female Subsample); Physiological Analysis (Blood Chemistry Subsample and Female Subsample); Questionnaire Analysis (Total Sample, Blood Chemistry Subsample, and Female Subsample); Questionnaire and Blood Analyses (Blood Chemistry Subsample); and Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses (Blood Chemistry Subsample and Female Subsample).

Each set of results are presented in tables. Some highlighted results are presented in the text and may also be presented in figures for ease of comparison. Thus, some tables have figures with corresponding numbers and titles.

Demographics

Data on sample composition showed pet ownership, gender, and age according to category, young-old (60-79 years of age) and old-old (80 and older) (Figures 4.1, 4.2, and 4.3). Data on demographics showed gender, age, race, education, marital status, income, and population size (Questionnaire H, #1-6 and #8; Tables 4.1, 4.2, and 4.3)

In the total sample, blood chemistry subsample, and female subsample, there were about twice as many people who did not own pets as there were people who did own pets (see

Figures 4.1, 4.2, and 4.3). Of the 44 pet owners in the total sample (see Figure 4.1.1), there were slightly more cat owners (48%) than dog owners (41%). Only 3 people (7%) owned both dogs and cats, and only 2 people (4%) owned birds.

Data on sample composition showed the following on gender. In the total sample, blood chemistry subsample, and female subsample, there were about four times as many females as there were males (see Figures 4.1, 4.2, and 4.3).

Data on sample composition showed the following on age categories. In the total sample, blood chemistry subsample, and female subsample, there were about twice as many young-old as there were old-old (see Figures 4.1, 4.2, and 4.3).

In the total sample, blood chemistry subsample, and female subsample, there were no significant differences between the pet owner group and the non-owner group in any of the demographics of gender, age, race, education, marital status, income, and population size (see Tables 4.1, 4.2, and 4.3). A mean age of seventy-five and a half years for the total sample was noted.

Diet Analysis

Nutrient Values

In the total sample and the female subsample, there were no significant differences between the pet owners group and the non-owners group for any of the 28 nutrient values

examined (see Tables 4.4 and 4.6). In the blood chemistry subsample, there were no significant differences between the pet owners group and the non-owners group for 26 of the 28 nutrients examined (see Table 4.5). However, non-owners consumed significantly more caffeine than pet owners ($186.3 \text{ mg} \pm 159.2$ compared to $71.4 \text{ mg} \pm 87.7$); and pet owners consumed significantly more zinc than non-owners ($85.9\% \text{ RDA} \pm 34.3$ compared to $63.3\% \text{ RDA} \pm 25.9$).

In all three sample sets, there were no significant differences in consumption of cholesterol, total fat, and saturated fat between pet owners and non-owners (see Tables 4.4, 4.5, and 4.6). Also, there was no significant difference in consumption of alcohol between pet owners and non-owners (see Tables 4.4, 4.5, and 4.6).

In all three sample sets, for both pet owners and non-owners, all nutrients were at least two-thirds of the RDA except for one notable exception. Vitamin D was consistently below two-thirds of the RDA and hovered around 50% (see Tables 4.4, 4.5, and 4.6). Zinc was consistently just at two-thirds of the RDA (see Tables 4.4, 4.5, and 4.6).

Food Exchanges and Percent of Kilocalories

Data on diet showed food exchange numbers (servings consumed) for milk, vegetables, fruit, bread, meat, and fat (Tables 4.7, 4.8, and 4.9). Data on diet showed percent of kilocalories for protein, carbohydrates, and fat.

In the total sample and in the female subsample, pet owners consumed significantly more milk servings than non-owners (1.04 ± 0.93 compared to 0.68 ± 0.78 and 1.01 ± 0.95 compared to 0.65 ± 0.71 , respectively) (see Tables 4.7 and 4.9). In the total sample alone, pet owners consumed significantly more vegetable servings than the non-owners (2.54 ± 2.98 compared to 1.70 ± 1.57) (see Table 4.7).

In all three sample sets, for both pet owners and non-owners, the number of servings consumed for both milk and vegetables were below that recommended by the USDA Food Guide Pyramid (2-3 milk servings and 3-5 vegetable servings) (see Tables 4.7, 4.8, and 4.9).

There was no significant difference in consumption of fat servings between pet owners and non-owners in all three sample sets (see Tables 4.7, 4.8, and 4.9). Also, there was no significant difference in consumption of meat servings between pet owners and non-owners (see Tables 4.7, 4.8, and 4.9).

In the blood chemistry subsample, pet owners consumed a significantly higher percentage of kilocalories as protein than non-owners ($21.09\% \pm 6.92$ compared to $16.91\% \pm 4.56$) (see Table 4.8). There was no significant difference in consumption of percent of kilocalories as fat between pet owners and non-owners for all three sample sets (see Tables 4.7, 4.8, and 4.9).

Blood Chemistry Analysis

In the blood chemistry subsample, BUN and the BUN/creatinine ratio were significantly higher in the pet owner group than the non-owner group ($20.27 \text{ mg/dL} \pm 4.82$ compared to $16.43 \text{ mg/dL} \pm 3.64$ and 18.85 ± 4.50 compared to 15.68 ± 3.19 , respectively) (see Table 4.10). In the female subsample, BUN was significantly higher in the pet owner group than the non-owner group ($19.89 \text{ mg/dL} \pm 4.37$ compared to $15.90 \text{ mg/dL} \pm 3.47$); the BUN/creatinine ratio was not significantly different between the two groups (see Table 4.11).

In the blood chemistry subsample, serum triglycerides were significantly higher in the non-owner group than the pet owner group ($192.48 \text{ mg/dL} \pm 93.5$ compared to $109.91 \text{ mg/dL} \pm 36.81$ (see Table 4.10). In the female subsample, serum triglycerides were significantly higher in the non-owner group than the pet owner group ($189.71 \text{ mg/dL} \pm 102.45$ compared to $114.56 \text{ mg/dL} \pm 39.49$) (see Table 4.11).

There were no significant differences between pet owners and non-owners for serum cholesterol, HDL-C, LDL-C, coronary risk ratio, and LDL-C/HDL-C in the blood chemistry subsample and the female subsample (see Tables 4.10 and 4.11). The values for all the other blood constituents were not significantly different between pet owners and non-owners (see Tables 4.10 and 4.11).

In both the blood chemistry subsample and female subsample, all blood values for both pet owners and non-owners were within normal ranges except for two notable exceptions. In the blood chemistry subsample, serum triglycerides for non-owners was $192.48 \text{ mg/dL} \pm 93.5$ (see Table 4.10) which exceeds the normal range of 30-190 mg/dL for both males and females. In the blood chemistry subsample, the coronary risk ratio for non-owners was 5.00 ± 1.81 (see Table 4.10) which was above the normal risk ratio of 4.44 for females and 4.97 for males. The coronary risk ratio for pet owners was 4.04 ± 1.35 (see Table 4.10) which was below the normal risk ratio for both females and males. In the female subsample, the coronary risk ratio for non-owners was 4.45 ± 1.42 (see Table 4.11) which was just slightly above the normal risk ratio for females. The coronary risk ratio for pet owners was 3.76 ± 1.19 (see Table 4.11) which was below the normal risk ratio for females.

On the blood analysis reports, medication use was reported. An equal percentage of pet owners and non-owners were using estrogen. Ten percent of the pet owners and almost twenty-five per cent of non-owners were using blood pressure medication. No pet owners and ten percent of non-owners were using cholesterol-lowering medication. The numbers were too small for valid Chi-square tests.

Anthropometric Analysis

Data on anthropometric measurements showed weight and body mass index for the total sample, blood chemistry subsample, and female subsample (Tables 4.12, 4.13, and 4.14). Data on anthropometric measurements showed waist hip ratio for only the blood chemistry subsample and the female subsample (Tables 4.13 and 4.14).

Weight was significantly higher for the pet owners than the non-owners in the total sample and female subsample ($73.76 \text{ kg} \pm 17.05$ compared to $65.71 \text{ kg} \pm 10.31$ and $70.70 \text{ kg} \pm 17.89$ compared to $64.02 \text{ kg} \pm 9.86$, respectively) (see Tables 4.12 and 4.14). Also, body mass index was significantly higher for the pet owners than the non-owners in the total sample and female subsample (26.86 ± 5.12 compared to 25.04 ± 3.08 and 27.19 ± 5.69 compared to 24.99 ± 3.21 , respectively) (see Tables 4.12 and 4.14). There were no significant differences in weight and body mass index between pet owners and non-owners in the blood chemistry subsample (see Table 4.13). In the total sample, the body mass index of 26.86 ± 5.12 for the pet owners and 25.04 ± 3.08 for the non-owners were both above 24 and in the excess weight category for both males and females.

There was no significant difference in waist hip ratio between pet owners and non-owners in both the blood chemistry subsample and the female subsample (see Tables 4.13 and 4.14). In both subsamples, the waist hip ratio was

above .8 for both pet owners and non-owners and was in the category associated with increased risk of mortality and morbidity for females.

Physiological Analysis

Data on physiological measurements showed systolic blood pressure and diastolic blood pressure for only the blood chemistry subsample and female subsample (Tables 4.15 and 4.16). In both the blood chemistry subsample and female subsample, there were no significant differences between pet owners and non-owners for either systolic blood pressure or diastolic blood pressure (see Tables 4.15 and 4.16). In both subsamples, systolic blood pressure for both pet owners and non-owners was below 140 and considered desirable; and diastolic blood pressure for both pet owners and non-owners was below 90 and also considered desirable.

Specific Questionnaire Analyses

Size of Evening Meal

Data on Questionnaire I (Eating Habits), #3, showed responses pertaining to the size of the evening meal: biggest, medium size, light, or seldom eat (Tables 4.17, 4.18, and 4.19). In the total sample and female subsample, there were significant differences in meal sizes between pet owners and non-owners (see Tables 4.17 and 4.19, and Figures 4.17 and 4.19). Most non-owners (about 60%) indicated their

evening meal was a light meal. Almost equal numbers of pet owners (about 33% each) indicated their evening meal was their biggest meal, a medium size meal, or a light meal. In the blood chemistry subsample, there was no significant difference between pet owners and non-owners in meal size choice for their evening meal (see Table 4.18).

Time Spent Walking

Data on Questionnaire B (Eating and Exercising Habits), #10, showed time in minutes spent walking (Tables 4.20.1, 4.20.2, 4.21, 4.22 and 4.23). In the total sample, blood chemistry subsample, and female subsample, there were no significant differences between pet owners and non-owners in time spent walking (see Tables 4.20.1, 4.21, and 4.22).

However, in the total subsample, there was a significant difference between dog owners only and non-owners in time spent walking (37.8 minutes $\pm$ 27.8 compared to 20.6 minutes $\pm$ 23.2) (see Table 4.20.2). In the pet subsample, dog owners also walked significantly longer than cat owners by almost 17 minutes (see Table 4.23).

Marital Status

Data on Questionnaire H (Demographic Descriptors), #5, showed responses pertaining to marital status: married, widowed, divorced, separated, living together, and never married. For the purpose of comparing people living with a spouse to people living alone, the responses of widowed, divorced, separated, and never married were combined; there

were no responses of living together (Tables 4.24, 4.25, and 4.26). In all three sample sets, there were no significant differences between pet owners and non-owners on whether they lived with a spouse or lived alone.

Questionnaire Score Totals

Data on Questionnaires A (Social Support), C (Lifestyle and Exercise), D (Emotional Distress), E (Recent Life Events), F (Illness Behavior), G (Minor Health Problems), and K (Pet Attachment) were used to determine total scores (Tables 4.27, 4.28, and 4.29). The higher the score on Questionnaire A (Social Support), the more social support one had. The higher the score on Questionnaire C (Lifestyle and Exercise), the more active one was. The higher the score on Questionnaire D (Emotional Distress), the more distressed one was. The higher the score on Questionnaire E (Recent Life Events), the more negative events one experienced. The higher the score on Questionnaire F (Illness Behavior), the more illness one had. The higher the score on Questionnaire G (Minor Health Problems), the more health problems one had.

Questionnaire K (Pet Attachment) was for pet owners only. The higher the score on Questionnaire K (Pet Attachment), the more attached one was to his or her pet. In the total sample, blood chemistry subsample, and female subsample, the mean scores on Questionnaire K (Pet

Attachment) were as follows: 38.68 ± 13.54 , 36.45 ± 7.05 , and 40.21 ± 12.73 , respectively.

In all three sample sets, there were no significant differences between pet owners and non-owners in total scores on all questionnaires except one. In the female subsample, pet owners had a significantly higher score on Questionnaire E (Recent Life Events) than non-owners. That is, pet owners experienced significantly more recent negative events than non-owners (see Table 4.29).

Special Combination Analyses

Pet Ownership with Eating and Exercising Habits

Pet ownership as the independent variable was combined in a multivariate analysis of variance with dependent variables on eating and exercising habits: size of evening meal; pattern of meals; time spent walking; Questionnaire C (Lifestyle and Exercise) total score; milk servings; and fat grams (Table 4.30). In previous analyses, in the total sample, there was a significant difference in meal sizes and a significant difference in consumption of milk servings between pet owners and non-owners. There were no significant differences in when any of the six meals were eaten, time spent walking, lifestyle and exercise total score, or consumption of fat servings between pet owners and non-owners.

The multivariate analysis of variance showed a significant difference at $p < 0.05$ based on pet ownership when eating and exercising habits were combined. The results appear in Table 4.30.

Social Support with Eating and Exercising Habits

Social support as the independent variable was combined in a multivariate analysis of variance with the dependent variables on eating and exercising habits discussed above. Social support was determined by the total score on Questionnaire A (Social Support). In previous analysis, there was no significant difference between pet owners and non-owners in the total score on Questionnaire A (Social Support) in the total sample.

The multivariate analysis of variance showed a significant difference at $p < 0.05$ based on social support when eating and exercising habits were combined. The results appear in Table 4.31.

Pet Ownership and Social Support with Eating and Exercising Habits

Pet ownership and social support as the independent variables were combined in a multivariate analysis of variance with the dependent variables on eating and exercising habits discussed above. The multivariate analysis of variance showed a significant difference at $p = 0.05$ based on pet ownership and social support when

eating and exercising habits were combined. The results appear in Table 4.32.

Exercise with Nutritional Status and Heart Health

Time spent walking as the independent variable was combined in a multivariate analysis of variance with dependent variables on nutritional status and specific risk factors for cardiovascular disease: serum triglycerides; weight; body mass index; waist hip ratio; diastolic blood pressure; and systolic blood pressure.

In previous analysis, there was a significant difference in serum triglycerides between pet owners and non-owners in the blood chemistry subsample. In previous analyses, there was no significant differences in time spent walking, weight, body mass index, waist hip ratio, diastolic blood pressure, or systolic blood pressure between pet owners and non-owners in the blood chemistry subsample.

The multivariate analysis of variance showed no significant difference based on exercise (time spent walking) when nutritional status and specific risk factors for cardiovascular disease were combined. The results appear in Table 4.33.

Total score on activity-Questionnaire C (Lifestyle and Exercise)-as the independent variable was combined in a multivariate analysis of variance with the dependent variables on nutritional status and certain risk factors for cardiovascular disease discussed above. In previous

analysis, there was no significant difference in total score on Questionnaire C (Lifestyle and Exercise) between pet owners and non-owners in the blood chemistry subsample.

The multivariate analysis of variance showed no significant difference based on exercise (total score on activity) when nutritional status and specific risk factors for cardiovascular disease were combined. The results appear in Table 4.34.

Eating with Nutritional Status and Heart Health

Milk servings consumed as the independent variable was combined in a multivariate analysis of variance with the dependent variables on nutritional status and specific risk factors for cardiovascular disease discussed above. In previous analysis, there was no significant difference in consumption of milk servings between pet owners and non-owners in the blood chemistry subsample.

The multivariate analysis of variance showed no significant difference based on eating (milk servings consumed) when nutritional status and specific risk factors for cardiovascular disease were combined. The results appear in Table 4.35.

Fat grams consumed as the independent variable was combined in a multivariate analysis of variance with the dependent variables on nutritional status and specific risk factors for cardiovascular disease discussed above. In previous analysis, there was no significant difference in

consumption of fat between pet owners and non-owners in the blood chemistry subsample.

The multivariate analysis of variance showed no significant difference based on eating (fat grams consumed) when nutritional status and specific risk factors for cardiovascular disease were combined. The results appear in Table 4.36.

Pet Ownership with Physical and Emotional Health

Pet ownership as the independent variable was combined in a multivariate analysis of variance with dependent variables on physical and emotional health: Questionnaire D (Emotional Distress) total score; Questionnaire E (Illness Behavior) total score; and Questionnaire G (Minor Health Problems) total score. In previous analysis, there were no significant differences on the total scores of Questionnaire D (Emotional Distress), Questionnaire E (Illness Behavior), and Questionnaire G (Minor Health Problems) between pet owners and non-owners in the blood chemistry subsample.

The multivariate analysis of variance showed no significant difference based on pet ownership when physical and emotional health were combined. The results appear in Table 4.37.

Social Support with Physical and Emotional Health

Social support as the independent variable was combined in a multivariate analysis of variance with the dependent variables on physical and emotional health discussed above.

In previous analysis, there was no significant difference between pet owners and non-owners in the total score on Questionnaire A (Social Support) in the total sample.

The multivariate analysis of variance showed significant difference at $p < 0.01$ based on social support when physical and emotional health were combined. The results appear in Table 4.38.

Recent Life Events

with Physical and Emotional Health

Recent life events as the independent variable was combined in a multivariate analysis of variance with the dependent variables on physical and emotional health discussed above. Recent life events was determined by the total score on Questionnaire E (Recent Life Events). In previous analysis, there was no significant difference between pet owners and non-owners in the total score on Questionnaire E (Recent Life Events) in the total sample.

The multivariate analysis of variance showed a significant difference at $p = 0.01$ based on recent life events when physical and emotional health were combined. The results appear in Table 4.39.

Specific Questionnaire, Diet, Blood, Anthropometric, and Physiological Variables

Data on pet ownership, time spent walking, blood lipids (LDL-C/HDL-C, cholesterol, triglycerides, HDL-C, LDL-C, and

coronary risk ratio), physiological measurements (systolic blood pressure and diastolic blood pressure), anthropometric measurements (waist hip ratio), and age were correlated with data on pet ownership, time spent walking, blood lipids (LDL-C/HDL-C), diet lipids (total fat, saturated fat, cholesterol), physiological measurements (systolic blood pressure and diastolic blood pressure), anthropometric measurements (weight, body mass index, waist hip ratio), and age; data were adjusted for body mass index; and data were adjusted for waist hip ratio (Tables 4.40, 4.41, 4.42, 4.43, 4.44, and 4.45). For the correlation analysis, analyses of covariance (ANCOVA) were performed and successfully tested the assumptions of homogeneity of variance and of slope.

Pet ownership was given a value of one; non-ownership was given a value of two. All other numbers were actual values for that variable. Correlations for pet ownership, for serum triglycerides, and for significant correlations for other variables were printed in the tables. Correlations for pet attachment with actual values for that variable were performed with the above variables, but there were no significant correlations and this was not printed in the tables.

In the blood chemistry subsample, pet ownership (non-ownership) was significantly positively correlated with serum triglycerides, with an r value of 0.4550 ($r^2 = 0.2070$). There were no significant correlations between pet

ownership and any of the other variables. Serum triglycerides were significantly negatively correlated with time spent walking, with an r value of 0.3201 ($r^2 = 0.1025$); Serum triglycerides were significantly positively correlated with LDL-C/HDL-C, with an r value of 0.4280 ($r^2 = 0.1832$). There were no significant correlations between serum triglycerides and any of the other variables. The results appear in Table 4.40.

In the blood chemistry subsample, adjusting for body mass index, pet ownership (non-ownership) was significantly positively correlated with serum triglycerides, with an r value of 0.5319 ($r^2 = 0.2829$). There were no significant correlations between pet ownership and any of the other variables. There were no significant correlations between serum triglycerides and any of the other variables. The results appear in Table 4.41.

In the blood chemistry subsample, adjusting for waist hip ratio, pet ownership (non-ownership) was significantly positively correlated with serum triglycerides, with an r value of 0.4922 ($r^2 = 0.2423$). There were no significant correlations between pet ownership and any of the other variables. Serum triglycerides were significantly positively correlated with LDL-C/HDL-C, with an r value of 0.4488 ($r^2 = 0.2014$). There were no significant correlations between serum triglycerides and any of the other variables. The results appear in Table 4.42.

In the female subsample, pet ownership (non-ownership) was significantly positively correlated with serum triglycerides, with an r value of 0.3944 ($r^2 = 0.1556$). There were no significant correlations between pet ownership and any of the other variables. Serum triglycerides were significantly positively correlated with LDL-C/HDL-C, with an r value of 0.4795 ($r^2 = 0.2299$). There were no significant correlations between serum triglycerides and any of the other variables. The results appear in Table 4.43.

In the female subsample, adjusting for body mass index, there were no significant correlations between pet ownership and any of the other variables. Also, there were no significant correlations between serum triglycerides and any of the other variables. The results appear in Table 4.44.

In the female subsample, adjusting for waist hip ratio, there were no significant correlations between pet ownership and any of the other variables. Also, there were no significant correlations between serum triglycerides and any of the other variables. The results appear in Table 4.45.

Figure 4.1

Sample Composition (Total Sample) . n=127

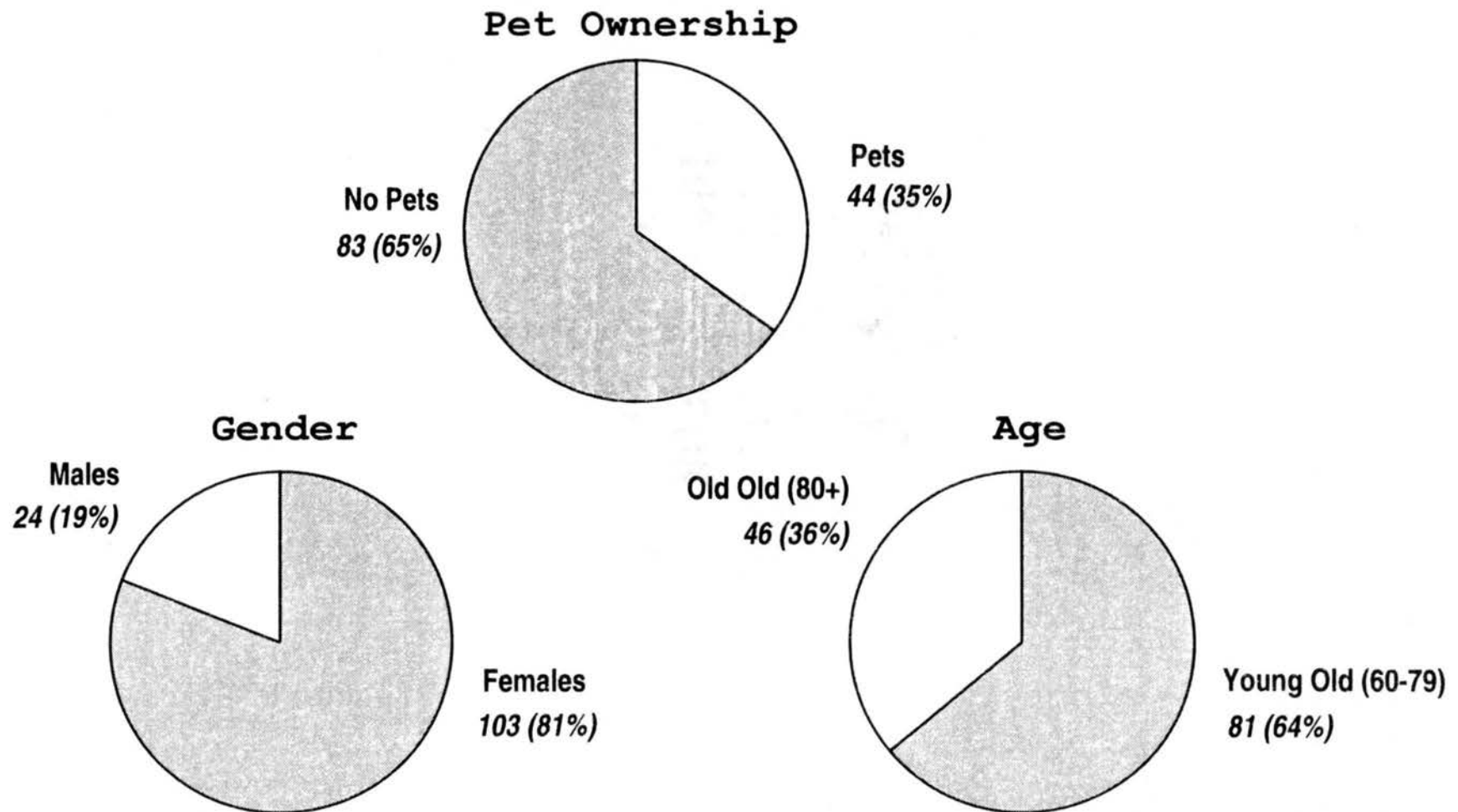


Figure 4.1.1

Sample Composition (Pet Subsample) . n=44

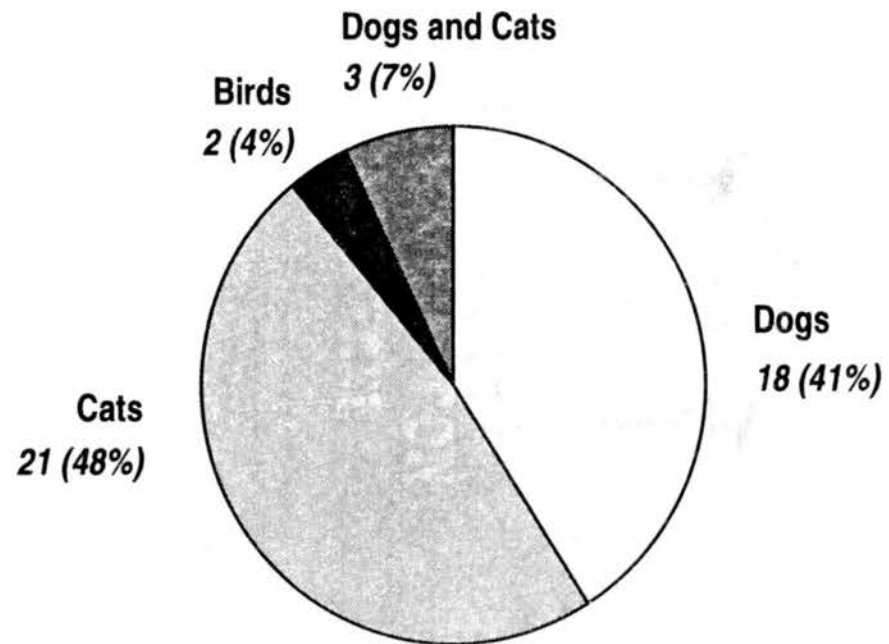
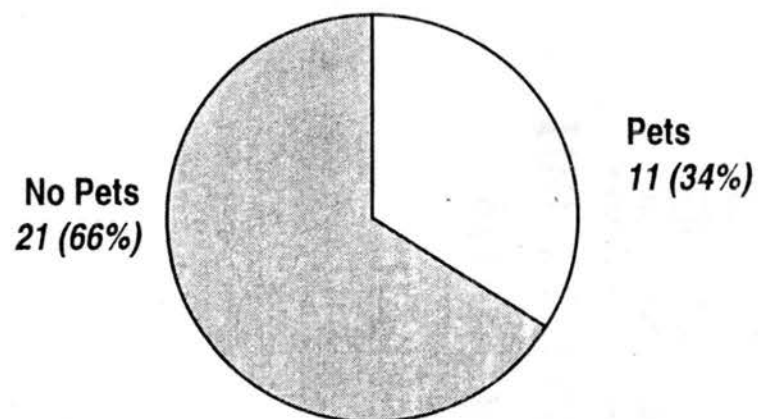


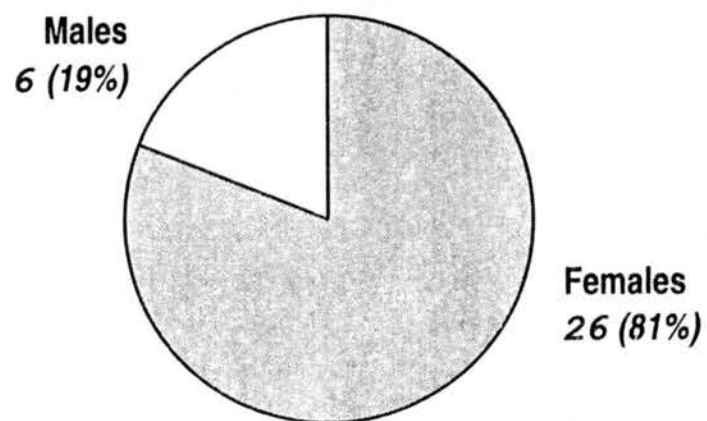
Figure 4.2

Sample Composition (Blood Chemistry Subsample). n=32

Pet Ownership



Gender



Age

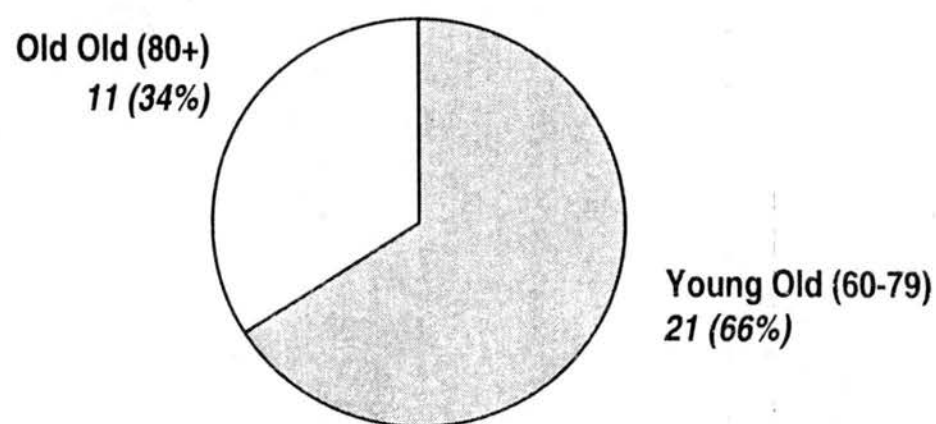


Figure 4.3

Sample Composition (Female Subsample) . n=103

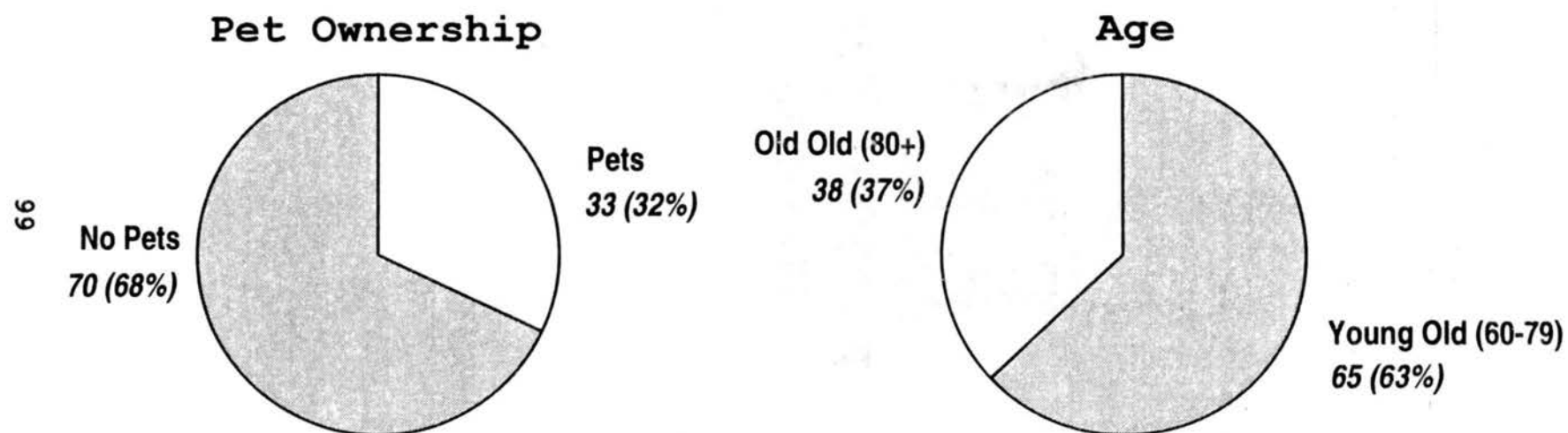


Table 4.1

Demographics (Total Sample). n=127

Comparing percent distribution of sample characteristics of pet owners and non-owners.

	Pet Owners	Non-Owners
GENDER $1.64 < X^2_{1,0.05} = 3.84$		
Female	75.0% (33)*	84.3% (70)
Male	25% (11)	15.7% (13)
AGE (years)	$75.1 \pm 8.4^{**}$ (44)	76.1 ± 7.7 (83)
RACE $1.46 < X^2_{2,0.05} = 5.99$		
White	100.0% (44)	96.4% (80)
Native American	0.0% (0)	2.4% (2)
Asian	0.0% (0)	1.2% (1)
EDUCATION $5.18 < X^2_{5,0.05} = 11.07$		
Grade School	2.3% (1)	7.2% (6)
Some High School	9.1% (4)	13.3% (11)
High School Graduate	34.1% (15)	24.1% (20)
Some College	27.3% (12)	33.7% (28)
College Graduate	4.5% (2)	10.0% (10)
Graduate Work	22.7% (10)	9.6% (8)
MARITAL STATUS $3.95 < X^2_{3,0.05} = 7.81$		
Married	40.9% (18)	45.8% (38)
Widowed	52.3% (23)	45.8% (38)
Divorced	6.8% (3)	6.0% (5)
Never Married	0.0% (0)	2.4% (2)

Table 4.1 (continued)

Demographics (Total Sample). n=127

Comparing percent distribution of sample characteristics of pet owners and non-owners.

	Pet Owners	Non-Owners
INCOME $1.64 < X^2_{1,0.05} = 3.84$		
< \$10,000	33.3% (13)	33.3% (26)
\$10,000-\$14,999	23.1% (9)	20.5% (16)
\$15,000-\$19,999	10.3% (4)	14.1% (11)
\$20,000-\$24,999	12.8% (5)	10.3% (8)
\$25,000-\$29,999	5.1% (2)	7.7% (6)
\$30,000-\$34,999	2.6% (1)	6.4% (5)
\$35,000-\$39,999	7.7% (3)	1.3% (1)
\$40,000-\$44,999	5.1% (2)	0.0% (0)
\$45,000-\$49,999	0.0% (0)	2.6% (2)
\$50,000 or greater	0.0% (0)	3.8% (3)
POPULATION SIZE $1.64 < X^2_{1,0.05} = 3.84$		
Rural	13.6% (6)	13.4% (11)
Small Town	25.0% (11)	26.8% (22)
Larger Town	11.4% (5)	14.6% (12)
City	47.7% (21)	45.1% (37)
Urban Area	2.3% (1)	0.0% (0)

* $\bar{x}$ ** $\bar{x} \pm SD$

Table 4.2
Demographics (Blood Chemistry Subsample). n=32
Comparing percent distribution of sample
characteristics of pet owners and non-owners.

	Pet Owners	Non-Owners
GENDER $0.00 < X^2_{1,0.05} = 3.84$		
Female	81.8% (9) *	81.0% (17)
Male	18.2% (2)	19.0% (4)
AGE (years)	$77.6 \pm 10.5^{**}$ (11)	74.3 ± 6.0 (21)
RACE $0.54 < X^2_{1,0.05} = 3.84$		
White	100.0% (11)	95.2% (20)
Native American	0.0% (0)	0.0% (0)
Asian	0.0% (0)	4.8% (1)
EDUCATION $7.07 < X^2_{5,0.05} = 11.07$		
Grade School	0.0% (0)	4.8% (1)
Some High School	9.1% (1)	4.8% (1)
High School Graduate	9.1% (1)	9.5% (2)
Some College	18.2% (2)	38.1% (8)
College Graduate	9.1% (1)	28.6% (6)
Graduate Work	54.5% (6)	14.3% (3)
MARITAL STATUS $3.24 < X^2_{2,0.05} = 5.99$		
Married	36.4% (4)	61.9% (13)
Widowed	54.5% (6)	38.1% (8)
Divorced	9.1% (1)	0.0% (0)
Never Married	0.0% (0)	0.0% (0)

Table 4.2 (continued)
 Demographics (Blood Chemistry Subsample). n=32
 Comparing percent distribution of sample
 characteristics of pet owners and non-owners.

	Pet Owners	Non-Owners
INCOME $7.82 < X^2_{9,0.05} = 16.92$		
< \$10,000	14.3% (1)	23.8% (5)
\$10,000-\$14,999	28.6% (2)	14.3% (3)
\$15,000-\$19,999	14.3% (1)	14.3% (3)
\$20,000-\$24,999	0.0% (0)	14.3% (3)
\$25,000-\$29,999	14.3% (1)	4.8% (1)
\$30,000-\$34,999	0.0% (0)	14.3% (3)
\$35,000-\$39,999	14.3% (1)	4.8% (1)
\$40,000-\$44,999	14.3% (1)	0.0% (0)
\$45,000-\$49,999	0.0% (0)	4.8% (1)
\$50,000 or greater	0.0% (0)	4.8% (1)
POPULATION SIZE $4.56 < X^2_{3,0.05} = 7.81$		
Rural	0.0% (0)	14.3% (3)
Small Town	9.1% (1)	28.6% (6)
Larger Town	18.2% (2)	19.0% (4)
City	72.7% (8)	38.1% (8)
Urban Area	0.0% (0)	0.0% (0)

* $\bar{x}$

** $\bar{x} \pm SD$

Table 4.3

Demographics (Female Subsample). n=103
 Comparing percent distribution of sample
 characteristics of pet owners and non-owners.

	Pet Owners	Non-Owners
AGE (years)	75.0 $\pm$ 9.1** (33) *	76.2 $\pm$ 7.3 (70)
RACE .54 < $X^2_{1,0.05} = 3.84$		
White	100.0% (33)	95.7% (67)
Native American	0.0% (0)	2.9% (2)
Asian	0.0% (0)	1.4% (1)
EDUCATION 7.07 < $X^2_{5,0.05} = 11.07$		
Grade School	3.0% (1)	7.1% (5)
Some High School	9.1% (3)	12.9% (9)
High School Graduate	36.4% (12)	22.9% (16)
Some College	33.3% (11)	34.3% (24)
College Graduate	3.0% (1)	12.9% (9)
Graduate Work	15.2% (5)	10.0% (7)
MARITAL STATUS 3.24 < $X^2_{2,0.05} = 5.99$		
Married	24.2% (8)	41.4% (29)
Widowed	66.7% (2)	52.9% (37)
Divorced	9.1% (3)	4.3% (3)
Never Married	0.0% (0)	1.4% (1)

Table 4.3 (continued)

Demographics (Female Subsample). n=103

Comparing percent distribution of sample characteristics of pet owners and non-owners.

	Pet Owners	Non-Owners
INCOME $7.82 < X^2_{9,0.05} = 16.92$		
< \$10,000	43.3% (13)	36.4% (24)
\$10,000-\$14,999	26.7% (8)	21.2% (14)
\$15,000-\$19,999	13.3% (4)	13.6% (9)
\$20,000-\$24,999	3.3% (1)	10.6% (7)
\$25,000-\$29,999	3.3% (1)	7.6% (5)
\$30,000-\$34,999	0.0% (0)	3.0% (2)
\$35,000-\$39,999	6.7% (2)	1.5% (1)
\$40,000-\$44,999	3.3% (1)	0.0% (0)
\$45,000-\$49,999	0.0% (0)	3.0% (2)
\$50,000 or greater	0.0% (0)	3.0% (2)
POPULATION SIZE $4.59 < X^2_{3,0.05} = 7.81$		
Rural	15.2% (5)	13.0% (9)
Small Town	27.3% (9)	26.1% (18)
Larger Town	12.1% (4)	10.1% (7)
City	45.5% (15)	50.7% (35)
Urban Area	0.0% (0)	0.0% (0)

* n

** $\bar{x} \pm SD$

Table 4.4

Diet Analysis (Total Sample). Nutrient Values. n=123
Comparing mean scores of pet owners and non-owners.

	Pet Owners n=44	Non-Owners n=79
Kilocalories ^a	66.6 ± 21.8*	70.0 ± 20.5
Kcals (actual consumed)	1476.4 ± 481.6	1549.4 ± 449.3
Carbohydrates ^a	76.8 ± 27.7	79.7 ± 29.8
Protein ^a	132.9 ± 42.1	134.0 ± 49.6
Fat ^a	59.3 ± 31.5	66.4 ± 31.9
Grams (actual consumed)	43.8 ± 23.1	72.0 ± 202.1
Saturated Fat ^a	59.1 ± 32.0	67.4 ± 42.4
Polyunsaturated Fat ^a	34.1 ± 22.5	33.8 ± 24.3
Monounsaturated Fat ^a	66.6 ± 40.6	73.0 ± 40.5
Cholesterol (% Dietary Recommendation)	58.1 ± 37.2	62.5 ± 40.7
Calcium (% RDA)	84.7 ± 41.7	73.5 ± 41.4
Phosphorous (% RDA)	134.3 ± 51.4	129.9 ± 57.0
Sodium (% Dietary Recommendation)	98.8 ± 45.7	95.7 ± 47.0
Potassium (% RDA)	145.1 ± 64.9	137.4 ± 67.8
Magnesium (% RDA)	91.8 ± 42.9	89.2 ± 47.3
Iron (% RDA)	83.3 ± 42.6	99.4 ± 71.6

Table 4.4 (continued)

Diet Analysis (Total Sample). Nutrient Values. n=123

Comparing mean scores of pet owners and non-owners.

	Pet Owners n=44	Non-Owners n=79
Zinc (% RDA)	66.3 ± 30.3	70.4 ± 35.3
Fiber(%Dietary Recommendation)	90.5 ± 77.3	85.1 ± 82.1
Alcohol (g)	.5 ± 2.3	.1 ± 1.2
Caffeine (mg)	161.1 ± 204.0	165.8 ± 162.1
Vitamin A (% RDA)	166.5 ± 145.1	162.0 ± 161.2
Vitamin D (% RDA)	55.6 ± 52.8	52.0 ± 53.3
Vitamin E (% RDA)	88.6 ± 66.8	112.7 ± 172.3
Thiamin (B ₁) (% RDA)	120.8 ± 59.3	140.6 ± 91.9
Riboflavin (B ₂) (% RDA)	117.8 ± 57.3	138.7 ± 89.4
Niacin (B ₃) (% RDA)	123.9 ± 67.0	140.9 ± 92.8
Pyridoxine (B ₆) (% RDA)	102.1 ± 49.8	123.8 ± 89.6
Folate (% RDA)	144.3 ± 86.6	170.4 ± 137.4
Cobalamin (B ₁₂) (% RDA)	159.6 ± 123.0	215.3 ± 203.5
Vitamin C (% RDA)	219.4 ± 120.2	277.5 ± 261.9

* $\bar{x} \pm SD$ ^a mean of all the percentages of individually calculated goals

Table 4.5

Diet Analysis (Blood Chemistry Subsample). Nutrient Values. n=32
Comparing mean scores of pet owners and non-owners.

	Pet Owners n=11	Non-Owners n=21
Kilocalories ^a	70.0 ± 26.0*	72.2 ± 22.9
Kcals (actual consumed)	1548.6 ± 572.5	1597.0 ± 503.1
Carbohydrates ^a	78.9 ± 28.5	85.3 ± 29.8
Protein ^a	156.3 ± 50.4	134.5 ± 40.0
Fat ^a	58.7 ± 44.1	63.8 ± 31.7
Grams (actual consumed)	43.5 ± 32.2	133.6 ± 390.2
Saturated Fat ^a	54.2 ± 29.0	67.3 ± 36.1
Polyunsaturated Fat ^a	32.6 ± 25.8	35.9 ± 28.0
Monounsaturated Fat ^a	71.8 ± 63.2	70.1 ± 36.0
Cholesterol (% Dietary Recommendation)	63.6 ± 50.7	54.9 ± 34.5
Calcium (% RDA)	92.2 ± 43.8	83.0 ± 42.4
Phosphorous (% RDA)	141.3 ± 48.8	141.7 ± 60.5
Sodium (% Dietary Recommendation)	118.7 ± 66.0	119.6 ± 51.6
Potassium (% RDA)	149.4 ± 36.7	160.5 ± 93.8
Magnesium (% RDA)	96.9 ± 39.1	98.1 ± 38.2
Iron (% RDA)	79.4 ± 26.2	100.4 ± 44.6

Table 4.5 (continued)
Diet Analysis (Blood Chemistry Subsample). Nutrient Values. n=32
Comparing mean scores of pet owners and non-owners.

	Pet Owners n=11	Non-Owners n=21
Zinc (% RDA) [†]	85.9 ± 34.3	63.3 ± 25.9
Fiber(%Dietary Recommendation)	95.7 ± 41.1	88.5 ± 45.2
Alcohol (g)	0.0 ± 0.0	0.0 ± 0.0
Caffeine (mg) [†]	71.4 ± 87.7	186.3 ± 159.2
Vitamin A (% RDA)	251.1 ± 222.7	143.2 ± 155.4
Vitamin D (% RDA)	57.4 ± 51.1	49.9 ± 42.4
Vitamin E (% RDA)	116.1 ± 96.5	86.7 ± 127.6
Thiamin (B ₁) (% RDA)	126.6 ± 61.2	150.6 ± 71.3
Riboflavin (B ₂) (% RDA)	128.5 ± 37.4	146.1 ± 78.3
Niacin (B ₃) (% RDA)	115.9 ± 42.5	163.2 ± 107.4
Pyridoxine (B ₆) (% RDA)	109.6 ± 39.3	132.7 ± 80.8
Folate (% RDA)	152.1 ± 90.6	162.3 ± 96.7
Cobalamin (B ₁₂) (% RDA)	200.9 ± 119.3	160.8 ± 110.2
Vitamin C (% RDA)	294.0 ± 141.7	335.0 ± 432.2

* $\bar{x} \pm SD$

† $p < 0.05$

^a mean of all the percentages of individually calculated goals

Table 4.6

Diet Analysis (Female Subsample). Nutrient Values. n=99
Comparing mean scores of pet owners and non-owners.

	Pet Owners n=33	Non-Owners n=66
Kilocalories ^a	64.7 ± 21.0*	68.6 ± 18.1
Kcals (actual consumed)	1433.7 ± 463.3	1519.5 ± 398.2
Carbohydrates ^a	75.8 ± 27.5	78.0 ± 25.6
Protein ^a	132.5 ± 42.9	132.7 ± 43.9
Fat ^a	59.3 ± 31.5	66.4 ± 31.9
Grams (actual consumed)	40.9 ± 22.7	75.0 ± 220.9
Saturated Fat ^a	54.6 ± 27.7	65.2 ± 40.4
Polyunsaturated Fat ^a	32.6 ± 24.8	32.0 ± 21.3
Monounsaturated Fat ^a	55.3 ± 31.0	64.4 ± 29.6
Cholesterol (% Dietary Recommendation)	60.3 ± 39.4	61.0 ± 40.3
Calcium (% RDA)	81.7 ± 42.4	71.7 ± 38.0
Phosphorous (% RDA)	131.3 ± 52.0	125.8 ± 48.5
Sodium (% Dietary Recommendation)	95.6 ± 42.0	93.6 ± 46.3
Potassium (% RDA)	147.0 ± 67.2	133.7 ± 61.3
Magnesium (% RDA)	87.7 ± 39.4	83.9 ± 33.0
Iron (% RDA)	82.5 ± 47.5	96.4 ± 65.0

Table 4.6 (continued)

Diet Analysis (Female Subsample). Nutrient Values. n=99
Comparing mean scores of pet owners and non-owners.

	Pet Owners n=33	Non-Owners n=66
Zinc (% RDA)	65.2 ± 30.1	68.0 ± 32.8
Fiber(%Dietary Recommendation)	92.5 ± 86.9	75.7 ± 37.5
Alcohol (g)	.3 ± 1.9	.2 ± 1.4
Caffeine (mg)	120.8 ± 11.4	155.5 ± 160.1
Vitamin A (% RDA)	157.9 ± 141.8	148.7 ± 143.9
Vitamin D (% RDA)	58.4 ± 54.0	47.9 ± 39.4
Vitamin E (% RDA)	84.2 ± 63.4	109.7 ± 177.1
Thiamin (B ₁) (% RDA)	119.4 ± 62.8	136.6 ± 81.6
Riboflavin (B ₂) (% RDA)	120.1 ± 61.8	135.0 ± 79.0
Niacin (B ₃) (% RDA)	126.6 ± 73.3	135.9 ± 83.6
Pyridoxine (B ₆) (% RDA)	104.4 ± 53.3	118.0 ± 74.5
Folate (% RDA)	140.2 ± 82.9	166.7 ± 123.3
Cobalamin (B ₁₂) (% RDA)	165.4 ± 134.8	208.1 ± 192.4
Vitamin C (% RDA)	226.4 ± 115.9	277.9 ± 264.4

* $\bar{x} \pm SD$

^a mean of all the percentages of individually calculated goals

Table 4.7

Diet Analysis (Total Sample). n=123

Food Exchanges, % of Kilocalories.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
FOOD EXCHANGES (USDA Food Guide Pyramid)		
Milk (2-3) [†]	1.04 ± .93* (44)**	.68 ± .78 (79)
Vegetables (3-5) [†]	2.54 ± 2.98 (44)	1.70 ± 1.57 (78)
Fruit (2-4)	3.11 ± 2.41 (44)	3.05 ± 2.12 (79)
Bread (6-11)	8.21 ± 4.33 (44)	9.92 ± 5.33 (79)
Meat (2-3)	4.56 ± 2.57 (44)	5.56 ± 3.84 (79)
Fat (use sparingly)	6.10 ± 3.69 (44)	8.14 ± 7.16 (79)
% OF KILOCALORIES		
Protein (about 15%)	18.16 ± 5.21 (44)	17.38 ± 5.02 (79)
Carbohydrates (about 55%)	56.09 ± 9.15 (43)	55.25 ± 9.95 (77)
Fat (30% or less, American Heart Association)	25.44 ± 8.57 (43)	27.38 ± 8.72 (77)

* $\bar{x} \pm SD$

** n

† $p < 0.05$

Table 4.8

Diet Analysis (Blood Chemistry Subsample). n=32

Food Exchanges, % of Kilocalories.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
FOOD EXCHANGES (USDA Food Guide Pyramid)		
Milk (2-3)	1.28 ± 1.20* (11)**	.66 ± .66 (21)
Vegetables (3-5)	2.54 ± 1.82 (11)	1.90 ± 1.70 (21)
Fruit (2-4)	4.20 ± 2.25 (11)	3.07 ± 1.79 (21)
Bread (6-11)	7.96 ± 4.31 (11)	10.40 ± 5.39 (21)
Meat (2-3)	5.82 ± 3.61 (11)	5.08 ± 2.57 (21)
Fat (use sparingly)	5.75 ± 4.96 (11)	7.55 ± 6.14 (21)
% OF KILOCALORIES		
Protein (about 15%)†	21.09 ± 6.92 (11)	16.91 ± 4.56 (21)
Carbohydrates (about 55%)	55.64 ± 11.32 (11)	57.62 ± 7.60 (21)
Fat (30% or less, American Heart Association)	23.18 ± 9.65 (11)	25.29 ± 7.03 (21)

* $\bar{x} \pm SD$

** n

† p < 0.05

Table 4.9

Diet Analysis (Female Subsample). n=99

Food Exchanges, % of Kilocalories.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
FOOD EXCHANGES (USDA Food Guide Pyramid)		
Milk (2-3) [†]	1.01 ± .95* (33)**	.65 ± .71 (66)
Vegetables (3-5)	1.99 ± 1.39 (33)	1.62 ± 1.51 (65)
Fruit (2-4)	3.42 ± 2.53 (33)	3.00 ± 1.79 (66)
Bread (6-11)	8.02 ± 4.61 (33)	9.84 ± 5.31 (66)
Meat (2-3)	4.78 ± 2.75 (33)	5.58 ± 3.74 (66)
Fat (use sparingly)	5.45 ± 3.63 (33)	7.85 ± 7.05 (66)
% OF KILOCALORIES		
Protein (about 15%)	18.59 ± 5.47 (32)	17.56 ± 4.76 (64)
Carbohydrates (about 55%)	57.00 ± 9.63 (32)	55.47 ± 9.85 (64)
Fat (30% or less, American Heart Association)	24.22 ± 8.08 (32)	26.94 ± 8.53 (64)

* $\bar{x} \pm SD$

** n

† p < 0.05

Table 4.10
Blood Analysis (Blood Chemistry Subsample). n=32
Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Glucose (mg/dL)	103.73 $\pm$ 30.07* (11)**	100.38 $\pm$ 20.05 (21)
Blood Urea Nitrogen (mg/dL) [†]	20.27 $\pm$ 4.82 (11)	16.43 $\pm$ 3.64 (21)
Blood Urea Nitrogen/ Creatinine Ratio [†]	18.85 $\pm$ 4.50 (11)	15.68 $\pm$ 3.19 (21)
Sodium (MEQ/L)	139.18 $\pm$ 1.83 (11)	139.57 $\pm$ 2.66 (21)
Potassium (MEQ/L)	4.37 $\pm$.32 (11)	4.39 $\pm$.36 (21)
Magnesium (MEQ/L)	1.76 $\pm$.15 (11)	1.66 $\pm$.14 (21)
Calcium (mg/dL)	9.16 $\pm$.49 (11)	9.18 $\pm$.33 (21)
Phosphorus (mg/dL)	3.49 $\pm$.32 (11)	3.38 $\pm$.52 (21)
Albumin (g/dL)	4.01 $\pm$.16 (11)	4.04 $\pm$.33 (21)
Iron (mcg/dL)	93.09 $\pm$ 27.23 (11)	90.81 $\pm$ 27.4 (21)
Cholesterol (mg/dL)	206.82 $\pm$ 36.48 (11)	227.29 $\pm$ 34.9 (21)
Triglycerides (mg/dL) [‡]	109.91 $\pm$ 36.81 (11)	192.48 $\pm$ 93.5 (21)
HDL-C (mg/dL)	56.00 $\pm$ 16.82 (11)	51.24 $\pm$ 20.84 (21)
LDL-C (mg/dL)	132.64 $\pm$ 35.21 (11)	142.50 $\pm$ 26.44 (20)
Coronary Risk Ratio (Chol./HDL-C)	4.04 $\pm$ 1.35 (11)	5.00 $\pm$ 1.81 (21)
LDL-C/HDL-C	2.66 $\pm$ 1.22 (11)	3.12 $\pm$ 1.33 (20)

* $\bar{x} \pm SD$ [†] p < 0.05

** n [‡] p < 0.01

Table 4.11

Blood Analysis (Female Subsample). n=26

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Glucose (mg/dL)	107.22 $\pm$ 32.47* (9)**	97.12 $\pm$ 13.48 (17)
Blood Urea Nitrogen (mg/dL) ‡	19.89 $\pm$ 4.37 (9)	15.90 $\pm$ 3.47 (17)
Blood Urea Nitrogen/ Creatinine Ratio	19.08 $\pm$ 4.23 (9)	15.68 $\pm$ 3.19 (17)
Sodium (MEQ/L)	139.22 $\pm$ 1.79 (9)	139.41 $\pm$ 2.74 (17)
Potassium (MEQ/L)	4.33 $\pm$.34 (9)	4.35 $\pm$.36 (17)
Magnesium (MEQ/L)	1.78 $\pm$.16 (9)	1.68 $\pm$.15 (17)
Calcium (mg/dL)	9.33 $\pm$.24 (9)	9.23 $\pm$.29 (17)
Phosphorus (mg/dL)	3.57 $\pm$.25 (9)	3.48 $\pm$.49 (17)
Albumin (g/dL)	4.04 $\pm$.14 (9)	4.12 $\pm$.28 (17)
Iron (mcg/dL)	96.11 $\pm$ 28.17 (9)	92.59 $\pm$ 29.04 (17)
Cholesterol (mg/dL)	208.67 $\pm$ 40.46 (9)	230.59 $\pm$ 32.49 (17)
Triglycerides (mg/dL) †	114.56 $\pm$ 39.49 (9)	189.71 $\pm$ 102.45 (17)
HDL-C (mg/dL)	59.56 $\pm$ 15.83 (9)	56.47 $\pm$ 19.74 (17)
LDL-C (mg/dL)	130.22 $\pm$ 38.81 (9)	140.56 $\pm$ 23.53 (16)
Coronary Risk Ratio (Chol./HDL-C)	3.76 $\pm$ 1.19 (9)	4.45 $\pm$ 1.42 (17)
LDL-C/HDL-C	2.39 $\pm$ 1.05 (9)	2.61 $\pm$.74 (16)

* $\bar{x} \pm SD$ † $p < 0.05$

** n

‡ $p < 0.01$

Table 4.12

Anthropometric Analysis (Total Sample). n=123

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Weight (kg) [†]	73.76 ± 17.05* (43)**	65.71 ± 10.31 (80)
Body Mass Index (kg/M ²) [‡]	26.86 ± 5.12 (43)	25.04 ± 3.08 (80)

* $\bar{x} \pm SD$ † p < 0.001

** n ‡ p < 0.05

Table 4.13

Anthropometric Analysis (Blood Chemistry Subsample)n=31

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Weight (kg)	68.95 ± 12.72* (10)**	64.95 ± 12.16 (21)
Body Mass Index (kg/M ²)	24.50 ± 4.45 (10)	24.86 ± 3.77 (21)
Waist Hip Ratio	.836 ± .068 (10)	.834 ± .088 (16)

* $\bar{x} \pm SD$

** n

Table 4.14

Anthropometric Analysis (Female Subsample). n=99

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Weight (kg) [†]	70.70 ± 17.89* (32)**	64.02 ± 9.86 (67)
Body Mass Index (kg/M ²) [†]	27.19 ± 5.69 (32)	24.99 ± 3.21 (67)
Waist Hip Ratio	.818 ± 0.62 (8)	.812 ± .080 (13)

* $\bar{x} \pm SD$

** n

† p < 0.05

Table 4.15

Physiological Analysis (Blood Chemistry Subsample). n=26
Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Systolic Blood Pressure (mm/Hg)	129.44 ± 14.22* (9)**	138.47 ± 21.35 (17)
Diastolic Blood Pressure (mm/Hg)	75.11 ± 8.78 (9)	75.00 ± 8.61 (17)

* $\bar{x} \pm SD$

** n

Table 4.16

Physiological Analysis (Female Subsample). n=20
Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Systolic Blood Pressure (mm/Hg)	129.57 ± 14.60* (7)**	137.38 ± 23.73 (13)
Diastolic Blood Pressure (mm/Hg)	76.57 ± 7.64 (7)	73.54 ± 9.02 (13)

* $\bar{x} \pm SD$

** n

Table 4.17

Questionnaire Analysis (Total Sample). n=126

Size of Evening Meal.

Comparing percent distribution of responses
of pet owners and non-owners.

	Pet Owners	Non-Owners
Biggest Meal	34.9% (15) *	12.0% (10)
Medium Size Meal	32.6% (14)	22.9% (19)
Light Meal	32.6% (14)	63.9% (53)
Seldom Eat	0% (0)	1.2% (1)

* n

$$14.19 > \chi^2_{2,0.05} = 5.99$$

Table 4.18

Questionnaire Analysis (Blood Chemistry Subsample)n=32

Size of Evening Meal.

Comparing percent distribution of responses
of pet owners and non-owners.

	Pet Owners	Non-Owners
Biggest Meal	45.5% (5) *	23.8% (5)
Medium Size Meal	27.3% (3)	33.3% (7)
Light Meal	27.3% (3)	42.9% (9)
Seldom Eat	0% (0)	0% (0)

* n

$$1.63 < \chi^2_{2,0.05} = 5.99$$

Table 4.19

Questionnaire Analysis (Female Subsample). n=103

Size of Evening Meal.

Comparing percent distribution of responses
of pet owners and non-owners.

	Pet Owners	Non-Owners
Biggest Meal	42.4% (14) *	11.4% (8)
Medium Size Meal	27.3% (9)	25.7% (18)
Light Meal	30.3% (10)	61.4% (43)
Seldom Eat	0% (0)	1.4% (1)

* n

$$14.80 > \chi^2_{2,0.05} = 5.99$$

Table 4.20.1

Questionnaire Analysis (Total Sample). n=126

Time Spent Walking.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Time (minutes)	27.4 ± 24.0* (44)**	20.6 ± 23.2 (82)

* $\bar{x} \pm SD$ ** n

Table 4.20.2

Questionnaire Analysis (Total Sample). n=100

Time Spent Walking.

Comparing mean scores of dog owners and non-owners.

	Dog Owners	Non-Owners
Time (minutes)†	37.8 ± 27.8* (18)**	20.6 ± 23.2 (82)

* $\bar{x} \pm SD$ ** n † p < 0.05

Table 4.21

Questionnaire Analysis (Blood Chemistry Subsample)n=32

Time Spent Walking.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Time (minutes)	23.6 ± 23.5* (11)**	24.8 ± 25.6 (21)

* $\bar{x} \pm SD$ ** n

Table 4.22

Questionnaire Analysis (Female Subsample). n=102

Time Spent Walking.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Time (minutes)	27.1 ± 25.26* (33)**	21.1 ± 24.4 (69)

* $\bar{x} \pm SD$ ** n

Table 4.23

Questionnaire Analysis (Pet Subsample). n=39

Time Spent Walking.

Comparing mean scores of dog owners and cat owners.

	Dog Owners	Cat Owners
Time (minutes)†	37.8 ± 27.8* (18)**	21.1 ± 19.5 (21)

* $\bar{x} \pm SD$ ** n † p < 0.05

Table 4.24

Questionnaire Analysis (Total Sample). n=127

Marital Status.

Comparing percent distribution of responses
of pet owners and non-owners.

	Pet Owners	Non-Owners
Married	40.9% (18) *	45.8% (38)
Living Alone	59.1% (26)	54.2% (45)

* n

$$0.28 < \chi^2_{1,0.05} = 3.84$$

Table 4.25

Questionnaire Analysis (Blood Chemistry Subsample)n=32

Marital Status.

Comparing percent distribution of responses
of pet owners and non-owners.

	Pet Owners	Non-Owners
Married	36.4% (4) *	38.1% (8)
Living Alone	63.6% (7)	61.9% (13)

* n

$$2.88 < \chi^2_{1,0.05} = 3.84$$

Table 4.26

Questionnaire Analysis (Female Subsample). n=103

Marital Status.

Comparing percent distribution of responses
of pet owners and non-owners.

	Pet Owners	Non-Owners
Married	24.2% (8) *	41.4% (29)
Living Alone	75.8% (25)	58.6 (41)

* n

$$1.89 < \chi^2_{1,0.05} = 3.84$$

Table 4.27

Questionnaire Analysis (Total Sample). n=127

Questionnaire Score Totals.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Questionnaire A:		
Social Support	11.00 $\pm$ 1.88*	10.77 $\pm$ 2.24
(higher score = more support)	(44)**	(83)
Questionnaire C:		
Lifestyle and Exercise	32.11 $\pm$ 8.36	29.35 $\pm$ 8.6
(higher score = more active)	(44)	(83)
Questionnaire D:		
Emotional Distress	7.70 $\pm$ 6.08	8.49 $\pm$ 8.11
(higher score = more distressed)	(44)	(83)
Questionnaire E:		
Recent Life Events	2.32 $\pm$ 1.76	1.76 $\pm$ 1.66
(higher score = more negative events)	(44)	(83)
Questionnaire F:		
Illness Behavior	3.30 $\pm$ 2.04	3.27 $\pm$ 1.89
(higher score = more illness)	(44)	(83)
Questionnaire G:		
Minor Health Problems	6.09 $\pm$ 3.61	5.72 $\pm$ 3.73
(higher score = more problems)	(44)	(83)

* $\bar{x} \pm SD$

** n

Table 4.28

Questionnaire Analysis (Blood Chemistry Subsample)n=32
Questionnaire Score Totals.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Questionnaire A:		
Social Support	10.82 ± 1.72*	11.90 ± 1.64
(higher score = more support)	(11)**	(21)
Questionnaire C:		
Lifestyle and Exercise	35.82 ± 9.39	31.57 ± 8.24
(higher score = more active)	(11)	(21)
Questionnaire D:		
Emotional Distress	6.91 ± 6.40	6.29 ± 7.07
(higher score = more distressed)	(11)	(21)
Questionnaire E:		
Recent Life Events	2.55 ± 1.86	1.95 ± 1.75
(higher score = more negative events)	(11)	(21)
Questionnaire F:		
Illness Behavior	3.18 ± 1.94	2.81 ± 1.99
(higher score = more illness)	(11)	(21)
Questionnaire G:		
Minor Health Problems	4.55 ± 3.59	5.00 ± 3.49
(higher score = more problems)	(11)	(21)

* $\bar{x} \pm SD$

** n

Table 4.29

Questionnaire Analysis (Female Subsample). n=103

Questionnaire Score Totals.

Comparing mean scores of pet owners and non-owners.

	Pet Owners	Non-Owners
Questionnaire A:		
Social Support	10.61 $\pm$ 1.66*	10.87 $\pm$ 2.19
(higher score = more support)	(33)**	(70)
Questionnaire C:		
Lifestyle and Exercise	32.79 $\pm$ 8.12	29.70 $\pm$ 8.43
(higher score = more active)	(33)	(70)
Questionnaire D:		
Emotional Distress	8.97 $\pm$ 6.05	8.60 $\pm$ 8.54
(higher score = more distressed)	(33)	(70)
Questionnaire E:†		
Recent Life Events	2.58 $\pm$ 1.87	1.71 $\pm$ 1.64
(higher score = more negative events)	(33)	(70)
Questionnaire F:		
Illness Behavior	3.67 $\pm$ 2.16	3.27 $\pm$ 1.86
(higher score = more illness)	(33)	(70)
Questionnaire G:		
Minor Health Problems	6.64 $\pm$ 3.43	5.96 $\pm$ 3.88
(higher score = more problems)	(33)	(70)

* $\bar{x} \pm SD$

** n

† $p < 0.05$

Table 4.30
 Questionnaire Analysis (Total Sample). n=118
 Pet Ownership with Eating and Exercise Habits.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		
	F	p	df
Pet Ownership	1.92	<0.05	106.00
Dependent Variables	Univariate		
	F	p	
Size of Evening Meal	13.66	<0.001	
Pattern of Meals			
When Ate Breakfast	0.08	ns	
When Ate Morning Snack	0.79	ns	
When Ate Lunch	0.00	ns	
When Ate Afternoon Snack	0.05	ns	
When Ate Dinner	2.47	ns	
When Ate Evening Snack	0.07	ns	
Time Spent Walking	1.14	ns	
Questionnaire C			
(Lifestyle and Exercise)			
Total Score	3.13	ns	
Milk Servings	4.98	<0.05	
Fat Grams	0.84	ns	

Table 4.31

Questionnaire Analysis (Total Sample). n=118
 Social Support with Eating and Exercise Habits.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		
	F	p	df
Questionnaire A (Social Support)			
Total Score	1.92	<0.05	106.00
Dependent Variables	Univariate		
	F	p	
Size of Evening Meal	0.64	ns	
Pattern of Meals			
When Ate Breakfast	2.38	ns	
When Ate Morning Snack	3.04	ns	
When Ate Lunch	0.01	ns	
When Ate Afternoon Snack	0.63	ns	
When Ate Dinner	0.34	ns	
When Ate Evening Snack	0.05	ns	
Time Spent Walking	2.68	ns	
Questionnaire C (Lifestyle and Exercise)			
Total Score	16.02	<0.001	
Milk Servings	0.04	ns	
Fat Grams	1.00	ns	

Table 4.32
 Questionnaire Analysis (Total Sample) . n=118
 Pet Ownership and Social Support
 with Eating and Exercise Habits.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		
	F	p	df
Pet Ownership and Social Support	1.86	=0.05	105.00

Dependent Variables	Univariate	
	F	p
Size of Evening Meal	0.37	ns
Pattern of Meals		
When Ate Breakfast	2.31	ns
When Ate Morning Snack	2.84	ns
When Ate Lunch	0.01	ns
When Ate Afternoon Snack	0.65	ns
When Ate Dinner	0.48	ns
When Ate Evening Snack	0.05	ns
Time Spent Walking	2.47	ns
Questionnaire C		
(Lifestyle and Exercise)		
Total Score	15.36	<0.001
Milk Servings	0.00	ns
Fat Grams	1.13	ns

Table 4.33

Questionnaire and Blood Analysis
 Physiologic Analyses (Blood Chemistry Subsample).n=23
 Exercise with Nutritional Status and Heart Health.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		df
	F	p	
Time Spent Walking	1.25	ns	16.00

Dependent Variables	Univariate	
	F	p
Triglycerides	5.37	ns
Weight	0.47	ns
Body Mass Index	0.25	ns
Waist Hip Ratio	0.52	ns
Diastolic Blood Pressure	1.76	ns
Systolic Blood Pressure	0.19	ns

Table 4.34

Questionnaire, Blood, Anthropometric, and
 Physiologic Analyses (Blood Chemistry Subsample).n=23
 Exercise with Nutritional Status and Heart Health.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		df
	F	p	
Questionnaire C (Lifestyle and Exercise) Total Score	1.47	ns	16.00

Dependent Variables	Univariate	
	F	p
Triglycerides	4.59	<0.05
Weight	0.44	ns
Body Mass Index	0.42	ns
Waist Hip Ratio	0.80	ns
Diastolic Blood Pressure	0.00	ns
Systolic Blood Pressure	5.05	<0.05

Table 4.35

Questionnaire, Blood, Anthropometric, and
 Physiologic Analyses (Blood Chemistry Subsample).n=23
 Eating with Nutritional Status and Heart Health.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		df
	F	p	
Milk Servings	0.99	ns	16.00

Dependent Variables	Univariate	
	F	p
Triglycerides	5.51	<0.05
Weight	0.22	ns
Body Mass Index	0.71	ns
Waist Hip Ratio	0.00	ns
Diastolic Blood Pressure	0.71	ns
Systolic Blood Pressure	0.69	ns

Table 4.36

Questionnaire, Blood, Anthropometric, and
 Physiologic Analyses (Blood Chemistry Subsample).n=23
 Eating with Nutritional Status and Heart Health.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		df
	F	p	
Fat Grams	0.40	ns	16.00

Dependent Variables	Univariate	
	F	p
Triglycerides	0.91	ns
Weight	0.05	ns
Body Mass Index	0.82	ns
Waist Hip Ratio	0.02	ns
Diastolic Blood Pressure	0.71	ns
Systolic Blood Pressure	0.13	ns

Table 4.37

Questionnaire Analysis (Total Sample). n=127
 Pet Ownership with Physical and Emotional Health.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		
	F	p	df
Pet Ownership	0.42	ns	123.00
Dependent Variables	Univariate		
	F	p	
Questionnaire D (Emotional Distress)			
Total Score	0.32	ns	
Questionnaire F (Illness Behavior)			
Total Score	0.01	ns	
Questionnaire G (Minor Health Problems)			
Total Score	0.29	ns	

Table 4.38

Questionnaire Analysis (Total Sample). n=127
 Social Support with Physical and Emotional Health.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		
	F	p	df
Questionnaire A (Social Support) Total Score	4.23	<0.01	123.00
Dependent Variables	Univariate		
	F	p	
Questionnaire D (Emotional Distress) Total Score	1.23	=0.001	
Questionnaire F (Illness Behavior) Total Score	2.99	ns	
Questionnaire G (Minor Health Problems) Total Score	5.54	<0.05	

Table 4.39
 Questionnaire Analysis (Total Sample). n=127
 Recent Life Events with Physical
 and Emotional Health.
 Multivariate Analysis of Variance.

Independent Variable	Multivariate		
	F	p	df
Questionnaire E (Recent Life Events) Total Score	5.58	=0.01	123.00
Dependent Variables	Univariate		
	F	p	
Questionnaire D (Emotional Distress) Total Score	13.51	<0.001	
Questionnaire F (Illness Behavior) Total Score	0.01	ns	
Questionnaire G (Minor Health Problems) Total Score	12.73	<0.005	

Table 4.40

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Blood Chemistry Subsample). n=32
Results of Correlation Coefficient.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
Pets	1.0000* (32)**	.0222 (32)	.1749 (31)	.2726 (32)	.4550† (32)	-.1184 (32)	.1618 (31)	.2720 (32)	.2259 (26)	-.0063 (26)	-.0140 (26)	-.2058 (32)
Time Walking	.0222 (32)	-	-	-	-.3201† (32)	-	-	-	-	-	-	-
LDL-C/ HDL-C	.1749 (32)	-	-	-	.4280† (31)	-.7289 [∞] (31)	.5320 ^Δ (31)	.9815 [∞] (31)	-	-	.4717† (25)	-
135 Tot Fat	.0690 (32)	-	-	-	.2544 (32)	-	-	-	-	-	-	-.3741† (32)
Sat Fat	.1876 (32)	-	-	-	.2614 (32)	-	-	-	-	-	-	-
Diet Chol	-.1248 (32)	-	-	-	.2099 (32)	-	-	-	-	-	-	-
Sys BP	.2259 (26)	-	-	-	.3123 (26)	-	-	-	-	.4655† (26)	-	-
Dia BP	-.0063 (26)	-	-	-	.0217 (26)	-	-	-	.4655† (26)	-	-	-
Wt	-.1548 (31)	-.3678† (31)	-	-.4011† (31)	.0612 (31)	-.4783† (31)	-	-	-	.4051† (25)	.4258† (25)	.3598† (31)
BMI	.0432 (31)	-	-	-	-.0529 (31)	-	-	-	-	.4128† (25)	-	-

Table 4.40 (continued)

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Blood Chemistry Subsample). n=32

Results of Correlation Coefficient.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
WHR	-.0140 (26)	-	.4717 [†] (25)	-	-.0706 (26)	-.4493 [‡] (26)	-	-	-	-	-	-
Age	-.2058 (32)	-	-	-	-.2664 (32)	-	-	-	-	-	-	-
* r ** n † p < 0.01 ‡ p < 0.05 ∞ p < 0.001 Δ p < 0.005												

LDL-C/HDL-C = Low-density lipoprotein/high-density lipoprotein

Blood chol = Total serum cholesterol

¹³⁶Trig = Triglycerides

HDL-C = High-density lipoprotein

Risk = Coronary risk ratio, total cholesterol/high-density lipoprotein cholesterol

Sys BP = Systolic blood pressure

Dia BP = Diastolic blood pressure

WHR = Waist-to-hip ratio

Tot Fat = Total fat

Sat Fat = Saturated fat

Diet Chol = Dietary cholesterol

Wt = Weight

BMI = Body Mass Index

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Blood Chemistry Subsample). n=21

[illegible]

Table 4.41 (continued)

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses

(Blood Chemistry Subsample). n=21

Results of Partial Correlation Coefficient. Controlling for Body Mass Index.

		Time	LDL-C/	Blood								
	Pets	Walking	HDL-C	Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
WHR	-.0319	-	.5991 ^Δ	-	-.0178	-.6235 ^Δ	-	.5642 [†]	-	-	-	-
	(18)		(18)		(18)	(18)		(18)				
Age	-.1981	-	-	-	-.2403	-	-	-	-	-	-	-
	(18)				(18)							

* r ** df † p < 0.05 ‡ p < 0.01 ∞ p < 0.001 Δ p < 0.005

LDL-C/HDL-C = Low-density lipoprotein/high-density lipoprotein

Blood chol = Total serum cholesterol

† Trig = Triglycerides

∞ HDL-C = High-density lipoprotein

Risk = Coronary risk ratio, total cholesterol/high-density lipoprotein cholesterol

Sys BP = Systolic blood pressure

Dia BP = Diastolic blood pressure

WHR = Waist-to-hip ratio

Tot Fat = Total fat

Sat Fat = Saturated fat

Diet Chol = Dietary cholesterol

Wt = Weight

BMI = Body Mass Index

Table 4.42

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Blood Chemistry Subsample). n=21

Results of Partial Correlation Coefficient. Controlling for Waist Hip Ratio.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
Pets	1.0000* (18)**	-.2681 (18)	.1776 (18)	.2002 (18)	.4922† (18)	-.1341 (18)	.0744 (18)	.2632 (18)	.2931 (18)	.0664 (18)		-.0762 (18)
Time Walking	-.2681 (18)	-	-	-	-.4188 (18)	-	-	-	-	-		-
LDL-C/ HDL-C	.1776 (18)	-	-	.5023† (18)	.4488† (18)	-.6721‡ (18)	.9732† (18)	.6540 [∞] (18)	-	-		-
631 Tot Fat	-.0356 (18)	-	-	-	.0437 (18)	-	-	-	-	-		-.4708† (18)
Sat Fat	.0029 (18)	-	-	-	-.1010 (18)	-	-	-	-	-		-
Diet Chol	-.0553 (18)	-	-	-	.0486 (18)	-	-	-	-	-		-
Sys BP	.2931 (18)	-	-	-	.1525 (18)	-	-	-	-	-		-
Dia BP	.0664 (18)	-	-	-	-.0363 (18)	-	-	-	-	-		-
Wt	.0399 (18)	-	-	-	-.0105 (18)	-	-	-	-	-		-
BMI	.2775 (18)	-	-	-	-.0633 (18)	-	-	-	-	-		-

Table 4.42 (continued)

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses

(Blood Chemistry Subsample). n=21

Results of Partial Correlation Coefficient. Controlling for Waist Hip Ratio.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
WHR												
Age	-.0762 (18)	-	-	-	-.2466 (18)	-	-	-	-	-		-
* r	** df	† p < 0.05	‡ p < 0.001	∞ p < 0.005								

LDL-C/HDL-C = Low-density lipoprotein/high-density lipoprotein

Blood chol = Total serum cholesterol

140 Trig = Triglycerides

HDL-C = High-density lipoprotein

Risk = Coronary risk ratio, total cholesterol/high-density lipoprotein cholesterol

Sys BP = Systolic blood pressure

Dia BP = Diastolic blood pressure

WHR = Waist-to-hip ratio

Tot Fat = Total fat

Sat Fat = Saturated fat

Diet Chol = Dietary cholesterol

Wt = Weight

BMI = Body Mass Index

Table 4.43

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Female Subsample). n=26

Results of Correlation Coefficient.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
Pets	1.0000* (26)**	.2292 (26)	.1277 (25)	.2939 (26)	.3944† (26)	-.0822 (26)	.1714 (25)	.2457 (26)	.1828 (20)	-.1750 (20)	-.0411 (21)	-.0917 (26)
Time Walking	.2292 (26)	-	-	-	-.2396 (26)	-	-	-	-	-	-	-
LDL-C/ HDL-C	.1277 (25)	-	-	-	.4795† (25)	-.7494‡ (25)	.5398 [∞] (25)	.9599‡ (25)	-	-	-	-
Tot Fat	-.0079 (26)	-	-	-	.2978 (26)	-	-	-	-	-	-	-.3928 ^Δ (26)
Sat Fat	.1210 (26)	-	-	-	.2906 (26)	-	-	-	-	-	-	-
Diet Chol	-.1819 (26)	-	-	-	.2160 (26)	-	-	-	-	-	-	-
Sys BP	.1828 (20)	-	-	-	.2606 (20)	-	-	-	-	-	-	-
Dia BP	-.1750 (20)	-	-	-	-.0623 (20)	-	-	-	-	-	-	-
Wt	-.2356 (25)	-	-	-	.0500 (25)	-.4165† (25)	-	-	-	.4611† (19)	-	.4607† (25)
BMI	-.0195 (25)	-	-	-	-.0889 (25)	-	-	-	-	-	.4725† (20)	.6000 ^Δ (25)

Table 4.43 (continued)

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses

(Female Subsample). n=26

Results of Correlation Coefficient.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
WHR	-.0411 (21)	-	-	-	-.1470 (21)	-	-	-	-	-	-	-
Age	-.0917 (26)	-	-	-	-.2454 (26)	-	-	-	-	-	-	-
* r ** n † p < 0.05 ‡ p < 0.001 ∞ p < 0.005 Δ p < 0.01												

LDL-C/HDL-C = Low-density lipoprotein/high-density lipoprotein

Blood chol = Total serum cholesterol

142 Trig = Triglycerides

HDL-C = High-density lipoprotein

Risk = Coronary risk ratio, total cholesterol/high-density lipoprotein cholesterol

Sys BP = Systolic blood pressure

Dia BP = Diastolic blood pressure

WHR = Waist-to-hip ratio

Tot Fat = Total fat

Sat Fat = Saturated fat

Diet Chol = Dietary cholesterol

Wt = Weight

BMI = Body Mass Index

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Female Subsample). n=16

[illegible]

Table 4.44 (continued)

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Female Subsample). n=16

Results of Partial Correlation Coefficient. Controlling for Body Mass Index.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
WHR	-.0672 (13)	-	-	-	-.1274 (13)	-	-	-	-	-	-	-
Age	.0372 (13)	-	-	-	-.1922 (13)	-	-	-	-	-	-	-
* r	** df	† p < 0.01	‡ p < 0.001									

LDL-C/HDL-C = Low-density lipoprotein/high-density lipoprotein

Blood chol = Total serum cholesterol

144 Trig = Triglycerides

HDL-C = High-density lipoprotein

Risk = Coronary risk ratio, total cholesterol/high-density lipoprotein cholesterol

Sys BP = Systolic blood pressure

Dia BP = Diastolic blood pressure

WHR = Waist-to-hip ratio

Tot Fat = Total fat

Sat Fat = Saturated fat

Diet Chol = Dietary cholesterol

Wt = Weight

BMI = Body Mass Index

Table 4.45

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Female Subsample). n=16

Results of Partial Correlation Coefficient. Controlling for Waist Hip Ratio.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
Pets	1.0000* (13)**	.0370 (13)	.1110 (13)	.1395 (13)	.4013 (13)	-.1021 (13)	.0254 (13)	.2127 (13)	.2613 (13)	-.1235 (13)		.1832 (13)
Time Walking	.0370 (13)	-	-	-	-.2597 (13)	-	-	-	-	-		-
LDL-C/ HDL-C	.1110 (13)	-	-	-	.3870 (13)	-.6533 [†] (13)	-	.9300 [‡] (13)	-	-		-
Tot Fat	-.0082 (13)	-	-	-	.1388 (13)	-	-	-	-	-		-.5453 [∞] (13)
Sat Fat	.0593 (13)	-	-	.5467 [∞] (13)	-.0427 (13)	-	-	-	-	-		-
Diet Chol	-.1494 (13)	-	-	-	.0532 (13)	-	-	-	-	-		-
Sys BP	.2613 (13)	-	-	-	.0241 (13)	-	-	-	-	-		-
Dia BP	-.1235 (13)	-	-	-	-.1798 (13)	.5205 [∞] (13)	-	-	-	-		-
Wt	-.0114 (13)	-	-	-	-.0070 (13)	-	-	-	-	-		-
BMI	.2561 (13)	-	-	-	-.0498 (13)	-	-	-	-	-		.6428 [†] (13)

Table 4.45 (continued)

Questionnaire, Diet, Blood, Anthropometric, and Physiological Analyses
(Female Subsample). n=16

Results of Partial Correlation Coefficient. Controlling for Waist Hip Ratio.

	Pets	Time Walking	LDL-C/ HDL-C	Blood Chol	Trig	HDL-C	LDL-C	Risk	Sys BP	Dia BP	WHR	Age
WHR												
Age	.1832 (13)	-	-	-	-.2018 (13)	-	-	-	-	-		-

* r ** df † p < 0.01 ‡ p < 0.001 ∞ p < 0.05

LDL-C/HDL-C = Low-density lipoprotein/high-density lipoprotein

Blood chol = Total serum cholesterol

146 Trig = Triglycerides

HDL-C = High-density lipoprotein

Risk = Coronary risk ratio, total cholesterol/high-density lipoprotein cholesterol

Sys BP = Systolic blood pressure

Dia BP = Diastolic blood pressure

WHR = Waist-to-hip ratio

Tot Fat = Total fat

Sat Fat = Saturated fat

Diet Chol = Dietary cholesterol

Wt = Weight

BMI = Body Mass Index

CHAPTER V: DISCUSSION

Introduction

A new model, based on pet ownership leads to better self care, was developed to show possible associations of pet ownership with the eating and exercising habits of seniors and, in turn, their nutritional status and specific cardiovascular risk factors. The first objective was to determine if there were any significant differences in dietary intake and exercise activities between pet owners and non-owners. The second objective was to determine if there were any significant differences in nutritional status and specific risk factors for disease between pet owners and non-owners. The third objective was to determine if the significant differences in dietary intake and exercise activities were related to the significant differences in nutritional status and specific risk factors for cardiovascular disease.

Major Findings

The first hypothesis—pet owners demonstrated significantly higher dietary quality, as measured by the Recommended Dietary Allowances and Dietary Guidelines, than

non-owners—was not supported. It is noteworthy to point out that there were no significant differences in consumption of cholesterol, total fat, and saturated fat between pet owners and non-owners. However, pet owners consumed significantly more milk servings and significantly more vegetable servings than non-owners.

The second hypothesis—pet owners eat more regularly than non-owners—was not supported. No significant differences were found when meals were eaten between pet owners and non-owners. However, a significant difference was found in the size of the evening meal: most non-owners indicated their evening meal was a light meal; almost equal numbers of pet owners indicated their evening meal was their biggest meal, a medium size meal, or a light meal.

The third hypothesis—pet owners are significantly more physically active than non-owners—was not supported. However, it was found that dog owners walked for significantly more minutes than non-owners.

The fourth hypothesis—pet owners have significantly lower body mass indices than non-owners—was not supported. The opposite was found. Pet owners had significantly higher body mass indices than non-owners.

The fifth hypothesis—pet owners have significantly lower waist to hip ratios than non-owners—was not supported. There was no significant difference in waist to hip ratios between pet owners and non-owners.

The sixth hypothesis—pet owners have significantly lower blood pressure than non-owners—was not supported. There were no significant differences in either systolic blood pressure or diastolic blood pressure between pet owners and non-owners.

The seventh hypothesis—pet owners have significantly lower serum total cholesterol, low-density lipoprotein cholesterol, and triglycerides than non-owners—was partially supported. Pet owners had significantly lower serum triglycerides than non-owners. There were no significant differences in serum total cholesterol or low-density lipoprotein cholesterol between pet owners and non-owners.

The eighth hypothesis—pet owners have significantly higher serum high-density lipoprotein cholesterol than non-owners—was not supported. There was no significant difference in serum high-density lipoprotein cholesterol between pet owners and non-owners.

The ninth hypothesis—the differences in blood lipids between pet owners and non-owners are explained by diet and physical activity—was partly supported. There was a significant negative correlation between serum triglycerides and time spent walking. There were no significant correlations between serum triglycerides and dietary lipids.

The tenth hypothesis—the differences in nutritional status between pet owners and non-owners, as measured by anthropometrics and blood chemistry, are explained by diet

and physical activity—was not supported. The only significant difference in nutritional status between pet owners and non-owners—pet owners had significantly higher body mass indices than non-owners—was not explained by any significant differences in diet or physical activity.

It could not be concluded that pet ownership is associated with better diet and nutritional status, greater physical activity, and reduced cardiovascular risk compared to non-ownership in seniors. However, there were two major findings of note: (1) Dog owners walked for significantly more minutes than non-owners; and (2) Pet owners had significantly lower triglycerides than non-owners.

Study Participation

A response rate of 31% for a mail survey to a specialized population is considered low. However, the large number of pages and the large number of items, and the limited incentives, probably detrimentally influenced the response rate. The participation rate of 25% for the people who agreed to have a sample of their blood drawn may be due, again, to the limited incentive.

It appeared to the investigator that a large number of seniors at congregate meals program sites would talk about their economic difficulties. Perhaps if cash incentives had been offered, more people would have participated. However, in seeking external support, four research proposals for

this study were rejected and thus the project was mostly funded by the investigator.

At almost every congregate meals program site, the investigator observed one or more seniors taking home half of their lunch for dinner in little plastic containers that they had brought with them. Often, they would try to do this unobserved. Again, it appeared economics was a factor.

Demographics

It was important that there were no significant differences between pet owners and non-owners in demographics so that the effects of pet ownership could be studied without these variables confounding the results.

The demographics of the total sample in this study was compared to that of the U.S. population and that of the Colorado population in order to examine its representativeness. The following population figures are based on 1990 and 1992 census information (American Association of Retired Persons, 1993; Bureau of the Census, 1990). Often, there were not exact comparison groups mainly due to different age categories, and these were noted.

For Americans aged 65 and older, females outnumber males 2 to 1. For Coloradans aged 65 and older, there are about a third more females than males. Although this study

sample started at age 60, females outnumbered males 4 to 1. Thus, females were over-represented in this study.

For Americans aged 65 to 84 compared to Americans age 85 and older, the ratio is 9 to 1 of young-old to old-old. For Coloradoans aged 65 to 79 compared to Coloradoans aged 80 and over, the ratio is about 5 to 1 of young-old to old-old. This study sample's young-old was age 60 to 79 and old-old was age 80 and older, and the ratio was 2 to 1 for young-old to old-old. Thus, old-old was over-represented in this study.

In the U.S. population aged 65 and older, 86% are White, 8% are Black, 4% are Hispanic, 2% are Asian, and less than 1% are Native American. In the Colorado population aged 65 and older, 89% are White, 2% are Black, 7% are Hispanic, less than 1% are Asian, and less than 1% are Native American. In this study sample aged 60 and older, 98% were White, less than 1% were Asian, and 2% were Native American; there were none who were Black or Hispanic. Thus, Whites were over-represented in this study, and Blacks and Hispanics were under-represented. Asians and Native Americans had about compatible representation.

In the U.S. population aged 65 and older, 60% completed high school and 12% had a bachelor's degree or more. In the Colorado population aged 65 and older, 63% completed high school and 14% had a bachelor's degree or more. In this study sample aged 60 and older, 83% completed high school

and 55% had a bachelor's degree or more. Thus, the sample in this study was much more educated than the U.S. population of similar age.

For Americans aged 65 and older, 41% of women and 76% of men are married. For Coloradoans aged 65 and older, 42% of women and 77% of men are married. In this study sample aged 60 and older, 36% of women and 79% of men were married. The study sample represented the U.S. population quite well in marital status. This was important because social support and its possible relationship with pet ownership was examined in this study.

For Americans aged 65 and older, 40% have an annual income of \$30,000 or more. For Coloradoans aged 65 and older, 28% have an annual income of \$30,000 or more. In this study sample aged 60 and older, only 15% had an annual income of \$30,000 or more. Thus, lower income seniors were over-represented in this study. This is despite the sample in this study was much more educated than the U.S. population of similar age. Although it was assumed questions were answered honestly, income is probably considered very personal information people would like not to reveal even when confidentiality is promised.

In the U.S. population aged 65 and older, 74% live in metropolitan areas and 26% live in rural areas. In the Colorado population aged 65 and older, 82% live in metropolitan areas and 18% live in rural areas. In this

study sample, about 50% lived in city and urban areas and about 50% lived in rural areas and towns. This is a good balance of rural and city residents but not a good representation of residency of seniors across the country or across the state, with rural residents being over-represented.

Because most of the participants in this study were recruited from senior congregate meals program sites, the study sample probably was more representative of those people that attend senior congregate meals program sites than of the U.S. population. Thus, any generalizations about the study sample to the general populace should not be made.

Diet Analysis

In only the blood chemistry subsample, there were only two nutrients that had significant differences between pet owners and non-owners. One was caffeine; non-owners consumed significantly more caffeine than pet owners ($186.3 \text{ mg} \pm 159.2$ compared to $71.4 \text{ mg} \pm 87.7$). Whether it was less healthy for non-owners to consume significantly more caffeine is debatable. Kris-Etherton et al. (1988) reported the following:

On the basis of their own findings, individual investigators have made recommendations to limit coffee intake in order to lower CHD risk. Some investigators

recommend that coffee intake not exceed 1 to 2 cups [139-278 mg of caffeine if brewed caffeinated] per day; others report that CHD risk is increased only after coffee intake equals and/or exceeds 9 cups [1251 mg of caffeine, if brewed caffeinated] per day. (p. 1392)

There are problems of coffee brewing procedures, variety, and strength which all affect caffeine content and of caffeine from sources other than coffee. The relationship between coffee consumption and risk for cardiovascular disease has not been clearly established.

The other nutrient with a significant difference was zinc; pet owners consumed significantly more zinc than non-owners. The zinc finding was not surprising since pet owners consumed a significantly higher percent of kilocalories of protein; zinc is found in protein-containing foods such as meats. Zinc is an important trace mineral for immune function, wound healing, and taste perception. Seniors should consume the RDA of zinc but neither the pet owners nor the non-owners did.

In the total sample and in the female subsample, pet owners consumed significantly more milk exchanges than non-owners. From the investigator's familiarity with the 24-hour food diaries that were entered into the computer software, there were numerous low-fat dairy products consumed. In the total sample, pet owners consumed

significantly more vegetable exchanges than non-owners. Eating more low-fat dairy products and eating more vegetables could be considered as eating more healthy.

The question to ponder is how could eating more vegetables and dairy products be related to pet ownership. Within the pet owners, pet attachment did not predict dietary intake. While a causal inference cannot be made, perhaps pets provide companionship during meal times or just throughout the day. It was shown in the literature review that eating alone is the most common factor behind poor nutrition among older people (Tucker, 1993) and that companionship serves as a buffer against the negative effects of poor appetite on dietary intake (McIntosh et al., 1989). Pets may be a substitute for human companionship (Stallones et al. 1990), and pet ownership may be an impetus for better self care.

Blood Chemistry Analysis

There was one significant difference between pet owners and non-owners in blood constituent values related to risk factors for cardiovascular disease. In both the blood chemistry subsample and female subsample, serum triglycerides were significantly higher in the non-owners than the owners; in the blood chemistry subsample, serum triglycerides for non-owners even exceeded the normal range for both males and females.

Anderson et al. (1992), in a younger study sample, also found that non-owners had significantly higher serum triglycerides than pet owners. In addition, Anderson et al. (1992) found that male non-owners had significantly higher serum cholesterol, which was not found in this study.

As reviewed in the literature, serum triglycerides are decreased by exercise (Cooper, 1988). However, in all three sample sets, there was no significant difference between pet owners and non-owners in total score on Questionnaire C, lifestyle and exercise (a higher score indicated a more active lifestyle). Also, in all three sample sets, there was no significant difference between pet owners and non-owners on Questionnaire B, #10, time spent walking. However, in the total subsample, dog owners did walk for significantly more minutes than non-owners. This agreed with similar findings by Serpell (1991). It is also noteworthy that in the correlation analysis in the blood chemistry subsample, time spent walking was significantly negatively correlated with serum triglycerides—the more exercising, the lower the serum triglycerides.

In the pet subsample, dog owners walked significantly longer than cat owners and by almost 17 minutes. This also agreed with similar findings by Serpell (1991). However, this was in direct contrast to Anderson's findings in a younger study sample. Anderson et al. (1992) found no significant difference in exercise between dog owners and

other pet owners. He also found no significant differences in serum triglycerides and cholesterol between dog owners and other pet owners. Unfortunately, these variables could not be tested in this study due to the small number of dog owners in the blood chemistry subsample.

Medication use by participants was noted. The fact that a higher percentage of non-owners than pet owners were taking cholesterol-lowering medicines may indicate they have more problems with blood lipids. It also suggests that their reported blood lipids were pharmacologically lowered, and actually would have been even higher. There was no report on medication use in the study by Anderson et al. (1992).

Although not directly related to this study, an interesting anomaly in the blood analysis was found. In the blood chemistry subsample, BUN and BUN/creatinine ratio were significantly higher in pet owners than non-owners. Higher BUN levels could be due to kidneys not working properly, dehydration, blood loss, high protein diets and/or strenuous exercise; higher creatinine could be due to kidneys not working properly and muscle breakdown due to exercise but is not affected by protein in the diet. However, in the blood chemistry subsample, pet owners consumed significantly more percent of protein than non-owners. Thus, the significantly higher BUN and BUN/creatinine ratio could be related to a higher protein diet, some kidney malfunction, more walking,

any combination of the three, or some other factor mentioned earlier. It could also be a chance occurrence owing to the large number of statistical tests that were performed.

Anthropometric Analysis

It is of note that the pet owners had significantly higher weight and body mass index than non-owners, in the total sample and in the female subsample. Anderson et al. (1992), in a younger study sample, found no difference in body mass index between pet owners and non-owners. It was also interesting that in all sample sets, both the pet owners and non-owners had body mass indexes in the excess weight categories.

As revealed in the literature, although overweight and obesity are risk factors for cardiovascular disease (American Heart Association Nutrition Committee, 1992), higher weight and thus higher body mass index may be a buffer against morbidity and mortality in the elderly (A. Sparks, personal communication, July 20, 1994). Thus, it may be healthier for seniors to have extra weight.

The interesting finding that pet owners were significantly heavier yet had significantly lower serum triglycerides than non-owners (in the female subsample) merits further discussion. Wood et al. (1988), in a study on changes in plasma lipids and lipoproteins in overweight men during weight loss through dieting as compared with

exercise, found that there were significant decreases in serum triglycerides with only dieting or with only exercising compared to the controls. The exercising consisted of mainly walking and jogging. However, weight loss also occurred in both intervention groups. Wood et al. (1991), in a study on the effects of plasma lipoproteins of a prudent weight-reducing diet with or without exercise, in overweight men and women, found that there were significant decreases in serum triglycerides with dieting and exercising compared to the dieting only group in men and the controls in women. The exercising consisted of mainly walking and jogging. However, weight loss also occurred in all intervention groups.

Unfortunately, the investigator in this study does not know if the heavier pet owner women with lower serum triglycerides than non-owner women were also in the process of losing weight. In the correlation analysis of the female subsample, time spent walking did not significantly correlate with serum triglycerides. Yet in the correlation analysis of the blood chemistry subsample (both males and females), time spent walking was significantly negatively correlated with serum triglycerides. But in the blood chemistry subsample (both males and females), there was no significant difference in weight and body mass index between pet owners and non-owners. Again, it is not known if weight loss is occurring. The conclusion drawn is that exercise

decreased serum triglycerides but it is not known if it is exercise with weight loss that decreased the serum triglycerides.

Fat patterning was also examined. There was no significant difference in waist hip ratio between pet owners and non-owners in both the blood chemistry subsample and female subsample. However, in both subsamples, and in both pet owners and non-owners, the waist hip ratio was in the category of increased risk of morbidity and mortality for females. Abdominal obesity does increase the risk for cardiovascular disease (Jern et al., 1992; Shrapnel et al, 1992). Thus, it would appear to the investigator that if seniors are going to weigh more to stay healthy, prevention or reduction of central fat patterning should accompany it for optimum health benefits.

Physiological Analysis

In both the blood chemistry subsample and female subsample, there were no significant differences between pet owners and non-owners for either systolic blood pressure or diastolic blood pressure. Anderson et al. (1992), in a younger study sample, found that non-owners had significantly higher systolic blood pressure than pet owners. Perhaps his finding of a significant difference was due to a much larger sample size. Not finding significant differences in this study may also be due to self-

reports--blood pressures not reported truthfully or accurately.

Medication use by participants was noted. The fact that a higher percentage of non-owners than pet owners was taking blood pressure medicine may indicate non-owners have more problems with hypertension. It also suggests that their reported blood pressures were pharmacologically lowered, and actually would have been even higher. In addition, diuretics can have the effect of pharmacologically raising serum total cholesterol and low-density lipoprotein cholesterol (Glueck, Gordon, Nelson, Davis & Tyroler, 1986; Lasser, Grandits, Caggiula et al., 1976; Weinberger, 1985).

It is interesting to note that, even though pet owners had significantly higher weight and body mass index than non-owners, factors usually associated with higher blood pressure, pet owners did not have significantly higher blood pressure. The fact that dog owners walked significantly more than non-owners may also be a factor in their blood pressure levels (American Heart Association Exercise Committee, 1992; National Cholesterol Education Program Expert Panel, 1993). As reviewed in the literature, it could also be the prolonged, habitual petting of a pet that has the sustained effect of lowering blood pressure (Baun et al., 1984). As noted above, it may also be due to self-reports.

Specific Questionnaire Analyses

Size of Evening Meal

In the total sample and female subsample, there were significant differences in the size of the evening meal between pet owners and non-owners. Most non-owners indicated their evening meal was a light meal while an equal number of pet owners indicated their evening meal was their biggest meal, a medium size meal, or a light meal. The reason for the association between meal consumption patterns and pet ownership is not readily apparent, but this also needs to be further investigated.

Marital Status

In all three sample sets, there were no significant differences between pet owners and non-owners on whether they lived with a spouse or lived alone. There was no significant difference between pet owners and non-owners in total score on Questionnaire A, social support (a higher score indicated more social support).

Questionnaire Score Totals

In all three sample sets, there were no significant differences between pet owners and non-owners in total scores on all questionnaires except one. In the female subsample, pet owners had a significantly higher score for recent life events (a higher score indicated more negative events), than non-owners.

Although pet owners in the female subsample reported significantly more negative events in their lives, it did not appear to affect their health as measured by nutritional status and specific risk factors for cardiovascular disease. Perhaps pets served as a buffer against negative events as was found by Stallones et al. (1990).

It was interesting to note that there were no significant differences between pet owners and non-owners in physical and emotional health as measured by emotional distress (Questionnaire D), illness behavior (Questionnaire F), and minor health problems (Questionnaire G). It may be that these measures of health, which were also used in previous studies on the influences of pet ownership (Garritty et al, 1989; Serpell, 1991; Stallones et al. 1990), were not quite as sensitive as the other measures of health used in this study.

Although pet attachment (Questionnaire K) was measured, the pet subsample was of inadequate size to examine this variable. This was mainly due to the fact that different species have different attachment levels as reviewed in the literature (Lago et al., 1982; Johnson et al., 1992). The pet subsample had too small numbers of only dog owners, only cat owners, both dog and cat owners (which would be a problem), and only bird owners to then compare high attachment and low attachment in each group. However, correlation analysis of pet attachment scores with other

dependent variables was performed and no significant correlations were found.

Special Combination Analyses

Pet Ownership with Eating and Exercising Habits

Pet ownership as the independent variable was combined in a multivariate analysis of variance with dependent variables on eating and exercising habits: size of evening meal; pattern of meals; time spent walking; Questionnaire C (Lifestyle and Exercise) total score; milk servings consumed; and fat grams consumed. The multivariate analysis of variance on pet ownership with eating and exercising habits showed a significant difference at $p < 0.05$.

Thus, there was a significant difference based on pet ownership when eating and exercising habits were combined. Although when pet ownership was evaluated with just eating habits or pet ownership was evaluated with just exercising habits, few significant differences were found.

Social Support with Eating and Exercising Habits

Social support as the independent variable was combined in a multivariate analysis of variance with the dependent variables on eating and exercising habits discussed above. The multivariate analysis of variance on social support with eating and exercising habits showed significance at $p < 0.05$.

Thus, there was a significant difference based on social support when eating and exercising habits were

combined. These results agree with the literature reviewed showing that social support is associated with eating habits (McIntosh et al., 1989; Tucker, 1993).

Pet Ownership and Social Support with Eating and Exercising Habits

Pet ownership and social support as the independent variables were combined in a multivariate analysis of variance with the dependent variables of eating and exercising habits discussed above. The multivariate analysis of variance on pet ownership and social support with eating and exercising habits showed significance at $p=0.05$. Perhaps the key to any possible influence of pet ownership on eating and exercising habits is social support, the theoretical framework of pets as substitutes for human support as reviewed in the literature (Stallones et al., 1990).

Exercise with Nutritional Status and Heart Health

The multivariate analysis of variance on exercise (time spent walking) with nutritional status and specific risk factors for cardiovascular disease (serum triglycerides, weight, body mass index, waist hip ratio, diastolic blood pressure, and systolic blood pressure) showed no significance. The multivariate analysis of variance on exercise (Questionnaire C-Lifestyle and Exercise-total score) with nutritional status and specific risk factors for cardiovascular disease (discussed above) showed no significance.

Thus, there was no significant difference based on exercise when nutritional status and heart health were combined. However, because of the variables used in this analysis, the study sample was much smaller, consisting of the people who agreed to have a sample of their blood drawn. The smaller sample size may be the reason no significance was found.

Eating with Nutritional Status and Heart Health

The multivariate analysis of variance on eating (milk servings consumed) with nutritional status and specific risk factors for cardiovascular disease (discussed above) showed no significance. The multivariate analysis of variance on eating (fat grams consumed) with nutritional status and specific risk factors for cardiovascular disease showed no significance.

Thus there was no significant difference based on eating when nutritional status and heart health were combined. Again, the smaller sample size may be the reason no significance was found. However, perhaps if other diet variables were examined, different results would have been found.

Pet Ownership with Physical and Emotional Health

Pet ownership as the independent variable was combined in a multivariate analysis of variance with dependent variables on physical and emotional health: Questionnaire D (Emotional Distress) total score; Questionnaire E (Illness

Behavior) total score; and Questionnaire G (Minor Health Problems) total score. The multivariate analysis of variance on pet ownership with physical and emotional health showed no significance.

Thus there was no significant difference based on pet ownership when physical and emotional health were combined. This is in contrast to previous studies reviewed in the literature which used these quantitative measures in models with a direct line of pet ownership to better health without any explanatory mechanisms (Robb & Stegman, 1983; Lago et al., 1989). However, the investigator believes these quantitative measures of health may not be as sensitive as other, qualitative, measures of health used in other parts of this study.

Social Support with Physical and Emotional Health

The multivariate analysis of variance on social support (discussed above) with physical and emotional health (discussed above) showed significance at $p < 0.01$. Thus there was a significant difference based on social support when physical and emotional health were combined. These results agree with similar findings by Garrity et al. (1989) and Stallones et al. (1990). Again, social support is indicated as an important influence. If future studies examine pet ownership and health, they should certainly also examine social support.

Recent Life Events

with Physical and Emotional Health

The multivariate analysis of variance on recent life events (Questionnaire E-Recent Life Events-total score) with physical and emotional health (discussed above) showed significance at $p=0.01$. Thus there was a significant difference based on recent life events when physical and emotional health were combined. These results agree with similar findings by Garritty et al. (1989) and Stallones et al. (1990).

Specific Questionnaire, Diet, Blood, Anthropometric, and Physiological Variables

In the blood chemistry subsample, pet ownership (non-ownership) was significantly positively correlated with serum triglycerides, accounting for 21% of the variation. In the blood chemistry subsample, adjusting for body mass index, pet ownership (non-ownership) was also significantly positively correlated with serum triglycerides, but this time accounted for 28% of the variation. In the blood chemistry subsample, adjusting for waist hip ratio, pet ownership (non-ownership) was also significantly positively correlated with serum triglycerides, accounting for 24% of the variation. Each time the variables were adjusted for size differences of the participants, the correlations became better, indicating size differences were masking some

of the relationships. In each analysis, pet ownership (non-ownership) was correlated with only serum triglycerides and not with any other variables. Again, this suggested the significant difference in serum triglycerides between pet owners and non-owners was probably not due to chance alone but was a real significant difference.

It is noteworthy that diet lipids were not associated with blood lipids as reviewed in the literature (National Cholesterol Education Program Expert Panel, 1993; Shrapnel et al., 1992). This may be due to the small sample size for a number of reasons. There may not have been much variation in quantity and quality of dietary lipids consumed by the participants in the blood chemistry subsample. Also, due to the limitations of the study, the sample had demographic characteristics not generalizable to the general populace.

In the female subsample, pet ownership (non-ownership) was significantly positively correlated only with serum triglycerides, accounting for 16% of the variation. In the female subsample, adjusting for body mass index and adjusting for waist hip ratio, there were no significant correlations between pet ownership and any of the other variables. This indicated that the significant correlation between pet ownership (non-ownership) and serum triglycerides in the female subsample was due to size differences of the participants.

Delimitations, Limitations and, Assumptions

The particular constraints of human/animal interaction studies in general and the financial limits of this study in particular necessitated the research design of a cross-sectional study using a convenience sample. As pointed out by the National Institutes of Health, cross-sectional, descriptive studies are needed to suggest hypotheses for testing (cited in Stallones et al., 1990). However, cross-sectional studies record information at one point in time and do not provide as much information as a longitudinal study and cannot test cause and effect as in an interventional study. People in a convenience sample who volunteer to participate in a study may have very unique characteristics that are different from people who do not volunteer. This would have an effect on the generalizability of the results.

Financial limits of the study also kept recruitment of participants to a small geographic area. Using senior congregate meals program sites was probably a better vehicle for performing community nutrition, which was also a part of this study, than as a vehicle for main recruitment of volunteers. This is because it again narrowed the characteristics of the participants. Thus, the demographic characteristics of this study sample did not allow the results to be generalized to the general populace for this

age group. Also, the make up of the sample may be part of the reason why more significant differences were not found.

Probably both the financial limits of the study in which cash incentives were not offered for participating and the length of the questionnaire packet had an adverse effect on the number of participants. The sample size of one-hundred twenty-seven people in the total sample was small, and the sample size of thirty-two people in the blood chemistry subsample was even smaller. The pet sample of forty-four people was small and did not allow for much evaluation of pet attachment. The small sample sizes also may be part of the reason why more significant differences were not found.

It was hoped using the twenty-four hour food diary would be less of a burden for participants than a longer food diary, especially since it was included in an already lengthy questionnaire packet, and thus more participants would be inclined to fill it out. However, a twenty-four hour food diary may not be indicative of habitual diet. Also, since participants know their food diary will be read by someone else, they may not fill it out truthfully. But this is the problem with all self-report responses, and this study did consist of self-report responses. However, other research projects also use self-report responses; sometimes, there is just no other way.

Again due to the financial limits of this study, the research was conducted during one season—Spring—when there is seasonal variation in food availability. This may be part of the reason for low consumption of vegetables.

The large standard deviations on certain measures indicated there was large variability. In doing numerous repeated t-tests, there is the possibility of finding significance due to chance. However, if a significant difference is found in a univariate test is also found in a multivariate test, it is probably a true significant difference.

Conclusions

It could not be concluded that pet ownership is associated with better diet and nutritional status, greater physical activity, and reduced cardiovascular risk compared to non-ownership in seniors. However, some results which were found in this study did duplicate results which were found in previous studies (Anderson et al., 1992; Garrity et al., 1989; McIntosh et al., 1989; Serpell, 1991; Stallones et al., 1990; Tucker, 1993).

The model which was developed based on the theory pet ownership leads to better self care could not be proved in this study. This may be partly or entirely due to the limitations discussed above, the most important ones being small sample size and a sample not representative of the

general populace of similar age. It also may be partly or entirely due to an incorrect or incomplete model. The investigator believes that, yes, the sample size and sample characteristics are problems. The investigator also believes that, in view of various findings in this study, and other studies, the model may be incomplete. It does appear social support, whether human or animal, is important to eating and is important to health. However, the variables measured in this study did not show any conclusive relationships concerning human support, animal support, eating, and health. Perhaps different questions need to be asked that can somehow show a tighter fit between social support and eating.

Recommendations

This was a very complex research project. Not only was it difficult to design but it was also difficult to write about. Working with human populations certainly has its challenges. However, just because something is difficult to do does not mean it should not be attempted. The investigator willingly accepted the challenge to research such a fascinating and worthwhile topic.

Perhaps this study was too broad in scope and should have focused on one particular aspect of interest. However, in doing this, certain important relationships might have been overlooked. As discussed above, it was discovered that

social support, whether animal or human, appears to be important; and social support variables should be fine tuned. Perhaps a future study should be limited to only female dog owners living alone.

The investigator feels that meal patterning variables still need to be fine tuned. There seems to be very little in the literature on it and thus should be considered for future research.

Although the total sample size may be considered small for a cross-sectional study, it was probably large enough to be considered as a pilot study for future research. It was also probably large enough to keep three investigators busy and not just one as was the case.

One of the major difficulties of this study was the amount of time it took for participants to return completed questionnaires, have blood drawn, and report blood pressure and waist and hip measurements. Certainly better incentives might have helped here. However, the investigator will never cease to be amazed by human behavior and certainly will be more cognizant of the importance of the human time factor in future studies.

The investigator truly believes that the most important part of this study was the process of doing community nutrition and applying anthropological techniques to nutrition education and practice. She would very much like

to continue investigating animal companionship and the health of seniors.

Practical Applications

In the context of adult development and aging, pet ownership could be another aid to living. In finding and understanding the associations of pet ownership with the health of seniors, perhaps we can maximize these benefits.

Specific policy/practice implications could be allowing, and perhaps even assisting, seniors to keep pets for as long as possible, in their homes, in long-term care facilities, and in hospices.

Assistance might be as simple as what happened in Richmond, Virginia: It was discovered that elderly people were sharing their home-delivered meals with their pets; consequently, home-delivered pet meals were made available (Smith, Selbert, Jackson & Snell, 1992).

CHAPTER VI: SUMMARY

The familiar adage "pets are good for your health" is a theory that has not been adequately tested. Research is needed to examine whether or not any health benefits result from pet ownership, and, if so, models must be developed in an attempt to explain the reasons for such benefits.

There are numerous anecdotal remarks on the health benefits of companion animals to the elderly that refer to eating and exercising habits. A plausible theory is that pet ownership leads to self care. Two important components of self care are eating and exercising.

An early empirical study found an increased survival rate of heart patients due to pet ownership (Freidmann et al., 1980). A theoretical framework is developing based on pet attachment and substitute social support (Stallones et al., 1990). Recent research investigated the effects of pets on risk factors for cardiovascular disease (Anderson et al., 1992).

The purpose of this study was to observe and evaluate any associations of pet ownership with the eating and exercising habits of seniors and, in turn, their nutritional status and specific cardiovascular risk factors. A new

model, based on pet ownership leads to better self care, was developed to show these associations. The first objective was to determine if there were any significant differences in dietary intake and exercise activities between pet owners and non-owners. The second objective was to determine if there were any significant differences in nutritional status and specific risk factors for cardiovascular disease between pet owners and non-owners. The third objective was to determine if the significant differences in dietary intake and exercise activities were related to the significant differences in nutritional status and specific risk factors for cardiovascular disease.

The experimental design was a cross-sectional, observational study of a self-selected convenience sample. Seniors aged sixty and above were solicited for participation at senior congregate meals program sites in Larimer and Weld counties, Colorado ($n = 127$). Seniors with pets made up the pet owners group and seniors without pets made up the non-owners group.

Instruments used were questionnaires on eating and exercising habits, emotional and physical health, social support, and pet attachment, biochemical analyses of diet and blood, and anthropometric and physiological measures. The instruments were tested in a pilot study.

Data were statistically analyzed in three sample sets: total sample ($n = 127$), blood chemistry subsample ($n = 32$),

and female subsample (n = 103). Statistical procedures included two-tailed t-tests, Chi-square, multivariate analysis, correlation coefficients and partial coefficients, analysis of covariance, and Chronbach's alpha; a value of $p < 0.05$ was considered significant.

It could not be concluded that pet ownership is associated with better diet and nutritional status, greater physical activity, and reduced cardiovascular risk compared to non-ownership in seniors. However, some results which were found in this study did duplicate results which were found in previous studies (Anderson et al., 1992; Garrity et al., 1989; McIntosh et al., 1989; Serpell, 1991; Tucker, 1993). There were two major findings of note: (1) Dog owners walked for significantly more minutes than non-owners; and (2) Pet owners had significantly lower triglycerides than non-owners.

The model which was developed based on the theory pet ownership leads to better self care could not be proved in this study. This may be due to the limitations of the study, the most important ones being small sample size and a sample not representative of the general populace of similar age. The investigator believes future models should include very specific measures on social support and eating. It is suggested a future study should be limited to only female dog owners living alone.

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APPENDIX A

MEMORANDUM

Regulatory Committees
Office of Vice President for Research
Fort Collins, CO 80523
(303) 491-6355
FAX (303) 491-6147

TO: Jennifer Anderson
Department of Food Science and Human Nutrition

FROM: LaVina Matzdorff, Administrator *L. Matzdorff*
Human Research Committee

SUBJECT: PROJECT APPROVAL
Title: The Healthful Effects of Pet Ownership on the Eating and
Exercising Habits of Seniors. Short Title: Seniors and Pets
Project.
Protocol No.: 93-120H
Funding Agency: N/A
Funding Agency Deadline: N/A

DATE: July 21, 1993

The above-referenced project was approved by the Human Research Committee on July 15, 1993 for the period July 15, 1993 to July 15, 1994 with the condition that the attached consent forms are signed by the subjects and each subject is given a copy of the form. It is the investigator's responsibility to obtain this consent form from all subjects. NO changes may be made to this document without first obtaining the approval of the Committee.

A status report of this project will be required within a 12-month period from the date of approval. The necessary form (H-101) will be mailed to you prior to that date.

It is the responsibility of the investigator to immediately inform the Committee of any serious complications, unexpected risks or injuries resulting from this research.

It is also the investigator's responsibility to notify the Committee of any changes in experimental design or consent procedures (file Form H-101).

Any questions about the Committee's action on this project should be directed to me.

Attachment

xc: D. Dembicki

APPENDIX B

Health Study on Seniors Questionnaire Packet



Diane Dembicki, M.A.
Department of Food Science & Human Nutrition
Colorado State University



February, 1994

Dear Valued Participant:

Department of Food Science
and Human Nutrition
Fort Collins, Colorado 80523
(303) 491-5093
FAX: (303) 491-7252

Thank you for indicating an interest to participate in our *Health Study on Seniors*. Only a very small number of Seniors are being asked to participate, and you as an individual are very important to us. We at Colorado State University believe you are making a valuable contribution to our knowledge about the health of Seniors. As promised, we will analyze your diet for you at no cost or obligation other than returning the completed Questionnaire Packet. A stamped, self-addressed envelope is attached for your convenience. Just be sure to fill in your name and address on page 29. If you should decide not to participate, please pass this Packet onto a local friend or relative who would willing to be a part of our study.

The questionnaires will take about one to two hours of your time to fill out, and we ask that you do so in the privacy of your own home. You may want to do one or two questionnaires at a time, take a break, and then come back to them. Questionnaire I is an all day food diary you can write down as you eat on any one day. You will also need to sign one Informed Consent form (on page two of the Packet) and keep the second loose copy for your records. If you have any questions or problems concerning this study, please contact Diane Dembicki at (303) 482-8757.

The risks of the physical health questionnaire, which includes medication use, is possible break in confidentiality and emotional risk. However, we promise all personal information will remain confidential and can be accessed only by us, the study investigators. Your name will not be connected to any responses.

In order to conduct this study in a timely manner, we ask that you please return the completed Questionnaire Packet within two weeks of receiving it. Your diet analysis will be mailed to you approximately one month later. There is a chance you may be contacted for further participation in this study.

Sincerely,

Jennifer Anderson, Ph.D., R.D.
Assoc. Prof. and Extension Specialist
Principal Investigator

Diane Dembicki, M.A., Ph.D. Candidate
Co-Investigator

Encs.

PLEASE KEEP THIS PAGE

**COLORADO STATE UNIVERSITY
INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT
Questionnaires**

TITLE OF PROJECT:
Health Study on Seniors

NAME OF PRINCIPAL INVESTIGATOR:
**Jennifer Anderson, Ph.D., R.D., Associate Professor and
Extension Specialist**

NAME OF CO-INVESTIGATOR:
Diane Dembicki, M.A., Ph.D. Candidate

CONTACT NAME AND PHONE NUMBER FOR QUESTIONS/PROBLEMS:
Diane Dembicki, (303) 482-8757

SPONSOR OF PROJECT:
Colorado State University

PURPOSE OF THE RESEARCH:
**To evaluate the effects of pet ownership on the eating
and exercising habits of seniors.**

PROCEDURES/METHODS TO BE USED:
1. Solicitation of participants at senior congregate meal sites: Seniors will be invited to participate in a health study on seniors in return for a computer analysis of their diet.
2. All participants will be given a letter of introduction, this letter of informed consent, and questionnaires on their demographics (sex, age, education, income), eating and exercising habits, emotional and physical health, social support, and pet(s) (if applicable). Completion of questionnaires will take about one to two hours.
3. All persons returning this letter of informed consent and completed questionnaires will be mailed a computer analysis of their diet.

RISKS INHERENT IN THE PROCEDURES:
The risks of the physical health questionnaire, which includes medication use, is break in confidentiality and emotional risk.

I understand that it is not possible to identify all potential risks in an experimental procedure, but I believe that reasonable safeguards have been taken to minimize both the known and the potential, but unknown, risks.

Continued on the back of this page.

BENEFITS:

Participants will benefit from being informed of their individual values for the dietary analyses.

CONFIDENTIALITY:

All completed questionnaires that are returned will be kept in a locked file which can only be accessed by the study investigators. Participants will not be identified individually or published individually. The results of the questionnaires will only be summarized in written reports as group data and not individual data.

FINANCIAL OBLIGATION:

Colorado State University is a publicly funded institution of higher education and, because it is a state institution, recourse for injuries sustained during the course of this research may be limited under a Colorado law known as the Colorado Governmental Immunity Act (Colorado Revised Statutes, Section 24-10-101, et seq.). If injuries should occur which the subject believes are the responsibility of Colorado State University or its employees, the University advises the individual to seek independent legal counsel. In addition, under Colorado law, any claim against the University must be filed with the Risk Management Liaison Office at Colorado State University, within 180 days from the date of the injury. In light of these laws, participants are encouraged to evaluate their own health and disability insurance to determine whether coverage exists for any injuries sustained during the course of research as it may be necessary to rely on individual coverage for any such injuries.

PARTICIPATION:

I understand that my participation in this research is voluntary. If I decide to participate in the study, I may withdraw my consent and stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.

I have read and understand the information stated and willingly sign this consent form. My signature also acknowledges that I have received, on the date signed, a copy of this document.

Participant Name (Please Print)

Participant Signature (Please Sign)

Date

Co-investigator Signature

Date

PLEASE SIGN THE BACK OF THIS PAGE

**COLORADO STATE UNIVERSITY
INFORMED CONSENT TO PARTICIPATE IN A RESEARCH PROJECT
Questionnaires**

TITLE OF PROJECT:
Health Study on Seniors

NAME OF PRINCIPAL INVESTIGATOR:
**Jennifer Anderson, Ph.D., R.D., Associate Professor and
Extension Specialist**

NAME OF CO-INVESTIGATOR:
Diane Dembicki, M.A., Ph.D. Candidate

CONTACT NAME AND PHONE NUMBER FOR QUESTIONS/PROBLEMS:
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The risks of the physical health questionnaire, which includes medication use, is break in confidentiality and emotional risk.
I understand that it is not possible to identify all potential risks in an experimental procedure, but I believe that reasonable safeguards have been taken to minimize both the known and the potential, but unknown, risks.

Continued on the back of this page.

BENEFITS:

Participants will benefit from being informed of their individual values for the dietary analyses.

CONFIDENTIALITY:

All completed questionnaires that are returned will be kept in a locked file which can only be accessed by the study investigators. Participants will not be identified individually or published individually. The results of the questionnaires will only be summarized in written reports as group data and not individual data.

FINANCIAL OBLIGATION:

Colorado State University is a publicly funded institution of higher education and, because it is a state institution, recourse for injuries sustained during the course of this research may be limited under a Colorado law known as the Colorado Governmental Immunity Act (Colorado Revised Statutes, Section 24-10-101, et seq.). If injuries should occur which the subject believes are the responsibility of Colorado State University or its employees, the University advises the individual to seek independent legal counsel. In addition, under Colorado law, any claim against the University must be filed with the Risk Management Liaison Office at Colorado State University, within 180 days from the date of the injury. In light of these laws, participants are encouraged to evaluate their own health and disability insurance to determine whether coverage exists for any injuries sustained during the course of research as it may be necessary to rely on individual coverage for any such injuries.

PARTICIPATION:

I understand that my participation in this research is voluntary. If I decide to participate in the study, I may withdraw my consent and stop participating at any time without penalty or loss of benefits to which I am otherwise entitled.

I have read and understand the information stated and willingly sign this consent form. My signature also acknowledges that I have received, on the date signed, a copy of this document.

Participant Name (Please Print)

(_____) (Study No.)

Participant Signature (Please Sign)

Date

Co-investigator Signature

Date

2

QUESTIONNAIRE A

1. Number of people in your household (please circle):
 - a. 1.
 - b. 2.
 - c. 3-4.
 - d. 5+.
2. Are any of your children in your household (please circle):
 - a. Yes.
 - b. No.
3. Your present marital status (please circle):
 - a. Married.
 - b. Widowed.
 - c. Divorced.
 - d. Separated.
 - e. Living together.
 - f. Never married.
4. Number of persons close to you (emotionally) (please circle):
 - a. 0-4.
 - b. 5-9.
 - c. 10+.
5. Number of friends/relatives you see monthly (please circle):
 - a. 0-4.
 - b. 5-9.
 - c. 10+.
6. Number of clubs/organizations you are active in (please circle):
 - a. 0.
 - b. 1-2.
 - c. 3+.

THANK YOU FOR COMPLETING QUESTIONNAIRE A.
PLEASE GO ON TO QUESTIONNAIRE B.





QUESTIONNAIRE B

On an ordinary day during the week:

1. I usually get out of bed in the morning (please circle):
 - a. at a specific time (please specify): _____.
 - b. when I wake up.
 - c. when the alarm wakes me.
 - d. when (some other reason--please specify): _____.
2. I usually eat breakfast (please circle):
 - a. at a specific time (please specify): _____.
 - b. when I feel hungry.
 - c. when (some other reason--please specify): _____.
 - d. I don't eat breakfast.
3. I usually eat a morning snack (please circle):
 - a. at a specific time (please specify): _____.
 - b. when I feel hungry.
 - c. when (some other reason--please specify): _____.
 - d. I don't eat a morning snack.
4. I usually eat lunch (please circle):
 - a. at a specific time (please specify): _____.
 - b. when I feel hungry.
 - c. when (some other reason--please specify): _____.
 - d. I don't eat lunch.
5. I usually eat an afternoon snack (please circle):
 - a. at a specific time (please specify): _____.
 - b. when I feel hungry.
 - c. when (some other reason--please specify): _____.
 - d. I don't eat an afternoon snack.
6. I usually eat dinner (please circle):
 - a. at a specific time (please specify): _____.
 - b. when I feel hungry.
 - c. when (some other reason--please specify): _____.
 - d. I don't eat dinner.

PLEASE GO TO THE BACK OF THIS PAGE.



7. I usually eat an evening snack (please circle):
a. at a specific time (please specify): _____
b. when I feel hungry.
c. when (some other reason--please specify): _____
d. I don't eat an evening snack.
8. I usually take my medicine (please circle as many as apply):
a. at a specific time or times (please specify): _____
b. when I get up in the morning.
c. when I eat breakfast.
d. when I eat a morning snack.
e. when I eat lunch.
f. when I eat an afternoon snack.
g. when I eat dinner.
h. when I eat an evening snack.
i. when I go to bed in the evening.
j. when (some other reason--please specify): _____
k. I don't take any medicine.
9. I usually go for a walk (please circle):
a. at a specific time or times (please specify): _____
b. when I feel like it.
c. when (some other reason--please specify): _____
d. I don't go for walks.
10. I usually walk for _____ minutes at a time, _____ times a day.
11. I usually (please specify activities): _____
(and please circle):
a. at a specific time or times (please specify): _____
b. when I feel like it.
c. when (some other reason--please specify): _____
d. I don't do other activities.
12. I usually do this activity (these activities) for _____ minutes at a time, _____ times a day.

PLEASE GO ON TO THE NEXT PAGE.

13. I usually take a nap or naps (please circle as many as apply):
- a. at a specific time or times (please specify): _____
 - b. in the morning.
 - c. in the afternoon.
 - d. in the evening.
 - e. after a meal or meals (please specify): _____
 - f. after a walk or walks.
 - g. when I feel tired.
 - h. when (some other reason--please specify): _____
 - i. I don't take naps.
14. I usually nap for _____ minutes at a time, _____ times a day.
15. I usually go to bed (please circle):
- a. at a specific time (please specify): _____
 - b. when I feel tired.
 - c. when (some other reason--please specify): _____
16. I usually sleep at night for _____ hours at a time.

THANK YOU FOR COMPLETING QUESTIONNAIRE B.
PLEASE GO ON TO QUESTIONNAIRE C.





QUESTIONNAIRE C

People enjoy different kinds of activities, and we would like to know some of the things you do:

1. Garden or do yardwork in season (please circle):
 - a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
2. Do house repairs or do-it-yourself projects (please circle):
 - a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
3. Can or bake (do not include regular meals) (please circle):
 - a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
4. Take walks (please circle):
 - a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
5. Jog, bike ride, swim or do some other vigorous exercise (please circle):
 - a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.

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6. Collect stamps, coins, or have other similar hobbies (please circle):
- a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
7. Hunt, fish, camp or go boating in season (please circle):
- a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
8. Play horse shoes/golf or play other moderate exercise games in season (please circle):
- a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
9. Sew, quilt, knit or do some other creative stitchery (please circle):
- a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.
10. Read or do crossword puzzles (please circle):
- a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.

PLEASE GO ON TO THE NEXT PAGE.

11. Watch TV (please circle):
a. Do not do.
b. Once a month or less.
c. Several times a month.
d. Once a week.
e. Several times a week.
f. Everyday.
12. Listen to the radio (please circle):
a. Do not do.
b. Once a month or less.
c. Several times a month.
d. Once a week.
e. Several times a week.
f. Everyday.
13. Paint, do ceramics or other art or craft hobbies (please circle):
a. Do not do.
b. Once a month or less.
c. Several times a month.
d. Once a week.
e. Several times a week.
f. Everyday.
14. Play cards, checkers, Bingo or other similar games (please circle):
a. Do not do.
b. Once a month or less.
c. Several times a month.
d. Once a week.
e. Several times a week.
f. Everyday.
15. Attend sports events, movies, concerts, or theater (please circle):
a. Do not do.
b. Once a month or less.
c. Several times a month.
d. Once a week.
e. Several times a week.
f. Everyday.



PLEASE GO TO THE BACK OF THIS PAGE.

16. Is there anything else that you can think of that we have not mentioned? Please specify: _____.
- a. Do not do.
 - b. Once a month or less.
 - c. Several times a month.
 - d. Once a week.
 - e. Several times a week.
 - f. Everyday.

THANK YOU FOR COMPLETING QUESTIONNAIRE C.
PLEASE GO ON TO QUESTIONNAIRE D.



QUESTIONNAIRE D

Below is a list of the ways you might have felt or behaved. Please tell us how often you have felt this way during the past week:

1. I was bothered by things that usually don't bother me (please circle):
 - a. Rarely or None of the Time (Less than 1 Day).
 - b. Some or a Little of the Time (1-2 Days).
 - c. Occasionally or a Moderate Amount of Time (3-4 Days).
 - d. Most or All of the Time (5-7 Days).
2. I did not feel like eating; my appetite was poor (please circle):
 - a. Rarely or None of the Time (Less than 1 Day).
 - b. Some or a Little of the Time (1-2 Days).
 - c. Occasionally or a Moderate Amount of Time (3-4 Days).
 - d. Most or All of the Time (5-7 Days).
3. I felt that I could not shake off the blues even with help from my family or friends (please circle):
 - a. Rarely or None of the Time (Less than 1 Day).
 - b. Some or a Little of the Time (1-2 Days).
 - c. Occasionally or a Moderate Amount of Time (3-4 Days).
 - d. Most or All of the Time (5-7 Days).
4. I felt that I was just as good as other people (please circle):
 - a. Rarely or None of the Time (Less than 1 Day).
 - b. Some or a Little of the Time (1-2 Days).
 - c. Occasionally or a Moderate Amount of Time (3-4 Days).
 - d. Most or All of the Time (5-7 Days).
5. I had trouble keeping my mind on what I was doing (please circle):
 - a. Rarely or None of the Time (Less than 1 Day).
 - b. Some or a Little of the Time (1-2 Days).
 - c. Occasionally or a Moderate Amount of Time (3-4 Days).
 - d. Most or All of the Time (5-7 Days).
6. I felt depressed (please circle):
 - a. Rarely or None of the Time (Less than 1 Day).
 - b. Some or a Little of the Time (1-2 Days).
 - c. Occasionally or a Moderate Amount of Time (3-4 Days).
 - d. Most or All of the Time (5-7 Days).

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7. I felt that everything I did was an effort (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
8. I felt hopeful about the future (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
9. I thought my life had been a failure (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
10. I felt fearful (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
11. My sleep was restless (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
12. I was happy (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
13. I talked less than usual (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
14. I felt lonely (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).

PLEASE GO ON TO THE NEXT PAGE.

15. People were unfriendly (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
16. I enjoyed life (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
17. I had crying spells (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
18. I felt sad (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
19. I felt that people dislike me (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).
20. I could not get "going" (please circle):
a. Rarely or None of the Time (Less than 1 Day).
b. Some or a Little of the Time (1-2 Days).
c. Occasionally or a Moderate Amount of Time (3-4 Days).
d. Most or All of the Time (5-7 Days).

THANK YOU FOR COMPLETING QUESTIONNAIRE D.
PLEASE GO ON TO QUESTIONNAIRE E.





QUESTIONNAIRE E

Within the last twelve months:

1. Have you lost something of sentimental value (please circle):
 - a. No.
 - b. Yes.
2. Have you had a close friend die (please circle)?
 - a. No.
 - b. Yes.
3. Have you been divorced or separated (please circle)?
 - a. No.
 - b. Yes.
4. Have you had trouble with your in-laws (please circle)?
 - a. No.
 - b. Yes.
5. Has your spouse died (please circle)?
 - a. No.
 - b. Yes.
6. Has another family member (other than spouse) died (please circle)?
 - a. No.
 - b. Yes.
7. Have you retired from your job (please circle)?
 - a. No.
 - b. Yes.
8. Has your income decreased substantially (enough to be noticed) (please circle)?
 - a. No.
 - b. Yes.
9. Have you gone deeply into debt (please circle)?
 - a. No.
 - b. Yes.
10. Have you had legal problems (please circle)?
 - a. No.
 - b. Yes.

PLEASE GO TO THE BACK OF THIS PAGE.



11. Have you been assaulted (beat-up, mugged, or attacked)
(please circle)?
a. No.
b. Yes.
12. Has a favorite pet died (please circle)?
a. No.
b. Yes.

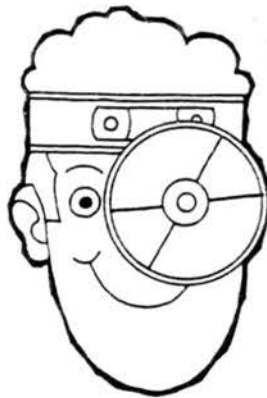
THANK YOU FOR COMPLETING QUESTIONNAIRE E.
PLEASE GO ON TO QUESTIONNAIRE F.



QUESTIONNAIRE F

1. Number of physician visits within the past six months (please circle):
 - a. No visits.
 - b. One to two visits.
 - c. Three to four visits.
 - d. More than five visits.
2. Number of prescription medications currently being used (please circle):
 - a. None.
 - b. One to two medications.
 - c. Three to four medications.
 - d. More than five medications.
3. Reduction in activity within the past year as a result of illness (please circle):
 - a. No.
 - b. Yes.
4. Hospitalization within the past year (please circle):
 - a. No.
 - b. Yes.

THANK YOU FOR COMPLETING QUESTIONNAIRE F.
PLEASE GO ON TO QUESTIONNAIRE G.





QUESTIONNAIRE G

Within the last month:

1. Have you had headaches (please circle)?
a. No.
b. Yes.
2. Have you had hay fever (please circle)?
a. No.
b. Yes.
3. Have you had difficulty sleeping (please circle)?
a. No.
b. Yes.
4. Have you had constipation (please circle)?
a. No.
b. Yes.
5. Have you had trouble with your eyes (please circle)?
a. No.
b. Yes.
6. Have you had a bad back (please circle)?
a. No.
b. Yes.
7. Have you had nerves (please circle)?
a. No.
b. Yes.
8. Have you had colds and flu (please circle)?
a. No.
b. Yes.
9. Have you had general tiredness (please circle)?
a. No.
b. Yes.
10. Have you had kidney or bladder trouble (please circle)?
a. No.
b. Yes.
11. Have you had painful joints (please circle)?
a. No.
b. Yes.

PLEASE GO TO THE BACK OF THIS PAGE.



12. Have you had trouble with your feet (please circle)?
a. No.
b. Yes.
13. Have you had difficulty concentrating (please circle)?
a. No.
b. Yes.
14. Have you had palpitations or breathlessness (please circle)?
a. No.
b. Yes.
15. Have you had trouble with your ears (please circle)?
a. No.
b. Yes.
16. Have you had worrying over every little thing (please circle)?
a. No.
b. Yes.
17. Have you had indigestion or other stomach trouble (please circle)?
a. No.
b. Yes.
18. Have you had sinus trouble (please circle)?
a. No.
b. Yes.
19. Have you had persistent cough (please circle)?
a. No.
b. Yes.
20. Have you had faints or dizziness (please circle)?
a. No.
b. Yes.

THANK YOU FOR COMPLETING QUESTIONNAIRE G.
PLEASE GO ON TO QUESTIONNAIRE H.



QUESTIONNAIRE H

1. Are you a (please circle):
 - a. Female.
 - b. Male.
2. Age: _____ years.
3. Which of the following do you consider yourself to be (please circle)?
 - a. White/Caucasian/Anglo.
 - b. Black/African-American.
 - c. Hispanic/Latino.
 - d. Native American/American Indian/Alaskan Native.
 - e. Asian/Asian American.
 - f. Other (please specify): _____.
4. What is your highest level of education completed (please circle)?
 - a. No formal education.
 - b. Grade School.
 - c. Some High School.
 - d. High School Graduate or GED.
 - e. Some College/Trade or Vocational School.
 - f. College Graduate.
 - g. Graduate Work.
5. What is your present marital status (please circle)?
 - a. Married.
 - b. Widowed.
 - c. Divorced.
 - d. Separated.
 - e. Living together.
 - f. Never married.
6. What was the gross (before taxes) annual income of your household in 1993 (please circle)?
 - a. Less than \$10,000.
 - b. \$10,000-\$14,999.
 - c. \$15,000-\$19,999.
 - d. \$20,000-\$24,999.
 - e. \$25,000-\$29,999.
 - f. \$30,000-\$34,999.
 - g. \$35,000-\$39,999.
 - h. \$40,000-\$44,999.
 - i. \$45,000-\$49,999.
 - j. \$50,000 or greater.

PLEASE GO TO THE BACK OF THIS PAGE.



7. What one thing were you doing most of last month (please circle)?
- a. Working for pay.
 - b. Retired.
 - c. Looking for work or on layoff from work.
 - d. Keeping house.
 - e. Disabled, unable to work.
 - f. Something else (please specify): _____.
8. Where do you live (please circle)?
- a. Rural.
 - b. Small town with less than 10,000 people.
 - c. Town with between 10,000 and 49,999 people.
 - d. City with between 50,000 and 250,000 people.
 - e. Urban area with over 250,000 people.
9. In general, would you say your health is (please circle):
- a. Excellent.
 - b. Very Good.
 - c. Good.
 - d. Fair.
 - e. Poor.
10. Have you ever been told by a health professional that you have any of the following (please circle as many as apply):
- a. Cancer.
 - b. Osteoporosis.
 - c. High Blood Pressure.
 - d. High Blood Cholesterol.
 - e. Stroke.
 - f. Heart Disease.
 - g. Diabetes.
 - h. Malnutrition.
 - i. Anemia.
 - j. Other (please specify): _____.
11. Are you on a special diet prescribed by a health professional (please circle)?
- a. Yes.
 - b. No.
 - c. Don't Know.
12. Do you smoke cigarettes now (please circle)?
- a. Yes, I have been a smoker for _____ years.
 - b. No, I no longer smoke, but I have been a smoker for _____ years. I stopped smoking _____ years ago.
 - c. No, I have never smoked cigarettes.

PLEASE GO ON TO THE NEXT PAGE.

13. Do you smoke cigars or a pipe now (please circle)?
a. Yes, I have been a smoker for _____ years.
b. No, I no longer smoke, but I have been a smoker for _____ years. I stopped smoking _____ years ago.
c. No, I have never smoked cigars or a pipe.
14. Do you need assistance with (please circle as many as apply):
a. Bathing.
b. Dressing.
c. Going to the bathroom.
d. Eating.
e. Walking about.
f. Transportation.
g. Food preparation.
h. Shopping.
i. None of the above.
15. Did you grow up with pets as a child (please circle)?
a. No.
b. Yes.
16. Are you a present pet owner (please circle)?
a. No.
b. Yes. Please specify total number of years: _____.
17. If you are not a present pet owner, did you used to be a pet owner (please circle)?
a. No.
b. Yes. Please specify total number of years: _____.
18. Where I live now (please circle):
a. does not allow any pets.
b. does not allow dogs.
c. does not allow (please specify): _____.
d. does allow pets.
19. Where I live now (please circle):
a. has a yard which can be used for pets.
b. does not have a yard which can be used for pets.
20. (If pet owner) The main care taker of my (our) pet(s) is (please circle as many as apply):
a. me.
b. spouse.
c. child.
d. someone else, please specify: _____.

THANK YOU FOR COMPLETING QUESTIONNAIRE H.
PLEASE GO ON TO QUESTIONNAIRE I.



QUESTIONNAIRE I

This questionnaire provides information for your individual nutrition report. Please read each question carefully and write your answer in the space provided. The accuracy of your nutrition report depends on the accuracy and completeness of your answers. Please complete all sections. Please print.

Eating Habits Review:

For each question, please circle the response which best describes your usual eating behavior as it is now. Please do the same for the two exercise questions.

1. How many days each week do you eat breakfast (please circle)?
 - a. 6-7 days.
 - b. 3-5 days.
 - c. 1-2 days.
 - d. Not at all.
2. How often do you eat between meals or after the evening meal (please circle)?
 - a. Daily.
 - b. Several times a week.
 - c. Once a week or less.
 - d. Seldom eat between meals.
3. What is your usual pattern for the evening meal (please circle)?
 - a. This is my biggest meal.
 - b. Medium size meal.
 - c. Light meal.
 - d. Seldom eat in the evening.
4. Do the type of meals you usually eat include the following (please circle)?
 - a. Red meats.
 - b. Fish or chicken but no red meats.
 - c. Vegetarian meals with milk, eggs, or cheese.
 - d. Total vegetarian with no animal foods.
5. How much water do you drink each day (please circle)?
 - a. Rarely drink a glass of water.
 - b. 1-2 cups per day.
 - c. 3-5 cups per day.
 - d. 6 or more cups per day.

PLEASE GO TO THE BACK OF THIS PAGE.



6. When salting your food, do you usually salt it (please circle):
- Freely.
 - Moderately.
 - Sparingly.
 - Don't add salt.
7. What kind of spread do you use most often (please circle)?
- Butter.
 - Stick margarine.
 - Soft tub margarine.
 - Don't use any of these.
8. What other kinds of fat do you use most often (please circle)?
- Shortenings and/or lard or animal fat.
 - Vegetable oils.
 - Use each about the same.
 - Don't use these fats.
9. Does your work or daily activity primarily involve the following (please circle only one)?
- Sitting.
 - Standing.
 - Walking or other active exercise.
 - Heavy labor (such as lifting heavy objects).
10. Outside of your normal work or daily responsibilities, how often do you engage in vigorous exercise of 20 minutes or more which markedly increases your breathing, such as vigorous walking, cycling, running, swimming, etc. (please circle)?
- Seldom or never.
 - Less than once per week.
 - 1-2 times per week.
 - 3-5 times per week.
 - 6 or more times per week.
11. Please list any vitamin supplements and the size of the dosage you are taking:
- _____
 - _____
 - _____
 - _____

PLEASE GO ON TO THE NEXT PAGE.

Mail Diet Analysis to:

NAME: _____

STREET ADDRESS: _____

CITY, STATE, AND ZIP CODE: _____

TELEPHONE NUMBER: (____) _____

Sex: Female Male Age: _____ years.

Height: _____ inches. Weight: _____ pounds.

24-Hour Food Diary:

Please pick a usual day during the week when you eat all or most of your meals at home. If you do eat out, write that down too. Record all the foods/beverages you eat/drink during the day as you consume them. A Checklist of Information Needed for Types of Food and Diagrams of Portion Sizes follow this page to help you do this.

Time	Where Eaten	Food/Beverage Description	Amount

MORE LINES ARE PROVIDED ON THE BACK OF THIS PAGE.
PLEASE GO TO THE BACK OF THIS PAGE.

Checklist for 24-Hour Food Diary:



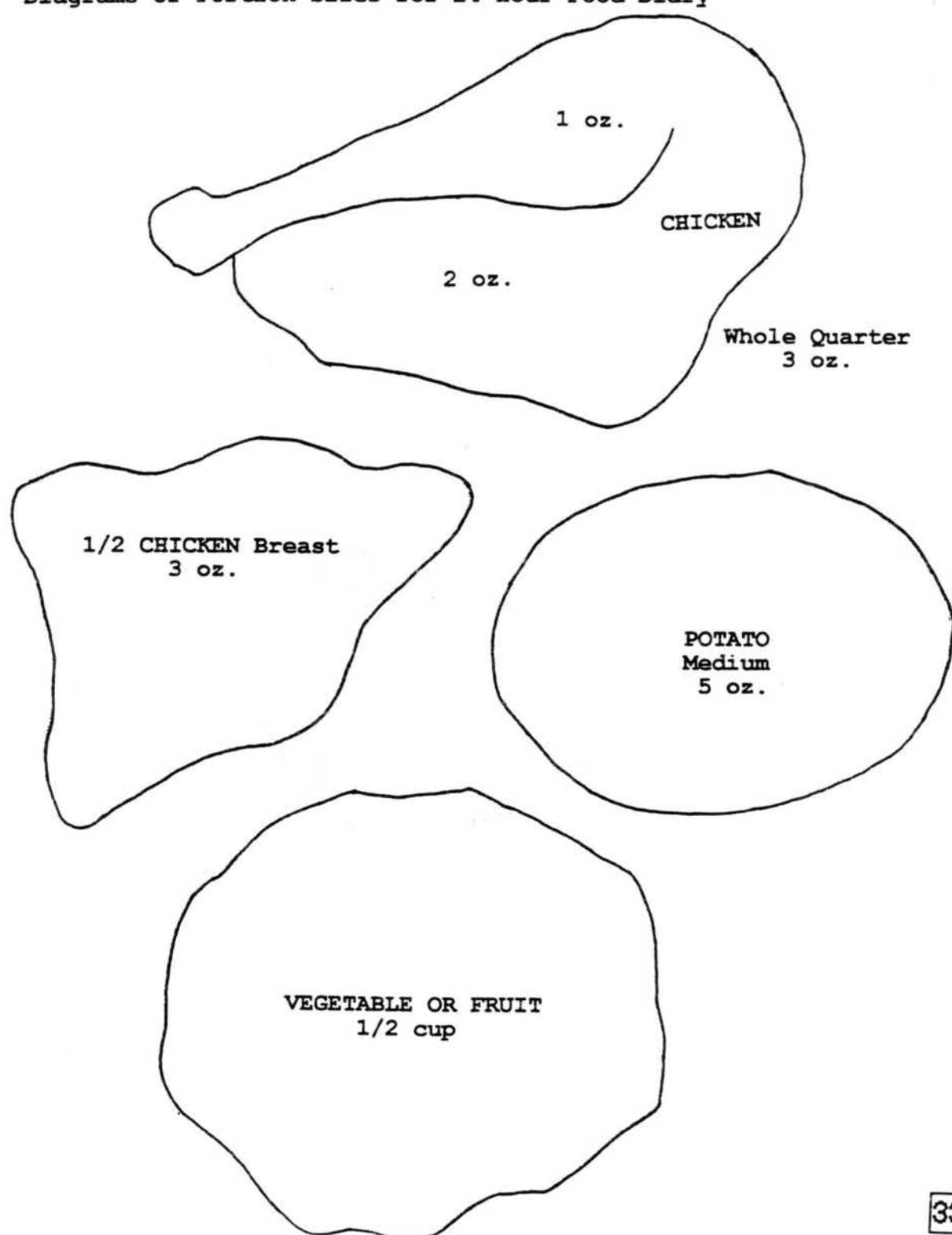
<u>Type of Food</u>	<u>Information Needed</u>
All	Portion size: Cups? Bottles? Cans? Length, width, thickness, diameter, shape compared to a diagram.
Milk and nondairy substitutes	% fat? Powder? Liquid? Evaporated? Dairy or nondairy? Type of fat? Added sweetening? Unsweetened? Chocolate?
Eggs and egg substitutes	Fresh? Frozen? Size? How prepared (boiled, scrambled, poached, fried)? Added fat, milk, other? Powder? Liquid? Frozen? Brand?
Meat, fish, poultry	Cut? Fat trimmed? Bone in or out? Cooked weight? How prepared (baked, broiled, fried)? Added fat, amount, kind? % fat (ground meat)? Source (animal, fish, poultry)? Oil or water pack (fish)? Skin eaten (poultry)?
Vegetables	Cooked or raw? Fresh, frozen, canned? Added sauce or fat? Kind of fat or sauce? Size of serving?
Fruit and juice	Cooked or raw? Fresh, frozen, canned, dried? Sweetened? Heavy, medium, light syrup? Unsweetened? Size of serving (piece or cup)?
Cereals	Ready-to-eat? Cooked? Brand? Additions, such as raisins, sugar, milk? How much? Size of servings?
Baked products	Homemade or commercial? Brand? From scratch or mix? Single or double crust (pie)? Meringue, frosting, topping? Yeast or quick bread (sweet rolls, muffins, and so on)? Dimensions of servings? Weight or number (crackers)?

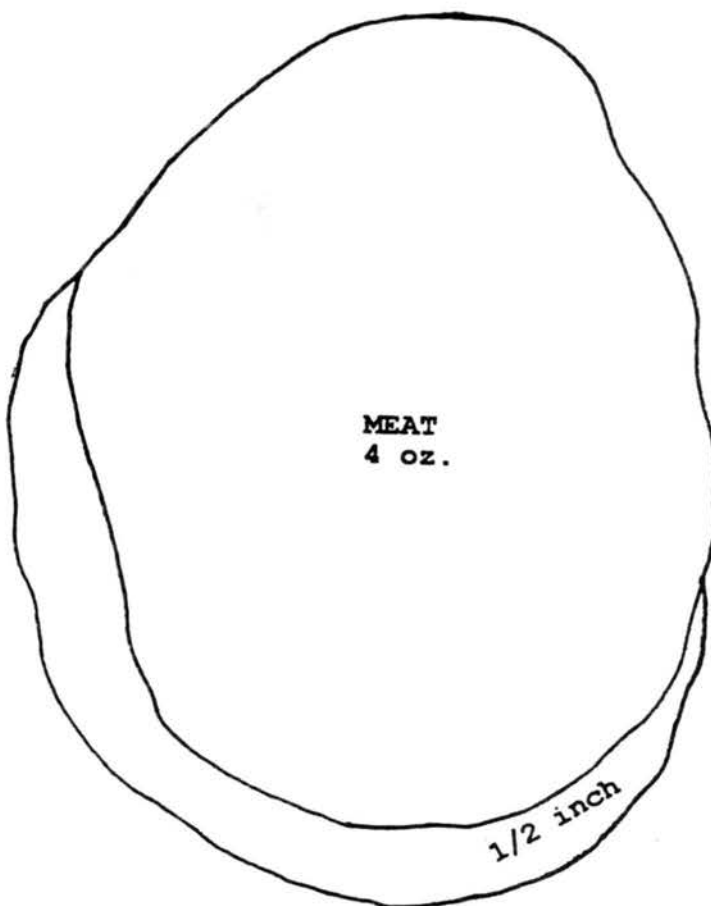
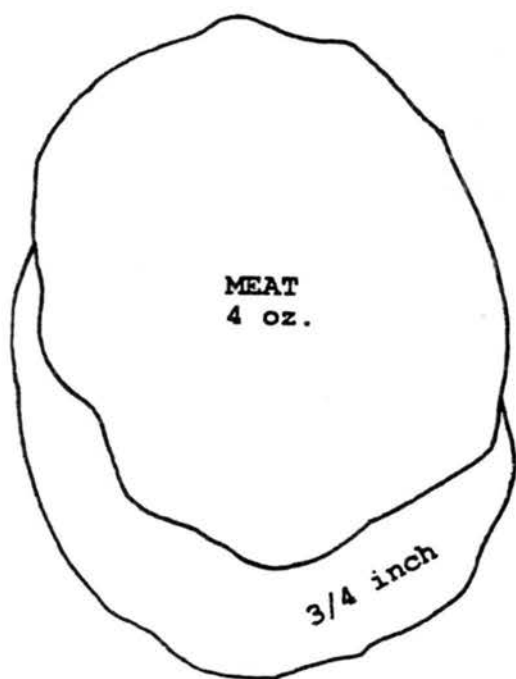
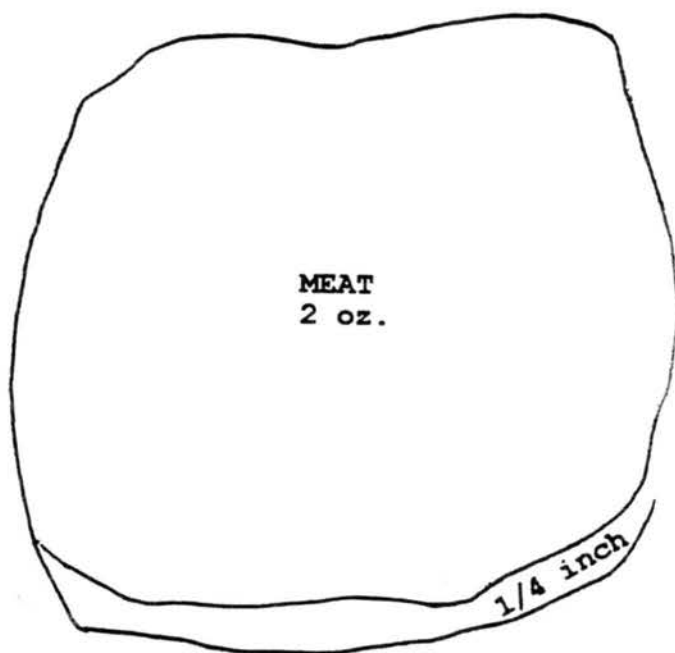
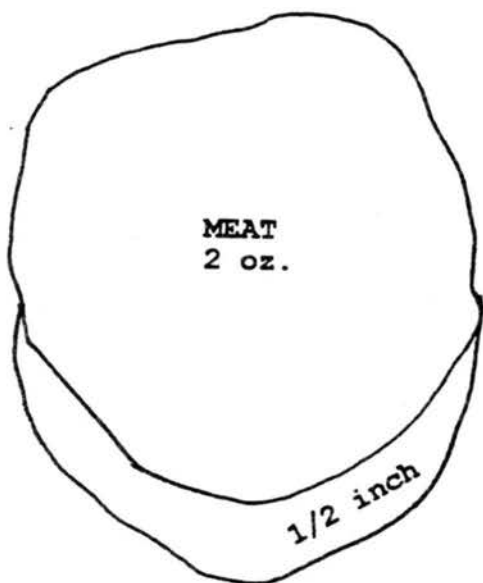
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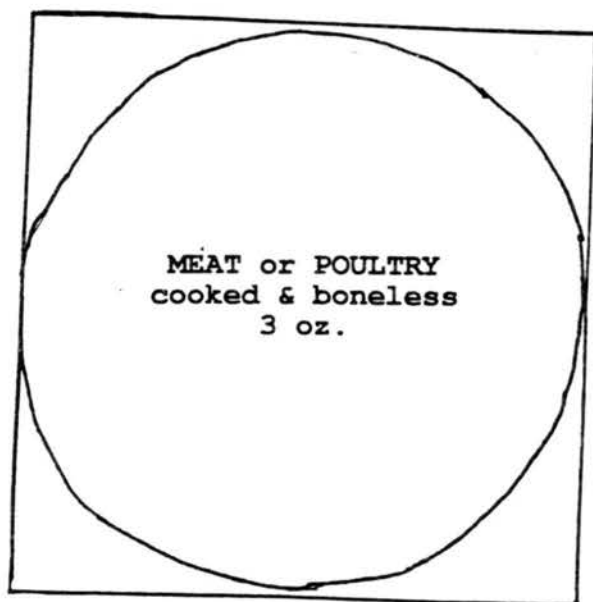
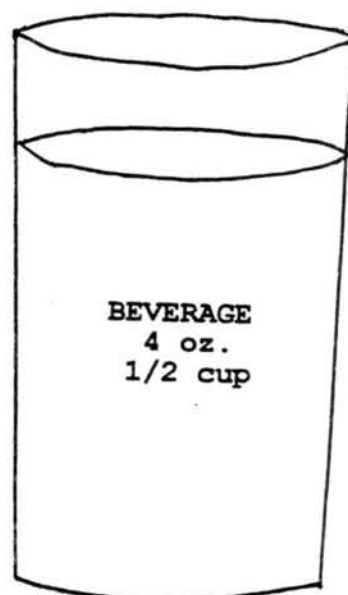
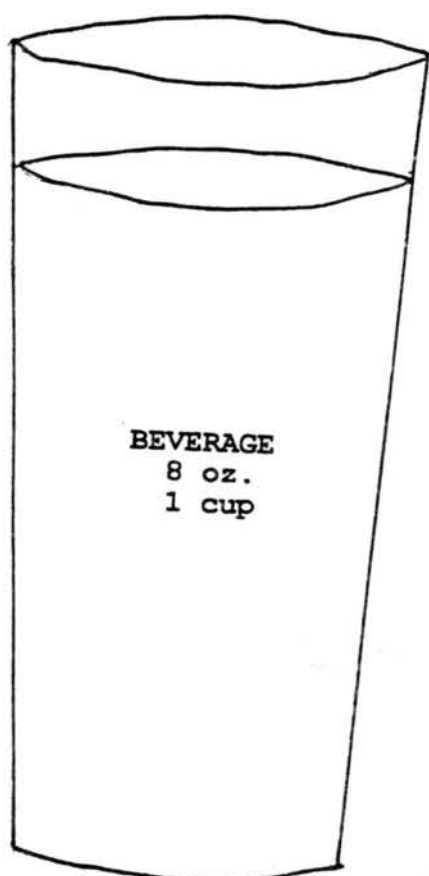
Fats and oils	Margarine: Major oil? Stick, tub, squeeze, or liquid? Brand? Diet? Whipped? Oil and shortening: Brand? Major oil? Solid? Salid dressing: Homemade or commerical? Type of oil or brand name? Creamy? Clear? Additions (cheese, bacon)?
Mixed dishes	Homemade: Ingredients and amounts? Cooking methods (baked, broiled, fried)? Commercial? Brand? Cooking method?
Gravies and sauces	Type of fat? Amount? Liquid, milk or other? Other additions? Amount used?
Soups	Broth or milk base? Type of milk? Principal ingredients.
Beverages	Diet, low-cal, sweetened? Brand? Caffeine or decaf? Added sugar, milk, cream? Cola or noncola? Alcohol content? Type of alcoholic beverage? Amount?
Snacks and candies	Brand? Size? Weight?



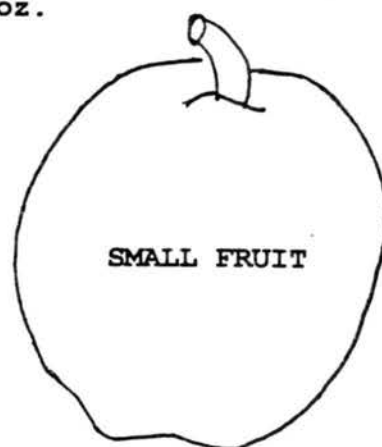
Diagrams of Portion Sizes for 24-Hour Food Diary

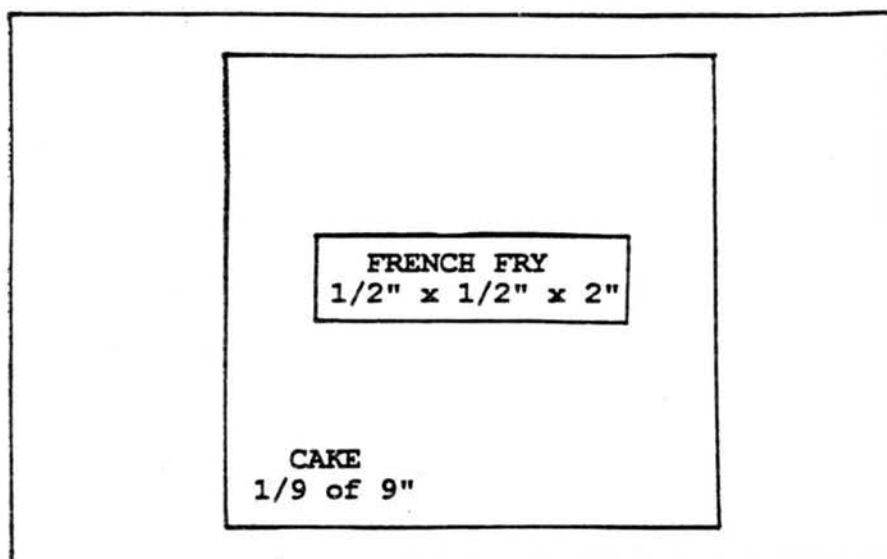




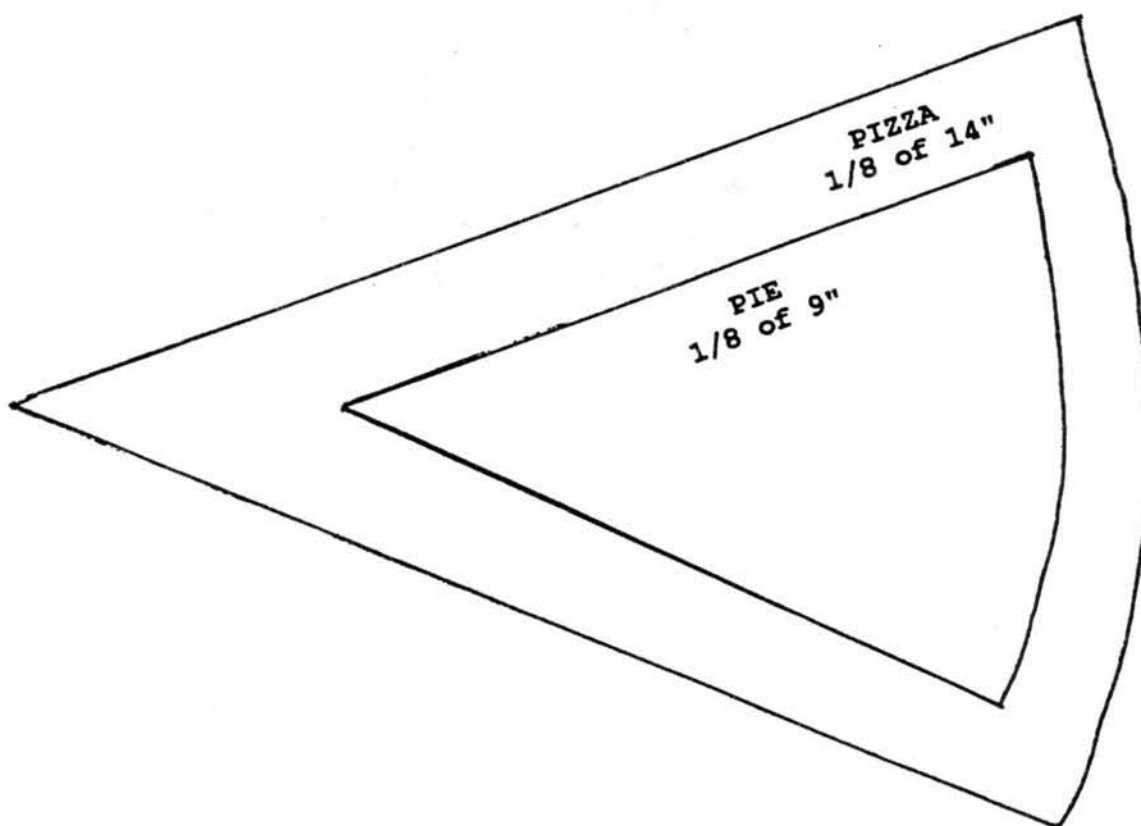


CHEESE or
LUNCH MEAT
1 oz.





WAFFLE
3 1/2" x 5 1/2"



QUESTIONNAIRE J: Pet Information

PET #1, Name: _____.

Species (please circle):

Dog Cat Bird Fish Horse Rabbit Guinea Pig Hamster

Other (please specify): _____.

Breed (please specify): _____.

Sex (please circle): Female Male

Neutered/Spayed (please circle): Yes No

Size (Dogs only--please circle): Small Medium Large

PET #2, Name: _____.

Species (please circle):

Dog Cat Bird Fish Horse Rabbit Guinea Pig Hamster

Other (please specify): _____.

Breed (please specify): _____.

Sex (please circle): Female Male

Neutered/Spayed (please circle): Yes No

Size (Dogs only--please circle): Small Medium Large

PET #3, Name: _____.

Species (please circle):

Dog Cat Bird Fish Horse Rabbit Guinea Pig Hamster

Other (please specify): _____.

Breed (please specify): _____.

Sex (please circle): Female Male

Neutered/Spayed (please circle): Yes No

Size (Dogs only--please circle): Small Medium Large

THANK YOU FOR COMPLETING QUESTIONNAIRE J.
PLEASE GO ON TO QUESTIONNAIRE K.



QUESTIONNAIRE K: Pet Attitude

If more than one pet, please pick your favorite pet: _____.

1. My pet means more to me than any of my friends (please circle):
 - a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.
2. Quite often I confide in my pet (please circle):
 - a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.
3. I believe that pets should have the same rights and privileges as family members (please circle):
 - a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.
4. I believe my pet is my best friend (please circle):
 - a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.
5. Quite often, my feelings toward people are affected by the way they react to my pet (please circle):
 - a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.
6. I love my pet because he/she is more loyal to me than most of the people in my life (please circle):
 - a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.
7. I enjoy showing other people pictures of my pet (please circle):
 - a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.



PLEASE GO TO THE BACK OF THIS PAGE.

8. I think my pet is just a pet (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
9. I love my pet because it never judges me (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
10. My pet knows when I'm feeling bad (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
11. I often talk to other people about my pet (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
12. My pet understands me (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
13. I believe that loving my pet helps me stay healthy (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
14. Pet deserve as much respect as humans do (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.



PLEASE GO ON TO THE NEXT PAGE.

15. My pet and I have a very close relationship (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
16. I would do almost anything to take care of my pet (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
17. I play with my pet quite often (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
18. I consider my pet to be a great companion (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
19. My pet makes me feel happy (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
20. I feel that my pet is a part of my family (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.
21. I am not very attached to my pet (please circle):
a. Strongly Disagree.
b. Somewhat Disagree.
c. Somewhat Agree.
d. Strongly Agree.



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22. Owning a pet adds to my happiness (please circle):
- a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.
23. I consider my pet to be a friend (please circle):
- a. Strongly Disagree.
 - b. Somewhat Disagree.
 - c. Somewhat Agree.
 - d. Strongly Agree.

THANK YOU FOR COMPLETING QUESTIONNAIRE K.
PLEASE GO ON TO QUESTIONNAIRE L.



QUESTIONNAIRE L: Pet Care

If more than one pet, please pick your favorite pet: _____.
On an ordinary day during the week:

1. I usually feed my pet (please circle as many as apply):
 - a. at a specific time or times (please specify): _____.
 - b. when I get up in the morning.
 - c. when I eat breakfast.
 - d. when I eat lunch.
 - e. when I eat dinner.
 - f. when I eat a snack.
 - g. when I go out.
 - h. when I go to bed at night.
 - i. when my pet wants to eat.
 - j. when (some other reason--please specify): _____.
 - k. no particular time.
2. I usually let my pet out of the house (please circle as many as apply):
 - a. at a specific time or times (please specify): _____.
 - b. when I get up in the morning.
 - c. when I eat breakfast.
 - d. when I eat lunch.
 - e. when I eat dinner.
 - f. when I eat a snack.
 - g. when I go out.
 - h. when I go to bed at night.
 - i. when my pet wants to go out.
 - j. when (some other reason--please specify): _____.
 - k. no particular time.
 - l. not applicable to my pet.
3. I usually walk my pet (please circle as many as apply):
 - a. at a specific time or times (please specify): _____.
 - b. when I get up in the morning.
 - c. just before/after I eat breakfast.
 - d. just before/after I eat lunch.
 - e. just before/after I eat dinner.
 - f. just before/after I eat a snack.
 - g. when I go out.
 - h. before I go to bed at night.
 - i. when my pet wants to go out.
 - j. when (some other reason--please specify): _____.
 - k. no particular time.
 - l. not applicable to my pet.

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4. I usually groom (brush/comb) my pet (please circle as many as apply):
- a. at a specific time or times (please specify): _____.
 - b. when I get up in the morning.
 - c. just before/after I eat breakfast.
 - d. just before/after I eat lunch.
 - e. just before/after I eat dinner.
 - f. just before/after I eat a snack.
 - g. just before/after I go out.
 - h. just before I go to bed at night.
 - i. just before/after my pet goes out.
 - j. when my pet wants attention.
 - k. when (some other reason--please specify): _____.
- l. no particular time
- m. not applicable to my pet
5. I usually talk to and/or pet my pet (please circle as many as apply):
- a. at a specific time or times (please specify): _____.
 - b. when I get up in the morning.
 - c. when I eat breakfast.
 - d. when I eat lunch.
 - e. when I eat dinner.
 - f. when I eat a snack.
 - g. just before/after I go out.
 - h. when I go to bed at night.
 - i. just before/after my pet goes out.
 - j. when my pet wants attention.
 - k. when (some other reason--please specify): _____.
- l. no particular time
- m. not applicable to my pet

THANK YOU FOR COMPLETING QUESTIONNAIRE L.
THIS CONCLUDES THE QUESTIONNAIRES.
THANK YOU!



APPENDIX C

Nutrient Values
(RDA and Dietary Recommendations)
Nutritionist IVTM

	Females 51+	Males 51+
	Harris-Benedict Equation*	Harris-Benedict Equation**
Kilocalories (kc)		
Carbohydrates (%kc)	60	60
Protein (%kc)	15	15
Fat (%kc)	25	25
Saturated Fat (%kc)	5	5
Polyunsaturated Fat (%kc)	10	10
Monounsaturated Fat (%kc)	10	10
Cholesterol (mg)	300	300
Calcium (mg)	800	800
Phosphorous (mg)	800	800
Sodium (mg)	2,400	2,400
Potassium (mg)	2,000	2,000
Magnesium (mg)	280	350
Iron (mg)	10	10
Zinc (mg)	12	15
Fiber (g)	19	23
Alcohol (g)	—	—
Caffeine (mg)	—	—
Vitamin A (RE)	800	1,000
Vitamin D (Ug)	5	5

Nutrient Values (continued)
(RDA and Dietary Recommendations)
Nutritionist IV™

	Females 51+	Males 51+
Vitamin E (mg)	8	10
Thiamin (B ₁) (mg)	1	1.2
Riboflavin (B ₂) (mg)	1.2	1.4
Niacin (B ₃) (mg)	13	15
Pyridoxine (B ₆) (mg)	1.6	2
Folate (Ug)	180	200
Cobalamin (B ₁₂) (Ug)	2	2
Vitamin C (mg)	60	60

* TDE = (655 + 9.6W + 1.7H - 4.7A) (AF)

** TDE = (66 + 13.7W + 5H - 6.8A) (AF)

where TDE = Total daily energy expenditure

W = Body weight in kg

H = Height in cm

A = Age in years

AF = Activity factor

APPENDIX D

3001-9

CHEM-SCREEN PROFILE

TEST NAME	REFERENCE RANGE	
A/G RATIO	1.1-2.3	
ALBUMIN	3.5-5.0	GM/DL
ALKALINE PHOSPHATASE	21-110	MU/ML
BILIRUBIN, TOTAL	0.1-1.6	MG/DL
BILIRUBIN, DIRECT	0.0-0.4	MG/DL
BUN/CREATININE RATIO	12-20	
CALCIUM	8.7-10.6	MG/DL
CHLORIDE	96-109	MEQ/L
CHOLESTEROL	120-240	MG/DL
CORONARY RISK RATIO	NORMAL RISK RATIO:	MALE: 4.97; FEMALE: 4.44
	1/2 RISK:	MALE: 3.43; FEMALE: 3.27
	2 TIMES RISK:	MALE: 9.55; FEMALE: 7.05
	3 TIMES RISK:	MALE: 23.4; FEMALE: 11.04
% HDL CHOLESTEROL	FEMALE:	PROBABLE PROTECTION: GREATER THAN 40% BELOW AVERAGE RISK: 26.7-40% AVERAGE RISK: 18.5-26.6% HIGH RISK: 11.7-18.4% DANGEROUS RISK: LESS THAN 11.7%
	MALE:	PROBABLE PROTECTION: GREATER THAN 37% BELOW AVERAGE RISK: 24.8-37% AVERAGE RISK: 15.4-24.7% HIGH RISK: 7.4-15.3% DANGEROUS RISK: LESS THAN 7.4%
CREATININE	0.5-1.5	MG/DL
*FERRITIN REFLEX	MALE: 23-233	FEMALE: 10-107 NG/ML
GGTP	MALE: 3-60	MU/ML
	FEMALE: 3-50	MU/ML
GLOBULIN	1.5-3.7	MG/DL
GLUCOSE	65-120	MG/DL
HDL	39-60	MG/DL
IRON	40-180	MCG/DL
*IRON BINDING CAPACITY	250-390	MCG/DL
*% TRANSFERRIN SATURATION	15-50	%
LDH	MALE: 100-250	MU/ML
	FEMALE: 80-250	MU/ML
LDL	57.37-171.00	MG/DL
MAGNESIUM	1.5-2.2	MEQ/L
PHOSPHATE	2.2-4.6	MG/DL
POTASSIUM	3.5-5.3	MEQ/L
SGOT (AST)	7-40	MU/ML
SGPT (ALT)	5-55	MU/ML
SODIUM	135-145	MEQ/L
TOTAL PROTEIN	6.2-8.2	GM/DL
TRIGLYCERIDES	30-190	MG/DL
UREA NITROGEN (BUN)	6-25	MG/DL
URIC ACID	MALE: 3.2-8.3	MG/DL
	FEMALE: 2.1-6.8	MG/DL

SPECIMEN: 1 SPUN BARRIER TUBE OR 4 ML SERUM AND 1 GRAY TOP TUBE. PATIENT MUST BE FASTING FOR 8-12 HOURS FOR OPTIMUM TEST RESULTS. THE REFERENCE RANGES LISTED ABOVE ARE UNSELECTED FOR AGE. IF AGE AND SEX ARE GIVEN ON THE REQUISITION, THE APPROPRIATE REFERENCE RANGE FOR THAT AGE/SEX WILL BE GIVEN ON THE REPORT.

*IF IRON BINDING CAPACITY IS LESS THAN OR EQUAL TO 250 OR GREATER THAN OR EQUAL TO 390, OR IF TRANSFERRIN % SATURATION IS LESS THAN OR EQUAL TO 15% OR GREATER THAN OR EQUAL TO 50%, A FERRITIN TEST WILL BE PERFORMED.