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# The Effect of Teaching on Knowledge and Osteoporosis Health Beliefs of Elderly Females

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# THE EFFECT OF TEACHING ON KNOWLEDGE AND OSTEOPOROSIS HEALTH BELIEFS OF ELDERLY FEMALES

by

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ABSTRACT

THE EFFECT OF TEACHING

ON KNOWLEDGE AND OSTEOPOROSIS HEALTH BELIEFS

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The purpose of this study was to examine the effect of an educational intervention on knowledge, self-efficacy, and health beliefs (susceptibility, seriousness, benefits, barriers, health motivation) related to osteoporosis.

The study was conducted using a pre-test-post-test quasi-experimental design. The sample included forty elderly females of two senior centers in a midwestern metropolitan area. The experimental group was composed of twenty subjects from a senior center. The remaining twenty subjects from a second senior center were included in the control group. Osteoporosis knowledge, self-efficacy, and health beliefs were measured before and after factual information about osteoporosis was given to the experimental group. The same pre and post-test measures of the study variables were collected from the control group without osteoporosis instruction. Analysis of covariance was performed to test the hypotheses.

The results of ANCOVA showed that the osteoporosis knowledge of the elderly women receiving osteoporosis instruction was significantly greater than the elderly women without such instruction ($p < .05$). Likewise, strength of susceptibility and the benefits of calcium intake belief and self-efficacy of calcium intake of elderly

women with osteoporosis instruction was significantly greater than those without osteoporosis instruction ($p < .05$). There were no significant difference with respect to the strength of seriousness, health motivation, benefits exercise, barriers calcium, barriers exercise, and self-efficacy of exercise ($p > .05$).

## Dedication

To the memory of my grandmother who inspired me to be a nurse with her caregiver stories.

To the memory of my parents who taught me "never let anything or anyone dim your light."

To my sister who always believes in me.

To my husband who anchors me and loves me.

To my friends who give me joy and laughter.

To my children who give me beautiful grandchildren.

To my grandchildren, in whose beautiful eyes I see eternal life.

To my Lord, Jesus Christ, who loves me, gives me hope, joy, purpose, and eyes to see grace.

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Creative effort requires nurturance and inspiration. This project exhausted my own well of energy, however, with the mentors and role models in my world I found the encouragement to remain committed.

Katherine Kim, RN, Ph.D., was my role model and mentor during this project. She was available and interested in the project. My heartfelt thanks is given to this woman of integrity and intelligence. Mary Horan, RN, Ph.D., also greatly influenced the work with her expertise in the osteoporosis research. Carl Sinke, Ph.D., guided my hand in statistical analysis, as did Cindy Coviak with her statistical programming.

Finally my deep appreciation to the senior women who so eagerly and willingly participated in the research project. Their energy and enthusiasm to learn new ideas motivated me to complete this challenge.

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# CHAPTER ONE

## INTRODUCTION

Osteoporosis, a metabolic bone disease most common in elderly women, is a major public health problem. Twenty-four million Americans currently are afflicted with osteoporosis. The cost of their care totals over ten billion dollars annually (Peck, 1990). Osteoporosis also accounts for 500,000 vertebral fractures and 300,000 hip fractures yearly, and hip fractures are expected to increase by 10,000 to 20,000 over the next decade (Culleton, 1987). In addition to economic costs, these fractures cause osteoporosis sufferers considerable pain, disability, loss of independence and, in many cases, premature death. Women are especially susceptible to the effects of osteoporosis. It is estimated that 25% of white, post-menopausal women suffer from osteoporosis.

As the number of elderly increase, so will the magnitude of the problem. Older adults comprise approximately 12.7% of the population, and this number is expected to increase 20% or more by early in the 21st century (American Association of Retired Persons, 1993). Consequently, public health professionals and policy makers are becoming increasingly concerned about prevention of osteoporosis.

Osteoporosis is characterized by a reduction in the quantity of bone mass. Average bone mass tends to decrease within the fourth or fifth decade. Bone is living tissue that undergoes active remodeling throughout life with new formation

occurring as old bone is reabsorbed into the blood plasma. In normal bone, reabsorption is coupled to and exactly balanced by resynthesis so that there is no net change in the amount of bone produced or lost. To either increase or decrease net bone mass, these processes may lose homeostasis, an event leading to osteoporosis (Coralli, Raisz, & Wood, 1986.)

Osteoporosis can be classified into two types. Type I, post-menopausal osteoporosis, is presumed to be caused by a reduction in estrogen which occurs at menopause, affecting primarily trabecular bone, and results in vertebral and Colles' fractures. Type II, senile osteoporosis, occurs in the very elderly as a result of impaired bone formation and increased bone reabsorption connected with reduced calcium absorption. It causes hip and humerus bone fractures involving both the cortical and trabecular bone, and occurs primarily in females. Males are affected, also, but to a lesser degree (Peck, 1990).

Osteoporosis is a complex, multi-factorial disease with chronic demineralization of calcium from bone. Risk factors include genetic predisposition, low body weight, sedentary lifestyle, smoking, age, gender, and menopause (Peck, 1990). Two risk factors that can be managed by the older osteoporotic are adequate calcium intake and regular exercise.

Calcium deficiency is a recognized cause of osteoporosis. The body needs to maintain plasmic (ionic) calcium concentration for the neuromuscular system. Intracellular calcium was resorbed from the skeleton when dietary intake falls. Studies conducted in the 1970s indicated that bone loss from osteoporosis could be

suppressed by increasing calcium intake from the 450 to 500 mg. daily, and that most women should average to 1000 to 1500 mg. for post-menopausal women (National Institutes of Health Consensus Development Conference Statement of April 1984). Research suggests that post-menopausal bone loss is due not so much to reduced intake of dietary calcium as to an increased requirement of calcium (Peck, 1990).

Dietary habits are primarily socially learned. Therefore, it is important to examine issues that produce insight into individuals' willingness and perception of ability to change nutrition behaviors. There remains a widespread belief that elderly women in their 60s and 70s are too old or disabled to benefit from preventive health care. Yet adoption of a healthy lifestyle by individuals at any age could contribute to a better old age. Effective preventive health practices for the elderly require a broad commitment from health care providers, the elderly themselves, their families, and private and public health systems (Aloia, 1988). In order to gain understanding of health behaviors aimed at osteoporosis prevention, it is important for the nurse to consider the psychological variables influencing behavior change. Individual needs of the patient are of utmost importance in disease management, for every patient will experience osteoporosis differently. In part, these differences may be explained by the belief system in which patients feel motivated to control health outcomes.

Since its introduction in 1950, the Health Belief Model (HBM) has been used in studies of health behavior including disease detection and prevention (Janz & Becker, 1984). The HBM was used in this study as the theoretical framework for assessing psychological variables related to osteoporosis preventive behaviors. The

original variables of the model are susceptibility, seriousness, barriers, and benefits with the recent addition of health motivation and self-efficacy (Rosenstock, Strecher, & Becker, 1988). The impact of HBM in disease detection has been studied by a variety of researchers (Becker, Kabeck, Rosenstock, & Ruth, 1975; Brailey, 1986; Champion, 1984, 1985, 1987, 1989; Hallal, 1982; Ruthledge, 1987; Trotta, 1980). The results vary, but suggest that certain health beliefs are useful in predicting specific behaviors.

This study builds on previous studies by Kim, Horan, Gendler, and Patel (1991) who incorporated the theoretical dimensions of the HBM to measure health beliefs related to osteoporosis, and developed the Osteoporosis Health Belief Scale (OHBS). This study also builds on research done by Boyer (1991), Esch (1991), and Peterson (1991). Quality of life may be enhanced and health care costs reduced with preventive care. Human behavior is complex and not easily explained or predicted; however, the challenge and need are paramount and nurses need to be involved in finding better ways of preventing osteoporosis.

## Purpose

The purpose of this study was to examine the effect of an educational intervention on knowledge and health beliefs (susceptibility, seriousness, benefits, barriers, health motivation and self-efficacy) related to osteoporosis. Identification of the relationship among these variables may add to nursing knowledge concerning behavior change in elderly women at risk for osteoporosis. The basic question of this

study is, what is the effect of an osteoporosis teaching protocol on the knowledge and health beliefs of elderly women?

# CHAPTER TWO

# REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

## Literature Review

Research utilizing the Health Belief Model (HBM) is diverse and extensive. Its use with the elderly is limited and only a small number of studies was found that used the HBM to examine osteoporosis preventive behaviors. This literature review is based on prior research of the HBM, self-efficacy and education and its effect on knowledge and health beliefs. The first section of this chapter will describe results of HBM studies that have used the model with and without variables such as knowledge and self-efficacy. Observations were made noting the studies' findings relative to the effect of health beliefs on health behaviors and disease prevention behaviors. Research that includes education and knowledge is included in this first section. Historical research is included which helps explain the evolution of the health belief model. A summary of conclusions will follow. Next, self-efficacy research, which will figure prominently in this study, is discussed. The elements of the chapter include a description of the conceptual framework for the study. This will include additional background on the HBM, the reasoning for use of the HBM in this study, a definition of terms used in the study, and the hypothesis on which the study is based. The last part of the review will include research on the effects of an educational program on knowledge, health beliefs and self-efficacy.

Health Beliefs Model Related Research

Evidence from studies of the HBM is varied. Early work investigated preventive health behaviors and usually involved a single behavior directed toward prevention, such as inoculation. Reviews of the HBM research found a number of studies utilizing the model. In general, the research provided support for several variables included in the original Health Belief Model. Pioneer investigations did suggest the innovative idea of tailored education programs to enhance the model's usefulness.

Hochbaum (1958) studied 1,200 adults in an attempt to identify respondents' beliefs concerning the decision to obtain a chest x-ray for the detection of tuberculosis. He measured the two variables of susceptibility to tuberculosis and the benefit of early detection. The two elements of perceived susceptibility are 1) the respondent's belief of the real possibility of contracting tuberculosis and 2) the extent to which the individual believes that one can carry tuberculosis without symptoms. The findings were that eighty percent of individuals holding both beliefs obtained a chest x-ray. Hochbaum has demonstrated, with some precision, that a health action is largely a result of two interacting variables, "perceived susceptibility" and "perceived benefits".

Bergman and Werner's (1963) early research describes cases of patients who are knowledgeable about an illness and preventive measure but nonetheless, do not carry out the regimen. Jenkins (1966) demonstrated that Health Belief Model perceptions vary with educational level, social class, and ethnic group membership.

This research recommends the idea of needs-based education. Another recommendation was to deliver the educational strategies to small groups.

Another early study, Kegeles (1963), reviewed members of a prepaid dental care plan to determine utilization in preventive dental checkups. This study measured the respondents' perceived susceptibility to dental disease, the severity of the conditions, the individuals' perception of benefits of these preventive actions, and the perception of the barriers to seeking dental care. Kegeles' findings support the value of the HBM variables, however, the results of the research are limited due to a substantial loss in the study's sample size.

A study by Aho (1979) used a retrospective survey design, collecting data from 122 elderly men and women, primarily black and Portuguese Americans. The subjects' health beliefs were examined for relationships to obtaining the swine flu inoculation. Using the traditional variables, susceptibility, seriousness, motivation value of threat reduction (benefits), and barriers, the subjects responded to a 45-item scale. The elderly men and women who perceived themselves susceptible to the flu were more likely to believe that the flu shot would be beneficial and perceived the vaccine safe.

An additional study, surveying 500 elderly men and women, investigated the swine flu inoculation (Rundall & Wheeler, 1979). A random sample of subjects were asked whether they received the vaccine. Two-hundred thirty responded to the four questions, one for each belief model construct. Perceived susceptibility, benefits, and barriers were positively correlated with inoculation in this group. Constraints on

generalization is due to the use of only one question to measure each variable of the Health Belief Model.

Janz and Becker (1984) reviewed 29 HBM-related studies designed to investigate preventive health behavior and disease detection behaviors. These studies used the "traditional" health beliefs of susceptibility, seriousness, benefits, and barriers. Janz and Becker (1984) concluded that substantial empirical evidence supports the importance of the HBM dimensions in explaining and predicting health behaviors. This review of HBM supports the idea that preventive health behavior is a result of a person's perception of health threat and motivation. Health threat is described as the belief in personal susceptibility to a disease. Health motivation is the interest the individual possesses in health matters and general concern about health behaviors. Overall, the authors praised the hardiness of the HBM; however, they did express concerns for the wide variability in methods of operationalizing the HBM. A major concern is the inconsistency of application of the HBM instruments of measurement.

Champion (1984), with concerns over the inconsistency of the HBM application, directed research toward development of valid and reliable instruments. Frequency of breast self-examination (BSE) was the dependent variable used during testing of the specifically designed measurement tool. Health Motivation was added as the fifth HBM variable. Recently, studies using the HBM have added knowledge as another variable. Results revealed that along with knowledge, barriers and susceptibility are correlated to frequency of BSE (Champion, 1987). Allard's study

(1989) adapted Champion's (1984) scale to investigate disease preventive practices and beliefs about AIDS. The HBM was found to be a good theoretical approach to obtain data on AIDS-related behaviors, and perceived susceptibility to AIDS, and perceived severity of AIDS.

Kim et al. (1991) developed an Osteoporosis Health Belief Scale (OHBS) based on Champion's scale (1984), to measure health beliefs related to osteoporosis. The study pioneered in both the application of the HBM to the elderly population and in developing a HBM scale specifically designed to assess beliefs related to exercise behavior and calcium intake. The results of the study by Kim et al. (1991) found barriers and health motivation to be statistically significant constructs in explaining both calcium intake and exercise behaviors.

Boyer, Esch, and Peterson's (1991) subsequent research using the osteoporosis health belief instrument revealed a correlation between osteoporosis health beliefs and calcium intake and exercise behavior. The investigation concluded that there is a statistically significant relationship between health beliefs of health motivation, benefits, and barriers, and calcium intake and exercise behaviors. In addition, Boyer found knowledge and self-efficacy accounted for some variance in calcium intake. However, the correlations between the independent variables and the dependent variables were weak.

Macleod, Clark, Haverty, and Kendall (1990) used a case-study approach with a range of patients to initiate 68 health education interventions related to smoking. The framework for this study was based partly on the HBM and partly on the

nursing process. Seventeen percent of the sample who were followed-up after one year had successfully given up smoking. These results compared favorably with earlier studies with results of five to fifteen percent (Russell, Stapleton, Jackson, Hajek, & Becker, 1987). The study supported a significant relationship between patients' self-efficacy and motivation and their subsequent success. The study also provides considerable insight into the nurse's potential as a highly effective health educator.

Jones, Jones, and Katz (1991) studied rehabilitation compliance of acute and chronic patients receiving a HBM based intervention in the Emergency Department. This study suggests that, consistent with previous research, older age and previous treatment experience correlated with higher rates of compliance. It may be important to note that chronic problems exert a cumulative effect upon the behavior of the patient and thus, the recurrence or perceived susceptibility may be an important influence on compliance behavior.

Leatherman, Blackburn, and Davidhizar (1990) used the Health Belief Model as the conceptual framework for a study to explain why postpartum women fail to obtain adequate prenatal care. The reasons cited in previous literature, insufficient money, access and motivation were the same reasons given by subjects in this study. Motivation was closely linked with money issues including the lack of money to pay for care. Lack of money was perceived as a formidable barrier which often overrode the potential positive effects of seeking prenatal care.

Barnes and Thomas (1990) found that subject-specific education lead to an increase in knowledge from pre-test to post-test. Theis (1991) had similar findings, with the additional comment that education intervention should follow the pre-test as soon as possible. When teaching included an educational plan researchers Baumann, Zimmerman and Leventhal (1989) found that belief changes and intentions to maintain healthful beliefs remained high nine months after the information was delivered.

Patient education research shows that while many of the principles of teaching and learning remain the same throughout the lifespan, certain considerations must be included when instructing the elderly. The subject taught should be relevant to the immediate health needs of the elderly (Kick, 1989; Moore, 1990; Weinrich, Boyd, & Nussbaum, 1989). The material should be presented in a variety of methods to maintain interest and prevent boredom (Kick, 1989). Information should be presented at a slower pace to facilitate learning (Kim, 1989; Kim & Grier, 1981; Weinrich, Boyd, & Nussbaum, 1989).

Ideally, separate scales should be constructed as the HBM is applied to each new health problem (Champion, 1984; Given, Given, Gallin, & Condon, 1983; Janz & Becker, 1984; Jette et al., 1981; Maiman, Becker, Kirscht, Haefner, & Drachman, 1977). Champion (1984) suggests that, if the HBM is found to be theoretically sound and if reliable instruments are available, the study results can be used to structure individualized health promotion nursing strategies.

In summary, general trends using the HBM with preventive behaviors is that certain HBM variables are helpful in predicting health behaviors. The strongest support for the HBM has been from studies in which data on beliefs and behaviors were collected at the same time. In some very early research, tailored educational strategies were suggested, but no follow-up studies were identified that utilized this approach of needs-based education.

Self-Efficacy Related Research

Bandura (1986) argues that self-efficacy is conceived from four sources: performance accomplishments, vicarious experience, verbal persuasion, and physiological state. The importance of these sources is their influence in promoting health behavior. Self-efficacy was generated from the basic construct of expectation of mastery learning that success prompts an individual to perform a particular behavior. Two types of expectancy influence behavior, the belief that a behavior will produce an outcome and the conviction that one has the knowledge and skill to perform the task.

Coelho (1984) conducted a study to examine the relationship between expectations of self-efficacy and cessation of smoking. The research supported previous work, suggesting a positive relationship between the level of self-efficacy and abstinence. The findings were consistent with Bandura's theory and support the usefulness of the theoretical construct of self-efficacy. Mere participation in the program at a smoking-cessation clinic enhanced self-efficacy, even to those who continued to smoke or relapsed. Additionally, of those who were abstinent, self-

efficacy was related to cessation of smoking. This study supports the idea of short-term effects of self-efficacy on smoking behavior. Self-efficacy and smoking investigation was researched by Godding and Glasgow (1985). Findings indicated a high correlation between self-efficacy and smoking behaviors.

Kaplan, Atkins, and Reinsch (1984) researched walking behaviors in individuals with chronic pulmonary disease. Findings were exemplified by the following result: success with the exercise program increased the participant's expectation to continue to exercise in the future. It was found that three months later, the individuals had increased treadmill endurance. Additionally, this physical performance was utilized in other physically challenging behaviors such as cleaning, lifting, etc.

Strecher et al. (1986) reviewed 21 studies with the concept of self-efficacy and health behavior. The studies involved smoking, weight control, contraceptive behaviors, alcohol abuse, and exercise. All of the studies supported self-efficacy as a predictor of both short-term and long-term success in health behaviors. In summary, these studies support Bandura's argument that it is the perceived capability rather than actual skill that has greater influence on behavior. It appears that self-efficacy is particularly important in changing difficult behaviors such as overcoming smoking addiction.

The types of behavior reviewed using self-efficacy included exercise, smoking, and BSE. All of these studies indicated that self-efficacy may assist in predicting health behaviors. The general trend in all these studies supports Bandura's assertion

that perceived capabilities influence behavior. Measurement of both self-efficacy and outcome expectation is required. Additional research with these two variables could result in more complete and concise exploration of behavior.

## Conceptual Framework

Several models and theories have been developed to explain and predict health behavior. These models encompass various combinations of factors that are felt to influence behavior, including a complex interaction of interpersonal, familial, cultural, and situational factors. Since rates of adherence to recommended medical treatment plans and health lifestyle practices tend to be quite low (Gerber & Nehamkis, 1988), study models which emphasize cognitive-behavioral aspects and which are grounded in Social Cognitive Theory seem to be the most popular frameworks for examining health behavior. These models focus on knowledge and skill, beliefs, motivation, and decision-making regarding what action to take, and feedback relative to the action taken. The Health Belief Model makes intuitive sense and is relatively easy to use. It follows a logical sequence that if an individual perceives that a condition is serious, and that he/she is susceptible, then the perceived benefit of seeking treatment would be worth the cost of overcoming the barriers to changing behaviors.

The HBM provides a framework for understanding why people may not avail themselves of opportunities to detect illness early or follow through with recommended preventive practices. Because it is a psychosocial model, the HBM is applicable only to behavior that can be explained by a person's attitudes and

beliefs, and is most applicable with voluntary, health-related actions that involve an element of uncertainty. The HBM is described as an evolving model. The evolutionary development for the HBM includes the concept of self-efficacy. Rosenstock, Strecher, and Becker (1988) recommended that self-efficacy be added to the other "traditional" health beliefs, and claim the addition will provide a model that better accounts for those factors responsible for determining health-related behavior.

The factors that influence readiness to act include those dimensions known as the health beliefs: (a) perception of a threat to health, which is conceptualized as a combination of perceptions of susceptibility and severity of effect of the illness; (b) belief that the action will result in benefitted outcome; (c) belief that there are not insurmountable barriers which preclude goal attainment; and (d) health motivation, defined as a concern about health, a health consciousness and a high saliency of health in one's value system (Becker & Joseph, 1988). Self-efficacy is the perceived ability to perform the desired task, the belief that the individual is capable of performing the task, along with a valued outcome expectancy.

In addition to the five original constructs of the HBM, this study also includes knowledge and self-efficacy as dependent variables. Previous studies found knowledge to be a significant influencer of health related behaviors and self-efficacy adds a dimension theorized to be a significant determinant of behavior. Although this study does not investigate behavior as a dependent variable, education (the instructional intervention) is theorized to increase knowledge, which is theorized to

modify beliefs, which in turn influences the intention to behave, and ultimately, actual health behavior. However, knowledge, or the holding of certain beliefs (a belief that one is susceptible) does not necessarily translate into behavior, or even intention to behave.

The HBM is the conceptual framework for this study (Appendix A). Many of the studies have applied the model to study disease prevention and health promotion behaviors. Because prior studies found knowledge to be a significant variable of HBM, this study included knowledge as one of the dependent variables. Since nursing is concerned with these areas of health, the HBM is a conceptual tool that can be useful to identify health beliefs about osteoporosis.

A growing body of HBM research has produced trending of data. First, health beliefs and self-efficacy are strongly related to intention to change behavior. Second, intention to change is clearly related to behavioral responses, therefore, motivation to change behavior may function as an intervening variable between beliefs, self-efficacy, and behavior. Studies also explain that "single" behaviors such as a one-time inoculation is most strongly related to intention to change behavior, while more challenging behavioral changes like smoking cessation or stress control, require education, counseling, group process, or some combination of these.

Kelly, Zyzanski, and Alemagno (1991) conducted a study of the prediction of intention to change health behaviors after health education. They found that health beliefs of benefits and self-efficacy were related to intention to change. The findings strongly suggest that intention to change might well be linked to education

intervention. Even the beliefs of benefit and self-efficacy were significant, actual behavior did not follow the beliefs.

Self-efficacy has been hypothesized to be a paramount concern with health care behaviors that require difficult lifestyle changes or with behaviors that are characterized as habitual. Merritt (1989) relates the significance of patient education intervention and knowledge acquisition to self-efficacy. She contends the individual was more likely to engage in behavior required to learn something new if it was perceived they are capable of the behavior. The osteoporosis preventive behavior of adequate calcium intake and exercise behavior are the interests of this study. Altering one's nutritional intake and exercise involves changing behavior that may be partially habitual and, subsequently, would be viewed as a challenging undertaking. Social cognitive theory states that behavior is contingent on both outcome expectation and the perceived ability to perform the desired task. Rosenstock (1988) states that while the variables of the HBM benefits and susceptability can be characterized as outcome expectations, there are no variables that measure the dimension of self-efficacy. For this reason, self-efficacy was also added as one of the dependent variables of this study.

Another limitation of the HBM is the lack of ability to account for variance in behavior related to attitude and belief (Janz & Becker, 1984; Rosenstock, 1988). Many other forces can influence decisions regarding health behaviors. For example, individuals may choose a calcium diet, not for health reasons, but because they like the taste of milk. Also, the model assumes that health is highly valued by most

people, which may not be true. Another criticism is that the model does not address the issue of coping skills. It focuses on rational, intentional behavior and does not take into account the spontaneous activity that characterizes much of human behavior.

In summary, the HBM can be applied to osteoporosis preventive behavior. According to the HBM, certain variables may influence preventive actions. Healthy behaviors are likely to occur if an individual feels susceptible to osteoporosis and feels that osteoporosis is serious. Perceived benefits of osteoporosis preventive actions with few barriers to the action add to the likelihood of osteoporosis preventive behaviors. Health motivation is a very important variable in health promotion and resulting behavior change concerning osteoporosis. Knowledge about osteoporosis influences health beliefs and self-efficacy, which in turn may lead to osteoporosis preventive behaviors. The last variable to be included in the HBM is the concept of self-efficacy, which refers to a person's belief about the ability to perform a desired behavior concerning osteoporosis healthy lifestyles. Individuals must feel competent to make the necessary changes in behavior.

This study examined the effect of educational intervention on knowledge and health beliefs related to osteoporosis. The study did not examine the resulting behaviors. One might expect a direct relationship between an increase in osteoporosis knowledge and health belief and behaviors.

## Definition of Terms

This study utilized an adapted version of the HBM. Health beliefs refers to a set of perceptions an individual holds about the following elements: susceptibility, seriousness, benefits, barriers, health motivation, and self-efficacy. Susceptibility refers to the perceived risks of developing osteoporosis. Seriousness is concerned with perceived degree of personal threat related to developing osteoporosis. Benefits refers to perceptions regarding the effectiveness of taking in adequate calcium and performing appropriate exercise to prevent osteoporosis. Barriers are perceptions of negative components of taking in adequate calcium and performing exercise in regard to osteoporosis preventive behavior. Health motivation relates to a state of concern about health matters that may influence an individual's general health behavior. Self-efficacy is defined as a perception concerning the ability to take in adequate amounts of calcium and the ability to perform exercise to prevent osteoporosis. Knowledge is defined as information that an individual has about risk of developing osteoporosis and preventive behaviors concerning calcium intake and exercise.

## Hypotheses

1) Elderly women who receive instruction concerning osteoporosis have more knowledge about osteoporosis than elderly women without osteoporosis instructions.

2) Strength of health beliefs related to osteoporosis susceptibility, seriousness, benefits, and health motivation of elderly women with osteoporosis instruction is greater than those without osteoporosis instruction.

3) Strength of health beliefs related to osteoporosis barriers of elderly women with osteoporosis instruction is less than those without osteoporosis instruction.

4) Elderly women who receive osteoporosis instruction have greater levels of calcium intake and exercise self-efficacy than those subjects not receiving the instruction concerning osteoporosis.

# CHAPTER THREE

# METHODOLOGY

## Research Design

A quasi-experimental nonequivalent control group pre-test post-test design was used (Cook & Campbell, 1979). See Figure 1. The control group contained twenty subjects from an urban senior center who had a low income level. The experimental group was composed of twenty subjects with mid to mid-high income level who lived in a suburb. Questionnaires were used to collect data from elderly women. The Osteoporosis Knowledge Test, Osteoporosis Health Belief Scale and the Osteoporosis Self-Efficacy Scale were administered to the experimental group prior to and after the osteoporosis instruction. The same pre and post-test measures of the study variables were collected from the control group without osteoporosis instruction. The independent variable was the instruction intervention. The post-test measures of osteoporosis knowledge, health beliefs, and self-efficacy served as the dependent variable. The pre-test measures of osteoporosis knowledge, health beliefs and self-efficacy were used as covariates.

Figure 1

Research Design

| | | | |
|---|---|---|---|
| Experimental Group | $0_1$ | X | $0_2$ |
| Control Group | $0_1$ | | $0_2$ |

$0_1$ = pre-test
$0_2$ = post-test
X = instruction about osteoporosis.

## Sample and Setting

The sample for this study consisted of forty elderly women, all part of a senior citizen's center program in a midwestern urban community. The criteria used for inclusion in the study were (a) female, age sixty and older, (b) English speaking, (c) no prior diagnosis of osteoporosis, and (d) oriented to person, place and time. The elderly women were divided into experimental and control groups by senior center location. There were twenty women in the control group and twenty women in the experimental group.

### Characteristics of Subjects

The characteristics of the sample are summarized in Table 1. The mean age among the subjects in both the control group and the experimental group was 74.1 years. The standard deviation was slightly higher (8.2 years) among the subjects in the control group than it was among the experimental group (7.2 years).

Table 1
Demographic Characteristics of Experimental and Control Groups

| | Group | |
|---|---|---|
| | Experimental (n = 20) | Control (n = 20) |
| Age (in years) | | |
| M | 74.1 | 74.1 |
| SD | 7.1 | 8 |
| Ethnic Background | | |
| White | 20 | 16 |
| Hispanic | 0 | 4 |
| Annual Income | | |
| $20,000 or less | 5 | 16 |
| Greater than $20,000 | 15 | 4 |

Incomes among the subjects in the experimental group were generally higher than were those among the subjects in the control group. Among the subjects included in the experimental group, 75 percent (15 subjects) had annual incomes in excess of $20,000, while among the subjects included in the control group, 80 percent (16 subjects) had annual incomes of $20,000 or less.

All of the subjects in both the experimental group and the control group were either white or Hispanic (although Hispanic may be considered to be white, a differentiation was made in this study). All 20 subjects included in the experimental group were classified ethnically as white, while 16 subjects included in the control group were classified ethnically as white, and four of the subjects included in the control group were classified ethnically as Hispanic. All of the subjects were oriented to place, time and person. No subject was diagnosed with osteoporosis.

## Instruments

This study used the following instruments: (a) the Osteoporosis Health Belief Scale (OHBS) (Kim et al., 1992a) which measures beliefs concerning osteoporosis related to calcium intake and exercise behaviors, (b) the Osteoporosis Self-Efficacy Scale (Horan, Kim, Gendler, & Patel, 1993) which measures perceptions of capability to ingest adequate amounts of calcium and capable of exercise, (c) the Osteoporosis Knowledge Test (Kim, Horan, & Gendler, 1992b) measuring the subjects' knowledge related to calcium and exercise as it relates to osteoporosis, and (d) a demographic data sheet which provides age, race, and income data of the research subjects.

### Osteoporosis Health Belief Scale (OHBS)

The Osteoporosis Health Belief Scale (OHBS) (Kim, Horan, & Gendler, 1992) was developed from Champion's Breast Self-Examination Health Belief Model instrument (Appendix B). The OHBS has 42 items addressing nutrition and exercise behaviors. The five original HBM dimensions are susceptibility, seriousness, barriers, benefits, and health motivation. The instrument consists of two subscales: The Osteoporosis Health Belief Calcium Scale (OHBC scale) and the Osteoporosis Health Belief Exercise Scale (OHBE scale). Each scale has five subscales; each subscale is comprised of six items, three of which are shared: those measuring perception of osteoporosis seriousness and susceptibility, and health motivation. The unique subscales measure the concepts of barriers and beliefs. The Likert format was used in the OHBS questionnaire with responses ranging from 1 to 5. A one is

"strongly disagree" and five is "strongly agree". Possible scores in each subscale range from 6 to 30. The readability is at the 5th grade reading comprehension level.

In a study of 201 women, Kim et al. (1992) reported that Cronbach Alpha coefficients for the OHB Calcium subscale ranged from .71 (seriousness) to .82 (susceptibility and barriers calcium). For the OHB Exercise scale, Cronbach Alpha coefficients for the subscale ranged from .71 (seriousness) to .82 (susceptibility). In this study, alpha reliability coefficients for internal consistency of the OHBS ranged from .69 (seriousness) to .92 (health motivation) (see Table 2).

Table 2

Internal Consistency for the OHB Subscales (N = 40)

| Subscale | No. of Items | Cronbach Alpha | |
|---|---|---|---|
| | | Calcium | Exercise |
| Susceptibility | 6 | .79 | .79 |
| Seriousness | 6 | .69 | .69 |
| Benefits | 6 | .84 | .89 |
| Barriers | 6 | .84 | .84 |
| Health Motivation | 6 | .92 | .92 |

The Osteoporosis Self-Efficacy Scale (OSES)

The Osteoporosis Self-Efficacy Scale (OSES) was developed by Horan, Kim Gendler, and Patel (1993) (Appendix C). It is a 12-item questionnaire based on Bandura's Social Learning Theory (Bandura, 1977). The OSES is comprised of items related to a person's perception of self-efficacy in two areas: calcium intake and exercise behaviors. The responses are recorded on a visual analogue format in which

a "not at all confident" response would be indicated at the left most side of the analogue and "very confident" is at the right side of the analogue.

In a study of 201 pre and post menopausal women, Horan et al. (1993) reported that Cronbach alphas for two subscales (exercise and calcium) was .90. Construct validity of the instrument was evaluated by factor analysis. Criterion validity of the OSE calcium and exercise subscales was further evaluated by testing the ability of the instrument to predict subjects' behavior in regard to exercise and calcium intake (Horan et al., 1993). Reliability coefficients were re-measured for this study. Results are self-efficacy calcium is .93 and self-efficacy exercise is .96.

Osteoporosis Knowledge Test

The Osteoporosis Knowledge Test (OKT) (Appendix D) was designed to measure subjects' knowledge concerning intake of calcium and exercise behaviors related to osteoporosis prevention and risk factors. The tool has 24 items addressing general osteoporosis risk, calcium intake behaviors, and exercise. There is a possible score of 24 if all responses are correct. Factors used in developing the Osteoporosis Knowledge Test were the following: (a) literature review used in writing the test questions concerning osteoporosis (b) review of questionnaire for content validity by a panel of judges composed of physical therapy and nursing faculty and a registered dietitian, and (c) some items were furnished from a prior investigator's research (Kim, Horan, & Gendler, 1992b). Reliability coefficients (K-R 20) for osteoporosis knowledge tests results are as follows: Osteoporosis calcium knowledge test is .72 and osteoporosis exercise knowledge test is .69.

Demographic Data Sheet

The Demographic Data Sheet was developed for this study. It includes subjects' income, age, race, and diagnosis of osteoporosis (Appendix E).

Osteoporosis Instruction

The intervention was conducted in a well lighted, comfortable environment at a local senior center. A brief introduction preceded the instructions with an explanation of the outcome and frequency of osteoporosis. Each participant received a booklet (Appendix F) and followed the instruction booklet with each of the eight health belief variables. The seriousness variable addressed the number of people affected and the results of osteoporosis which includes pain, deformity, and loss of independence and even death. Susceptibility variable instructions included risk factors such as gender, age, race, disease, small-boned structures, and menopause. Lifestyle issues were addressed with a discussion and centered on the positive outcomes of exercise and the negative outcome from alcohol and smoking behavior. Benefits instructions explained how good bone health enhances the overall health of a woman. Components of healthy bones included longer productive lives, greater independence, and better posture. Barriers addressed ways in which women could achieve a balanced diet of adequate calcium intake and exercise appropriate to the older women. The instruction discussed selections of low cost, low fat, calcium rich foods and exercise which are safe and effective. In conclusion, the issue of self-efficacy was discussed focusing on ways a woman can be strong, able, and have fun.

The investigator developed a script of the instructional intervention to assure each participant received the same information concerning Osteoporosis (Appendix G). These procedures were tested on a small group of elderly women prior to the actual collection process. An adjustment in speed of presentation was necessary. Evaluations from the small pilot group suggested the use of a handout for each participant to follow during the osteoporosis educational intervention. The handout enhanced the lecture and was given to each elderly woman at completion of the project.

## Procedures

Permission was obtained from Grand Valley State University Human Research Committee prior to collection of data. In addition, Dr. Katherine Kim granted permission to use the Osteoporosis Health Belief Scale and the Osteoporosis Self-Efficacy Scale (Appendix H). Subjects were recruited on a volunteer basis from two senior centers in the midwestern metropolitan area. The investigator obtained permission from the participants at the senior centers (Appendix I). A poster explaining the study was placed in a prominent area so that all persons attending the senior center had an equal opportunity to review the information. On the poster was a date and time on which the researcher was present to answer further questions and enroll subjects. Also at that time, individual arrangements were made for administration of the measurement tools. A written consent (Appendix J) was obtained from each participant. It included a brief explanation of the purpose of the study, procedure, and the individual's rights as far as confidentiality, potential

benefits, voluntary participation, and the right to withdraw from the study at any time. Cognitive function was determined in cooperation with the senior centers' directors.

The questionnaires were administered in a group with self administration with instructions and guidance from the researcher. Questions concerning items were clarified individually. The instruments were administered in the following order: (a) Demographics data sheet, (b) Osteoporosis Knowledge Test, (c) Osteoporosis Health Belief Scale, and (d) Osteoporosis Self Efficacy Scale. This order was selected to avoid possible bias resulting from exposure to the information about osteoporosis included on the OHBS and the OSES.

Data were collected by the investigator over a period of four weeks. The osteoporosis instructions at the experimental site were given immediately after the pre-test. The post-test followed two weeks later. Control site participants completed the pre-test and were brought back to the senior center two weeks later for the post-test. There were one-hour sessions for each component of the process. Education intervention at the control center was given after the post-test. For the sake of confidentiality, all education intervention and testing was performed at the two senior centers.

# CHAPTER FOUR

## RESULTS

Data for this study were collected by the investigator during a 31-day period from August 1, 1992 to August 31, 1992. Forty-six elderly women met the criteria for the study and were approached regarding participation in the research project. Forty subjects consented to participate in the study and completed such participation. The six subjects who did not agree to participate in the study declined because of time constraints. All quantitative analysis of the data collected were performed using the Statistical Package for the Social Sciences (SPSSX) PC software.

In preparation for quantitative statistics analysis, data were coded on a collection record. Analysis of covariance (ANCOVA) was the statistical procedure used to assess the effect of the independent variable (educational intervention) on the several dependent variables. Pre-test scores were used as covariates. Statistical significance of the quantative results was established at the $p < .05$ level of probability.

The purpose of this study was to examine the effect of an educational intervention on knowledge and health beliefs related to osteoporosis (susceptibility, seriousness, benefits, barriers, health motivation and self-efficacy).

## Results of Hypotheses Testing

Four hypotheses were tested through the application of ANCOVA procedures. The results of this testing are presented separately by hypothesis. The ANCOVAs compared post-test score means for an experimental and a control group after removing the effects of pre-test measures on the post-test measures.

### Hypothesis Number One

Hypothesis number one stated that elderly women receiving osteoporosis instruction have greater knowledge of osteoporosis than women receiving no such instruction. ANCOVA results are presented in Table 3. Means and standard deviations of pre-test and post-test scores for both the experimental and control groups are presented in Table 4.

The results of ANCOVA indicated that the difference in the post-test score means between the experimental and control groups was statistically significant ($p < .05$). As the post-test score mean for the experimental group was higher than those for the control group, hypothesis number one was supported.

Table 3

Analysis of Covariance for Total Osteoporosis Knowledge

| Source of Variation | df | MS | F | P |
|---|---|---|---|---|
| Between groups | 1 | 119.46 | 8.57 | .006 |
| Covariate | 1 | 244.04 | 17.52 | .000 |
| Within groups | 37 | 13.93 | | |

Table 4

Means and Standard Deviations of Total Osteoporosis Knowledge, Calcium Knowledge, and Exercise Knowledge

| | Group | |
|---|---|---|
| | Experimental (n = 20) | Control (n = 20) |
| Total Osteoporosis Knowledge | | |
| Mean | | |
| Pre-test | 12.85 | 13.05 |
| Post-test | | |
| Obtained | 18.25 | 14.90 |
| Adjusted | 18.30 | 14.85 |
| Standard Deviation | 4.09 | 4.82 |
| Calcium Knowledge | | |
| Mean | | |
| Pre-test | 8.50 | 9.00 |
| Post-test | | |
| Obtained | 12.85 | 10.10 |
| Adjusted | 12.99 | 9.96 |
| Standard Deviation | 3.05 | 3.93 |
| Exercise Knowledge | | |
| Mean | | |
| Pre-test | 8.10 | 8.15 |
| Post-test | | |
| Obtained | 11.50 | 9.15 |
| Adjusted | 11.51 | 9.13 |
| Standard Deviation | 3.15 | 3.41 |

## Hypothesis Number Two

Hypothesis number two stated that the strength of health beliefs related to osteoporosis susceptibility, seriousness, benefits and health motivation of elderly women with osteoporosis instruction is greater than those without osteoporosis instruction. Means and standard deviations of pre-test and post test scores for both

the experimental and control groups are presented in Tables 5 and 6, while the ANCOVA results are presented in Tables 7 and 8.

Table 5

Means and Standard Deviations of Susceptibility, Seriousness, and Health Motivation

| | Group | |
|---|---|---|
| | Experimental (n = 20) | Control (n = 20) |
| Susceptibility | | |
| Mean | | |
| Pre-test | 20.30 | 18.75 |
| Post-test | | |
| Obtained | 22.60 | 18.15 |
| Adjusted | 22.09 | 18.66 |
| Standard Deviation | 3.68 | 4.67 |
| Seriousness | | |
| Mean | | |
| Pre-test | 18.90 | 20.15 |
| Post-test | | |
| Obtained | 19.85 | 19.65 |
| Adjusted | 20.26 | 19.24 |
| Standard Deviation | 3.21 | 4.21 |
| Health Motivation | | |
| Mean | | |
| Pre-test | 24.15 | 22.90 |
| Post-test | | |
| Obtained | 23.60 | 23.00 |
| Adjusted | 23.40 | 23.20 |
| Standard Deviation | 3.25 | 3.08 |

Table 6

Means and Standard Deviations of Benefits of Calcium Intake and Exercise

| | Group | |
|---|---|---|
| | Experimental (n = 20) | Control (n = 20) |
| Calcium Benefits | | |
| Mean | | |
| Pre-test | 21.85 | 22.90 |
| Post-test | | |
| Obtained | 23.40 | 21.65 |
| Adjusted | 23.56 | 21.49 |
| Standard Deviation | 1.76 | 3.60 |
| Exercise Benefits | | |
| Mean | | |
| Pre-test | 23.70 | 23.95 |
| Post-test | | |
| Obtained | 23.85 | 23.30 |
| Adjusted | 23.90 | 23.26 |
| Standard Deviation | 3.03 | 4.44 |

Table 7

Analysis of Covariance for Susceptibility, Seriousness, and Health Motivation

| Source of Variation | df | MS | F | P |
|---|---|---|---|---|
| Susceptibility | | | | |
| Between groups | 1 | 113.87 | 10.92 | .002 |
| Covariate | 1 | 285.65 | 27.40 | .000 |
| Within groups | 37 | 10.42 | | |
| Seriousness | | | | |
| Between groups | 1 | 10.15 | 1.09 | .303 |
| Covariate | 1 | 189.31 | 20.37 | .000 |
| Within groups | 37 | 9.29 | | |
| Health Motivation | | | | |
| Between groups | 1 | 0.37 | 0.04 | .837 |
| Covariate | 1 | 65.69 | 7.71 | .009 |
| Within groups | 37 | 8.52 | | |

Table 8

Analysis of Covariance for Calcium Intake and Exercise Benefits

| Source of Variation | df | MS | F | P |
|---|---|---|---|---|
| Calcium Benefits | | | | |
| Between groups | 1 | 41.63 | 5.84 | .021 |
| Covariate | 1 | 41.49 | 5.82 | .021 |
| Within groups | 37 | 7.13 | | |
| Exercise Benefits | | | | |
| Between groups | 1 | 4.08 | 0.32 | .575 |
| Covariate | 1 | 75.60 | 5.91 | .020 |
| Within groups | 37 | 12.79 | | |

The results of ANCOVA showed that the differences in the post-test score means between the experimental and control groups were statistically significant with respect to susceptibility to osteoporosis and the benefits of calcium ($p < .05$). The strength of susceptibility and the benefits of calcium beliefs of elderly women with osteoporosis instruction was significantly greater than those without osteoporosis instruction. On the other hand, the strength of seriousness of osteoporosis, general health motivation and benefit exercise beliefs of two groups was not significantly different from each other ($p > .05$).

Hypothesis Number Three

Hypothesis number three stated that the strength of health beliefs related to osteoporosis barriers of elderly women with osteoporosis instruction is less than those without osteoporosis instruction. Means and standard deviations of pre-test and post-test scores for both the experimental and control groups are presented in Table 9, while the ANCOVA results are presented in Table 10. The ANCOVA

results indicated that the differences in the post-test score means between the experimental and control groups were not statistically significant ($p > .05$); thus, hypothesis number three was not supported.

Table 9

Means and Standard Deviations of Barriers to Calcium Intake and Exercise

| | Group | |
|---|---|---|
| | Experimental (n = 20) | Control (n = 20) |
| Calcium Barriers | | |
| Mean | | |
| Pre-test | 14.95 | 13.80 |
| Post-test | | |
| Obtained | 15.50 | 14.85 |
| Adjusted | 15.24 | 15.11 |
| Standard Deviation | 4.84 | 5.27 |
| Exercise Barriers | | |
| Mean | | |
| Pre-test | 14.50 | 14.85 |
| Post-test | | |
| Obtained | 15.60 | 14.95 |
| Adjusted | 15.70 | 14.86 |
| Standard Deviation | 5.58 | 4.77 |

Table 10

Analysis of Covariance for Calcium Intake and Exercise Barriers

| Source of Variation | df | MS | F | P |
|---|---|---|---|---|
| Calcium Barriers | | | | |
| Between groups | 1 | 0.18 | 0.01 | .929 |
| Covariate | 1 | 152.97 | 6.90 | .012 |
| Within groups | 37 | 22.18 | | |
| Exercise Barriers | | | | |
| Between groups | 1 | 7.04 | 0.03 | .566 |
| Covariate | 1 | 249.41 | 11.92 | .001 |
| Within groups | 37 | 20.93 | | |

Hypothesis Number Four

Hypothesis number four stated that elderly women who receive osteoporosis instruction have greater levels of calcium intake and exercise self-efficacy than those subjects not receiving instruction concerning osteoporosis. Means and standard deviations of pre-test and post-test scores for both the experimental and control groups are presented in Table 11, while the ANCOVA results are presented in Table 12. The results from ANCOVA indicated that the difference in the post-test score means of calcium intake self-efficacy between the experimental and control groups was statistically significant ($p < .05$). However, two groups were not significantly different from each other with respect to exercise self-efficacy ($p > .05$). Thus, hypothesis number four was partially supported.

Table 11

Means and Standard Deviations of Calcium Intake Self-Efficacy, and Exercise Self-Efficacy

| | Group | |
|---|---|---|
| | Experimental (n = 20) | Control (n = 20) |
| Calcium Self-Efficacy | | |
| Mean | | |
| Pre-test | 366.60 | 376.80 |
| Post-test | | |
| Obtained | 462.00 | 386.80 |
| Adjusted | 465.02 | 383.78 |
| Standard Deviation | 152.71 | 178.47 |
| Exercise Self-Efficacy | | |
| Mean | | |
| Pre-test | 395.30 | 384.75 |
| Post-test | | |
| Obtained | 396.80 | 442.90 |
| Adjusted | 394.03 | 445.67 |
| Standard Deviation | 174.37 | 170.11 |

Table 12

Analysis of Covariance for Calcium Intake Self-Efficacy, and Exercise Self-Efficacy

| Source of Variation | df | MS | F | P |
|---|---|---|---|---|
| Calcium Self-Efficacy | | | | |
| Between groups | 1 | 56,550 | 4.45 | .042 |
| Covariate | 1 | 499,596 | 33.69 | .000 |
| Within groups | 37 | 14,829 | | |
| Exercise Self-Efficacy | | | | |
| Between groups | 1 | 21,252 | 1.02 | .319 |
| Covariate | 1 | 357,445 | 17.17 | .000 |
| Within groups | 37 | 20,812 | | |

# CHAPTER FIVE

# DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

## Discussion

One hypothesis of this study was supported in entirety, one was not supported and two were only partially supported. This discussion section will interpret the results of the study in relationship to theory and related research findings. Each hypothesis will be discussed individually, in consecutive order. The discussion section will be followed by a discussion of the methodological limitations. Chapter five will conclude with a final section describing implications and recommendations for further research.

### Hypothesis One

The results of hypothesis one suggest a teaching intervention about osteoporosis increased knowledge. This finding is consistent with Theis's study (1991), which found that knowledge about sodium restricted diets was increased with education intervention. Theis's study compared the effect of standard teaching on a low sodium diet with education intervention which was based on previous knowledge, and which was individually tailored. While both education groups' (standardized and individualized) knowledge test scores improved after the teaching, the individually taught group achieved better outcomes in knowledge gain as determined by additional statistical analysis. Although this study did not

individualize teaching, it is interesting to note that the control group's mean post-test scores increased without a teaching intervention, perhaps reflecting that their lack of knowledge was stimulated by the pre-test, and led them to either seek additional knowledge on their own, or to relate the information on the pre-test to their previous knowledge, and subsequently increased their post-test score. Many variables influence acquisition of knowledge, and this phenomenon could also have been operative with the experimental group's improved knowledge scores at post-test. In other words, the improved knowledge scores cannot necessarily be wholly attributed to the teaching intervention. The results of this study are also consistent with Barnes and Thomas (1990), who found that cancer education intervention modified for the elderly resulted in increased knowledge. While this study did not examine the difference between different types of teaching methodology, some modification was made for the elderly age group to which the education intervention was provided, such as slowing the speed of the instruction.

Hypothesis Two

Of the five variables hypothesized to be influenced by a teaching intervention, the strengths of only susceptability and benefits calcium were increased. Susceptability and severity are theorized to relate together to result in the extent to which osteoporosis would be perceived as an actual threat and they are both theorized to have a strong cognitive influence. It is interesting that education intervention influenced perceived susceptability, but did not increase the strength of perceived severity. Perceived severity scores may not have increased because the

subjects, who, after the education intervention, apparently recognized themselves as susceptible, planned to do something to prevent osteoporosis from being a serious threat to them. This study's findings relative to susceptability are similar to Brailey (1986), who found perceived susceptibility to breast cancer increased with teaching. The difference between her study and this one, however, is that she found that susceptibility was only increased with teaching that was tailored to the individual, and was not affected with a standard teaching intervention. This study used a standard teaching intervention.

Health motivation is defined as a generalized concern for health, and hence is not specific to osteoporosis. Because health motivation may represent more of an "entrenched" attribute, as opposed to the other more specific beliefs about osteoporosis, it would be less likely to be influenced by a condition-specific teaching intervention. Health motivation would be more likely to be influenced through a process of enculturation and not easily influenced by a brief educational session. The motivation variable is problematic with HBM research. Kelly et al. (1991) characterized it as an intervening variable in their study that examined health behavior following health promotion intervention. Thus, health motivation may act on the other health beliefs much like education intervention, social support, or cues to action might influence a belief.

The increase in the strength of perceived benefits-calcium after educational intervention, is consistent with Brailey (1986), who found that a teaching intervention increased the perceived benefits of breast self-examination. Although Barnes and

Thomas (1990) did not explicate whether or not the strength of perceived benefits was increased with cancer education intervention modified for the elderly, they did report that the subjects' level of education was positively correlated with the perception of the utility of diagnosis and treatment of cancer. This has some relevance since previous knowledge, in addition to the teaching intervention, may also have had some effect on increasing the strength of the benefit of taking adequate calcium to prevent osteoporosis (see hypothesis one).

Because education intervention increased the perceived benefit of taking adequate calcium to prevent osteoporosis, it is surprising that perceptions of the benefits of exercise to prevent osteoporosis were not also strengthened. Failure of the education intervention to influence the benefits-exercise belief may by attributed to the fact that calcium intake is more directly related to bone health. If scores were partially reflective of general awareness, this would further help to explain this phenomenon, since women, especially those with a higher level of education, are probably knowledgeable about relationship between calcium and bone health. Women are probably less likely to be aware of the benefits of exercise for bone health. Exercise is attributed to promoting health and preventing disease in a more generalized way, and its beneficial effect on bone density has, in the past, not been so well "advertised" as the beneficial effect of calcium intake and prevention of osteoporosis.

Failure of all the variables of hypothesis two to be influenced by the education intervention may be explained by the fact that the health beliefs are characterized

as attitudes, and hence not easily altered. It would be expected that one educational session would be unlikely to alter attitudes, especially for an elderly population, whose attitudes, which were developed over a life time, would not be very amenable to change.

Hypothesis Three

Janz and Becker (1984) reported that the barriers belief was consistently associated with health behaviors in all 13 studies reviewed (p. 36). This study found that education intervention was not related to this belief. It is possible that one of the other enabling/modifying variables of the HBM would be a stronger influencer of perceived barriers to exercise and calcium intake to prevent osteoporosis. The finding that education intervention was not related to barriers is consistent with Brailery's failure to establish a relationship between education about cancer and breast self-examination and perceived barriers regarding breast self-examination. Brailery reported that individualization, as opposed to a standard teaching plan, increased the strength of the health beliefs of susceptability and benefits regarding breast self-examination. Individualization may be an important strategy to increase calcium intake and exercise behavior. Perhaps modifying variables such as income or social support would be a stronger influencer of perceived barriers than education intervention. The general nature of the education intervention relating to barriers may not have had relevance to the individual's unique characteristics or concerns relative to calcium intake and exercise behavior, and the education intervention would have done little to alter their perception about barriers.

Jones, Jones, and Katz (1991) compared the effect of a HBM intervention on compliance behavior between acutely and chronically ill patients. It is difficult to compare the results of their study with this one, since their intervention involved use of several different types of teaching methods, and the dependent variable was behavior. However, they reported that the chronically ill patient was more compliant than the acutely ill patient, and concluded previous experience and knowledge apparently had an additive effect on their interventions to increase the strength of health beliefs, including barriers, which resulted in more compliant behavior.

Hypothesis Four

Hypothesis four was partially supported in that self-efficacy regarding calcium intake was increased with education intervention, but self-efficacy regarding exercise was not. This study found that women, after receiving information about osteoporosis and preventive strategies, were more likely to perceive themselves capable of taking in adequate calcium to prevent osteoporosis, but not capable of exercising. Perhaps this difference can be explained in that exercise would be a more difficult behavior. Self-efficacy theory states that efficacy expectations vary according to the magnitude, or difficulty of the tasks, as well as the generality. Exercise behavior may have been characterized by the sample as more difficult than taking in adequate calcium, and the education intervention session, although it addressed ways to decrease barriers to exercise, with the expectation that this could impact ability to exercise, apparently did not convince the subjects.

This aspect of generality regarding efficacy expectations could be significant here also regarding the differences between calcium intake and exercise behavior, in that, as discussed in hypothesis three, calcium is more specific behavior to affect bone health, and because of this, influences self-efficacy. Since exercise is a more generalized behavior, a woman may perceive her ability to maintain this behavior over time as more difficult.

Few studies that examined the direct effect of education intervention on the health beliefs were found. Many of the HBM studies examined HBM interventions, which used education, in addition with other modifying variables, such as social support, cues for action, etc. and their effect on outcome behavior. This makes it difficult to relate the results of this study, with outcome behavior studies, since one cannot make a "leap", and assume that because education intervention was used in these studies, and because behavior occurred, it cannot be assumed that education intervention changed the belief, which then resulted in the behavior. When comparing HBM research, it is important to differentiate the influence of the intervention on beliefs from influence on behavior. Much HBM research is explanatory (examine relationship between the health beliefs and outcome behavior).

Kelly et al. examined the effect of HBM intervention on behavior change, and found that greater than 50% of subjects who were identified to be at risk for a variety of health problems, made some kind of lifestyle change. This was a complex study, however, and because the intervention incorporated multiple modifying

variables in the intervention (and not just education), it is difficult to compare results with this study. Nevertheless, a few studies using the HBM have found that educational strategies can modify health behavior (Kelly, Zyzanski, & Alemagno, 1991, p. 312). This study does not examine relationships between the health beliefs and behavior, but the findings that education intervention increased the strength of susceptability and benefits (calcium) is significant in light of the fact that, according to Janz and Becker's HBM research review (1984, p. 36), susceptibility and benefits were consistently related to health behaviors. If these beliefs are likely to influence behavior, and if education intervention influences these beliefs, as this study suggests, then this provides support for the efficacy of educational programs to alter these beliefs in a way that may lead to behavior that may prevent osteoporosis.

In conclusion, although lack of previous studies that examined the effect of education intervention on the health beliefs made relating this study to prior research using the HBM somewhat limited. Relating the results to previous research and the theory of HBM and self-efficacy, indicates some relevance for the significance of education intervention on influencing the health beliefs. However, just as the HBM has been found to be more explanative when measures of the beliefs are specific to illness, so does it seem that education intervention, individualized to women's beliefs, and hence that which builds on prior knowledge and education would be more likely to be effective in changing beliefs and, ultimately, behavior to prevent osteoporosis.

## Limitations

A major methodological limitation of this study involved the selection and composition of the research sample. The experimental group within the research sample was drawn from a suburban area characterized by mid-to-high income levels, while the control group was drawn from an urban area characterized by a low income level. This disimilar grouping is the result of a change in the original research design which occurred when one researcher resigned from the project. The literature is replete with studies indicating that income levels are a significant explanatory variable with respect to health care awareness, health care knowledge, self-care related to health care, acquiring and retaining knowledge related to health care, and levels of wellness.

The difference between the experimental and control groups of the study with respect to income levels limits generalizability of the findings of this study. Small sample size of forty subjects influences the power of statistical analysis as well as generalization of findings to other groups. Thus, the findings of this study may not be generalizable beyond the research sample for this study.

A limitation of this study concerned the data collection questionnaire that was employed. This questionnaire was lengthy, and required a substantial amount of time to administer. As a consequence, many of the elderly subjects became fatigued prior to the completion of the administration. This fatigue may have affected the reliability of the measurement. Self administration of the lengthy questionnaire may have added to the fatigue factor.

Lastly, in the context of limitations associated with the conduct of the study, the researcher was unable to make clear to the research groups the concept of experimental research design. Thus, these subjects perceived the retest as a waste of time. This attitude may have compromised the validity and reliability of the study findings.

## Implications and Recommendations

One implication of this study, even considering the methodological limitations, is that educational interventions related to osteoporosis may, if carefully designed, be effective in both the reduction in the onset of the condition, and in the management of the condition. Women, if effectively educated with respect to osteoporosis and the several factors affecting onset and management, can protect themselves from some of the worst outcomes of osteoporosis. If a unique educational plan is directed to meet the elderly women's learning style, the women will learn more readily. Elderly women may require a tailored plan to account for belief patterns and ability to learn. Little attention has been paid to this population due to our culture's preoccupation with youth. As adults age, a degree of dependency may surface which can affect self confidence. The sensitive teacher will take this potential attitude into account, addressing it openly. A climate of mutual respect can evolve when a learner is regarded for her history and what she is today.

In view of the rather weak supportive findings of this investigation, continued testing of the HBM is suggested. Even though the results of this study do not support definite conclusions concerning knowledge and health beliefs, communication

of the research will add to nursing's knowledge base. This investigation built on earlier research and may stimulate additional studies into how an instructional intervention can influence elderly women's health beliefs. Nurses with sound behavioral theory are equipped to develop health care instructional components for differing health concerns. This study used a uniform teaching plan, however, it may be suggested that a tailored plan could more effectively meet the learners' needs.

The literature would suggest that a tailored teaching plan which meets special learning needs of each elderly woman would have a positive effect on health beliefs and self-efficacy perceptions. Provision of information alone is not adequate. The next logical step in osteoporosis research would be to study behaviors resulting from changes in osteoporosis knowledge, health beliefs, and self-efficacy.

Nursing intervention strategies based on belief dimensions could be developed for a disease specific group. There are cases of patients having the knowledge about the illness and prevention, but nonetheless are non-compliant. The non-compliant individuals may lack motivation, skill, and belief in their risk, while others may lack seeing the benefit in proposed actions. People only act on what they believe to exist even though it may not match reality. An individual weighs the expenditure in changing an attitude or belief against the cost. Beliefs are driven by education and by a state of readiness to believe.

More study should be considered in researching the interaction and overlapping of health beliefs and the influence on combinations of beliefs. In addition, research of stability of beliefs over time is recommended with larger

numbers of subjects. A one-time exposure to the information may have not allowed a change in health beliefs to occur. This research would indicate that a change in beliefs over a two-week interval may not be adequate to sustain a health belief. Educational strategy that will change and maintain health beliefs over long periods of time. Nursing should consider the importance of measuring patients' beliefs. There is a need to more fully understand why and when patients will follow advice. It is important to assess what a patient knows and maybe even more importantly, what the patient believes. Beliefs are central to the person's decision to act.

In conclusion, the main purpose of this study was to examine the effect of an educational evaluation on knowledge and health beliefs (susceptibility, seriousness, benefits, barriers, health motivation, and self-efficacy) related to osteoporosis. In this study, the findings indicated there is some significant relationship between the women's knowledge, health beliefs, and self-efficacy after an instructional intervention. The results showed that the osteoporosis knowledge of the elderly women receiving osteoporosis instruction was significantly greater than the elderly women who did not receive the instruction. The strength of susceptibility and benefit of calcium intake belief and self-efficacy of calcium intake belief was increased for the elderly women after the instructional intervention. The educational intervention had no significant effect on the strength of beliefs to seriousness, health motivation, benefits exercise, barriers calcium, barriers exercise, or self-efficacy of exercise.

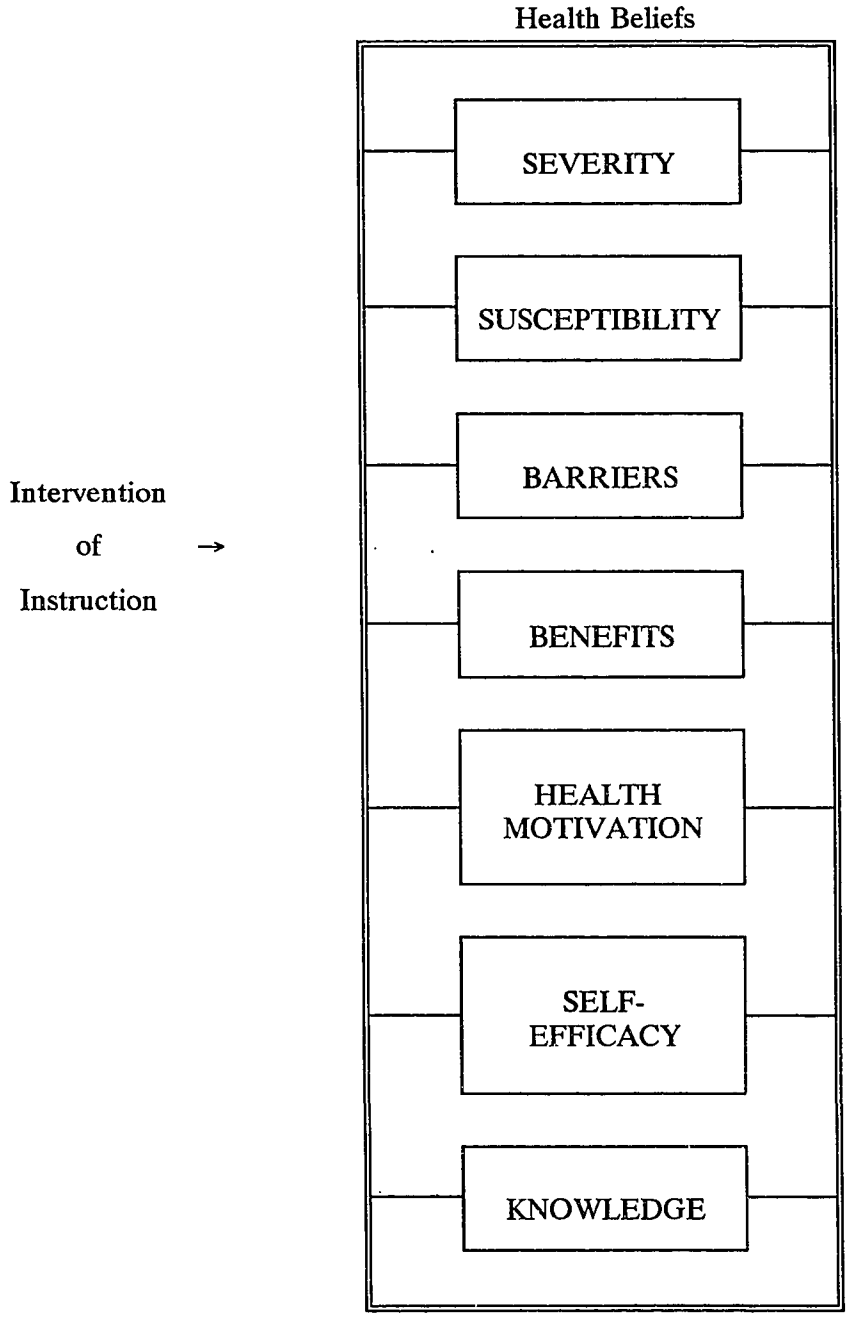
Certainly many questions remain unanswered about the variables and the importance of each in determining an elderly woman's health belief and knowledge.

Nurses need to continue to assist elderly women in identifying their beliefs and knowledge concerning osteoporosis. There is a continued need for research directed toward health issues of elderly women.

# APPENDICES

APPENDIX A

## CONCEPTUAL FRAMEWORK: "ADAPTED" FROM THE HEALTH BELIEF MODEL



## APPENDIX B

ID NO: _____

OSTEOPOROSIS HEALTH BELIEF SCALE

(Interviewer: Read the following instruction SLOWLY)

Osteoporosis (os-teo-po-ro-sis) is a condition in which the bones become excessively thin (porous) and weak so that they are fracture prone (they break easily).

I am going to ask you some questions about your beliefs about osteoporosis. There are no right or wrong answers. Everyone has different experiences which will influence how they feel. After I read each statement, tell me if you STRONGLY DISAGREE, DISAGREE, are NEUTRAL, AGREE, or STRONGLY AGREE with the statement. I am going to show you a card with these five choices. When I read each statement, tell me which one of the five is your choice.

It is important that you answer according to your actual beliefs and not according to how you feel you should believe or how you think we want you to believe. We need the answers that best explain how you feel.

(Interviewer: Before administration of the scale, check whether the participant can read the five choices on the card. If the person is unable to read them, you need to read the five choices after each statement).

| Strongly disagree | Disagree | Neutral | Agree | Strongly agree | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | |
| SD | D | N | A | SA | 1. Your chances of getting osteoporosis are high. |
| SD | D | N | A | SA | 2. Because of your body build, you are more likely to develop osteoporosis. |
| SD | D | N | A | SA | 3. It is extremely likely that you will get osteoporosis. |
| SD | D | N | A | SA | 4. There is a good chance that you will get osteoporosis. |
| SD | D | N | A | SA | 5. You are more likely than the average person to get osteoporosis. |
| SD | D | N | A | SA | 6. Your family history makes it more likely that you get osteoporosis. |
| SD | D | N | A | SA | 7. The thought of having osteoporosis scares you. |
| SD | D | N | A | SA | 8. If you had osteoporosis you would be crippled. |

| Strongly disagree | Disagree | Neutral | Agree | Strongly agree | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | |
| SD | D | N | A | SA | 9. Your feelings about yourself would change if you got osteoporosis. |
| SD | D | N | A | SA | 10. It would be very costly if you got osteoporosis. |
| SD | D | N | A | SA | 11. When you think about osteoporosis you get depressed. |
| SD | D | N | A | SA | 12. It would be very serious if you got osteoporosis. |
| SD | D | N | A | SA | 13. Regular exercise prevents problems that would happen from osteoporosis. |
| SD | D | N | A | SA | 14. You feel better when you exercise to prevent osteoporosis. |
| SD | D | N | A | SA | 15. Regular exercise helps to build strong bones. |
| SD | D | N | A | SA | 16. Exercising to prevent osteoporosis also improves the way your body looks. |
| SD | D | N | A | SA | 17. Regular exercise cuts down the chances of broken bones. |
| SD | D | N | A | SA | 18. You feel good about yourself when you exercise to prevent osteoporosis. |

(Interviewer: Read the following instruction SLOWLY)

For the following 6 questions, when I say "taking in enough calcium" it means taking enough calcium by eating calcium rich foods and/or taking calcium supplements.

| | | | | | |
|---|---|---|---|---|---|
| SD | D | N | A | SA | 19. Taking in enough calcium prevents problems from osteoporosis. |
| SD | D | N | A | SA | 20. You have lots to gain from taking in enough calcium to prevent osteoporosis. |
| SD | D | N | A | SA | 21. Taking in enough calcium prevents painful osteoporosis. |
| SD | D | N | A | SA | 22. You would not worry as much about osteoporosis if you took in enough calcium. |
| SD | D | N | A | SA | 23. Taking in enough calcium cuts down on your chances of broken bones. |

| Strongly disagree | Disagree | Neutral | Agree | Strongly agree | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | |
| SD | D | N | A | SA | 24. You feel good about yourself when you take in enough calcium to prevent osteoporosis. |
| SD | D | N | A | SA | 25. You feel like you are not strong enough to exercise regularly. |
| SD | D | N | A | SA | 26. You have no place where you can exercise. |
| SD | D | N | A | SA | 27. Your spouse or family discourages you from exercising. |
| SD | D | N | A | SA | 28. Exercising regularly would mean starting a new habit which is hard for you to do. |
| SD | D | N | A | SA | 29. Exercising regularly makes you uncomfortable. |
| SD | D | N | A | SA | 30. Exercising regularly upsets your every day routine. |
| SD | D | N | A | SA | 31. Calcium rich foods cost too much. |
| SD | D | N | A | SA | 32. Calcium rich foods do not agree with you. |
| SD | D | N | A | SA | 33. You do not like calcium rich foods. |
| SD | D | N | A | SA | 34. Eating calcium rich foods means changing your diet which is hard to do. |
| SD | D | N | A | SA | 35. In order to eat more calcium rich foods you have to give up other foods that you like. |
| SD | D | N | A | SA | 36. Calcium rich foods have too much cholesterol. |
| SD | D | N | A | SA | 37. You eat a well-balanced diet. |
| SD | D | N | A | SA | 38. You look for new information related to health. |
| SD | D | N | A | SA | 39. Keeping healthy is very important for you. |
| SD | D | N | A | SA | 40. You try to discover health problems early. |
| SD | D | N | A | SA | 41. You have a regular health check-up even when you are not sick. |
| SD | D | N | A | SA | 42. You follow recommendations to keep you healthy. |

## APPENDIX C

ID NO: _____

### OSTEOPOROSIS S-E SCALE

We are interested in learning how confident you feel about doing the following activities. Everyone has different experiences which will make each person more or less confident in doing the following things. Thus, there are no right or wrong answers to this questionnaire. It is your opinion that is important. In this questionnaire, EXERCISE means activities such as walking, swimming, golfing, biking, aerobic dancing.

Place your "X" anywhere on the answer line that you feel best describes your confidence level.

If it were recommended that you do any of the following THIS WEEK, how confident or certain would you be that you could:

1. begin a new or different exercise program

   Not at all confident |——————————————————————| Very confident

2. change your exercise habits

   Not at all confident |——————————————————————| Very confident

3. put forth the effort required to exercise

   Not at all confident |——————————————————————| Very confident

4. do exercises even if they are difficult

   Not at all confident |——————————————————————| Very confident

5. exercise for the appropriate length of time

   Not at all confident |——————————————————————| Very confident

6. do the type of exercises that you are supposed to do

   Not at all confident |——————————————————————| Very confident

If it were recommended that you do any of the following THIS WEEK, how confident or certain would you be that you could:

7. increase your calcium intake

Not at all confident ——— Very confident

8. change your diet to include more calcium rich foods

Not at all confident ——— Very confident

9. eat calcium rich foods as often as you are supposed to do

Not at all confident ——— Very confident

10. select appropriate foods to increase your calcium intake

Not at all confident ——— Very confident

11. stick to a diet which gives an adequate amount of calcium

Not at all confident ——— Very confident

12. obtain foods that give an adequate amount of calcium

Not at all confident ——— Very confident

ID NO: _____

# APPENDIX D
## OSTEOPOROSIS KNOWLEDGE TEST

(Interviewer: Read the following instruction SLOWLY)

Osteoporosis (os-teo-po-ro-sis) is a condition in which the bones become very brittle and weak so that they break easily.

I am going to read a list of things which may or may not affect a person's chance of getting osteoporosis. After I read each one, tell me if you think the person is:

MORE LIKELY TO GET OSTEOPOROSIS, or

LESS LIKELY TO GET OSTEOPOROSIS, or

IT HAS NOTHING TO DO WITH GETTING OSTEOPOROSIS.

I am going to show you a card with these 3 choices. When I read each statement, tell me which one of the 3 will be your best answer. (Test administrator. Do not read "don't know" choice. If the participants say "don't know", circle this option.)

| CODE | | MORE LIKELY | LESS LIKELY | NEUTRAL | DON'T KNOW |
|---|---|---|---|---|---|
| | 1. Eating a diet LOW in milk products | ML | LL | NT | DK |
| 0 1 | 2. Being menopausal; "change of life" | ML | LL | NT | DK |
| 0 1 | 3. Having big bones | ML | LL | NT | DK |
| 0 1 | 4. Eating a diet high in dark green leafy vegetables | ML | LL | NT | DK |
| 0 1 | 5. Having a mother or grandmother who has osteoporosis | ML | LL | NT | DK |
| 0 1 | 6. Being a white woman with fair skin | ML | LL | NT | DK |
| 0 1 | 7. Having ovaries surgically removed | ML | LL | NT | DK |
| 0 1 | 8. Taking cortisone (steroids e.g. Prednisone) for long time | ML | LL | NT | DK |
| 0 1 | 9. Exercising on a regular basis | ML | LL | NT | DK |

10/90

(Interviewer: Read the following instruction SLOWLY)

For the next group of questions, you will be asked to choose one answer from several choices. Be sure to choose only one answer. If you think there is more than one answer, choose the best answer. If you are not sure, just say "I don't know."

CODE

10. Which of the following exercises is the best way to reduce a person's chance of getting osteoporosis?

0 1

A. Swimming
B. Walking briskly
C. Doing kitchen chores, such as washing dishes or cooking
D. DK

11. Which of the following exercises is the best way to reduce a person's chance of getting osteoporosis.

0 1

A. Bicycling
B. Yoga
C. Housecleaning
D. DK

12. How many days a week do you think a person should exercise to strengthen the bones?

0 1

A. 1 day a week
B. 2 days a week
C. 3 or more days a week
D. DK

13. What is the LEAST AMOUNT OF TIME a person should exercise on each occasion to strengthen the bones?

0 1

A. Less than 15 minutes
B. 20 to 30 minutes
C. More than 45 minutes
D. DK

14. Exercise makes bones strong, but it must be hard enough to make breathing:

0 1

A. Just a little faster
B. So fast that talking is not possible
C. Much faster, but talking is possible
D. DK

15. Which of the following exercises is the best way to reduce a person's chance of getting osteoporosis.

0 1

A. Jogging or running for exercise
B. Golfing using golf cart
C. Gardening
D. DK

16. Which of the following exercises is the best way to reduce a person's chance of getting osteoporosis.

0 1

A. Bowling
B. Doing laundry
C. Aerobic dancing
D. DK

(Interviewer: Read the following statement SLOWLY)

Calcium is one of the nutrients our body needs to keep bones strong.

CODE

17. Which of these is a good source of calcium?

0 1 A. Apple D. DK
B. Cheese
C. Cucumber

18. Which of these is a good source of calcium?

0 1 A. Watermelon D. DK
B. Corn
C. Canned Sardines

19. Which of these is a good source of calcium?

0 1 A. Chicken D. DK
B. Broccoli
C. Grapes

20. Which of these is a good source of calcium?

0 1 A. Yogurt D. DK
B. Strawberries
C. Cabbage

21. Which of these is a good source of calcium?

0 1 A. Ice cream D. DK
B. Grape fruit
C. Radishes

22. Which of the following is the recommended amount of calcium intake for an adult?

0 1
A. 100 mg - 300 mg daily D. DK
B. 400 mg - 600 mg daily
C. 800 mg or more daily

23. How much milk must an adult drink to meet the recommended amount of calcium?

0 1
A. 1/2 glass daily D. DK
B. 1 glass daily
C. 2 or more glasses daily

24. Which of the following is the best reason for taking a calcium supplement?

0 1
A. If a person skips breakfast D. DK
B. If a person does not get enough calcium from diet
C. If a person is over 45 years old

APPENDIX E Subject # _____

## Demographic Sheet

1. My age is _____.

2. My income is:

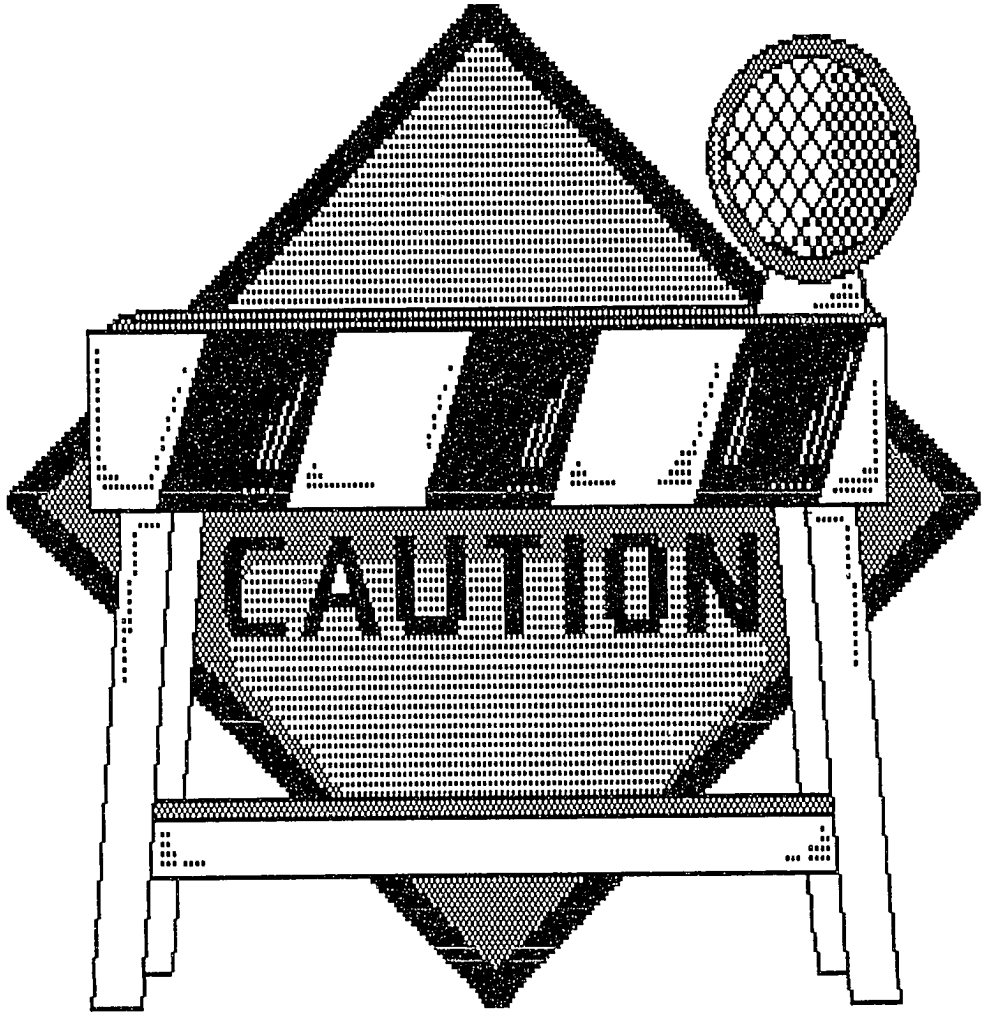
   [ ] under $10,000 per year
   [ ] $10,000 - $19,999
   [ ] $20,000 - $29,999
   [ ] $30,000 - $39,999
   [ ] $40,000 - $49,999
   [ ] over $50,000 per year

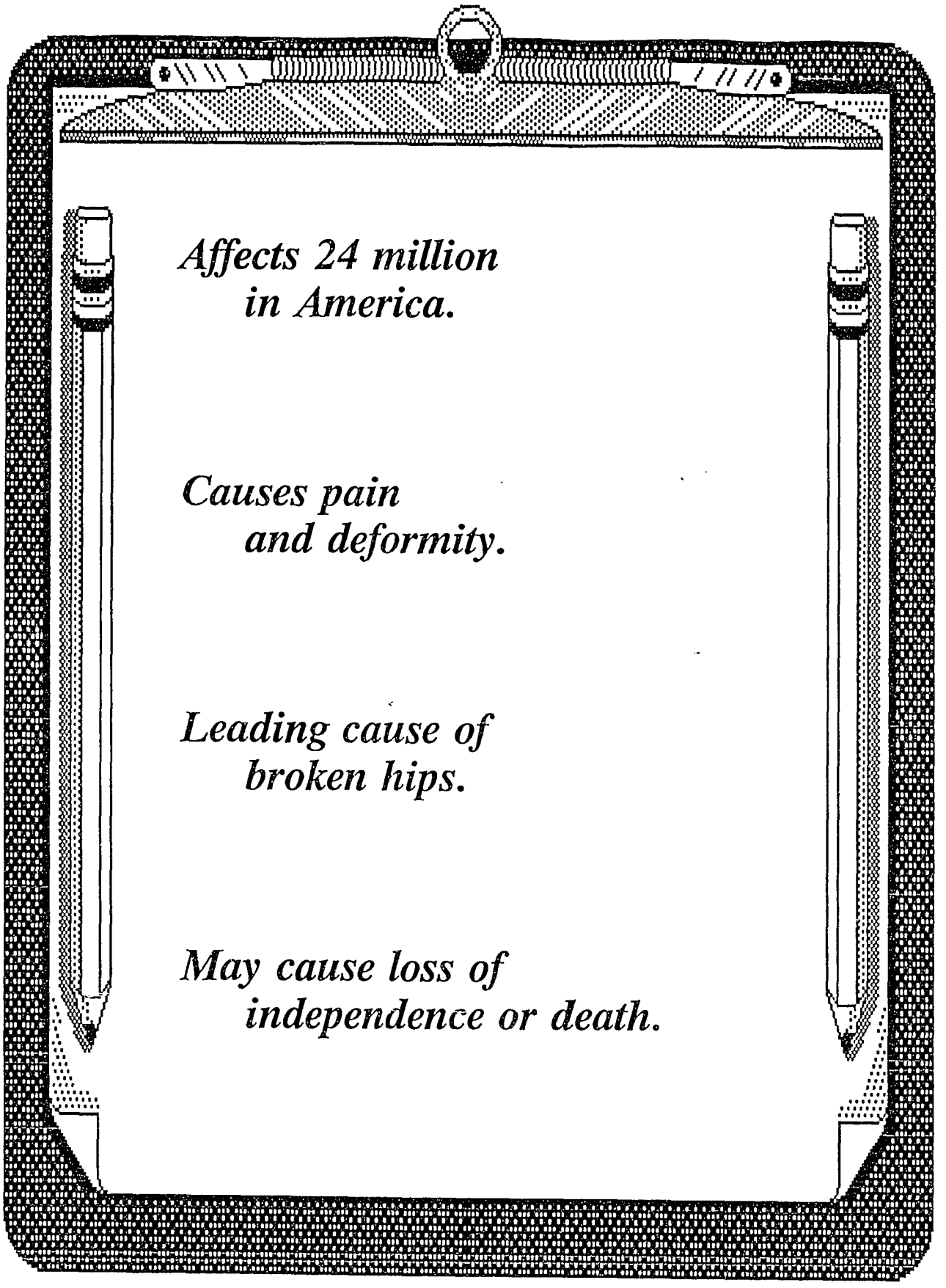
3. My race is:

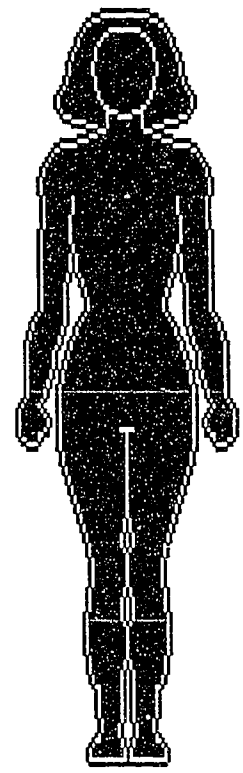
   [ ] Black
   [ ] White
   [ ] Asian
   [ ] Hispanic
   [ ] American Indian
   [ ] Other _____

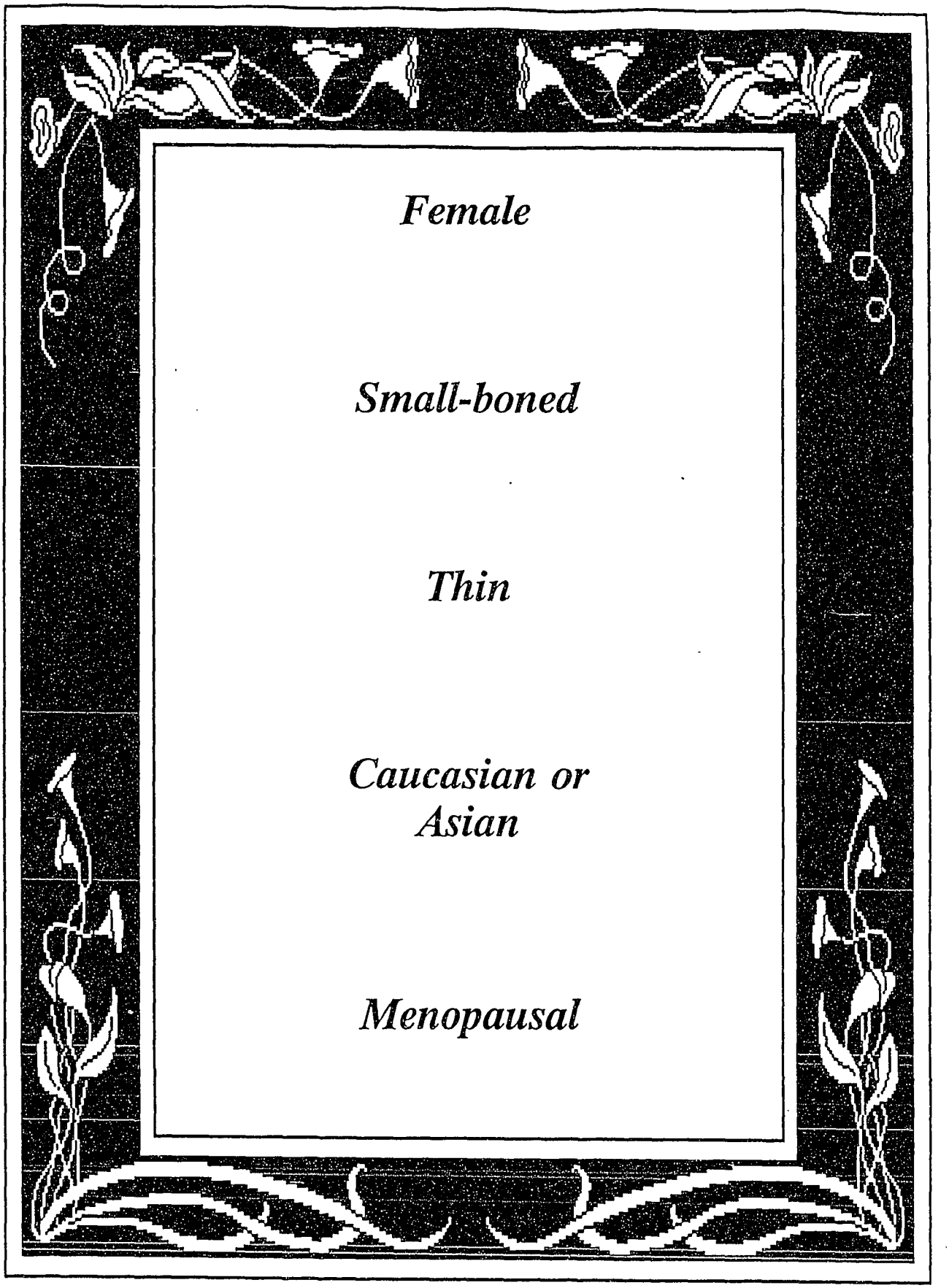
4. Do you have osteoporosis? _____

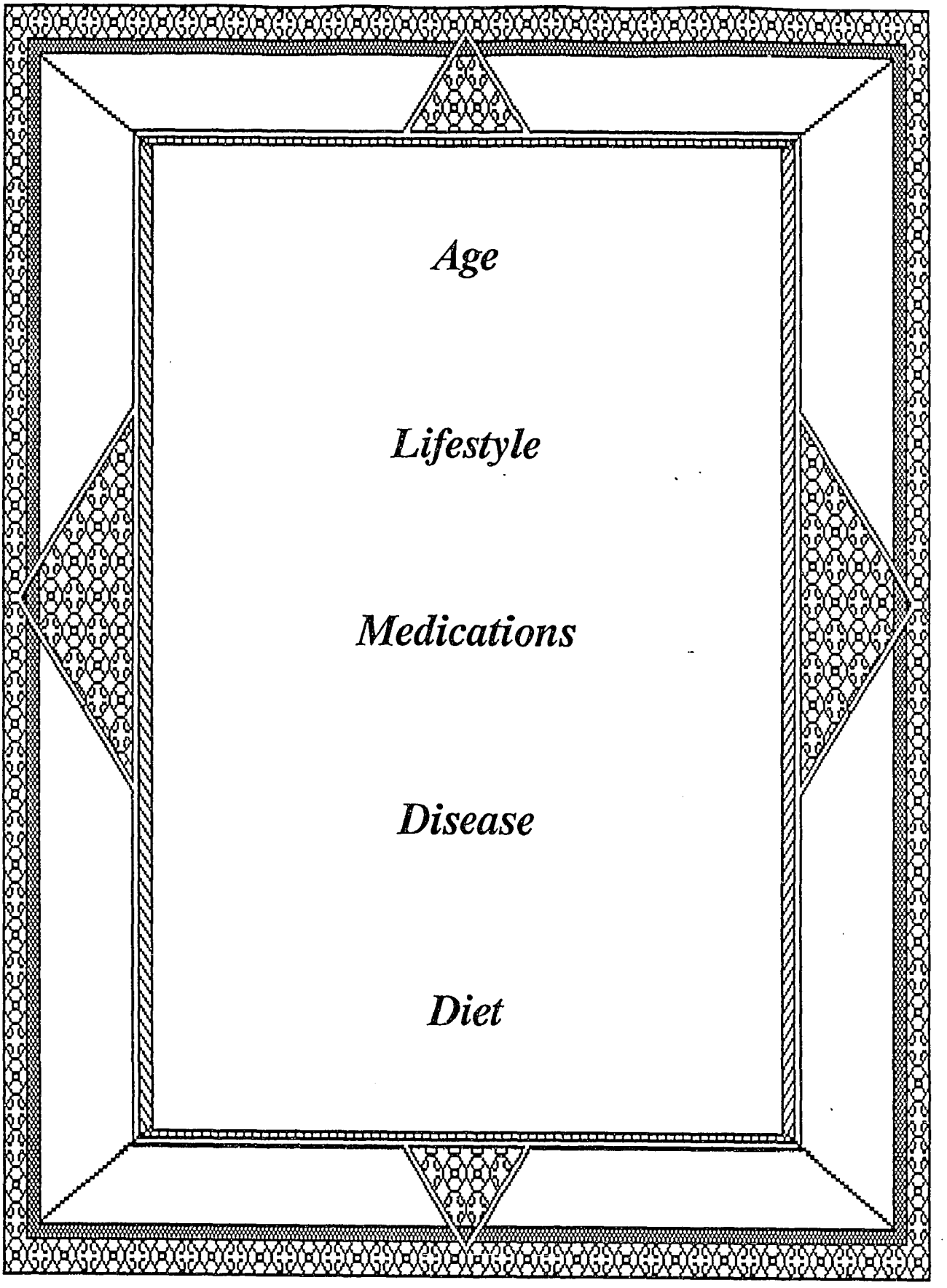
APPENDIX F

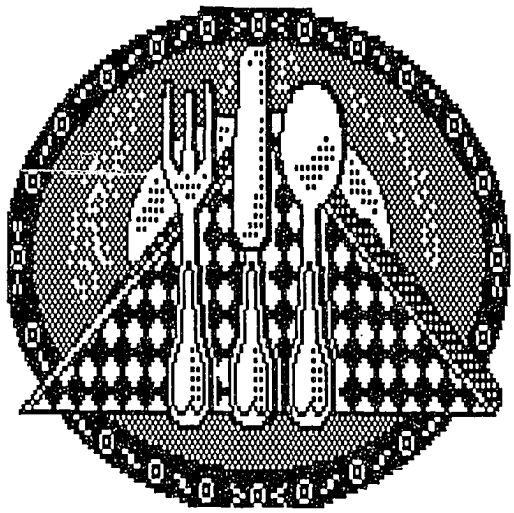


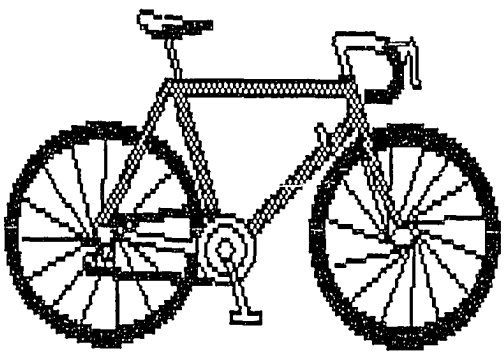

*Affects 24 million in America.*
*Causes pain and deformity.*
*Leading cause of broken hips.*
*May cause loss of independence or death.*

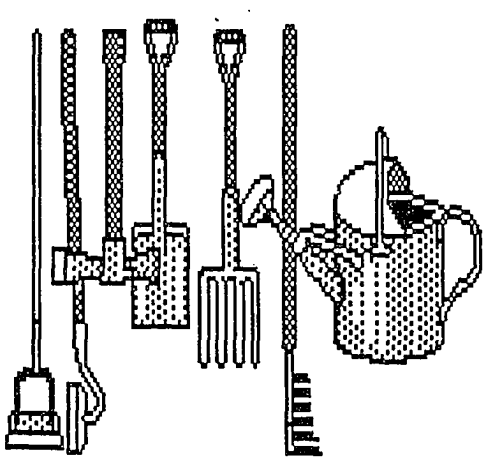


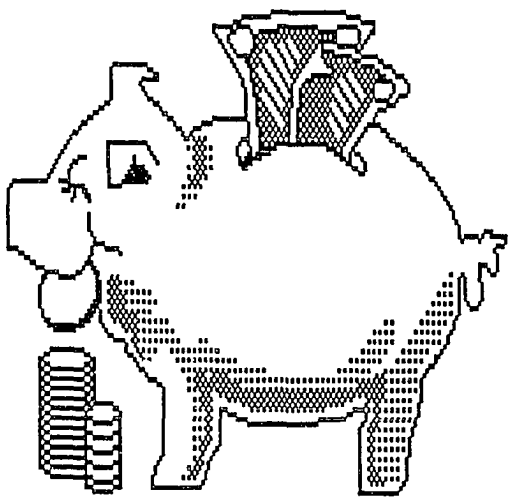

Female
Small-boned
Thin
Caucasian or
Asian
Menopausal


Age
Lifestyle
Medications
Disease
Diet









*Longer Life*

*Decreased chance of other broken bones*

*Money saved:*
*Fewer lost work days*
*Lower medical bills*

*Increased activity*

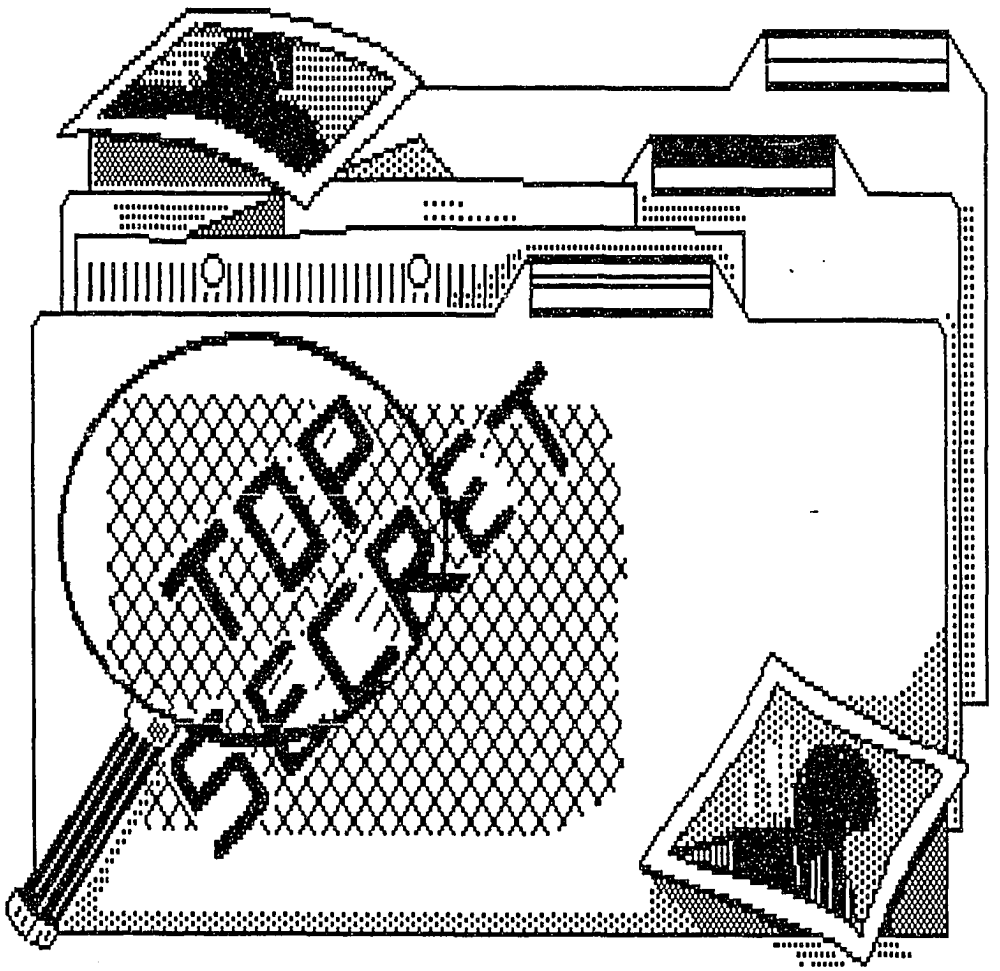
*Independence*

*Decreased pain*

*Health*

*Better posture*

*Increased activity tolerance*


TOP
SECRET

*Calcium:*

*Can't tolerate dairy foods*

*Too expensive*

*Gives me gas/diarrhea*

*Too fattening*

*I hate taking pills*

*Exercise:*

*I hate exercise*

*Too hard*

*No time*

*Too painful*

*I'm too old*

*It's dangerous*

Introduction

You have probably read and heard a lot about osteoporosis. Osteoporosis is a disease that weakens bones. How and why we get osteoporosis is still being studied. But there are some things we do know.

Most of the time about 99 percent of all the calcium in our body is stored in the bones. Calcium makes bones strong.

As we develop from infant to young adult, the bone-building process continues. When we reach adulthood, bones may stop growing in length, but they continue to store calcium to make them stronger. By around age 35, our bones are at their strongest.

After the age of 35, bones begin to lose their strength. How fast their loss is dependent upon many things, including diet and exercise.

In order to protect yourself from osteoporosis there are some things you need to know. We will answer your questions at the end of this session.

Seriousness

Osteoporosis is a serious disease that affects **24 million Americans.**

It causes **pain and deformity,** One deformity seen with osteoporosis is **hunched posture.** You may have seen an older person with this problem (demonstrate kyphosis). This may be related to having osteoporosis.

Osteoporosis is the leading cause of **broken hips.** One woman in five will suffer a broken hip sometime in her life. (If there are five or more women in the group, point out that one of them will likely suffer a fracture in the future.) Half of those women who break their hip will die within one year.

**Pain, broken hips and deformity may cause you to lose your independence or even your life.**

Susceptibility

Persons who are most likely to develop osteoporosis have one or more of the following:

**Female** = For every four women that develop osteoporosis, only one male will.

**Small bones** = small bones have less calcium to begin with, so any loss is going to make the bones weak.

**Thin** = very thin women have less padding to protect their hips when they fall. Heavier women's bones had to work harder to support their weight, so their bones are stronger than thinner women's are.

**Caucasian or Asian** = whites and Asians tend to develop osteoporosis. We don't know why, yet.

**Menopausal** = at menopause, the woman's body stops making estrogen. Estrogen is needed to help the bones stay strong.

**Age** = as you age, your body stores less and less calcium, so your bones get weaker. The older you get, the weaker your bones become.

**Lifestyle** = bones need exercise to stay strong, just like your muscles do. People who don't get much exercise have weaker bones. And to make things worse, people who smoke or drink alcohol tend to lose bone more than people who don't smoke or drink.

**Medication** = certain medications can affect how your body stores calcium.

Steroids like cortisone, are one example. Check with your doctor.

**Disease** = diabetes, thyroid diseases and rheumatoid arthritis all increase your risk of developing osteoporosis.

**Diet** = you need to take in enough calcium <u>every day</u> to make strong bones. There are many different and delicious ways to do this, which we will discuss in a couple minutes.

<u>Benefits</u>

Taking care of your bones helps them take care of you. Some of the benefits of good bone health are:

**Longer life** = as we learned earlier, people who have broken hips tend to die sooner. If you can avoid a broken hip, you may actually live longer.

**Decreased chance of other broken bones** = people who break one bone are more likely to break another. Strong bones don't break as easily or as often.

**Money saved:**

**Fewer lost work days** = it is hard to work with broken bones or pain.

**Lower medical bills** = you don't have to pay for what you don't break.

**Increased activity** = strong bones can work and play harder and longer.

**Independence** = people who break bones may have to go to a nursing home or hospital to recover.

**Decreased pain** = broken hips and bones are very painful. Strong bones don't break very easily.

**Health** = an active, pain-free well-fed woman not only looks healthy, but <u>is</u>

healthy.

**Better posture** = strong bones can better support the upper body, so you can stand tall and proud.

**Increased activity tolerance** = like we said before, strong bones can work and play harder and longer.

Barriers

We have been talking about the importance of calcium and exercise in the prevention of osteoporosis. Now let's see what you can do to get more calcium and exercise into your life.

**Calcium** - of course a balanced diet is best. Be sure your diet includes at least five servings a day from foods that are good sources of calcium.

**Dislike dairy foods** = calcium, found in dairy foods, can also be found in green, leafy vegetables, nuts, beans and fish that is canned with bones. Here is a list of good sources of calcium. (Hand out list)

**Can't tolerate dairy foods** = there are several products you can buy to help you with this problem. Ask a pharmacist or your doctor about them. Or your doctor may suggest a calcium pill.

**Too expensive** = actually, it only costs about a dollar a day to eat enough dairy foods to meet your calcium needs. Other sources may cost more.

**Gives me gas/diarrhea** = Lactaid helps your body digest the sugars in milk to avoid this problem.

Some people can tolerate yogurt of cheese without getting gas or

diarrhea. Sometimes spreading the servings out can help. Your doctor may be able to help you work this out.

**Too fattening** = Dairy foods are not the only source of calcium. Use low fat products (such as skim milk or yogurt) and eat more vegetables high in calcium if you are counting calories.

**I hate taking pills** = A balanced diet should have enough calcium in it to meet your needs.

Exercise - comes in many forms. You don't have to spend a lot of money or time to get your body and bones in shape. Of course, before you begin <u>any</u> exercise program you should check with your doctor.

**I hate exercise** = exercise comes in many forms. Don't focus on how you hate it. Think of it as insurance for the future.

**No time** = walking for thirty minutes three times a week may be all that you need to do to strengthen your bones. It's also a fun thing to do with friends. You can combine a visit and a walk very easily.

**Too painful** = probably because you're out of shape. Start gradually and work up to it.

**I'm too old** = studies show that many of the problems of old age are caused by being inactive, more than by actually aging. Active people tend to <u>feel</u> younger.

**It's dangerous** = you don't need to take up skydiving. Walking is safe, easy and inexpensive. Malls often open early for walkers and have places to hang coats, and distances marked off for you.

Conclusion

As you can see, adding calcium and exercise to your life can be fun, easy and delicious.

We don't want you to think that there is no way to avoid osteoporosis, because you can. You can control what happens to your body. What you do can make a difference. It's up to you.

GRAND VALLEY STATE UNIVERSITY
1 CAMPUS DRIVE • ALLENDALE MICHIGAN 49401-9403 • 616/895-6611

APPENDIX H

Letter of Permission

November 1, 1992

Yvonne M. Van Hoven BSN
5964 Chicago Dr.
Zeeland, MI 49464

Dear Yvonne:

You have my permission to use the Osteoporosis Health Belief Scale and Osteoporosis Self-Efficacy Scale. Please keep us informed of any results you obtain using the scales. In that way I hope to continue to serve as a clearing house for information about the scales.

I wish you much success with your study.

Sincerely,

[redacted]
Katherine K. Kim RN, PhD
Associate Professor
Kirkhof School of Nursing
Grand Valley State University

APPENDIX I

(Participation Agreement form)

I understand that I will be participating in a study about osteoporosis and that the knowledge gained is expected to help medical professionals improve health care for the elderly.

I also understand that:

1) participation in this study will involve administration of three questionnaires on two different dates and attendance at an educational session on one of those days.

2) that it is not anticipated that this study will lead to physical or emotional risk to myself.

3) that the information I provide will be kept in the strictest confidence and that the questionnaires will be coded so that, once all data has been collected, no identification of individual participants will be possible.

4) a summary of the results will be made available to me upon my request once the study is completed.

I acknowledge that:

"I have been given an opportunity to ask questions regarding this research study, and that these questions have been answered to my satisfaction."

"In giving my consent, I understand that my participation in this study is voluntary and that I may withdraw at any time using the postpaid card provided by Yvonne Van Hoven."

"I hereby authorize the investigator, Yvonne Van Hoven, to release the information obtained in this study to scientific literature. I understand that I will not be identified by name."

"I have been given the phone number of Yvonne Van Hoven so that I may contact her at any time if I have questions."

"I acknowledge that I have read and understand the above information, and that I agree to participate in this study."

| | |
|---|---|
| _____ | _____ |
| (Witness) | (Participant Signature) |
| Date:_____ | Date:_____ |

APPENDIX J

Knowledge Intervention Script

Information to Participants

Hello, I am _____, a nursing student (graduate nursing student) at Grand Valley State University, and interested in special concerns of elderly women. Part of my project is helping in the osteoporosis study which is being conducted by graduate students at Grand Valley State University. As you may know, osteoporosis is a condition in which the bones become brittle and weak so that they break easily.

For this project, we would like to ask you some questions about osteoporosis, specifically your exercise and food intake and what you know and feel about osteoporosis.

The interview will take about one hour. Information you give to me will be kept confidential. You can withdraw participation at any time. Would you be willing to help us?

Response (if yes proceed -- if no thank the individual and continue to the next candidate).

Thank you, and if concerns or questions arise I will be available at this address on _____ or phone _____.

(Script of letter)

Dear

I am a student at Grand Valley State University working toward a master's degree in nursing. My area of interest is the disease osteoporosis.

I am currently searching for persons to participate in this research. The study will consist of two sessions: one session will last approximately one hour, during which three questionnaires will be administered, and one session which will include not only the questionnaires, but an educational component as well.

To protect your privacy, should you agree to join the study group, a master list of names and phone numbers will be generated. Each person on that list will be issued a code number. After participation in the second session, the name portion and phone number portion of the master list will be destroyed, and no further attempt to contact you will be made.

Participation is strictly voluntary. All information obtained will be used in the preparation of a thesis. While combined data may eventually be published, specific answers will not, nor will the forms completed be made available for viewing by other persons.

I appreciate your taking the time to read this letter. I have enclosed a separate form for your reply if you would like to participate. Complete the form and return it in the envelope provided. Should you decline to participate, no further action on your part is necessary.

Thank you.

Yvonne Van Hoven, BSN, RN

(You may wish to retain this page for your personal records.)

## LIST OF REFERENCES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