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Relationships of Osteoporosis Health Beliefs to Calcium Intake of Women

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RELATIONSHIPS OF OSTEOPOROSIS HEALTH BELIEFS TO CALCIUM INTAKE OF WOMEN

By

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ABSTRACT

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The purpose of this study was to examine the relationships of health beliefs to calcium intake of women. There were two hypotheses tested. Hypothesis one: there is a positive relationship between the strength of health beliefs related to susceptibility, seriousness, benefits and motivation and the level of calcium intake. Hypothesis two: there is a negative relationship between the strength of health beliefs related to barriers and calcium intake.

The study was conducted using a descriptive correlational design. The sample included 201 women recruited from senior centers and apartment complexes, and clients from an outpatient mammography clinic. The study used the Osteoporosis Health Belief Calcium Scale to measure health beliefs about osteoporosis, and a 24-hour dietary recall and calcium supplement sheet to measure calcium intake. A statistically significant relationship was demonstrated between calcium intake and the health belief variables health motivation, perceived benefits, and perceived barriers.

In addition to testing the hypotheses, stepwise multiple regression was used to examine which health beliefs account for the greatest proportion of variance in calcium intake. Health motivation explained 4.1% of the variance in calcium intake.

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Table of Contents

List of Tables

List of Appendices

CHAPTER 1

INTRODUCTION

Osteoporosis is a major public health problem affecting approximately 20 million individuals in the United States (Galsworthy, 1990). While both sexes are affected, osteoporosis is more prevalent in women. By age 65, approximately 25 percent of all white women have had one or more bone fractures. Seventy percent of these fractures are caused by osteoporosis (Crilly, Horsman, Marshall, & Nordin, 1978). There are over 1.3 million fractures including 247,000 hip fractures in the United States every year (Bowen, 1989). Hip fractures have a high mortality rate because of complications that result from the fractures (Resnick & Greenspan, 1989). Of the patients who experience hip fractures, 20 percent die within the first year, 20 percent become totally dependent, 25 percent partially dependent, an only 30-35 percent recover independence after that first year (Cummings, Kelsey, Nevitt, & O'Dowd, 1984).

It is estimated that the cost of osteoporosis in the United States is $10 billion dollars a year (Special Committee of Aging [SCA], 1989). While osteoporosis is indeed financially costly to society, the human costs in suffering, and in loss of an older person's independence must also be measured. More attention to prevention efforts are

needed to sustain the quality of life and well-being of individuals in later life.

Osteoporosis is a complex, multifactorial disorder. Inadequate calcium intake is only one of a number of factors that contribute to this disorder. Other important factors that contribute to osteoporosis are age, gender, race, family history, menopause, and sedentary life style (Spencer, 1982). Calcium intake and sedentary life style are two risk factors that can be controlled by the individual. A change in dietary habits and exercise could ultimately prevent or at least retard the rate of bone loss. Researchers (Coralli et al., 1986; Grisso, Baum, & Turner, 1990; Nordin, 1983; White, 1986) generally agree that the pathological effects of osteoporosis can be lessened by regular exercise and by maintaining an adequate dietary calcium intake throughout life.

The elderly comprise the fastest-growing segment of our population, and they are at the greatest risk for developing osteoporosis. By the year 2000, the number of persons over 65 is expected to represent 13 percent of the population, and this number may climb to 21.8 percent by 2030 (Fowles, 1989). Thus, the aging of the American population increases the problem of osteoporosis.

The sequelae of chronic calcium deficiency are greatest in the elderly. It has been well documented that calcium is one of the nutrients most often deficient in the diet of

elderly in the United States, especially among women (Heaney et al., 1982).

Research suggests that careful assessment of health beliefs facilitates implementing appropriate interventions to foster positive self-care practices related to treatment of chronic illness and health problems (Redecker, 1988; Janz & Becker, 1984). Since the prevention of osteoporosis is much more effective than attempting to reverse its consequences, teaching preventive behaviors can be valuable in preventing this health problem.

Changes in dietary and exercise habits are difficult to initiate and maintain. Knowledge gained from health education, does not always translate into subsequent health behaviors. This suggests that more detailed knowledge of the mediators of these behavioral changes is needed. Therefore, in order to gain a deeper understanding of health behaviors aimed at osteoporosis prevention, it is important for nurses to consider the influence of psychological variables that can affect behavior change. Identification of such variables could enhance the individualization of health promotion strategies.

The Health Belief Model (HBM) is used in this study as the theoretical framework for assessing psychological variables. Since its introduction in 1950, the HBM has been used in a variety of studies of health behavior including disease detection and prevention (Becker, Kabeck, Rosenstock, &Ruth, 1975; Brailey, 1986; Champion, 1984, 1985, 1987;

Hallal, 1982; Janz & Becker, 1984; Kim, Horan, Gendler, & Patel, 1991; Rutledge, 1987; Trotta, 1980). The results of these studies were varied, but suggested that certain health beliefs are useful in predicting specific behaviors. The original variables of the HBM include severity, susceptibility, barriers, and benefits. In addition to the four original concepts, health motivation and self-efficacy have also been used as part of the HBM in predicting health-related behavior. The concept of health motivation was introduced for inclusion in the HBM by Becker (1974). The concept of self-efficacy was introduced by Bandura in 1977. This study builds on a previous study by Kim et al. (1991) who developed the Osteoporosis Health Belief Scale (OHBS), incorporating the theoretical dimensions of the HBM, to measure health beliefs related to osteoporosis. This study is part of a larger one which examined the relationship of the health beliefs to both calcium intake and exercise.

Purpose

The purpose of this study was to examine the relationships of health beliefs to calcium intake of women. Identification of relationships among these variables adds to existing nursing knowledge concerning effecting behavior change in individuals that are at high risk for developing osteoporosis. This knowledge could be used by nurses in developing creative interventions to effectively modify complex lifestyle practices.

CHAPTER 2

REVIEW OF LITERATURE AND CONCEPTUAL FRAMEWORK

Review of the Literature

Research utilizing the Health Belief Model (HBM), is extensive. Its use with the elderly, however, is limited. Only one study was found that utilized the HBM to examine osteoporosis preventive behaviors (Kim et al., 1990). The literature review for this study includes the application of the HBM in previous studies of preventive health behaviors and early disease detection. The review will also include prior research of the relationship of behavior to osteoporosis.

Health Belief Model Related Research. The HBM has generated prolific research regarding health behaviors related to disease detection and prevention of disease in asymtomatic subjects (Janz & Becker, 1984). Examples of disease detection studies utilizing the HBM include: Bailey, 1986; Burack and Liang, 1989; Champion, 1987; Hallal, 1982; Kegeles, 1963; Macrae, 1984; Stillman, 1977; and Trotta, 1980. The results were varied but suggested that certain HBM variables are useful in predicting specific behaviors.

Janz and Becker (1984) reviewed 29 HBM related studies that were published during the period of 1974 to 1984. The

health beliefs examined using the health belief model constructs were perceived susceptibility, seriousness, benefits, and barriers. Most of the research supported an association between health beliefs and resultant health behaviors. Barriers were found to account for the largest percent of variance, followed closely by perceived susceptibility, benefits and seriousness. Janz and Becker (1984) concluded that substantial empirical evidence supports the importance of the health belief model dimensions in explaining and predicting a person's health behaviors. However, it was noted, that many of the studies using the HBM as the conceptual framework have lacked consistent operationalization and measurement of the variables being studied. The variability in measures makes the interpretation and comparison of findings across studies difficult. Refinement and standardization of tools was recommended for future studies directed toward the measurement of condition-specific beliefs.

Champion (1984, 1985), concerned with the inconsistency in application of the model and the lack of valid and reliable instruments for measuring the constructs, developed and tested an instrument designed specifically for the study of the HBM variables as they relate to breast self-examination (BSE). In addition to the four original concepts, health motivation was incorporated into the HBM. Using a convenience sample of 201 women, frequency of BSE practice was measured on a six-point scale. The five

variables accounted for a statistically significant amount amount of the variance (26 percent) in BSE practice. Barriers accounted for the largest portion of variance (23 percent) for a single health belief model construct, followed by health motivation with 2 percent variance. Women perceiving multiple barriers tended to examine their breasts less frequently. A more recent study by (Champion, 1987) added knowledge as a variable. Using a convenience sample of 585 women, frequency of BSE practice was measured using a questionnaire. Items measuring health beliefs were placed on a Likert scale. Champion's study demonstrated that knowledge, barriers and susceptibility were significantly correlelated with the frequency of BSE (Champion, 1987).

Research regarding the influence of the HBM variables in disease prevention behavior also supports the conceptualization of the HBM. Research utilizing the HBM in disease prevention is extensive (Aho, 1974; Allard, 1989; Becker, 1985; Kim et al., 1991; Knight & Hay, 1989; Maiman et al., 1977; Tirrell & Hart, 1980). An example is a study by Allard who adapted Champion's (1984) BSE scale to study disease preventive practices regarding beliefs about AIDS. The study telephone surveyed the AIDS prevention practices of 1072 men and women between the ages of 18 and 65 using random digit dialing. Allard (1989) concluded that the most important modifiable determinants to AIDS prevention behaviors were perceived serverity and perceived susceptibility. The HBM has been a useful contruct for

developing health education programs to promote behavior change to reduce risk and to help contain the AIDS epidemic. Adapting Champion's (1984) BSE tool to specific health problems makes comparsions of findings meaningful (Becker and Joseph, 1988).

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 is a pioneer study both in application of the HBM to the elderly population and in application of an instrument that assesses health beliefs related to osteoporosis health behaviors - exercise and calcium intake. Using a five point Likert scale, the researchers measured the osteoporosis health beliefs of 150 elderly subjects. Kim et al. (1991) demonstrated that barriers and health motivation are statistically significant constructs in explaining both calcium intake and exercise behaviors. The OHBS is in its initial stages of development. Further use and revisions of the scale were suggested in order to gather additional information about health beliefs and to facilitate the development of individual programs to decrease specific barriers and promote health motivation for those at risk for developing osteoporosis.

Calcium Intake Related Research. The literature pertaining to osteoporosis indicates that involutional bone loss is a multifactorial disorder. Bone health can be thought of as a chain whose links collectively determine

its overall strength. Calcium, as well as gonadal hormones, exercise, age, gender, and genetics are important links in the chain. Two of these links, calcium intake and exercise, are influenced by behavioral factors. This review focuses on the evidence relating to only one of the links in the chain of bone health - calcium intake.

The first three studies (Riis, Thomsen, and Christiansen, 1987; Baran et al., 1989; Nordin, Horsman, Crilly, Marshall, & Simpson, 1980) examined the effect of calcium modification in the human diet and its effect on bone mineral density. The remainder of the review consists of studies that involve calcium modification along with preventive treatment modalities such as estrogen replacement therapy, and the use of certain vitamins and minerals.

Riis, Thomsen, and Christiansen (1987), in a two-year double-blind study, examined the effects of calcium supplementation on postmenopausal bone loss in 43 women in the early menopause period. The bone mineral content in the forearm was measured by single photon absorptiometry, and the entire body and spine was measured by dual photon absorptiometry every three months. The group that was treated with 2,000 milligrams of calcium showed a tendency toward slowed loss of compact bone in the proximal forearm and total skeleton as compared with the placebo group. The investigators concluded that calcium supplementation had a minor effect on the loss of cortical bone.

Baran et al. (1989) researched the effect of calcium intake and bone density in younger women. The purpose of the randomized study used to investigate the effect of dietary modification in the form of dairy products on vertebral bone mass in 30 to 42 year old premenopausal women over a three year period. Twenty women increased their dietary calcium intake by an average of 610 mg. of calcium per day, while 17 age and weight-matched women served as controls. Calcium intake was monitored by three day diet histories and 24-hour urinary calcium excretion. The vertebral bone density in the women consuming increased calcium did not change over the three year period. In contrast, bone density in the control group was lower (-2.9% plus or minus 0.8%, $P < .001$) than in the supplemented intervention group. The results suggest that increased calcium intake in premenopausal women may prevent age related bone loss.

Nordin, Horsman, Crilly, Marshall, and Simpson (1980) investigated bone loss in a population of women with osteoporosis. Forty-one of the patients, serving as controls, did not receive a calcium supplement, while the 20 women in the treatment group, in addition to their regular diet, received a 1200 milligram calcium supplement every day for one year. Changes in mean bone density in metacarpal cortical areas were calculated. The treatment group was not significantly different from the untreated group. However, when the treatment group was treated with

estrogen, vitamin and calcium supplement, bone loss was effectively slowed.

Multiple studies have concluded that calcium supplements in combination with estrogen replacement therapy have a positive effect on bone mineral density. Among these studies is research done by acknowledged experts in the field (Heaney et al., 1978; Heaney, Recker, & Saville, 1978; Horsman, Gallagher, Simpson, & Nordin 1977; Recker, Saville, & Heaney 1977).

Yano, Heilbrun, Wasnich, Hankin, and Vogel (1985) evaluated the relationship of dietary intake of nutrients and supplemental vitamins and minerals among elderly Japanese American men and women living in Hawaii. The researchers reported that dietary intakes of milk, calcium supplements, and vitamin D were significantly and positively associated with increased bone mineral content in both sexes after adjusting for age, weight, height, strenuous exercise (men), history of nonviolent fracture, thiazide use, and estrogen use (women).

A study by Spencer, Menczel, Lewin, and Samachson (1964) concluded that elderly patients have a decreased ability to absorb calcium from the intestine. Therefore, greater calcium intake is necessary to achieve a comparable calcium balance in the elderly as compared with younger subjects.

Two studies examined the relationship of calcium intake in combination with Vitamin D to bone mass changes (Aloia et al., 1983; Riggs, Jowsey, Kelly, Hoffman, & Arnaud, 1976).

The investigators concluded that calcium modification in combination with vitamin D was effective in decreasing bone turnover in patients with osteoporosis. The researchers concluded that increased intake of calcium should be encouraged in the perimenopausal years, and adequate calcium absorption should be ensured by provision of an adequate amount of vitamin D through diet or sunlight.

A study done by Riggs, Seeman, Hodgson, and O'Fallow (1982) was designed to assesse the rates of vertebral fractures in patients with postmenopausal osteoporosis. The results revealed that the combination of calcium, fluoride and estrogen was an effective treatment in the slowing of postmenopausal bone loss.

In summary, the findings of several studies have demonstrated a positive correlation of calcium intake to bone density (Aloia et al., 1983; Horsman et al., 1977; Nordin et al., 1980; Recher et al., 1985). In many cases the results of the studies are difficult to interpret because either the studies did not take place over a long enought period of time to reveal long term bone changes (Aloia et al., 1983; Nordin et al., 1980; Riggs et al., 1977; Yano et al., 1985), or the studies were conducted on women soon after menopause when estrogen deficiency induces a transient bone loss (Heaney et al., 1978; Riis et al., 1987). Most of the researchers of relevant studies have reported that, although calcium supplementation retarded bone loss, the therapeutic effect was less effective than estrogen replacement (Horsman et al.,

1977; Recher et al., 1977; Riggs et al., 1982; Riis et al., 1987). Since these studies covered only a one to two year span of time, more conclusive research is still pending.

Conceptual Framework

Rates of adherence to recommended medical treatment plans and healthy lifestyle practices tend to be quite low (Gerber & Nehamkis, 1988). Behavior is the result of a complex interaction of interpersonal, familial, cultural and situational factors. More difficult types of behaviors involve an even more complex interplay of a myriad of behavioral determinents. Several models and theories have been developed to explain and predict behavior. The models encompass various combinations of certain factors that are felt to influence behavior. 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, as well as feedback relative to the action taken. Models based on Social Cognitive Theory also assume that people are capable of rational decision-making.

The Health Belief Model (HBM), developed in the 1950s by a group of social psychologists, provided the conceptual framework for this study. This model is probably the most widely utilized in health behavior research, and has "...very substantial empirical evidence supporting HBM dimensions as important contributors to the explanation and prediction of

individuals' health-related behaviors" (Janz & Becker, 1984, p.41). It was originally developed to explain and predict behaviors related to preventive health, but has since been utilized with illness and sick role behaviors. The following paragraphs will include an overview of the HBM, definition of the terms specific to this study and a description of how the HBM relates to this study.

The HBM provides a framework for understanding why people may not avail themselves of opportunities to detect illness early or to follow through with recommended preventive practices. It is most applicable with voluntary, health-related actions that involve an element of uncertainty. Because it is a psychosocial model, it is only applicable to behavior that can be explained by a person's attitudes and beliefs. The HBM encompasses a "value-expectancy" approach which attributes behavior to the value an individual places on an expected outcome of his/her action and also to the perception by the individual that the specific behavior will result in the expected outcome. The

HBM hypothesizes that health-related behavior occurs as a result of the interactive and combined effects of (a) readiness to comply with recommended actions, and (b) modifying and enabling factors. 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 how susceptible the individual perceives him/herself to be to an illness and

how severe of an effect he/she believes the illness would have on his/her life; (b) perception regarding the effectiveness of specific behaviors to prevent the occurrence of the disease, (c) perception that there are not insurmountable barriers which preclude goal attainment, and (d) health motivation, which is a generalized state of intent that results in health behaviors. Although the HBM has always viewed health motivation as a significant dimension of health behavior, it was not explicitly delineated as a major variable until 1974. Health motivation is characterized as a concern about health, a health consciousness and a high saliency of health in one's value system. In addition to the five health belief constructs severity, susceptibility, barriers, benefits, and health motivation, more recently, HBM researchers have included the construct, self-efficacy, and a modifying factor, knowledge. In this study, self-efficacy and knowledge were not examined. This study is limited to testing the original five constructs of the HBM (severity, susceptibility, barriers, benefits, and health motivation) on variance of calcium intake (Appendix A).

The HBM provides a logical framework upon which to explore osteoporosis preventive health behaviors. The model includes variables which are not necessarily immutable and which are amenable to nursing interventions. If significant correlations between the health beliefs of the HBM and calcium intake are found, nursing interventions can be tailored to appropriately alter beliefs and modify behavior.

The HBM is a model that is limited to explaining and predicting behaviors that are due to attitudes and beliefs (Janz & Becker, 1984, p.44). Although dietary intake of calcium might have a habitual component, as is often the case with dietary behaviors, there is also a significant component of attitudes and beliefs. The amount of calcium included in a woman's meals or whether or not she takes a calcium supplement is probably largely a function of the health beliefs she holds and subsequent formulation of attitudes about calcium intake. Calcium intake behaviors also represent behaviors that are under voluntary control, and thus are contingent upon a woman's decision to act or not to act, according to the beliefs and attitudes she holds.

The HBM can be applied to osteoporosis preventive behaviors as indicated by the following examples relative to each of the HBM variables. If a woman perceived herself as susceptible she would see herself as being vulnerable to developing osteoporosis. The perception of severity is a combination of an emotional arousal created by the thought of osteoporosis, and perceptions of the kinds of difficulties osteoporosis would represent. For example, a woman might perceive that having osteoporosis would result in physical disability, causing an inability to continue to work or function as a wife and/or mother. In regard to the benefits variable, if a woman perceived sufficient calcium intake was beneficial, she would believe that ingesting sufficient amount of calcium would decrease her susceptibility to

osteoporosis. Examples of barriers that might be perceived by a woman with regard to calcium intake to prevent osteoporosis include: (a) viewing calcium supplements or foods high in calcium to be too expensive, (b) being concerned that recommended calcium supplements would result in stomach irritation, or (c) believing it would be too inconvenient to keep track of calcium intake to ensure adequate inclusion in the diet. If a woman was motivated towards health, she would be more likely to eat a well balanced diet, obtain regular exercise and obtain regular medical "check-ups".

Definition of terms

This study used an adapted version of the HBM (Appendix A). Collectively, health beliefs refer to attitudinal components of health behaviors and include: susceptibility, seriousness, benefits, barriers, and health motivation.

Susceptibility refers to the perceived threat of developing osteoporosis. Seriousness is concerned with perceived degree of personal threat related to developing osteoporosis. Benefits focuses on the belief in the effectiveness of specific behaviors to prevent the occurrence of the disease. Barriers are perceptions of negative components of osteoporosis preventive behaviors, which would be undertaken to prevent osteoporosis. Health motivation relates to a state of concern about general health matters, which results in positive health activities and willingness

to seek and comply with recommendations that are believed to decrease disease. Calcium intake refers to the amount of calcium ingested either by eating foods that include calcium or by taking a calcium supplement.

Hypotheses

The following hypothesis will be tested in this study: (a) there is a positive relationship between the strength of health beliefs related to susceptibility, seriousness, benefits and motivation and the level of calcium intake. (b) there is a negative relationship between the strength of health beliefs related to barriers and calcium intake. In addition to testing the hypotheses, the following question will be addressed: which health beliefs account for the greatest proportion of variance in calcium intake?

CHAPTER 3

METHODOLOGY

Research Design

This study was conducted using a descriptive correlational design. The purpose of the study was to examine relationships of osteoporosis health beliefs to the calcium intake of women. A correlational design was chosen for this study because it has been accepted by researchers as an effective design for investigating complex relationships between attitudes, beliefs, and behaviors.

Sample and Setting

A convenience sample of 201 women was used for the study. Data collection took place in a mid-size metropolitan area of Western Michigan. The subjects were recruited from senior centers, apartment complexes which housed senior citizens, clients from an outpatient mammography clinic, and employees from a university and a public school system. The variety of interviewing sites was selected in order to obtain a representative sample of social, economic and employment groups. Eligibility for inclusion into the study included the following criteria: (a) female, age 35 and older; (b) English speaking; (c) no prior diagnosis of osteoporosis; and (d) oriented to person, place and time.

Instruments

This study used the following instruments: (a) the Osteoporosis Health Belief Calcium Scale (OHBCS) to measure health beliefs about osteoporosis, and (b) the 24-hour dietary recall method to measure dietary calcium intake. A calcium supplement data sheet was used to assess calcium intake from supplements and medications which contain calcium (Appendix B). In addition, demographic information, including age, race and education was obtained from each subject (Appendix C). The instruments were piloted and procedural problems were identified and rectified before beginning the study.

Osteoporosis Health Belief Calcium Scale (OHBCS). The (OHBCS) is a refined tool developed from the Osteoporosis Health Belief Scale (OHBS) by Kim et al., (1991). The OHBS has 7 subscales which address both nutrition and exercise behaviors (Appendix D). Each subscale has 6 items, for a total of 42 items (Appendix D). The OHBS was based on Champion's Breast Self-Examination HBM instrument. For this study, 5 of the 7 subscales were used for a total of 30 items. The 30 item scale is called the OHBCS. The 5 subscales include (a) perceived susceptibility to osteoporosis, (b) perceived barriers to calcium intake, (c) perceived benefits of calcium intake, (d) perceived seriousness of osteoporosis, and (e) health motivation. The items are reflective of each of the five theoretical

dimensions of the HBM. The OHBCS questionnaire uses a Likert format with responses from 1 to 5. Strongly disagree is scored as 1 and strongly agree as 5. Questions were worded at a fifth grade readability level.

The OHBS is a new tool. To date, it has been used in one previous study (Kim et al., 1991). Reliability and validity were initially examined using a sample size of 150 elderly women ranging in age from 60 to 93 years (M = 74 years). Internal consistency of the OHBCS was evaluated by using Cronbach's alpha. Reliability coefficients ranged from .61 (Health Motivation) to .80 (Susceptibility). For this study the additional refinement of the original OHBS strengthened the reliability coefficiants of the OHBCS. Coefficient alpha of the revised OHBCS ranged from .71 (seriousness) to .82 (susceptibility). (Table 1). Stability of the revised OHBCS was evaluated using a subsample of 51 women who were tested at a three week interval. The reliability coefficients ranged from .52 (benefits calcium) to .84 (susceptibility). (Tale 1).

A review of the literature and input from nursing faculty and nurses in practice established content validity for the items. Construct validity of the OHBCS was determined by factor analysis. The five factors, reflective of the five OHB Calcium subscales, accounted for 49.9% of the total variance. Concurrent validity of the OHBCS was determined by discriminant function analysis. Subjects were grouped according to calcium intake scores. One group

consisted of subjects with calcium intake greater than or equal to 50% RDA. Analysis revealed that 69.2% of the were correctly classified by Barriers Calcium and Susceptibility.

Table 1
Reliability Coefficients of OHBCS

Subscales	Items	Chronbach's Alpha N=201	Test-Retest Coefficient N=51
Susceptibility	6	.82	.84
Seriousness	6	.71	.79
Benefits Calcium	6	.80	.52
Barriers Calcium	6	.74	.68
Health Motivation	6	.73	.67

24-hour dietary recall method. Calcium intake behavior refers to the amount and frequency with which calcium rich foods were eaten and/or supplements were taken. Calcium intake was measured by using the 24-hour dietary recall method (Appendix E). The 24-hour recall was developed by Burke (1947), McHenry (1939), and Kruse, Palmer, Schmidt, and Wiehl (1940). Several large dietary studies have successfully used the 24-hour dietary recall as a means for individual dietary assessment. Examples are the Ten-State Nutrition Survey and the Health and Nutrition Examination

Survey (Carroll et al., 1983; Abraham et al., 1979).

The subjects in this study were asked to recall all food and drink consumed the previous day. The success of 24-hour dietary recalls depends on the subject's motivation, awareness of food intake, memory, cooperation, and communication skills.

There are several known threats to reliability and validity of the instrument: (a) socially acceptable foods may be better remembered and reported than those that are less acceptable; (b) memory of food intake fades rapidly as the number of items increase; and (c) large intakes tend to be underreported, and small intakes tend to be over reported (Becker, 1960).

Gersovitz, Madden, and Smiciklas-Wright, (1978); and Witschi, (1990) reported that the 24-hour dietary recall provides an accurate estimate of mean intake over a 24 hour period. Hankin et al. (1967) recommended that 3 repeated 24-hour recalls be obtained from the individual's nutrient intake to increase reliability. In this study, only one 24-hour dietary recall was obtained on each subject. Considering the purpose of this study (examining relationships of the health beliefs and an individual's typical daily calcium intake) one 24-hour dietary recall is an adequate method for collecting dietary information and a small variation in calcium intake estimation would not seriously affect the outcome. Furthermore, three repeated 24-hour recalls of dietary intake was not feasible for this

study. Research done by Young, Hagan, Tucker, and Foster, (1952) and Chalmers et al. (1952) found a one day 24-hour recall was adequate for obtaining the mean of a group when large numbers of subjects were used. Young et al. (1952) reported 50 subjects were the minimum number required to secure accurate means.

To overcome the potential threats to validity and reliability that can occur with administration of the 24-hour dietary recall method, food models, sample measuring spoons, cups and other frequently used food containers were used to help subjects accurately estimate amounts of food consumed. Food intake was assessed only if it represented "typical foods" consumed in a 24 hour period and cognitive function was assessed by determining if the subject was oriented to person, place and time.

The 24-hour dietary recall method was chosen for this study because it is a simple and rapid means of obtaining information; it can accommodate today's lifestyle where many people eat at least one meal outside the home; and a higher percentage of participation can be achieved as compared to a dietary assessment method that requires precise measurement by weighing each serving.

Calcium Supplement Form. After recording dietary intake on the 24-hour recall, participants were asked if they took a calcium supplement. If they answered affirmatively, the type and amount of calcium supplement was recorded on a calcium supplement sheet (Appendix B).

Procedure

The data was obtained by directly questioning the subjects regarding the desired information using a structured interview method. Closed-ended questions were used that offered a number of alternative responses from which the respondents could make a decision. Data were collected by three graduate nursing students, physical therapy students, and six undergraduate nursing students who participated in an extensive training program before data collection began. Before the full-scale study was undertaken, a pretest of the instruments was done on a similar population to determine clarity and research adequacy.

Permission was obtained to conduct the study from the Grand Valley State University Human Subjects Review Board. Participation in the study was voluntary. Potential subjects were assured that anonymity was guaranteed and the uses of the research data were specified. Subjects were informed about the purpose of the study, their rights regarding confidentiality and voluntary participation, and potential benefits. Since no risk to the subjects was anticipated, a consent form was not obtained. Verbal consent was obtained prior to the interview. Before proceeding with the interview a determination was made if the respondent had a prior history of osteoporosis, if she had a typical dietary intake 24 hours prior to the interview, and if she was oriented to time, place, and person (Appendix G).

After the demographic data sheet was completed, the instruments were administered in the following order: (a) Osteoporosis Health Belief Scale, (b) 24-hour dietary recall, and (c) calcium supplement sheet.

CHAPTER 4

DATA ANALYSIS

The HBM postulates that it is the combined effect of the health beliefs which explains behavior. The literature indicates, however, that some beliefs have a stronger influence on health behaviors than others. Therefore, it is significant to look at both the combined effect of the beliefs on nutrition behavior, as well as the effect each individual belief has upon calcium intake. Pearson r was used to explore the relationship between variables in hypotheses one and two. Multiple regression analysis was use to examine the combined and individual effects of the health beliefs upon calcium intake.

The summated health beliefs are at an interval level of measurement, and calcium intake is at a ratio level of measurement. Although individual items of the OHBCS represent an ordinal level of measurement, the total score of a Likert scale enhances the discriminatory ability and can be treated as an interval measure for the purposes of data analysis (Polit & Hungler, 1987). Relationships were considered to be significant at the 0.05 level. All data were analyzed using the Statistical Package for Social Sciences.

Characteristics of Subjects

The distribution of subjects by age, education, and ethnic background are listed in Table 2. Age was the most diverse characteristic with a range of 60 years. The subjects ranged from 35 to 95 years old. The wide age range of subjects allowed for an ample sampling of both pre and postmenopausal women. Demographic characteristics were similar with respect to race, and education. The majority of persons were white with a high school education. The mean educational level was 14.7 years, indicating an average educational level of two years of college.

Calcium intake of the subjects was further assessed by age groups. Group 1 ranged from age 35 to 44 years; group 2 ranged from age 45 to 54 years; group 3 ranged from age 55 to 64 years; and group 4 was 65 years or older (Table 3). Results from this study showed similar trends found in previous studies (Heaney et al., 1982; National Center for Health Statistics, 1983) that indicate older women tend to consume less calcium in their diet as compared to younger women (Table 4).

Reported calcium intake of the subjects ranged from a low of 90 mg. to a high of 4237 mg. While collecting data, the researchers realized there was a discrepancy in actual calcium intake and perceived calcium intake that accounts for the wide variance of intake. Several subjects who were taking a multivitamin reported that the

Table 2
Distribution by Age, Education, and Ethnic Background

	Group	
Characteristic	M	SD
Age (years)	56.144	14.832
Education (years)	14.726	3.848
Ethnic background	Frequency	Percent
Black	6	3.0%
White	194	99.5%
Other	1	0.5%
Total	201	100%

Table 3
Age Group Distribution

	Group	
Characteristic	Frequency	Percent
Group 1 (35-44)	58	28.9%
Group 2 (45-54)	45	22.4%
Group 3 (55-64)	39	19.4%
Group 4 (65 +)	59	29.4%

multivitamin included 1000 mg. of calcium. A product analysis was done, and it revealed that multivitamins

usually contain 50 to 200 mg. of calcium rather than the reported 1000 mg. of calcium. Therefore, several subjects had over estimated their supplementary calcium intake.

Table 4
Calcium Intake by Age Distribution

	Group	
Characteristic	M	SD
Group 1 (35-44)	1019.966 mg.	698.036
Group 2 (45-54)	1036.933 mg.	542.355
Group 3 (55-64)	1034.282 mg.	486.809
Group 4 (65 +)	928.831 mg.	536.796
Total	971.149 mg.	578.201

After careful consideration, the researchers decided to use reported calcium intake, rather than actual calcium intake, to maintain consistency with the five HBM constructs that measure perceived beliefs. It is the perceived belief about calcium intake, and not necessarily the actual calcium intake of the subjects that is relevant for this study.

Results

Each of the 5 subconstructs had a total possible score ranging from 6 to 30. Calculation of the mean scores are described in Table 5. Subjects scored highest on health motivation and perceived benefits of taking

calcium, and they did not identify a high number of barriers, or deterrents that would keep them from ingesting adequate amounts of calcium in their diet.

Table 5
Mean Scores of the OHBCS Subscales

	Score	
Subconstructs	M	SD
Susceptibility	15.721	4.482
Seriousness	18.194	3.694
Health Motivation	23.841	2.945
Benefits	23.507	3.005
Barriers	13.045	3.294

Analysis to Test the Research Hypotheses

Hypothesis one states there is a positive relationship between the strength of health beliefs of susceptibility, seriousness, benefits and motivation and the level of calcium intake.

For perceived motivation and perceived benefits, the correlation coefficient was statistically significant ($P = .002$ and $P = .012$ respectively). However, the strength of the correlation was weak for all five constructs (Table 6).

Hypothesis two states there is a negative relationship between the strength of health beliefs related to barriers and calcium intake. A statistically significant negative relationship was found between barriers and calcium intake ($p = .012$). The correlation between barriers and calcium intake was -.159 (Table 6).

Table 6
Correlations Between Health Beliefs and Calcium Intake

	Sus	Ser	HM	Ben	Bar
Calcium	.029	-.086	.203**	.137*	-.159*
Susceptibility		.169**	-.236**	-.084	.234
Seriousness			-.055	.013	.151*
Health Motivation				.438**	-.331**
Benefits					-.282**

* p less than .05
** p less than .01

The question addressed in the research was which health beliefs accounted for the greatest proportion of variance in calcium intake? To answer this question, all of the health belief contructs were entered into a multiple regression model. The only belief variable that was entered in stepwise multiple regression analysis was health motivation. Health motivation explained 4.1% of the variance in calcium intake (Table 7).

Table 7
Stepwise Multiple Regression of Health Motivation on Amount of Calcium Intake (N = 201)

Predictor	Multiple R	R^2	F	p
Health Motivation	.203	.041	8.507	.004

Of interest, was the finding that the women who had friends or relatives who had osteoporosis tend to have higher calcium intakes (Mean = 1095 mg.) than those who did not have friends or relatives with osteoporosis (Mean = 945 mg.) [r = .125, p = .039]. Friends or relatives with osteoporosis may have served as an external cue. Having a friend or relative who has osteoporosiss is a constant reminder of the seriousness of the disease, and may have been a strong enough cue to trigger the individual to increase their calcium intake as a preventive measure. Also of interest, is that those subjects that scored high on the health motivation scale perceived more benefits and fewer barriers to taking measures designed to prevent osteoporosis (r = .438, p = .000, and r = -.331, p = .000) respectively.

CHAPTER 5

DISCUSSION AND IMPLICATIONS

Discussion

This study was designed to examine the relationships of women's health beliefs about calcium intake. Janz and Becker (1984), after reviewing the research on the HBM, concluded that there was substantial empirical evidence that supports the importance of the HBM dimensions in explaining and predicting a person's health behaviors. Kim et al.(1991) developed a tool, using the HBM as a conceptual framework for measuring osteoporosis health beliefs. Given the findings of previous research, the results of this study were expected to support a moderate to strong correlation between osteoporosis health beliefs and calcium intake behavior. The data, however, only weakly supported the premise. The findings of the study revealed that there was a statistically significant relationship between health motivation, benefits, and calcium intake.

Perceived susceptibility and seriousness were not found to be statistically correlated to calcium intake. One explanation is that since the disabling effects of osteoporosis do not occur until an older age, younger women may not think of osteoporosis in terms of a disease

process, but rather as an inevitable condition of aging. The mean scores of susceptibility and seriousness help to substantiate this premise. Of the four constructs used to test hypothesis one, susceptibility and seriousness had the lowest mean scores (Table 5). A concern related to age is that since the reliability of the OHBS was established on an older sample, the instrument's reliability when used on a younger sample may be affected. It would follow that if the constructs seriousness and susceptibility were affected by the perception that osteoporosis is less threatening because it is not a disease, but a condition of aging, then it also follows that this same population of women would not perceive benefits as having the same degree of positive preventative effects that they would with another condition they considered a more serious threat to their health. This premise may partially explain the weak correlation found between perceived benefits and calcium intake.

The HBM postulates that when barriers to engaging in adequate calcium intake are minimal, a person is expected to have an increase in calcium intake. The findings of the study revealed a statistically significant negative relationship between perceived barriers and calcium intake, albeit the correlation coefficient was low ($r = -.159$). One explanation for the weak correlation between barriers and calcium intake is the complexity of calcium behavior. Women ingest calcium rich foods for reasons other than osteoporosis

prevention. Learned dietary habits and food preferences are also influential in predicting calcium intake. The complexity of the behavior may have outweighed the benefits as the individual perceived them.

Limitations.

Calcium intake was assessed using a 24-hour dietary recall. The instrument was developed especially for this study. Food models and measuring devices were used to assist the subject with recall and accuracy in describing nutrient intake, but the success of the 24-hour recall depended, to a great degree, on the subject's awareness of food intake and the ability to accurately remember all the food and drink consumed the previous day. The researchers also faced difficulty when calculating the dosage of calcium obtained from supplements. It was decided to measure reported calcium intake obtained by supplement.

Another concern regarding calcium intake, as a measure for predicting osteoporosis health beliefs, is that calcium intake is confounded by other variables. For example, people drink milk for reasons other than osteoporosis prevention. When the OHBS was developed from Champion's original model, the dependent variable being measured was breast self examination (BSE). BSE is a less complex variable. Women perform self-breast examination for only one reason, to detect breast cancer. People consume food and drink for various reasons. The HBM assumes that persons act on the

basis of rational thought. Nutrition behavior is complex and the motives for dietary intake may be, to some degree, independent of rational thought processes. Dietary habits, that affect calcium intake, are not only influenced by nutrition concerns, but also by learned habits, economic status, ethnic background , and life-style. The complex factors make it difficult to isolate a single set of factors that influence nutrient behavior.

Limitations with the nutrient database created a problem of accurately assessing calcium intake. Because some nutrients were absent from the data base, the researchers could not always provide an exact measure of the individual's calcium intake. In several instances, where subjects reported eating foods that were made from complex recipes not found in the data base, the researchers made substitutions using similar foods. In describing the limitation of using a nutrient database to measure dietary intake, Witschi (1990) states that nutrient data is derived from various sources and, as such, have limited accuracy when applied in a particular case.

The Osteoporosis Health Belief Scale used a 5-point Likert scale to rate items from strong disagreement (1) to strong agreement (5). During the interviewing process it was noticed that the majority of subjects tended to respond using middle range answers (agree/disagree) and avoided strong responses (strongly disagree/strongly agree). Shades in

attitude discrimination were not keenly differentiated by the respondents. When asked to respond to "the thought of osteoporosis scares you", some subjects responded by saying "I've never really thought about it", and followed this statement by giving a middle range answer. Beliefs about osteoporosis did not seem to elicit the extremes in emotional content that perhaps diseases such as cancer or heart disease would have evoked. Another factor that may have resulted in respondent bias was the length of the interview. Polit and Hungler (1987), state that during long interviews, respondents may become fatigued or bored and manifest their discomfort by responding with middle range answers. If this phenomena occurred during the interview, respondent bias may have distorted the data analysis.

Implications for Nursing Practice.

In light of the weak supportive findings, more theory testing of the HBM as a conceptual model for predicting osteoporosis health beliefs is needed before nursing interventions can be developed. Perhaps, individual constructs of the HBM differ in importance depending on the health behavior being measured, and the age of the sample being tested. During the interview process, some respondents admitted that prior to the interview, they had never thought much about osteoporosis. The actual interviewing process seemed to stimulate an awareness of osteoporosis and the process seemed to help the subjects to articulate their

beliefs about osteoporosis. After the interview, most subjects had generated enough interest about osteoporosis that they requested the researchers mail their dietary analysis to them so they could further assess their calcium intake. Many of the subjects asked questions after the interview, and appreciatively accepted written educational materials about osteoporosis. The data collection process enlightened the nurse researchers about the lack of osteoporosis awareness in the general public, and also how the simple act of asking questions about osteoporosis stimulated an interest in learning more about the condition. This information seems to verify the need for developing health promotion programs that would stimulate the awareness of osteoporosis and its impact on health and quality of life.

Recommendations for Future Investigation.

The findings of this research study raise several issues of concern that suggest a need for further investigation. The study could be repeated using a shorter interview schedule. It was mentioned earlier that the researchers collected data not only on calcium intake behavior, but also on exercise behavior. In a future study, the length of the interview could be reduced by eliminating data collection on exercise behavior. The interview time could be reduced further by having the subjects record their dietary intake for three consecutive days prior to the interview and bring the completed dietary records with them to the interview.

By making modifications in the interview schedule, the interview time could be reduced to thirty minutes. The assumption would be that by shortening the interview time the subjects would experience less fatigue, and the potential for respondent bias would be reduced. A three to five day dietary record would increase accuracy in measuring calcium intake because daily fluctuations in diet would balance out over a period of time.

A second area for further research stems from the observation of an interesting phenomenon that developed during the interview process. It seemed, the interview process created a milieu that increased the subject's awareness and interest in osteoporosis, it's risks, and factors that contribute to it's prevention. During the interview, subjects were asked to articulate their beliefs. This seemed to stimulate the subjects' interest about a condition that, prior to the interview, they had never thought much about. A further study could evaluate the supposition that the process of completing the OHBS leads to a new understanding of one's behavior, which, in turn, can facilitate a positive behavior change.

An intervention study would provide stronger support for the proposed relationship between health beliefs and calcium intake behaviors. Baseline measurements of calcium intake and osteoporosis health beliefs would be established using the 24-hour dietary recall, the calcium supplement form and

the OHBCS. After the measurements were obtained, each of the subjects would attend a patient education class designed to provide instruction about the importance of adequate calcium intake as a prevention for osteoporosis. They would also receive information about the incidence of osteoporosis, risk factors, and the effects of osteoporosis on quality of life. After the intervention, the subject's calcium intake and osteoporosis health beliefs would be remeasured. Results would be analyzed to determine if patient education influences osteoporosis health beliefs and in turn, calcium intake.

Summary

The purpose of the study was to evaluate the relationship between health beliefs and the amount of calcium intake. The investigators concluded that there is a statistically significant relationship between the independent variables health motivation, benefits, barriers and the dependent variable calcium intake. However, the correlations between the independent variables and the dependent variable were weak. Because of the paucity of the findings and the need for clarification of the HBM tools and concepts as they relate to osteoporosis health beliefs, definitive interventions can not be recommended at this time.

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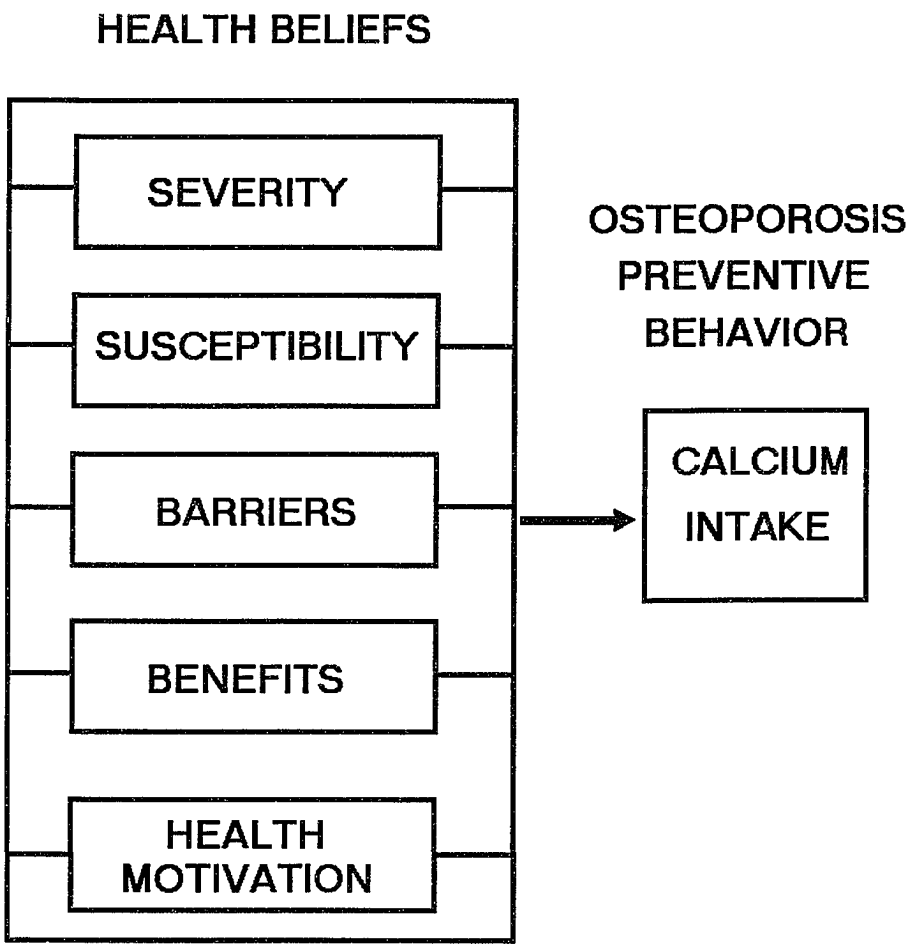
APPENDICES

APPENDIX A

CONCEPTUAL FRAMEWORK: HEALTH BELIEF MODEL



APPENDIX B

ID NO: _____

CALCIUM SUPPLEMENTS

TYPE	AMOUNT OF CALCIUM INTAKE PER DAY		
	Mg. per tab/Tbsp	No of tab/ Tbsp per day	Total in mg.
Calcium Carbonate			
1. Caltrate _____			
2. Calel-D _____			
3. BioCal 625 or 1250 _____			
4. Oyster Shell calcium e.g. Oscal, generics _____			
5. Titralac liquid _____			
6. Tums _____			
7. Alka-Mints _____			
8. CalSup _____			
9. Titralac tablets _____			
Calcium Phosphate			
10. Posture _____			
11. Discal-D _____			
Calcium Gluconate			
12. Neo calglucon _____			
Other: specify			
_____			
_____			
_____			

CODE

_____ Total amount per day (in mg.)

APPENDIX C

DEMOGRAPHIC DATA SHEET

Date: _____ ID # _____

Interviewer # _____

Data Collection Site: _____

I need to have some information about you.

1. How old are you? _____ (in years)

2. How many years of school have you completed? _____ (in years)

3. How tall are you? _____ feet and _____ inches

   (CODE: in cm) _____

4. How much do you weigh? (in pounds) _____

5. Are you (Interviewer: If race is apparent, do not ask this question)

   _____ 1. American Indian

   _____ 2. Black

   _____ 3. Pacific/Asian

   _____ 4. White

   _____ 5. Other Specify: _____

6. Do you have osteoporosis?

   _____ 1. Yes

   _____ 2. No

   (Interviewer: If the person says "yes", terminate the interview and thank the person for his/her assistance.)

7. Do you have friends or relatives who have osteoporosis?

   _____ 1. Yes

   _____ 2. No

Interviewer: If you have experienced any special problems during the interview with this person, record the nature of the problem.

_____

_____

_____

Appendix D

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).

1 STRONGLY DISAGREE	2 DISAGREE	3 NEUTRAL	4 AGREE	5 STRONGLY AGREE	
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 E

RECORD OF ALL FOOD EATEN (24 HOUR RECALL METHOD)

DATE: _____ ID NO: _____

CODE	QUANTITY	HOUSE MEAS.	FOOD OR BEVERAGE	TIME
				Snack
				Breakfast
				Snack
				Lunch

Is what you ate yesterday the way you usually eat? Yes _____ No _____

(Interviewer: If food intake for the previous day was NOT typical, make another appointment.

10-90

24 HOUR RECALL METHOD (CONTINUED)

CODE	QUANTITY	HOUSE MEAS.	FOOD OR BEVERAGE	TIME
				Snack
				Supper
				Snack

Appendix F

Information To Participants

Hello, I am _____, a nursing student (graduate nursing student) at Grand Valley State University. I am helping in the osteoporosis study which is being conducted by several faculty members and graduate students at Grand Valley State University. As you may know, osteoporosis is a condition in which the bones become very 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?