The Effect Of An Osteoporosis Health Promotion Education Program For Perimenopausal And Postmenopausal Women

Donna G. Cobb
Mississippi University for Women

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THE EFFECT OF AN OSTEOPOROSIS HEALTH PROMOTION EDUCATION PROGRAM FOR PERIMENOPAUSAL AND POSTMENOPAUSAL WOMEN

by

DONNA G. COBB

A Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Science in Nursing in the Division of Nursing Mississippi University for Women

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The Effect of an Osteoporosis Health Promotion Education Program for Perimenopausal and Postmenopausal Women

by

Donna G. Cobb

Marilyn E. Rush
Assistant Professor of Nursing
Director of Thesis

Dyan Chilton
Associate Professor of Nursing
Member of Committee

Donnie E. Schub
Professor of Nursing
Member of Committee

Director of the Graduate School
Abstract

Development of osteoporosis has been a major concern for women who are menopausal since this bone disorder is a major cause of fractures in the spine, hip, wrist, and other bones. A relationship has been suggested between osteoporosis prevention and health-promoting behaviors, yet little is known about the attitudinal variables that may predict osteoporosis preventive behaviors among menopausal women. The purpose of this research was to evaluate the effect of an educational program on behaviors related to osteoporosis prevention. A pre-experimental design was used to test the null hypothesis: There will be no difference in health promotion behaviors of women before and after an educational program in prevention of osteoporosis. The theoretical framework was Becker’s Health Belief Model. The variables which were measured included hormone replacement therapy, calcium intake, and exercise. A researcher-designed questionnaire was the instrument used. The setting consisted of two churches in south central Mississippi. An education program was
preceded by a pretest and followed up by a posttest 4 weeks after the program via mail to participants who met criteria. Data analysis was done using the t test by comparing pretest and posttest scores. The null hypothesis was not rejected as no significant difference was found between the pretest and posttest. Implications for the advanced practice nurse in the primary care setting include the incorporation of teaching as a facet of an holistic assessment. Education should begin with women as young adults when the attitudes and behaviors are being developed. Recommendations for future research include the use of a stronger research design in which one group receives the educational program and another group does not receive the educational program and inclusion of a knowledge test to be used as an assessment prior to and following the educational program.
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Chapter I

The Research Problem

Osteoporosis is the most common metabolic bone disorder in the United States. The most serious manifestation of osteoporosis is hip fracture. Some 250,000 hip fractures occur each year in the United States with a mortality of 12 to 20%. For those who survive the acute event, nearly half have their lifestyle dramatically changed. Many become chair-bound, and some need to enter nursing homes (Levin, 1991).

Osteoporosis has been recognized as a major preventive health problem for women. Little research is available on how to identify factors that might influence women to adopt an osteoporosis-preventive lifestyle. Although osteoporosis can affect either sex, it is four times more common in women than in men. The estimated cost for osteoporosis-related health care exceeded $10 billion in 1990, and costs are expected to continue to grow as the population ages (Taggart & Connor, 1995).
Osteoporosis was once considered a normal part of aging. Now, with the identification of risk factors, the ability to manage osteoporosis has changed. Although new treatments may help reverse some of the damage of osteoporosis, prevention of the disease altogether is the best way to avoid complications of bone loss (Swiers, 1996).

Women can increase bone mass and reduce the risk of osteoporosis in the first three to four decades of life if they consume adequate daily calcium, exercise regularly, restrict alcohol, and avoid cigarette smoking. Postmenopausal women can help prevent further bone loss if they follow the same strategies for younger women in addition to receiving hormone replacement therapy as recommended by their physician (Ali & Bennett, 1992). Little is known about the attitudinal variables that may predict osteoporosis preventive behaviors among postmenopausal women (Ali & Twibell, 1995). Therefore, the focus of this study was to evaluate the effectiveness of an educational program on osteoporosis preventive behaviors.
Establishment of the Problem

As the United States population ages, certain diseases and medical conditions become more common among the older age group. Osteoporosis is a condition that is a recognized public health problem. The disease affects 25 million people and is associated with 1.5 million fractures annually. The direct and indirect costs of osteoporotic fractures average $18 billion annually and are increasing every year (National Osteoporosis Foundation, 1992).

Osteoporosis causes 500,000 vertebral crush fractures, more than 250,000 hip fractures, and 200,000 distal radius fractures annually. Fractures associated with osteoporosis are distinguished by three characteristics: greatly increased incidence as people age, with fractures occurring 2 to 100 times more among adults over 35 years of age; greater incidence among women than men; and fractures associated with modest trauma (National Osteoporosis Foundation, 1996). Although women believe that osteoporosis is significantly less likely to develop in them than either heart disease or breast cancer, Kasper, Peterson, Allergrante, Galsworthy, and Gutin (1994) show that 50% of women will be affected by
osteoporosis, and 33% will be affected by heart disease, while only 11% will develop breast cancer.

The total cost of osteoporotic fractures is $18 billion annually and a mean hospital stay of up to 32.6 days for those over 65 years of age. Annual physician office visits are 122,000 for hip fractures, 161,000 for vertebral fractures, and 422,000 for forearm fractures (National Osteoporosis Foundation, 1996).

The significant morbidity, morality, and economic consequences of osteoporosis are not forgotten in today's aging population. Preventive action from an early age through education, guidance, and support will all combine to reduce bone loss and risk of fracture in this disease. Prevention, early diagnosis, and treatment are the keys to success in osteoporosis (National Osteoporosis Foundation, 1992).

Education. It is important for women to build an adequate bone mass in early life. Peak bone mass is reached by the third decade of life (Kasper et al., 1994). The onset of menopause in women is often accompanied by rapid bone loss, which can reach 5 to 8% total bone mass lost per year (Berman, Epstein, & Lydick, 1996). In women, significant amounts of bone mass are lost before
menopause. If young women are to prevent or delay the development and onset of osteoporosis in later life, then prevention needs to begin decades before women experience symptoms of this disease. There is a need for development and evaluational interventions targeted at younger women (Kasper et al., 1994).

Comprehensive community-wide educational programs targeted at adults and older Americans have resulted in significant reductions in cardiovascular disease risk factors. No such large-scale interventions have been attempted in the prevention of osteoporosis (Taggart & Connor, 1995).

Little is known about the attitudinal variables that may predict osteoporosis preventive behaviors among postmenopausal women (Ali & Twibell, 1995). Ali and Twibell (1995) found a relationship between health-promoting behaviors, health status, and the relationship of education about osteoporosis preventive behaviors.

Nursing interventions related to osteoporosis prevention have consisted primarily of educational programs aimed at changing dietary and exercise habits (Kim, Horan, Gendler, & Patel, 1991). However, knowledge and skills gained from health education do not always
translate into healthful behaviors. Therefore, more research is needed in the area of health education.

Risk factors. Identified factors for prevention of osteoporosis that can be controlled are individual diet, cigarette smoking, hormone replacement, alcohol intake, inadequate calcium, and being underweight. Women should build up their reserves of bone before bone loss begins during perimenopause (Kim et al., 1991).

The condition of an older woman's skeleton depends on two things: the peak amount of bone attained before menopause and the rate of the bone loss thereafter (National Osteoporosis Foundation, 1996). Although there is no cure, a number of risk factors have been identified. Many of these risk factors, heredity, fair complexion, small body frame, and being female and white, are not under the individual's control (Taggart & Connor, 1995). Heredity factors are important in determining peak bone mass. Black women attain a greater spinal mass and, therefore, have fewer osteoporotic fractures than white women (National Osteoporosis Foundation, 1996).

Pathogenesis of the osteoporotic fracture. Menopause is the point in a woman's life when menstruation stops permanently, signifying the end of her ability to have
children. The transitional phase is called the climacteric, or perimenopause. Menopause is considered complete when a woman has been without periods for one year (National Institute of Health, 1995).

After menopause, bone is removed faster than it is formed so bone loss occurs and bones become weaker. Peak bone density is achieved at the end of skeletal growth, at approximately the age of 30 in women (Swiers, 1996). Following cessation of ovarian function at menopause, bone is lost from the spine at the rate of 5% per year for 5 to 10 years (Swiers, 1996).

Bones consist of healthy, living tissue which continuously perform two processes: breakdown and formation of new bone tissue. If breakdown exceeds formation, bone tissue is lost and bones become thin and brittle. Gradually and without discomfort, bone loss leads to a weakened skeleton incapable of supporting normal daily activities (Swiers, 1996).

The underlying mechanism of bone loss is a disturbance of the bone remodeling process. There is more cellular removal of bone and less replacement of bone. Osteoclasts are responsible for bone removal or resorption. Osteoclasts erode bone, forming a cavity on
the bone surface. The entire remodeling process occurs over approximately 4 to 8 months, with a range of 3 months to 2 years (Swiers, 1996). Osteoporosis results from a basic abnormality in bone remodeling: Bone resorption is greater and with increasing age formation of new bone tissue declines (Black, 1995).

Treatment/prevention. The most effective therapy against osteoporosis available today for postmenopausal women is estrogen. Estrogen saves more bone tissue than large daily doses of calcium (National Institute of Health, 1995). Women use hormone replacement therapy to relieve menopausal symptoms instead of prevention of osteoporosis. Many women for whom hormone replacement therapy was prescribed were not aware of the reasons for continuing the therapy in the longer term and often stopped taking the treatment before osteoporosis was likely to have been prevented (Albers, 1990). Women have been more concerned with the immediate and unpleasant nature of symptoms of menopause than the distant risk of osteoporotic fracture (Garton, Reid, & Rennie, 1995). The majority of young women are not consuming the recommended daily amount of 1200 mg of calcium and are lacking sufficient osteoprotective exercise for building healthy
bone (Kasper et al., 1994). Women can increase bone mass and reduce the risk of osteoporosis if, in the first third to fourth decades of life, they consume adequate calcium intake (Swiers, 1996).

The ultimate goal of pharmacologic treatment in women with postmenopausal osteoporosis is to reduce the risk of fractures by increasing bone mass of normal quality. A relatively new treatment with Alendronate (fosamax) progressively increases the bone mass in the spine, hip, and total body and reduces the incidence of vertebral fractures, the progression of vertebral deformities, and height loss in postmenopausal women with osteoporosis (Liberman et al., 1995). However, prevention is more effective than waiting until the disease has occurred and then treating it.

Black (1995) has shown that if estrogen therapy prevented future bone loss and was administered to all 65-year-old women, hip fracture incidences would be reduced by 73%. Treatment of osteoporosis is the replacement of estrogen because of the effect of estrogen loss on bone mass. Concurrent and cyclic administration of progesterone with estrogen has been promoted for women with intact uteri (Albers, 1990). Calcium supplementation to the 1.0
to 1.5 level is often prescribed in combination with hormone replacement therapy. Additional treatment of osteoporosis includes bone-stressing activity. Weight-bearing activity has been shown to result in an increase in total body calcium and bone density even in previously sedentary postmenopausal women and in older male and female patients (Swiers, 1996).

Salmon calcitonin can be used to treat osteoporosis. Calcitonin is a peptide hormone secreted by the parafollicular cells of the thyroid and inhibits osteoclast function and inhibits bone resorption (National Osteoporosis Foundation, 1992).

**Purpose of the Study**

The purpose of this study was to evaluate the effectiveness of an osteoporosis health promotion program on the lifestyle behavior changes among perimenopausal and postmenopausal women. These data are pertinent in nurses’ efforts to gain insight into the educational needs of women.

**Significance to Nursing**

The effects of a teaching program about lifestyle behaviors and osteoporosis prevention may aid the nursing
profession in the areas of education, practice, and research (Kasper et al., 1994).

The incidence of osteoporosis is the most common metabolic bone disorder in the United States (Berman, Epstein, and Lydick, 1996). This nursing research was significant to nursing education for early detection of the disease and people at risk for osteoporosis. A patient education program would provide the foundation to delay the onset and severity of the disease. Women have demonstrated that there is more than one way to make a decision, and they value the information they are given (National Osteoporosis Foundation, 1996).

Teaching about and maintaining adequate bone mass in early life are very important. The family practice practitioner should use the clinical visit to educate women about the risk factors for osteoporosis, in particular calcium intake, physical activity, and hormone replacement therapy. A complete medical history, diet, and lifestyle all play a role in determining a person's risk of osteoporosis.

Limited research is available on variables that may predict osteoporosis preventive lifestyle behaviors among women. Numerous studies have been conducted regarding the
long-term health problems of osteoporosis and its causes. Findings from this study may prove beneficial in educating women regarding lifestyle behavior changes that may prevent osteoporosis. Conclusions would serve as a basis for further research about lifestyle behavior changes in premenopausal and postmenopausal women.

**Statement of the Problem**

Little research has been done to evaluate teaching as a means of initiating a change in lifestyle behaviors in osteoporosis prevention. Education about risk factors and treatment associated with osteoporosis aimed at perimenopausal and postmenopausal women may decrease the risk of osteoporosis in elder women (Ali & Twibell, 1995).

**Theoretical Framework**

The theoretical framework for this research was the Becker Health Belief Model (Becker, 1974). Compliance and preventive health care practices are considered to be concepts explained by this model. The major components of this model are that in order for an individual to take action to avoid a disease the person would need to believe that there was susceptibility to the disease, that the disease would have a severity on some component of that
person's life, and that taking a particular action would, in fact, be beneficial (Becker, 1974).

Interventions for osteoporosis have primarily included educating in prevention and treatment health education. Health education would serve as an individual's cue to action. The Health Belief Model was used to evaluate individual perceptions of personal risk of developing osteoporosis, the seriousness of the potential disease, the person's health motivation, and the perceived barriers and benefits of preventive action. The model was useful for identifying specific variables that can enhance individualized health-promotion strategies (Taggart & Connor, 1995).

The health belief model was used to indicate that an individual's recognition of his or her susceptibility to a disease and perception of the benefits of preventive action versus the perception of barriers to preventive action are strongly related to the decision to participate in preventive activities (Taggart & Connor, 1995). In designing this study, the author attempted to educate the women about personal susceptibility to osteoporosis, the risks and costs of the disease, and the benefits of
exercise, diet, and hormone replacement therapy in preventing osteoporosis.

**Null Hypothesis**

The following hypothesis guided this research: There will be no difference in health promotion behaviors of women before and after an educational program on prevention of osteoporosis.

**Definition of Terms**

For the purpose of this study, terms were defined as follows:

**No difference in health promotion behaviors.**

*Theoretical*: No change in the manner in which individuals assume responsibility for health.

*Operational*: No change in a majority of lifestyle behaviors as defined by the Cobb Osteoporosis Questionnaire.

**Women**

*Theoretical*: Adult female persons.

*Operational*: Menopausal women who reside in a south central rural community in Mississippi who were willing to participate and who met the criteria for the study.
Educational program for prevention of osteoporosis:

Theoretical: To educate through instruction and discipline, therefore, acquiring knowledge and making health changes.

Operational: For this study, a program consisting of a 15-minute video and 15-minute slide presentation on risk factors and prevention of osteoporosis.

Assumptions

For the purpose of this study, the following assumptions were made:

1. Participants will honestly report their answers relating to demographic data and health behaviors.

2. Osteoporosis is an incurable disease that can be prevented.

3. Health behaviors can be measured.
Chapter II

Review of the Literature

A review of the literature revealed many studies on the incidence and prevalence of osteoporosis among perimenopausal and postmenopausal women. Most studies stated that prevention needed to begin before menopause and not after bone loss had already begun (Rothert et al., 1990). The studies were conducted in a variety of geographic areas, in rural and urban female populations, and with individuals whose ages ranged from college to postmenopausal. Very little research was found, however, which addressed lifestyle behavior changes among women. Therefore, the focus of this selected review of literature was studies related to prevention programs and strategies for behavior changes in hormone replacement therapy, exercise, and calcium intake. Although much remains to be discovered about osteoporosis and health behaviors, several researchers' conclusions strongly suggest that there is a positive correlation between the variable of
calcium intake, exercise, and hormone replacement therapy (Ali & Bennett, 1992; Ali & Twibell, 1995).

Ail and Twibell (1995) sought to explain if there was a relationship between behaviors identified in the Health Promotion Model and variables of the osteoporosis preventive behaviors among postmenopausal women. The purpose of the research was to investigate relationships of attitudinal variable that may predict osteoporosis preventive behaviors among postmenopausal women. Four research questions guided this study:

1. What are the subjects' osteoporosis prevention behaviors of calcium intake, exercise participation, and taking hormones?

2. What are the relationships between 12 selected variables from the Health Promotion Model and performance of osteoporosis prevention behaviors?

3. Is there a significant difference between women who are currently taking hormones and women who took them in the past using the variables from the Health Promotion Model?

4. Is there a significant difference between women who received hormones and those who did not relate to
their calcium intake and exercise participation (Ali & Twibell, 1995)?

The sample included 100 postmenopausal women 50 years of age or greater obtained from attendants at three churches in a midwestern state. A total of 100 surveys were distributed to three contact persons in three churches, and all surveys were returned and included in this study. The 10 questionnaires used in the study were a 24-hour recall of dietary intake of calcium-rich foods, exercise participation minutes/week, hormone usage, the calcium benefits/barriers scale, a modified form of the exercise benefits/barriers scale, hormone benefits/barriers scale, general self-efficacy scale, Health Locus of Control, Health Scale of the Multiple Assessment Instrument, and importance of health (Ali & Twibell, 1995).

Data analysis was conducted using the MANOVA to determine differences between hormone replacement therapy and variables of the Health Promotion Model. A t test was used to examine the difference between hormone users and nonusers regarding calcium intake and exercise therapy (Ali & Twibell, 1995).
Major findings for the research questions were as follows. Eighty-nine percent of the participants noted consistent consumption of the reported amount of milk as a source of calcium throughout their lives, 81% exercised with irregular pattern with 3% being consistent, 31% were on hormone replacement therapy (currently), 11% were past users, and 68% had never used hormone replacement therapy. The relationship between variables of the Health Promotion Model and behaviors of osteoporosis prevention behaviors showed a significant relationship between exercise benefits ($p < .01$) and exercise barriers ($p < .05$). Intake of calcium-rich foods was significant, and women who consumed greater amounts of calcium-rich foods perceived improved health status ($p < .05$) than in the past. Calcium intake levels from foods and perceived good health were significant, compared to exercise and exercise barriers ($p < .05$). Benefits and barriers to taking hormones showed a significant difference only in the multivariate test, $F(2, 49) = 5.172$, $p < .01$. The difference was not significant between hormone users and nonusers and intake of calcium and exercise participation (Ali & Twibell, 1995).
Ali and Twibell (1995) concluded the findings of the study support relationships between health-promoting behaviors, health status, and the relationship of education about osteoporosis preventive behaviors. This study is germane to current research as it illuminates the variances of knowledge (education) and risk factors.

Ali and Bennett (1992) compared the relationship of knowledge of osteoporosis prevention among postmenopausal women and health-promoting behaviors and perceptions of milk intake as an osteoporosis prevention. Although knowledge of a behavior has not been consistently predictive of health behavior, the authors of this study assumed that a lack of knowledge about osteoporosis preventive behaviors may contribute to prediction of osteoporosis preventive behaviors because the behaviors have not been widely disseminated to the public.

The sample included 91 postmenopausal women ages 54 to 83 years who were volunteers at a large midwestern hospital and a large senior citizens' residential apartment complex in the Midwest. The demographics identified were race, age, educational level, and marital status. The instruments used in the study were the Knowledge of Osteoporosis, Health Promotion Lifestyle
Profile, Osteoporosis Prevention Behaviors questionnaire, and Calcium Intake from Milk questionnaire (Ali & Bennett, 1992).

The findings revealed that older women were not found to have more knowledge than younger women about risk factors for osteoporosis. Osteoporosis preventive behaviors were significantly and positively correlated with calcium intake from milk. The higher the education level, the greater the knowledge about preventive practices of osteoporosis. Women with less than a high school education exhibited lower mean scores than those with a high school diploma or those with some college education (Ali & Bennett, 1992).

Knowledge of osteoporosis was significant to calcium intake of milk, and health-promoting behavior is significant to calcium intake from milk. Only health-promoting lifestyle behaviors and knowledge of osteoporosis were significant predictors of osteoporosis preventive behaviors (Ali & Bennett, 1992).

A high mean score for the Health Promotion Lifestyle Profile was consistent with the finding that adults and older adults engage in health-promoting behaviors. The six levels of education were condensed to three categories.
The higher the education level, the greater the knowledge about preventive practices of osteoporosis and the more positive outlook of preventive practices. Conclusions drawn from the findings indicate that an increase in knowledge is associated with health practices. This study was germane to current research as it illuminates that older women did not have more knowledge of preventive behaviors to prevent osteoporosis. Knowledge was not a strong predictor of behavior change; information about osteoporosis prevention was an important construct for practice (Ali & Bennett, 1992).

In a study by Kasper et al. (1994), the knowledge of osteoporosis risk factors among college-age women, their beliefs about the disease, and to what extent they practice preventive behaviors, such as adequate calcium intake and physical activity, were determined through a survey. The sample consisted of 127 women (mean age of 19.6 years, 92% White) enrolled in a required undergraduate health course at a midwestern state university.

The study questionnaire consisted of 20 sections. Nine questions were related to cigarette use, hormonal contraceptive use, family history, demographic
information, and self-reported height and weight. The remaining section assessed osteoporosis information sources, risk-factor knowledge, osteoporosis beliefs, exercise habits, calcium intake, and menstrual history (Kasper et al., 1994).

Women were surveyed and asked, "How much information have you heard about the health condition osteoporosis, sometimes called brittle or weak bones?" The respondent was asked to choose between "a lot," "some," or "nothing at all." Those who had heard some or a lot about the disease were asked where they had received their information and responded by checking "yes" or "no" for each of 12 sources, such as television, physician, or magazine. Knowledge of risk factors was assessed by listing 13 commonly discussed risk factors; for each factor, the respondent had five responses from which to choose (Kasper et al., 1994).

The strength of respondents' beliefs about osteoporosis, heart disease, breast cancer, and acquired immunodeficiency syndrome was measured using a 5-point Likert-type scale. Respondents were asked to respond to exercise activity by frequency of each activity in minutes spent on each occasion and if they had a change in their
heart rate or breathing during the activity. Only activities that produced a moderate or large increase in the heart rate or breathing were scored (Kasper et al., 1994).

A frequency questionnaire was used to assess dietary calcium intake. For each of eight common calcium-rich foods, respondents were asked to report how often they consumed each item. Calcium intake was also categorized as adequate (at least the 1200 mg recommended daily dietary allowance for 11- to 24-year-old women) or inadequate (less than the 1200 mg recommended daily dietary allowance for 11- to 24-year-old women) (Kasper et al., 1994).

Participants responded to menstrual history and were categorized as eumenorrheic (10 or more periods per year), eumenorrheic/oligomenorrheic (seven to nine periods per year), oligomenorrheic (three to six periods per year at intervals of more than 36 days), or amenorrheic (two or fewer periods per year or no period during the last 6 months) (Kasper et al., 1994).

Data were collected using a questionnaire from women who were recruited at a class meeting of the spring 1993 term from five sections of the undergraduate health course. They were asked to volunteer to complete a
questionnaire "about college age women's opinions and behaviors related to health issues" (Kasper et al., 1994, p. 697).

One hundred fourteen (90%) of the survey respondents had heard about osteoporosis, but only 49 (43%) of the 114 had received information from either a health care provider or a school. There was a significant relationship between receiving osteoporosis information and the ability to correctly identify risk factors (p < .006). Only 6.7% of the women reported getting both adequate osteoprotective exercise per week and the recommended 1200 mg of calcium per day. They also expressed less concern about osteoporosis in relation to heart disease and breast cancer (p < .02). There was no significant relationship between risk-factor identification and exercise habits, calcium intake, or beliefs about osteoporosis. Kasper et al. (1994) concluded that the majority of young women were not consuming the recommended daily amount of calcium and were lacking sufficient osteoprotective exercise for building healthy bones. The Kasper et al. (1994) study provided guidance for the current researcher to illuminate that women may have knowledge of osteoporosis risk factors
of low-calcium intake and lack of exercise but may not be practicing osteoprotective behaviors.

Taggart and Connor (1995) sought to investigate the relation of exercise habits of female college students to their knowledge about osteoporosis and their health beliefs, using the Health Belief Model to determine why some people participate in self-care preventive actions and others do not participate in self-care preventive actions. The purpose of this research was to investigate relationships of identified factors that can be controlled, especially weight-bearing exercise.

The conceptual framework was the Health Belief Model by Becker (1974). In this study, variables from the Health Belief Model were compared to osteoporosis prevention behaviors. This model is useful for identifying specific variables that can enhance individualized health-promotion strategies (Taggart & Connor, 1995).

Taggart and Connor (1995) used a descriptive, correlational design to determine exercise habits, osteoporosis knowledge, and health beliefs in female college students. A convenience sample of 113 students enrolled in a basic health course. Participants' ages ranged from 18 to 53 years (M = 25.06 years, mode = 27
years) with osteoporosis risk factors among the participants being white (84.8%), light complexion (43%), light hair color (56.2%), slender build (i.e., wrist measurement less than 5.5 inches) (54.5%), positive family history of osteoporosis (8.8%), and lack of exercise (25.7%).

The participants completed the Osteoporosis Health Belief Model Scale and an Osteoporosis Knowledge test. Heights were taken and exercise frequency assessed (Taggart & Connor, 1995).

Taggart and Connor (1995) determined whether a statistically significant relationship existed among the variables in this study using Pearson product-moment correlation coefficients. There was no statistically significant relationship between frequency of exercise and either osteoporosis knowledge or health beliefs. Taggart and Connor (1995) found correlations between scores on knowledge of osteoporosis and some of the health belief variables and among the health belief scores. Students who were most knowledgeable about osteoporosis were also most aware of the benefits of exercise ($r = .25, p = .01$). Students who perceived osteoporosis as serious were more likely to be aware of their own susceptibility ($r = .24,$
Significant relationships were found at the \( p < .05 \) level between age and knowledge scores \((r = .19, p = .04)\), and age and health motivation \((r = .19, p = .05)\). The older participants, however, noted more barriers to exercise \((r = .94, p = .001)\) than the younger students. The older the student, the greater the knowledge of osteoporosis and the higher the motivation to aspire to a healthy lifestyle. The Taggart and Connor (1995) study provided guidance for the current researcher to illuminate that exercise programs should begin early in life and be continued throughout the life span.

Kim et al. (1991) developed and tested an instrument designed to measure personal attitudes and beliefs related to the potential for developing osteoporosis. The research also sought to identify variables that would enhance individualization of health promotion behaviors.

The conceptual framework was the Health Belief Model by Becker (1974). In this study, variables from the Health Belief Model were used to test health-related activities of elders. Kim et al. (1991) identified several definitions used for this osteoporosis study. Susceptibility referred to the perceived risk of developing osteoporosis. Seriousness was the perception of
threat from having osteoporosis, including harmful consequences in relation to personal physical health. Benefits focused on the belief in the effectiveness of specific behaviors to prevent the occurrence of the disease. Barriers were defined as the beliefs about the negative components of the behaviors which would be undertaken to prevent the disease. Health motivation was related to a general tendency for an individual to engage in health behaviors (Kim et al., 1991).

The sample included 150 elders whose ages ranged from 60 to 93 years (M = 74 years). Subjects had an average of 10.5 years of education ranging from 0 to 19 years. Females comprised 80.7% of the sample. Individuals who reported that they had osteoporosis were excluded from the study. The subjects, 60 years or older, were recruited from four senior centers and one large senior residential apartment complex. Data collection took place over a 3-month period in a metropolitan area of western Michigan (Kim et al., 1991).

The instruments used were the Osteoporosis Instrument (Kim et al., 1991) and the Health Belief Model which had a total of 50 items reflective of each of the five theoretical dimensions of the Health Belief Model.
A 5-point Likert scale was used to rate items. Questions were worded at a fifth-grade readability level. The Osteoporosis Instrument focused on two risk reduction behaviors, calcium intake and physical exercise.

Health motivation for exercise was the strongest discriminator followed by Barriers Exercise. The two variables correctly classified low versus high exercisers in 62% of the cases. Of the 60 low exercisers, 37 (61.7%) were accurately classified; of 90 high exercisers, 56 (62.2%) were correctly identified (Kim et al., 1991).

The results of the study demonstrated the importance of health motivation in influencing health-related behaviors. In this study, barriers and health motivation were found to be important in explaining both calcium intake and exercise behaviors. Kim et al. (1991) sought to assess that in elders, barriers and health motivation were important in explaining both calcium intake and exercise behaviors. Assessment of perceived barriers would suggest an intervention to decrease a deterrent for motivation for risk factors.

Garton, Reid, and Rennie (1995) presented the results of interviews with 45- to 49-year-old women who were randomly selected and invited to participate in a bone
density screening program. The purpose of this study was to investigate the views of women in relation to hormone replacement therapy and osteoporosis. This study focused on the reasons women take hormone replacement therapy.

Garton et al. (1995) used a descriptive design for this study. Questions were asked face-to-face, and all responses were recorded by the interviewer. A total of 481 consecutive attendants were invited to answer a confidential semistructured questionnaire administered by one of the interviewers during the bone densitometry scan.

The questionnaire was completed by 481 women age 45-49 years (mean age of 47 years) which included social class, menopausal status, history of hormone replacement therapy, exposure and climacteric symptoms, awareness of hormone replacement therapy and osteoporosis, and potential willingness to consider hormone replacement therapy before and after bone densitometry (Garton et al., 1995).

Major findings for the study were a comparison of social classes showing no significant differences in the prevalence of surgical castration or simple hysterectomy. Women from lower social classes were more likely to have had a natural menopause (16% vs. 9%, $\chi^2 = 5.15, p < .05$)
despite there being no difference in mean age between the
groups (mean SD = 47.1 [1.38] vs. 47.1). Fourteen percent
of premenopausal women and 41% of postmenopausal women
were current or previous hormone replacement therapy
users; no significant social class differences in hormone
replacement therapy use were observed. Most women (n =
447, 93%) were medically eligible for hormone replacement
therapy. Climacteric symptoms were common; 189 (56%)
premenopausal women reported three or more symptoms
compared to 64 (94%) postmenopausal women. Most women were
aware of hormone replacement therapy (n = 462, 84%)
although those from upper social classes were more likely
to have heard about osteoporosis (88% vs. 78%, $\chi^2 = 8.53,$
$p < .005$) (Garton et al., 1995).

Of the 101 current and previous users of hormone
replacement therapy, 70 had taken it for climacteric
symptoms, 16 for menorrhagia, and 7 on the recommendation
of the physician after hysterectomy or menopause; only one
had taken it to prevent osteoporosis. More previous users
than current users had experienced side effects from
hormone replacement therapy (54% vs. 26%, $\chi^2 = 7.81,$
p < .01) and had stopped therapy (Garton et al., 1995).
Only one third of nonusers had considered taking hormone replacement therapy before they came for their scan. A high proportion (n = 364, 96%) said they would consider hormone replacement therapy if their scan suggested an enhanced risk of future osteoporotic fracture, and many (n = 324, 85%) said they would take hormone replacement therapy as long as their doctor recommended. Garton et al. (1995) sought to explain that women take hormone replacement therapy to relieve menopausal symptoms and not for prevention of osteoporosis. Women would benefit knowing the benefits of estrogen on the skeletal system (Garton et al., 1995).

Rothert et al. (1990) sought to determine how women use the information gained and make a decision to use hormone replacement therapy and whether there are clusters of women with similar characteristics in use of information. The variables were cancer risk, osteoporosis rises, hot flashes, risks of fractures due to osteoporosis, and treatment protocol. The target population was women who were considering benefits and risks of hormone replacement therapy. A convenience sample was drawn from a university community and metropolitan community churches, local civic groups, newspapers,
television, and radio announcements. The sample consisted of 271 women between the ages of 44 and 55 years, with an intact uterus, and not taking hormonal replacement and were predominantly well-educated, white, middle-class, Protestant women.

The instruments were two sets of systematically written cases based on the Social Judgement Theory. Women were given a three-page information sheet describing the relation of hot flashes, osteoporosis, and endometrial cancer risk to estrogen replacement therapy. Women were asked to consider the three factors in one of two levels: risk of osteoporosis (high or standard), risk of endometrial cancer (high or standard), and hot flashes (severe or minimal). All combinations made eight cases, which were repeated for a total of 16 cases. In the first 16 cases, women were asked how likely it would be for them to take hormone replacement therapy. In addition to written cases, instruments were used to obtain demographic data, perceptions and knowledge of menopause, and management of menopausal symptoms (Garton et al., 1995).

Data were analyzed using multiple regression. The analysis included 26 sociodemographic, attitudinal, and knowledge variables used to impact on women's use of
information in making decisions on the use of hormone replacement therapy (Garton et al., 1995).

The Rothert et al. (1990) study provided guidance for the current researcher to illuminate that women do weigh and combine information gained to make a decision on the use of hormone replacement therapy. Rothert et al. acknowledged that women make decisions to use hormone replacement therapy based on prevention of high-risk diseases such as osteoporosis.

Liberman et al. (1995) sought to determine if women receiving alendronate (Fosamax) had significant increases in bone mineral density at all skeletal sites. The purpose of this research was to determine if bone mineral density is a predictor for fractures and to reduce the risk of fractures by increasing bone mass. Pharmacologic treatment in women with postmenopausal osteoporosis was useful using alendronate. Alendronate inhibits bone mineralization and permits effective antiresorption of bone.

Conclusions of the study were that daily treatment with alendronate increases bone mass in the spine, hip, and total body and reduces the incidence of vertebral fractures, progression of vertebral deformities, and height loss in postmenopausal women with osteoporosis.
Postmenopausal women who were educated and treated with alendronate showed a significant decrease in bone loss and height loss (Liberman et al., 1995).

In summary, little is known about the attitudinal variables that may predict osteoporosis preventive behaviors among postmenopausal women (Ali & Twibell, 1995). By increasing knowledge of osteoporosis preventive behaviors, the incidence of osteoporosis may not be a high risk factor for women later in life (Ali & Bennett, 1992). Because of the importance of building and maintaining an adequate bone mass in early life, young women should be educated about risk factors for osteoporosis (Kasper et al., 1994). Identified factors that can be controlled are individual diet and lifestyle, especially weight-bearing exercise (Taggart & Connor, 1995).
Chapter III

The Method

A high incidence of development of osteoporosis has been reported in postmenopausal women which has stimulated clinicians to develop prevention strategies. Educational programs developed for perimenopausal and postmenopausal women have been helpful in increasing the knowledge of women in prevention strategies and changes in lifestyle behaviors. The purpose of this study was to determine the effectiveness of an osteoporosis prevention program which focused on health promotion activities reflective of lifestyle behaviors.

Research Design

A pre-experimental, one-group pretest-posttest design was used in this study. Pre-experimental design has been defined by Polit and Hungler (1995) as a study that does not include controls to compensate for the absence of either randomization or a control group. The one-group pretest-posttest design does not control for the effects of external factors. Roberts and Burke (1989) defined pre-
experimental studies as those in which two observations of the dependent variable are carried out, one after the introduction of the independent variable. Without randomization or the use of a control group, there is little evidence that the cause of change observed between the two observations is the result of the experiment. The independent variable believed to influence or cause the dependent variable (Roberts & Burkes, 1989) was identified as a teaching program about preventive lifestyle behaviors associated with osteoporosis. The dependent variable predicted to be caused by or dependent on the independent variable was identified as lifestyle behavior changes of menopausal women as determined by results of responses on the Cobb Osteoporosis Questionnaire.

The control variables were menopausal women and the setting in which the research study was implemented. The extraneous variables, those which may have interfered with the results of the study (Polit & Hungler, 1995), were identified as poor attendance at osteoporosis prevention teaching programs, previous knowledge of the disease, and interest in the disease. Design control was maintained since only the researcher had access to obtained data and presented the teaching program.
Setting

The setting for this research study was two churches in a rural area of Mississippi. The church council agreed to allow members of the designated churches to participate in the study. The two rural Baptist churches were selected by the researcher because of the interest of the members in receiving an educational program on osteoporosis.

Subjects

A nonprobability method of sampling was used for convenience and was directly related to the availability of subjects. Postmenopausal women were the target population for this study. The actual population consisted of premenopausal and postmenopausal women. Thirty-six women signed consent forms to participate in the study (10 women from one church and 26 from the second church). This sample consisted of both perimenopausal and postmenopausal women who signed consent forms. All 36 women attended the educational program and participated in the pretest phase of the study; however, only 22 women who indicated that they were in the menopausal state were subjects in this study and completed the posttest phase.
Data Collection Instrument

One instrument was employed to record data in the study. The Cobb Osteoporosis Questionnaire, a 19-item researcher-designed instrument, was used for data collection (see Appendix A). The demographic section of the Cobb Osteoporosis Questionnaire includes four questions pertaining to age, race, income, and education. Questions 5 through 15 referred to lifestyle osteoporosis preventive behaviors, including calcium supplements, history of alcohol intake, hysterectomy, oophorectomy, female hormone replacement, and menopausal state. These questions were in the form of yes and no responses. Question 16 referred to smoking habits and was measured on an ordinal scale ranging from 1 to 5 (0 = none and 4 = more than 1 pack daily). Question 17, consisting of eight bone strengthening exercises habits, was measured on a Likert-type scale ranging from 1 (Don't exercise) to 5 (Exercise 7 x weekly) with the lowest possible score of 8 and the highest possible score of 40. Question 18, consisting of length of time spent in the eight bone strengthening exercises, was also measured on a Likert-type scale ranging from 1 (Don't exercise) to 6 (over 60 minutes). The potential lowest score was 8 and the
potential highest score was 48. Question 19 measured responses in terms of the amount of calcium-rich food intake. Each food item was analyzed separately since the amounts reflected different types of measurements (cups, slices, servings).

The Cobb Osteoporosis Questionnaire was piloted using a group of 38 graduate students in order to test its readability. Revisions were made based on the comments. Content validity was obtained using a panel of experts, including specialists in the fields of women's health, psychology, and behavior modification. The internal consistency reliability of the Cobb Osteoporosis Questionnaire use of pretest exercise was .02 and alpha of .41 for the posttest.

Data Collection Procedures

Permission was obtained to conduct the study from the Mississippi University for Women's Committee on the Use of Human Subjects in Experimentation (see Appendix B). A letter was sent to each church informing them of the research study. Permission was requested to conduct the study with the possibility of having interested women members who met the criteria participate in the teaching program (see Appendix C). A letter of permission to
conduct the study from the church council was sent to the researcher (see Appendix D).

The idea of the study was presented to 36 female church members who were premenopausal and postmenopausal. All 36 women agreed to participate in the pretest and educational program by signing consent forms. Participants also completed a sign-in sheet with home address to be mailed a posttest. The Cobb Osteoporosis Questionnaire pretest was administered to the subjects prior to the osteoporosis prevention teaching program. The one-hour educational program was held in the church fellowship hall. The program began with a discussion about the pathophysiology of osteoporosis. The discussion included statistics, sites of osteoporosis, and remodeling of bone. Information was disseminated regarding the effects of lifestyle behaviors of exercise, calcium intake, and female hormone replacement therapy (see Appendix E). A question-and-answer session followed the presentation of the educational program.

One month following the presentation of the osteoporosis teaching program, the Cobb Osteoporosis Questionnaire was mailed to the 22 participants who reported that they were postmenopausal. The researcher
emphasized the need to answer the questions honestly. Data were collected from March to May 1997. The posttest was mailed to participants in May by matching the home address on the sign-in sheet with the name on the consent form attached to each pretest questionnaire given in March. Each consent form was then separated from the questionnaire by the researcher and destroyed. Each posttest questionnaire was correlated by number matched to the pretest number on the questionnaire. Completed questionnaires were returned in a self-addressed, postage prepaid envelope furnished by the researcher.

Statistical Analysis

The subjects in this study were their own control in this pre-experimental study. Descriptive statistical techniques were used to analyze the profile of subjects and the osteopreventive behaviors. Means and standard deviations were used to describe the age, educational level, total exercise time, and length of time spent exercising since these latter data were at the ratio or interval level of measurement. The median was used to summarize the amount of calcium food intake, and the median range was employed to describe the subjects' annual income. The null hypothesis was tested using chi-square
for questions pertaining to the lifestyle behaviors of calcium supplement intake and female hormone replacement therapy since these data were at the nominal level of measurement (yes and no). The paired t test was used to test the null hypothesis pertaining to lifestyle behaviors relating to use of bone-strengthening exercises and the length of time exercises were carried out. Finally, since the calcium food items were measured in different types of units, each food item was tested separately. The paired t test was used to analyze the amount of vegetable and bean intake before and after the educational program since these data were at the ratio level of measurement and met the assumption of normality (see Appendix F). Since the frequency distributions of the amounts of food intake, with the exception of vegetables and beans, were not normally distributed, the Wilcoxon rank test was submitted for the paired t test for all remaining food items.
Chapter IV
The Findings

The purpose of this study was to determine the effect of an osteoporosis preventive teaching program on postmenopausal women. A pre-experimental pretest-posttest design was utilized for this study. Data were obtained using the Demographic and the Cobb Osteoporosis Questionnaire. The analysis of the data is presented in this chapter. A profile of the subjects is presented in the first section. Comparisons of data from pretests and posttests are presented in the second section, and outcomes of data analysis related to the hypothesis are presented in the last section.

Profile of Subjects

Race. A total of 22 women who indicated that they were in a menopausal state were subjects in this study. All subjects were Caucasian.

Age. Ages of subjects ranged from 46 to 92 years. Most of the subjects (40%) were between the ages of 60 and
69 years. The mean age was 68.59 years, the standard deviation was 11.19, indicating a large variation in the ages of the subjects.

Years of Education. Years of education ranged from 7 years to 20 years. The mean grade level of subjects was 12.73, which indicated that on the average subjects were high school graduates (see Table 1).

Table 1

Demographics of Race, Age, and Educational Level by Frequency and Percentage

<table>
<thead>
<tr>
<th>Variable</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Race^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>22</td>
<td>100.0</td>
</tr>
<tr>
<td>Age (years)^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 50</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>50-59</td>
<td>3</td>
<td>14.0</td>
</tr>
<tr>
<td>60-69</td>
<td>9</td>
<td>40.0</td>
</tr>
<tr>
<td>70-79</td>
<td>4</td>
<td>18.0</td>
</tr>
<tr>
<td>80-89</td>
<td>4</td>
<td>18.0</td>
</tr>
<tr>
<td>&gt; 89</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>Education (years)^</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>5.0</td>
</tr>
<tr>
<td>9-12</td>
<td>13</td>
<td>62.0</td>
</tr>
<tr>
<td>13-16</td>
<td>3</td>
<td>14.0</td>
</tr>
<tr>
<td>&gt; 16</td>
<td>4</td>
<td>19.0</td>
</tr>
</tbody>
</table>

^n = 22. ^n = 22. ^n = 21.
Subjects' Annual Income

Subjects' annual income levels ranged from less than $5,000 to more than 25,000. The highest percentage (29%) of subjects had an annual income level ranging from $10,000 to $14,999 followed by 20% of subjects with annual income level from $15,000 to $19,999. Forty-eight percent of subjects had incomes ranging from $15,000 to over $25,000.

Medical History of Subjects

Data pertaining to the medical history of subjects are presented in Table 2. None of the 22 subjects smoked or used alcohol beverages. The majority of subjects (59%) reported that they had a hysterectomy. Nine (69%) of those who had a hysterectomy also indicated that they had one or both ovaries removed. Thirteen (59%) of the 22 subjects indicated that they did not have an oophorectomy. All 22 subjects indicated that they were menopausal. None of the subjects reported that they had osteoporosis. Over two thirds of the subjects stated that they had discussed female hormone replacement therapy with their physician.
Table 2

Medical History of Subjects by Frequency and Percentage

<table>
<thead>
<tr>
<th>Medical history</th>
<th>f</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>100.0</td>
</tr>
<tr>
<td>Alcohol use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>22</td>
<td>100.0</td>
</tr>
<tr>
<td>Hysterectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>59.0</td>
</tr>
<tr>
<td>Oopharectomy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>3</td>
<td>14.0</td>
</tr>
<tr>
<td>Both</td>
<td>6</td>
<td>27.0</td>
</tr>
<tr>
<td>Osteoporosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>100.0</td>
</tr>
<tr>
<td>Menopausal state</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>22</td>
<td>100.0</td>
</tr>
<tr>
<td>Hormone therapy discussed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>with physician</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>15</td>
<td>68.0</td>
</tr>
</tbody>
</table>

Note. N = 22.

In order to test the null hypothesis, it was determined to make a significant difference there would need to be a majority of health-promoting behaviors to make a difference. The following eight different health
related conditions of osteoporosis prevention were analyzed pre- and post-education programs.

**Comparison of Pretest and Posttest Data**

Comparison of use of calcium supplements before and after the osteoporosis health program. There was a 17% increase in the use of calcium supplements following the educational program (64% vs. 81%, respectively). The types of calcium supplement varied but were similar during both reporting periods.

The chi-square test was used to test the null hypothesis regarding use of calcium supplements since these data were at the nominal level of measurements. There was a significant increase in the use of calcium supplements following the prevention teaching program, $\chi^2(1, N = 22) = 5.53, p = .0188$.

Comparison of use of female hormone before and after the osteoporosis health promotion program. A 4% increase in the use of female hormones was noted following the osteoporosis prevention teaching program (55% vs. 51%, respectively). Premarin or Estradiol were the two female hormones used by the subjects. Prior to the educational program, 9 (41%) indicated that they used Premarin, one (5%) stated that she used Estradiol, and one (5%)
stipulated that she used Premarin-Estradiol. Following the educational program, 50% of the subjects were using Estradiol, while one (5%) reported using Premarin. Since the data were at the nominal level of measurement, the chi-square test was used to test the use of female hormones before and after an educational program. There was a significant increase in the use of female hormone therapy following the prevention teaching program, $\chi^2(1, N = 22) = 9.78, p = .0018$.

**Pretest-posttest comparison of time spent walking.** There was a 27% increase in the number of subjects who reported that they walked for 20 to 30 minutes after the teaching program. A 5% increase in the number of subjects walking 31 to 40 minutes was also noted. Two subjects (9%) increased their walking time from 41 to 50 minutes to 51 to 60 minutes. To test if there was a significant difference in the amount of the time spent walking, a $t$ test was performed comparing the mean amount of time spent pretest and posttest periods. There was no significant difference in time spent walking, $t(21) = .269, p > .05$.

**Comparison of time spent in other types of bone-strengthening exercise before and after osteoporosis health promotion teaching program.** None of the subjects
reported time spent bicycling on their pretest, while only one subject indicated on the posttest that she bicycled between 20 and 30 minutes. One subject reported that she swam for 20 to 30 minutes prior to the teaching program, while none of the subjects reported time spent swimming on the posttest. Twenty-one (96%) of the 22 subjects reported that they did not spend any time in weight lifting or exercising using a video exercise program before or after the teaching program. Fourteen percent (n = 3) indicated that they used sitting/lifting exercises between 20 and 40 minutes following the teaching program compared to only one subject who reported that she used this exercise 20 to 30 minutes prior to the teaching program. Three (14%) of the 22 subjects reported using floor exercises between 20 and 40 minutes prior to the teaching program while only one subject (5%) indicated that she used floor exercises for 20 to 30 minutes following the teaching program. A t test was performed on the mean amount of time spent in bone strength exercises pre- and post- educational program to determine if there was a significant difference. There was a significance in time spent in other exercises, t(21) = 2.52, p < .05.
Use of bone-strengthening exercises. There was no significant difference found between pretest and posttest use of bone-strengthening exercise in terms of prevention of osteoporosis. The means reflecting the use of bone-strengthening exercises and the standard deviations for the pretest and posttest data were similar (see Table 3).

Table 3

Pretest and Posttest Use of Bone-Strengthening Exercises Using Two-Tailed t Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>22</td>
<td>10.00</td>
<td>1.61</td>
<td>.650</td>
<td>.525</td>
</tr>
<tr>
<td>Posttest</td>
<td>22</td>
<td>10.14</td>
<td>1.97</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p ≤ .05.

Time spent in bone-strengthening exercises. There was a significant increase in length of time of participation in bone-strengthening exercises. The mean score was substantially greater following the educational program. The standard deviation was slightly larger in the posttest period indicating a greater variability in length of time that exercises were conducted in the post-education period (see Table 4).
Table 4

Results of Length of Time Performing Bone-Strengthening Exercises Using the Two-Tailed \( t \) Test

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>M</th>
<th>SD</th>
<th>( t )</th>
<th>( p )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretest</td>
<td>22</td>
<td>9.45</td>
<td>1.61</td>
<td>1.91</td>
<td>.05</td>
</tr>
<tr>
<td>Posttest</td>
<td>22</td>
<td>10.09</td>
<td>1.58</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\( p \leq .05. \)

Statistical test results for dietary intake of high-calcium foods. The Wilcoxon rank test was substituted for the paired \( t \) test to test the null hypothesis relating to diet, since the results of Goodness of Fit Test (Kolmogorov-Smirnov test) (see Appendix F) indicated that the frequency distribution of the listed foods, with the exception of vegetables and beans, were not normally distributed (\( p < .05 \)). Furthermore, each food item noted in the diet questionnaire was measured differently (cups, servings, slices, or no indication); therefore, each food item was tested separately. There was no significant difference indicated by the Wilcoxon rank test before and after the osteoporosis prevention teaching program (see Table 5).
Table 5

Wilcoxon Rank Test Results for Dietary Intake of High-Calcium Foods

<table>
<thead>
<tr>
<th>Food item</th>
<th>T</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>-.591</td>
<td>.554</td>
</tr>
<tr>
<td>Yogurt</td>
<td>1.754</td>
<td>.061</td>
</tr>
<tr>
<td>Cheese</td>
<td>-1.534</td>
<td>.125</td>
</tr>
<tr>
<td>Cottage cheese</td>
<td>-1.330</td>
<td>.183</td>
</tr>
<tr>
<td>Ice cream</td>
<td>.078</td>
<td>.938</td>
</tr>
<tr>
<td>Custard</td>
<td>-.070</td>
<td>.944</td>
</tr>
<tr>
<td>Salmon</td>
<td>-.592</td>
<td>.554</td>
</tr>
<tr>
<td>Broccoli</td>
<td>-.534</td>
<td>.594</td>
</tr>
</tbody>
</table>

Comparison of mean use of vegetables and beans in diet before and after osteoporosis health promotion program. Since the data reflective of the intake of vegetables and beans were normally distributed, the mean values at the pretest and posttest recordings were used for comparison. There was a slight increase in the intake of vegetables and beans following the prevention teaching program as noted by the mean values of servings.
There was no statistically significant differences indicated by the results of the paired t test for vegetables, \( t(21) = -.13, p = .895 \), and beans, \( t(21) = -.44, p = .665 \), before and after the osteoporosis prevention teaching program.

**Outcomes of data analysis related to the hypothesis.**

The null hypothesis was as follows: There will be no difference in health promotion behaviors of women before and after an educational program in prevention of osteoporosis. The health promotion behaviors in this study included bone-strengthening exercises, time spent using these exercises, diet, calcium supplements, and hormone replacement therapy. There were four areas of significant difference in health-promoting behaviors: length of time spent on other bone-strengthening exercises, calcium intake, the use of hormone therapy, and length of time spent in bone-strengthening exercises. There were four areas of health promotion activities in which there was no significant difference before and after the educational program: use of bone-strengthening exercises, time spent walking, dietary intake of vegetables and beans, and dietary intake of high-calcium foods. Since there was no
difference in a majority of health-promoting activities, the researcher failed to reject the null hypothesis.
Chapter V
The Outcomes

The purpose of this study was to determine if an osteoporosis health promotion program would increase use of health prevention behaviors. This chapter is presented in six sections: findings based on data analysis, relationship of findings to the theoretical framework, relationship of the findings to the literature review, conclusions, implications for nursing, and recommendations for future research.

Summary of Findings

Twenty-two Caucasian postmenopausal women were subjects in this study. None of the subjects reported that they had been diagnosed as having osteoporosis. The average age of the subjects was 68, the average years of education was 12.73 years, and the median range of annual income was $10,000-$14,999.

The null hypothesis that there will be no difference in health promotion behaviors of women before and after an educational program on prevention of osteoporosis was
tested for each group of risk factors. The following findings relative to these risk factors follow: a significant increase in use of calcium supplement, use of hormone replacement therapy, and time spent on bone-strengthening exercises as a result of the osteoporosis health promotion program (p ≤ .05), and the time spent in other exercises. There were no significant differences in the use of bone-strengthening exercises or in intake of calcium-rich foods following the educational program (p ≥ .05) or in vegetable and bean intake and time spent walking. Smoking and alcohol intake were not risk factors for osteoporosis for these subjects since none of these products were used. It was noted that 15 (68%) of the subjects had discussed hormone replacement therapy with their physician prior to the educational program; however, only 12 (55%) of this group reported that they used hormone replacement therapy. Eighteen (81%) reported using hormone replacement therapy following the educational program. Since there was no significant change in a majority of health-promoting activities, the researcher failed to reject the null hypothesis.
Discussion

Relationship to the literature review. The findings in this study supported the conclusions reported by Ali and Twibell (1995) that there was a relationship between health promotion behaviors and education as noted by increased use of calcium supplements, hormone replacement therapy, and length of time exercising following the institution of an educational program. The participants in this study were already engaged in the health behavior of taking calcium. Perhaps because of this they were motivated to increase calcium intake. The introduction of knowledge from the educational program probably motivated the participants to take female hormones following the program. This provides support for the strength of education programs for this population for hormone therapy.

Rothert et al. (1990) concluded that women made decisions to use hormone replacement therapy based on prevention of high-risk diseases such as osteoporosis. This conclusion was supported in the current study as indicated by the significant increase in use of hormone replacement following the educational program.
Conclusions drawn by Kim et al. (1991) supported specific findings in the current study. Health motivation based on educational programs in influencing health-related behaviors is important in explaining calcium intake and length of time in which exercise was performed. There was an increase in length of time exercising by the participants probably due to increase in the time spent in other exercises. Other exercises were already integrated into the participants' lifestyles and thus was not an introduction of a new behavior. These exercises were already a part of their lifestyle, and they were physically able to perform.

Ali and Twibell (1995) reported that osteoporosis preventive behaviors were positively correlated with calcium intake. Findings in the current study showed no significant difference between pretest and posttest reports. In the current study the change in eating habits would have been a new behavior change not previously incorporated in their lifestyle. The participants could have lacked motivation to change eating habits at their age. Perhaps cost was a factor in changing eating habits. Cultural differences may have been a factor. The participants may have failed to understand the concept or
they may have perceived that the use of calcium supplements would have been sufficient to prevent osteoporosis. Ali and Bennett (1992) assumed that a lack of knowledge about osteoporosis preventive behaviors may contribute to prediction of osteoporosis preventive behaviors because the behaviors have not been widely disseminated to the public.

Taggart and Connor (1995) determined there was no statistically significant relationship between frequency of exercise and either osteoporosis knowledge or health beliefs. In this study there was no difference in length of time in walking and use of bone-strengthening exercises following the educational program, perhaps due to the mean age of 68.59 years and inability to increase length of time in walking. Lack of motivation to change lifestyle could have been a factor as well as a lack of understanding of the concept.

Conclusions

The osteoporosis health promotion program was instrumental in increasing specific osteoporosis prevention behaviors relating to calcium intake, hormone replacement therapy, and increased length of time in exercising.
Milk and vegetable intake were the dietary items most used by this group of subjects; however, calcium-rich foods in general were not considered to be important contributors to osteoporosis prevention by this group of subjects.

The period of time between the completion of the educational program and the posttest may not have been sufficient to determine long-term effects of the educational program. Internal consistency reliability of the section of the Cobb Osteoporosis Questionnaire dealing with exercise is in question since the majority of the bone-strengthening exercises were not used by the subjects in the study. The internal consistency reliability of the Cobb Osteoporosis Questionnaire use of pretest exercise was $\alpha = .02$ and $\alpha = .41$ for the posttest exercise.

**Implications for Nursing**

Findings from this study underscore the importance of educational programs regarding risk factors associated with osteoporosis and methods of motivating premenopausal and postmenopausal women to use osteoporosis prevention activities. Nursing education programs at all levels must address the dynamics involved in promoting such activities. Numerous implications for nursing were
identified in this study. The roles of a nurse practitioner include counselor, advisor, teacher, and researcher. These roles are essential to the community and society as a whole.

Nurse practitioners can serve as powerful role models by encouraging healthy behaviors. Long-term relationships also may provide for the trust needed to maintain a therapeutic milieu for education. Clinic visits offer an opportune situation to provide education in health-promoting behaviors. The current research showed an increase in length of time in exercise, increase in calcium, and increase in hormone replacement therapy after the participants received an educational program. Since peak bone mass is reached by age 30, education should begin with women as young adults when the attitudes and behaviors are being developed.

The findings support one of the major concepts of Becker's Health Belief Model in that taking a particular action was seen as beneficial in preventing osteoporosis. In the current study, a significant number of subjects increased their use of calcium supplements and female hormone replacement following the educational program. Although the Health Belief Model was not used in this
study per se in evaluating the subjects' perceptions of developing osteoporosis, all women at the church meeting consented to participate in the study. This indicated that the subjects were interested in learning about preventive activities regarding osteoporosis.

Inclusion of the Health Belief Model could be used as a tool for assessing clients in basic educational programs for health care providers. The Health Belief Model could be used as a nursing plan of care in all client populations.

The nurse practitioner serves as a researcher to keep women current in therapies, diagnostic tests, screenings, and treatments available for prevention of osteoporosis and treatment. Educational programs can be used as an opportunity to teach in practice. Continued nursing research on lifestyle behavior changes in osteoporosis prevention is essential.

Recommendations for Future Research

Based on the findings and conclusions of this study, the following recommendations for research were made:

1. Revision of the Cobb Osteoporosis Questionnaire to reflect a Likert scale pertaining to total preventive osteoporosis behavior habits and inclusion of factor
analysis to determine whether subscales reflecting various behaviors are included.

2. Inclusion of a knowledge test to be used as an assessment prior to and following the educational program.

3. Use of a probability sample in place of a convenience sample to strengthen the use of hypothesis relating to the parameters of the population rather than to the statistics of the sample.

4. Use of a stronger research design in which one group receives the educational program and another group does not receive the educational program.

5. Use of repeated measures or time-series design instead of a one-time pretest and posttest design to determine the long-term effects of the educational program.

For future studies, subjects should be given a longer period of time than one month between testing because behavior changes take more than one month to make and reevaluation in a 2-year period to determine if these changes still exist.
References


Health Belief Scale. Research and Health in Nursing, 14(2), 155-162.


APPENDIX A

COBB OSTEOPOROSIS QUESTIONNAIRE
Cobb Osteoporosis Questionnaire

Thank you for agreeing to participate in my study. Please place an "X" or write in an answer in the blank spaces. Answering all questions will help me in completing this study.

1. Age: ____ years

2. Race:
   ___ 1. White
   ___ 2. Black
   ___ 3. Asian
   ___ 4. Spanish
   ___ 5. Other (please specify) ____________________

3. Highest grade or educational level completed:_______

4. Family yearly income:
   ___ 1. Less than $5,000
   ___ 2. $5,000-$9,999
   ___ 3. $10,000-$14,999
   ___ 4. $15,000-$19,999
   ___ 5. $20,000-$24,999
   ___ 6. $25,000 or more

5. How many glasses of alcohol do you drink?
   ___ 0. None
   ___ 1. Daily
   ___ 2. Weekly
   ___ 3. Monthly

6. Do you take a calcium supplement?
   ___ 1. Yes
   ___ 2. No

7. If yes, what is the name of the calcium supplement?
   ____________________________________________________________
8. If yes, how often do you take the calcium supplement?
   ____ 1. Once a day
   ____ 2. Twice a day
   ____ 3. Three times a day
   ____ 4. Other

   Explain:__________________________________________________________

9. Has your doctor told you that you have osteoporosis?
   ____ 1. Yes
   ____ 2. No

10. Have you had a hysterectomy (removal of the uterus)?
    ____ 1. Yes
    ____ 2. No

11. Have you had your ovaries removed?
    ____ 1. No
    ____ 2. One
    ____ 3. Both

12. Do you take female hormones (including birth control pills)?
    ____ 1. Yes
    ____ 2. No

13. If yes, what is the name of the female hormone you are taking?
    ________________________________________________________________

14. Have you discussed hormone replacement therapy (taking a female hormone) with your doctor or nurse?
    ____ 1. Yes
    ____ 2. No

15. Are you in menopause or have you gone through menopause ("change of life")?
    ____ 1. Yes
    ____ 2. No

(Please go to next page)
16. Directions: Please place an "X" under the smoking habit that applies to you.

<table>
<thead>
<tr>
<th>Don't smoke</th>
<th>1 to 5 cigarettes per day</th>
<th>6 to 10 cigarettes per day</th>
<th>11 to 1 pack per day</th>
<th>More than 1 pack per day</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>

17. Directions: Place an "X" in the column that applies to you. Write in other types of exercise that you do in space indicated by "Other."

<table>
<thead>
<tr>
<th>Type of Exercise</th>
<th>Don't Exercise</th>
<th>1-2 x Weekly</th>
<th>3-4 x Weekly</th>
<th>5-6 x Weekly</th>
<th>7 x Weekly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycling/Indoors-Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treadmill/Nordotrack</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sit-ups/Leg lifts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weights</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Floor Exercise</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Explain)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Please go to next page)
18. Place an "X" in the column which best applies to you. Write in other exercises that you do in the space indicated by "Other."

<table>
<thead>
<tr>
<th>Type of Exercise</th>
<th>Don't Exercise 1</th>
<th>20-30 minutes 2</th>
<th>31-40 minutes 3</th>
<th>41-50 minutes 4</th>
<th>51-60 minutes 5</th>
<th>Over 60 minutes 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bicycling/Indoors-Outdoors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treadmill/Nordotrack</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sit-ups/Leg lifts</td>
<td></td>
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</tr>
<tr>
<td>Weights</td>
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</tr>
<tr>
<td>Floor Exercise</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (Explain)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Please go to next page)
19. Directions: Read the following list of foods. In the space provided, for each food write in the amount you eat each week. For example, if you drink 2 glasses of milk each week, write in 2 glasses. If you do not drink any milk weekly, write in 0. If you eat 2 slices of cheese per week write in 2 slices and so forth.

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Amount Per Week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td></td>
</tr>
<tr>
<td>Yogurt</td>
<td></td>
</tr>
<tr>
<td>Cheese</td>
<td></td>
</tr>
<tr>
<td>Cottage Cheese</td>
<td></td>
</tr>
<tr>
<td>Ice Cream</td>
<td></td>
</tr>
<tr>
<td>Custard</td>
<td></td>
</tr>
<tr>
<td>Salmon (canned)</td>
<td></td>
</tr>
<tr>
<td>Sardines</td>
<td></td>
</tr>
<tr>
<td>Green Leafy Vegetable</td>
<td></td>
</tr>
<tr>
<td>Broccoli</td>
<td></td>
</tr>
<tr>
<td>Dried Beans (cooked)</td>
<td></td>
</tr>
</tbody>
</table>

Thank you for your participation.
APPENDIX B

APPROVAL OF THE COMMITTEE ON USE OF HUMAN SUBJECTS IN EXPERIMENTATION OF MISSISSIPPI UNIVERSITY FOR WOMEN
February 28, 1997

Ms. Donna Cobb  
c/o Graduate Program in Nursing  
Campus

Dear Ms. Cobb:

I am pleased to inform you that the members of the Committee on Human Subjects in Experimentation have approved your proposed research provided the following conditions are met.

Your consent form must be amended to state that the questionnaires will not include the names of the participants.

I wish you much success in your research.

Sincerely,

Susan Kupisch, Ph.D.  
Vice President  
for Academic Affairs

SK:wr

cc: Mr. Jim Davidson  
Dr. Mary Pat Curtis  
Dr. Rent

Where Excellence is a Tradition
APPENDIX C

LETTERS OF INFORMED CONSENT
Dear Participant:

My name is Donna Cobb. I am a registered nurse enrolled in an advanced degree program at Mississippi University for Women. I am conducting a research study concerning osteoporosis and health promotion behaviors. I am requesting your participation in this study as findings of the study may benefit all women in the prevention and treatment of osteoporosis. Your participation will require approximately 30 minutes of your time to complete the forms and participate in an education program.

Completion of the questionnaires and your signature on this form indicate your agreement to participate in this study. Participation is voluntary, and your confidentiality will be maintained as the consent forms and the questionnaires will be separated as soon as I receive them. The questionnaires will not include the names of the participants.

I will send a follow-up questionnaire to those who are over 40 in approximately 4 weeks. Please complete this and return to me within 2 weeks after receiving the questionnaire. I will enclose a self-addressed, stamped envelope with the questionnaire. You may withdraw from the study at any time.

Sincerely,

Donna Cobb, RNC

I, ________________________________, agree to participate in this study. I understand the terms of my consent.
1057 Bonhomie Road  
Hattiesburg, MS 39401  
January 16, 1997

Reverend Bobby Holder  
Dixie Baptist Church  
111 Dixie Church Road  
Hattiesburg, MS 39401

Dear Rev. Holder:

My name is Donna Cobb, and I am a registered nurse and graduate student at Mississippi University for Women. I am conducting a research study concerning osteoporosis and health promotion behaviors. The study will identify if there will be a change in lifestyle behaviors after an education program on osteoporosis prevention. I am requesting permission to conduct this study at your church.

The subjects will be premenopausal and postmenopausal women who wish to participate. Each participant will have the opportunity to refuse participation, and confidentiality will be maintained. Participants will answer a demographic questionnaire and an osteoporosis questionnaire and will receive an osteoporosis prevention program which includes a 30-minute presentation and discussion on the health risks and osteoporosis prevention. Four weeks after the program the participants will receive a questionnaire to complete and return to me via a self-addressed, stamped envelope. No names will be on the questionnaire.

Please indicate your permission to conduct this study about osteoporosis prevention at your church by sending me a permission letter. I appreciate your assistance in this matter.

Sincerely,

Donna G. Cobb
Dear Rev. Shurden:

My name is Donna Cobb, and I am a registered nurse and graduate student at Mississippi University for Women. I am conducting a research study concerning osteoporosis and health promotion behaviors. This study will identify if there will be a change in lifestyle behaviors after an education program on osteoporosis prevention. I am requesting permission to conduct this study at your church.

The subjects will be premenopausal and postmenopausal women who wish to participate. Each participant will have the opportunity to refuse participation, and confidentiality will be maintained. Participants will answer a demographic questionnaire and an osteoporosis questionnaire and will receive an osteoporosis prevention program which includes a 30-minute presentation and discussion on the health risks and osteoporosis prevention. Four weeks after the program the participants will receive a questionnaire to complete and return to me via a self-addressed, stamped envelope. No names will be on the questionnaire.

Please indicate your permission to conduct this study about osteoporosis prevention at your church by sending me a permission letter. I appreciate your assistance in this matter.

Sincerely,

Donna G. Cobb
March 9, 1997

Ms. Donna Cobb
1057-B Bonhomie Rd
Hattiesburg, MS 39401

Dear Donna,

This letter is to confirm that our church would love for you to share your program with us on March 11, 1997. My only regret, is that I will be out of the country that week and will not be able to assist you in preparation. However, several ladies in our church will be available to help in any way they can.

I hope this will help you with your education process. If there is anything I can do in the future to help, please feel free to call.

Your servant in Christ,

[Signature]

Bobby Shurden, Pastor
March 8, 1997

Donna Cobb,

This letter confirms that Dixie Baptist Church would be happy for you to share your program on Osteoporosis Prevention on March 13, 1997.

We appreciate this type of ministry, and we will be glad to help in any way possible. Thank you for giving us this opportunity to benefit from your expertise.

In Appreciation,

Bobby L. Holder
Pastor: Dixie Baptist Church
APPENDIX E

OSTEOPOROSIS PREVENTION
EDUCATION PROGRAM
Osteoporosis Prevention

Education Program

Objectives

1. Discuss the pathophysiology of bone.

2. State statistics associated with fractures from osteoporosis.


4. Identify risk factors for osteoporosis.

5. List clinical features of osteoporosis.

6. Discuss prevention of osteoporosis and early intervention.

7. Discuss treatment available for osteoporosis.
Outline

I. Pathophysiology of the bones

II. Statistics associated with fractures caused from osteoporosis

III. Risk factors for osteoporosis

IV. Prevention of osteoporosis
   A. Adequate calcium intake
   B. Weight bearing exercise
   C. Hormone replacement therapy

V. Treatment of osteoporosis

VI. Conclusion
APPENDIX F

NORMALITY TEST FOR CALCIUM FOOD INTAKE ITEMS
Normalcy Test for Calcium

Food Intake Items

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Pretest K-S Z</th>
<th>Pretest 2-tailed p</th>
<th>Posttest K-S Z</th>
<th>Posttest 2-tailed p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Milk</td>
<td>1.36</td>
<td>.049*</td>
<td>1.09</td>
<td>.188</td>
</tr>
<tr>
<td>Yogurt</td>
<td>2.07</td>
<td>.000*</td>
<td>2.06</td>
<td>.000*</td>
</tr>
<tr>
<td>Cheese</td>
<td>1.39</td>
<td>.043*</td>
<td>0.91</td>
<td>.382</td>
</tr>
<tr>
<td>Cottage cheese</td>
<td>2.09</td>
<td>.000*</td>
<td>1.64</td>
<td>.009*</td>
</tr>
<tr>
<td>Ice cream</td>
<td>1.57</td>
<td>.014*</td>
<td>1.49</td>
<td>.024*</td>
</tr>
<tr>
<td>Custard</td>
<td>1.71</td>
<td>.006*</td>
<td>2.17</td>
<td>.000*</td>
</tr>
<tr>
<td>Salmon</td>
<td>1.74</td>
<td>.005*</td>
<td>1.79</td>
<td>.003*</td>
</tr>
<tr>
<td>Vegetables</td>
<td>.73</td>
<td>.667</td>
<td>.75</td>
<td>.632</td>
</tr>
<tr>
<td>Broccoli</td>
<td>1.24</td>
<td>.091</td>
<td>1.67</td>
<td>.008</td>
</tr>
<tr>
<td>Beans</td>
<td>1.07</td>
<td>.206</td>
<td>1.21</td>
<td>.108</td>
</tr>
</tbody>
</table>

*Does not meet pattern expected for a normal population.