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# Osteoporosis Education in College-Age Women

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Osteoporosis Education in College-Age Women

by

Elizabeth Byrne Rodzik

Thesis

Submitted to the School of Nursing

Eastern Michigan University

in partial fulfillment of the requirements

for the degree of

Master of Science

in

Nursing

Thesis Committee:

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April 15, 2008

Ypsilanti, Michigan



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ABSTRACT

Osteoporosis, a degenerative bone disease, is a preventable disease. The purpose of this study was to determine if an educational intervention would increase knowledge and influence women to change their behaviors (i.e., exercise and dietary calcium intake) related to osteoporosis.

A random sample of 149 college female students participated in this study. Participants completed two questionnaires consisting of the Osteoporosis Knowledge Test and the Osteoporosis Self-Efficacy Scale. Participants were surveyed to determine their knowledge of osteoporosis and their intent to change their health behavior before and after an educational intervention.

Statistical analysis indicated that an educational intervention increased the subjects' knowledge about osteoporosis and elicited self-reported confidence level in health lifestyle behavioral changes. These findings suggest that an educational intervention is one strategy that can be implemented to bring about awareness of those at risk for osteoporosis and behavioral changes they can incorporate into their lives.

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## Chapter 1

## INTRODUCTION

Osteoporosis is a chronic health problem affecting more than 25 million Americans. While both sexes are prone to the disease, 80% are females. According to Berarducci, Lengacher, & Keller (2002), by 2015, approximately 41 million Americans will have or be at high risk for developing osteoporosis. This projection indicates that the disease has rapidly evolved into a severe health crisis for the American public. Unless interventions are identified and initiated to halt this disease, this potential threat will become a reality.

According to the International Osteoporosis Foundation (2003), osteoporosis is defined as a disease in which the density and quality of bone are reduced, leading to weakness of the skeleton and increased risk of fracture, particularly of the spine, wrist, hip, pelvis, and upper arm. The term “porosis” means spongy, which describes the appearance of osteoporotic bones when they are broken in half and the inside composition is examined.

Osteoporosis is caused by the loss of bone mass, creating thin, porous bones that are fragile and easily fractured. Bone is a complex and living tissue. It has the capacity for growth and regeneration if damaged and is sensitive to the forces it experiences. Bone tissue is constantly undergoing remodeling in which old bone is removed and new bone is formed (Wardlaw, 1993). Bone that lasts throughout a lifetime is built during childhood and teenage years. After age thirty, the cells that build bone are not as efficient and bone is gradually lost. Bones begin to break down faster than new bone can be formed.



Currently there is no cure for osteoporosis; however, there are many preventative measures that can be taken to deter the development of the disease. Healthy bone marrow has small holes within it, but a bone with osteoporosis will have much larger holes (Wardlaw, 1993). Osteoporosis can begin as early as age twenty-five, yet the majority of those affected by osteoporosis are postmenopausal women (Leslie & St. Pierre, 1999). In women, bone loss accelerates after menopause because the ovaries stop producing estrogen, the hormone that protects against bone loss. Since women's estrogen levels fall dramatically at menopause, women are especially at risk of osteoporosis. It is a major cause of fractures in elderly women, resulting in pain and disability. Therefore, it is important to promote educational interventions designed for osteoporosis prevention in young, pre-menopausal women.

Both genetic and behavioral risk factors contribute to the development of osteoporosis (Beraducci, Lengacher & Keller, 2002). Genetic risk factors include race, gender, diminished estrogen levels after menopause, thinness, small frame, and hereditary predisposition. Behavioral risk factors include alcohol and caffeine consumption, calcium deficient diet, and sedentary lifestyle.

### *Problem*

Health education on osteoporosis is critical for young women to become better aware of the causes and symptoms of osteoporosis, given the critical long-term effects of this illness for women. Since the majority of primary prevention programs for osteoporosis have focused on women in mid-life, a concern is that young women may not be aware of osteoporosis risk factors and therefore may not be engaging in preventive behaviors (Piaseu, Belza & Mitchell, 2001).

Women in young adulthood in particular will benefit from being informed about how proper nutrition and regular exercise can help them achieve optimal peak bone mass. Leslie and St. Pierre (1999) discuss the lack of awareness this age group has of the negative impact that smoking, alcohol abuse, diets low in calcium and Vitamin D, high protein diets, and both physical inactivity and excessive exercise have on their bone structure. Educating these women about what may predispose them to a higher risk of osteoporosis in later years would benefit all young women. Once young women are educated on the risks of osteoporosis and preventive behaviors, they will be able to act on the evidence, which suggests that heightening bone mass in young women through increased calcium intake and increased weight-bearing exercise may help decrease or prevent osteoporosis later in life (Piaseu, Belza & Mitchell, 2001).

The theory of self-efficacy proposes that individual beliefs about personal capabilities predict behavior performance. The strength of social cognitive theories lies in their ability to highlight an individual's reasons for considering and possibly adopting any health-related behavioral change (Whitehead, 2001). This study will determine whether or not an educational intervention leads to changed behaviors reflected in diet and exercise.

Nurses can influence and educate young women about the risks for osteoporosis and behaviors for the prevention of osteoporosis, but whether they will be motivated to engage in behavior change remains the question that this study will explore. According to Horan and colleagues (1998), the gap exists because self-efficacy has not been studied directly with reference to exercise and calcium intake behaviors as they relate to osteoporosis. Until recently there were few research studies about the use of education

intervention for osteoporosis prevention in young women. Therefore, research is needed on the efficacy of osteoporosis prevention strategies designed for young women focusing on increasing weight-bearing exercise and calcium intake.

### *Purpose*

The proposed study examined what effect education had on intention to perform these preventive activities. The purpose of this study was to document the effectiveness of an osteoporosis educational program for young college-age women. This research determined whether this population was influenced to be more confident and knowledgeable about making lifestyle changes after receiving the initial educational information.

For this study, the hypothesis tested whether college-age women who participated in an osteoporosis education program had greater knowledge about osteoporosis prevention and a higher level of confidence (self-efficacy) for activities related to osteoporosis prevention.

### *Research Questions*

The research questions posed were:

1. What is the current level of knowledge among college-age females on osteoporosis prevention activities?
2. Does an educational program aimed at increasing the understanding of osteoporosis prevention influence the self-efficacy of college-age women to make lifestyle behavioral changes to prevent the disease?

## Chapter 2

## LITERATURE REVIEW

*Previous Research*

Osteoporosis is a preventable disease and women of all ages need to take steps to reduce their risk of this disease. Both genetic and behavioral risk factors contribute to the development of osteoporosis.

*Risk Factors.* Family history plays an important role because there is a 60-80% chance of inheriting the disease. Another important factor is age. Women are at higher risk of accelerated bone loss in the five to seven years following menopause (Wood & Fleet, 1998). Race also plays an important role because data demonstrate that Caucasian or Asian women are more susceptible to the disease (Piaseu, Belza & Mitchell, 2001). Other high risk factors include estrogen deficiency, low life-long calcium intake, smoking, low body mass, inadequate physical activity, and alcoholism. Certain conditions such as hyperparathyroidism and certain medications including anticonvulsants and glucocorticoids add to the risk (NIH Consensus Development Conference Statement, 2000). Warning signs of osteoporosis include breaking a bone as a result of minimal resistance, chronic medical problems (e.g., rheumatoid arthritis, diabetes, liver disease), and persistent back pain and loss of body height by ½ to 1 inch.

*Prevention.* Osteoporosis is different from most other diseases in that there is no one single cause. The best prevention for the onset is proper nutrition and exercise beginning in childhood and continuing through young adulthood. Although osteoporosis can affect anyone, it is most prevalent in females. College students, women in particular,

need to be better informed about how proper nutrition and regular exercise can help them achieve optimal peak bone mass.

The risk of developing osteoporosis can be minimized for young women by lifestyle behaviors they choose early on. There are several identified means to prevent osteoporosis. The NIH has determined that physical activity along with calcium consumption are two major factors affecting maximum achievement of bone mass. Bones are living tissue, and calcium gets deposited and withdrawn daily from your skeleton. When you do not consume enough calcium or if your body does not absorb it adequately, your bones become depleted, making them brittle and weak. Calcium is the main building block of bone and is essential for bone health, but calcium intake alone does not ensure healthy bones. For adults 19 to 50 years an estimated adequate daily calcium intake is 1,000 mg per day (NIH Consensus Development Conference Statement, 2000).

Exercise is also essential throughout life to build and maintain strong bones and muscles. Bones lose density if they are not used. Weight-bearing exercises (e.g., jogging, walking, stair climbing, and dancing) are important to strengthen muscles and bones. Regular high-impact and resistance activities like running and weight-lifting increase bone density and may slow bone loss.

*Related studies in Osteoporosis Education.* There is abundant research supporting the fact that osteoporosis is preventable (Ali, 1996; Sedlak, Doheny & Jones, 1998; Beraducci, Burns, Lengacher & Sellers, 2000). Yet several studies indicate that a significant number of women do not have adequate knowledge about osteoporosis and the associated risk factors and preventive behaviors (Ailinger & Emerson, 1998; Ali, 1996; Terrio & Auld, 2002). Weiss and Sankaran (1998) conducted a study at a

Pennsylvania university with 144 college-age sorority women that examined knowledge, attitude, and behavior toward osteoporosis prevention. The survey analysis revealed generally poor knowledge about osteoporosis and prevention strategies but strong desire for information about the disease and preventive behaviors. Only 46% of their respondents correctly identified physical inactivity as a risk factor for developing osteoporosis. Thus, more than half of the young, at-risk women surveyed were unaware of one of the most critical risk factors for osteoporosis. Results of this study provided evidence that conducting an osteoporosis education program is beneficial for college-aged women.

Sedlak, Doheny, and Jones (1998) used an experimental design to test the effect of an osteoporosis prevention program on three variables – knowledge, health belief attitudes, and self-efficacy – within a population of 31 young college women. They found that the program improved the subjects' knowledge and health beliefs regarding the prevention of the disease, but not their self-efficacy.

Another study by Sedlak, Doheny, and Jones (2000) provided evidence that women participants in an osteoporosis health education program demonstrated significantly higher levels of knowledge after completing the program. They implemented three osteoporosis prevention educational programs that utilized three levels of intensity of design. The goals of each program were to increase knowledge of osteoporosis, health beliefs, and frequency of osteoporosis preventing behaviors. Participants completed evaluation instruments before and three weeks after participating. The women participants demonstrated that in all programs, regardless of design, an increased knowledge of osteoporosis prevention was found.

The majority of osteoporosis research findings have been on postmenopausal women with minimal focus on prevention research for young women (Ali & Bennett, 1992). It is critical that young women become better educated about the risk factors that lead to osteoporosis because this illness has long term effects for women. In order for women to make cognizant choices about prevention, they need to know what osteoporosis is, how to prevent it, and how to perform the preventive behaviors.

The results of a study done by Ailinger & Emerson (1998) indicate the majority of women surveyed (age 22 through 84 years) did not have adequate knowledge of osteoporosis, associated risk factors, and preventive behaviors. Prevention is of utmost importance because the cost of osteoporosis is \$13.8 billion in the United States in terms of health care dollars (National Osteoporosis Foundation, 2000).

The current research study explored female college students' knowledge of osteoporosis and their self-efficacy to perform osteoporosis preventive behaviors (i.e., calcium intake and weight-bearing exercises). These modifiable measures can prevent or deter the development of osteoporosis. Increasing peak bone mass in young females through increased calcium intake and increased weight-bearing exercises may prevent osteoporosis later in life.

Piaseu, Schepp, and Belza (2002) studied the effects of knowledge, attitude, and self-efficacy on exercise and calcium intake among young women enrolled in a nursing program in Thailand before and after an intervention program. They concluded that knowledge of adequate calcium intake and exercise to prevent osteoporosis is a strong determinant of a young woman's self-efficacy to perform healthy lifestyle behaviors.

Enhancing self-efficacy can facilitate the link between knowledge and behaviors by persuading individuals to accomplish the requisite behaviors within their control.



## Chapter 3

## CONCEPTUAL FRAMEWORK

Social cognitive theory (SCT) provides the theoretical framework for this study. SCT addresses both the psychosocial dynamics influencing health behavior and methods for promoting behavioral change; thus, it is relevant to health education and health behavior programs. According to SCT, cognitive processes are important to attain behavior. Bandura (2004) states SCT posits a multifaceted causal structure in which self-efficacy beliefs operate together with goals, outcome expectations, perceived environmental impediments, and facilitators in the regulation of human motivation, behavior, and well-being. Social cognitive approaches promote effective self-management of health habits that keep people healthy through their life span.

Bandura (2004) states SCT specifies a core set of determinants, the mechanism through which they work, and the optimal ways of translating this knowledge into effective health practices. The core determinants include knowledge of health risks and benefits, perceived self-efficacy, outcome expectations, health goals, and perceived facilitators to change.

Knowledge of health risks and benefits creates the precondition for change. If people lack knowledge about how their lifestyle habits affect their health, they have little reason to change. Belief of personal efficacy is the foundation of human motivation and action. Self-efficacy is the most important prerequisite for behavior change because it affects how much effort is invested in a given task and what level of performance is attained (Bandura, 1977). Health behavior is also affected by the outcomes people expect their actions to produce. This determinant concerns the positive and negative self-

evaluative reactions to one's health behavior and status. Personal goals provide further self-incentives and guides for health habits. The perceived facilitators and obstacles are another determinant of health behaviors. Bandura (2004) states that most of the models of health behavior are concerned only with predicting health habits, but they do not tell you how to change health behavior. SCT offers both predictors and principles on how to inform, enable, guide and motivate people to adapt habits that promote health and reduce those that impair it.

A study by Piaseu, Schepp, & Belza (2002) conducted on 100 first year female nursing students ages 17 through 21 years in Thailand used SCT to test the effects of knowledge, attitude, and self-efficacy on exercise and calcium intake before and after an intervention program. The program was a three-hour instructional slide show that identified osteoporosis risk factors, potential consequences of osteoporosis and prevention strategies. The study utilized the above-mentioned instruments, and the findings support the importance of knowledge and self-efficacy. The relationship of knowledge and self-efficacy found in this study suggests that knowledge of adequate calcium intake and exercise to prevent osteoporosis is a strong determinant of young women's judgment of their ability to perform the behaviors.

The current study utilized SCT as a framework (Figure 1) to explore osteoporosis variables including knowledge, preventive behaviors, and self-efficacy in order to promote effective self-management related to osteoporosis.

Knowledge → Self-Efficacy → Goals → Behavior Change

*Figure 1.* Structural path of influence. Extracted from: Bandura, A. (2004). Health promotion by social cognitive means. *Health Education and Behavior*, 31 (2), 143-164.

### *Definitions*

1. *Knowledge of osteoporosis.* The learning of information about osteoporosis risk factors and preventive behaviors re: calcium intake and weight-bearing exercises.

2. *Self-efficacy for health behaviors.* The belief in one's capabilities to organize and execute the courses of action required to prevent or minimize the risk of osteoporosis.

3. *Preventive behaviors.* Those identified behaviors that will decrease the individual's risk for osteoporosis, namely calcium intake and weight-bearing exercises.

4. *Calcium.* An essential mineral for bone growth and formation.

5. *Weight-bearing exercises.* Exercises that refer to your feet and legs bearing the weight, e.g., jogging, walking, stair climbing and dancing, versus weight-lifting, which is a resistance exercise that also is beneficial.

## Chapter 4

## METHODS

*Research Design*

A descriptive design with a pre-test and post-test was utilized to test the theoretical model for this osteoporosis study. A convenience sample was used with recruitment of eligible participants at a Midwestern community college. Before the educational intervention was given, two instruments were provided to all participants. The first measure was the Osteoporosis Knowledge Test (OKT; Kim, Horan, & Gendler, 1991; Appendix A), and the second measure was the Osteoporosis Self-Efficacy Scale (OSES; Horan, Kim, Gendler, Froman & Patel, 1998; Appendix B) to test the dependent variables of knowledge of osteoporosis and self-efficacy for lifestyles health behavioral changes (exercise and calcium intake). Approval was obtained to utilize these tools (Appendix C).

All participants in the study attended an osteoporosis education preventive Power Point presentation (Appendix D). The presentation content included identification of osteoporosis risk factors, potential consequences of osteoporosis, and strategies to prevent osteoporosis, including weight-bearing exercise and daily calcium intake requirements. Two measures (OKT and OSES) then were administered as post-tests.

*Participants*

The targeted population was college-age females, aged 18 years and older, enrolled in community college courses (Chemistry, Medical Terminology, and Anatomy). The convenience sample included 149 females aged 18-48. This age group was selected because very little research has been conducted on this age group of young adult, pre-

menopausal women. Demographic information was obtained to describe the sample. Characteristics included age, ethnicity, height and weight, age of onset of menarche, use of medications or vitamin supplements, marital status, and educational status (Appendix E).

#### *Inclusion Criteria*

Females older than 18 years who can read and write English and complete a questionnaire.

#### *Exclusion Criteria*

Females who have previously participated in an osteoporosis preventive educational session or who have been diagnosed with Osteopenia.

#### *Instruments*

The OKT (Kim, Horan, & Gendler, 1991) and the OSES (Horan et al., 1998) were used as both pre-tests and post-tests with this study. A group of researchers led by Kim, Horan, and Gendler developed these instruments that measure knowledge, health beliefs, and self-efficacy related to osteoporosis. These tools have been developed as part of an ongoing research project on osteoporosis prevention at Grand Valley State University, in Michigan, with 201 women 35 years and older.

The OKT (Kim, Horan & Gendler, 1991) is a 24-item tool consisting of multiple choice questions regarding knowledge or facts on osteoporosis. The OKT was designed to identify participants' knowledge about risk factors for osteoporosis, potential consequences of the disease, and benefits of exercise and calcium intake as preventive measures. The OKT Exercise subscale includes 16 items, and the total possible score for exercise ranges from 0 to 16. The OKT Calcium intake subscale has 17 items, and the

total possible score for calcium intake ranges from 0 to 17. When scoring the OKT, first determine whether the subject has answered the questions correctly. For items 1-9, count the Neutral and Don't Know responses as incorrect. Correct answers are coded as 1 and incorrect as 0. Total scores range from 0-24. Reliability coefficients for internal consistency for OKT Calcium and OKT Exercise were 0.72 and 0.69; validity was not available (Ziccardi, Sedlak, and Doheny, 2004). The test addresses two topics, including the relationship of exercise (OKT Exercise) and dietary intake of calcium (OKT Calcium) to osteoporosis prevention.

The OSES (Horan et al., 1998) is a measure of self-efficacy, or confidence, for behaviors related to physical activity and calcium intake. Subjects are asked to rate their confidence about conducting osteoporosis-preventing activities, which indicates their confidence in conducting behaviors that address exercise and calcium intake. The OSES developed by Kim et al. (1991) is a 21-item visual analogues scale. Items are scored by measuring the participants' responses on a scale with a range of 0 to 100 for each item. The tool consists of two subscales, OSES-Exercise scale (items 1-10) and OSES-Calcium scale (items 11-21). In order to calculate the scores for each subscale, the scores are added for each item within the respective subscale. Then the total is divided by the number of items in the respective scale, thus obtaining the individual subscale score.

Reliability coefficients for the OSES subscales for internal consistency was 0.94 (exercise) and 0.93 (calcium intake). Validity of the OSES was evaluated by factor analysis and hierarchical regression (Horan et al., 1998). The construct validity evidence is all supportive but clearly more persuasive for the measurement of OSE-exercise than for OSE-calcium.

*Data Collection & Human Subjects Procedures*

Approval was obtained from Eastern Michigan University's College of Health and Human Services (CHHS) Human Subjects Review Committee (Appendix F). Upon approval, recruitment of eligible participants occurred at a Midwestern community college campus. Contact and support was obtained from the president of the community college who provided the support for the study to be conducted (Appendix G). Participation took approximately 30 minutes, which included a pre-test, 15-minute Power Point presentation, and a post-test. These sessions were offered five times to obtain a total of 149 female college-age participants.

College-age females who met the study criteria were given an informed consent form (Appendix H) prior to the distribution of the OKT and OSES pre-tests by the primary researcher in the classroom setting. Participants' voluntary consent was explained as well as their right to withdraw from the study at anytime without consequence. The participants' identities remained confidential with demographics and questionnaires coded by number without names.

This research study posed no physical, psychological, or social harm to the participating subjects since it involved only completing questionnaires. Any stress on the subject was precluded by their ability to either withdraw from the study or not answer a question on the instrument. The subject's identity remained confidential. The data were collected by means of questionnaires distributed as pre-test and post-test. The researcher was the only person distributing and responding to concerns. All information was stored in a locked file cabinet in the researcher's office.

## Chapter 5

## RESULTS

*Data Analysis*

The Statistical Package for the Social Sciences (SPSS), versions 13.0 and 14.0, were used to analyze the demographic data and both instruments used in this study. Descriptive statistics including percentages, mean, and standard deviation were used to describe demographic characteristics as well as instrument findings. Independent *t*-tests were conducted to answer the research questions and examine changes in osteoporosis knowledge from pre-test to post-test. The level of significance established for a two-tailed *t*-test was .05.

*Demographic Data*

Table 1 presents baseline information on the participants. A total of 149 college female participants completed the informed consent, and 133 participants completed the questionnaires. The demographics showed the sample consisted of 149 participants with diverse backgrounds, namely 48.3% of the participants were Caucasian, 32.9% were African American, 6.7% were Asian, 2% were Hispanic, and 10.1% were other.

The mean age of these participants was 29.8 years old, with ranges from 18 to 48 years old (33.6% were 18-25 years of age). Of the 149 participants, the majority are single and have an educational status of 1-2 years of college (Table 1).



Table 1.

*Demographic Characteristics of College Age Women*


---

<b>Variable</b>	<b>Frequency</b>	<b>%</b>
<b>Race/Ethnicity</b>		
African American	49	32.9
Asian American	10	6.7
Caucasian	72	48.3
Hispanic American	3	2.0
Other	15	10.1
<b>Age</b>		
No Data	3	2.0
18-25 Years Old	50	33.6
26-32 Years Old	49	32.9
33-39 Years Old	24	16.1
40-46 Years Old	19	12.8
47-Older	4	2.7
<b>Educational Status</b>		
High School Graduate	5	3.4
1-2 Years of College	74	49.7
3 or More Years of College	70	47.0
<b>Marital Status</b>		
Single	82	55.0
Widowed	1	0.7
Married	57	38.3
Divorced	9	6.0

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### *Knowledge Level on Osteoporosis*

The participants were first given a pretest Osteoporosis Knowledge Test. This questionnaire identified their existing basic knowledge of osteoporosis prior to an educational intervention. A perfect score on an OKT is 24 (Kim, Horan & Gendler, 1991).

*Age impact on knowledge level at pretest* The study sample was divided by age into two subsets (18-25 year olds and 25 years and older) for comparison (Table 2). Questionnaire scores indicate that the older population demonstrated a statistically higher existing pre-OKT knowledge score (mean = 15.98, sd = 3.59;  $t = 12.40$ ,  $p < .05$ ) than the younger group (mean = 13.89, sd = 3.50;  $t = 8.0$ ,  $p < .05$ ). As a result of the educational intervention, post OKT scores (Table 2) in this study reflected a mean of 20.20 ( $t = 12.40$ ) for the older population and 18.09 for the younger group. These results demonstrate that the improvement in knowledge as a result of an education intervention is similar regardless of age group.

*Ethnic impact on knowledge level* To assess the basic knowledge of the Caucasian females and non-Caucasian females, independent  $t$ -tests were calculated (Table 2). Caucasian females were found to have a basic knowledge mean of 16.32 (sd = 3.15;  $t = 12.52$ ,  $p < .05$ ), and that of the non-Caucasian females was slightly lower (mean = 14.02, sd = 3.88;  $t = 9.28$ ,  $p < .05$ ).

The pre-test questionnaire results showed all participants had some general knowledge of osteoporosis. However, the participants did not demonstrate specific knowledge of osteoporosis and the associated risk factors. The post-test questionnaire

results following the educational intervention reflect a significant increase in both general and specific knowledge of osteoporosis and the associated risk factors (pretest mean = 15.20, sd = 3.70, post-test mean = 19.43, sd = 2.82,  $t = 15.12$ ,  $p < .05$ ; Table 2).

Table 2.

*Pre and Post Osteoporosis Knowledge Test (OKT) Scores*

---

<b>Variable</b>	<b>N</b>	<b>Pre- Mean / SD</b>	<b>Post- Mean / SD</b>	<b>Pre / Post Std. Error Mean</b>
All	133	15.20 / 3.70	19.43 / 2.82	.32 / .24
Age				
25 and younger	47	13.89 / 3.50	18.09 / 3.01	.51 / .44
26 and older	85	15.98 / 3.59	20.20 / 2.42	.39 / .26
Race/Ethnicity				
Caucasian	68	16.32 / 3.15	20.62 / 2.05	.38 / .25
Other	65	14.02 / 3.88	18.18 / 2.99	.48 / .37

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*Self-Efficacy Level on Osteoporosis*

Study participants were asked in a separate Osteoporosis Self-Efficacy Score questionnaire to rate their confidence about conducting osteoporosis preventing activities, i.e., exercise and calcium intake. The subjects' score on this 21-item visual analogues scale was measured to the nearest millimeter. Thus the maximum score for each item is 100. The OSES has 2 sub-scales, one for exercise (OSES questions 01 – 10) and one for calcium (OSES questions 11 -21). The total possible score for each subscale ranges from 0 – 1000 for exercise and 0 – 1100 for calcium.

In this study the OSES pre-Calcium mean score was 76.34 (sd = 19.94) and the post mean score was 84.40 (sd = 16.28); the *t*-test showed a significant improvement ( $t = 7.00, p < .05$ ). The pre-exercise mean score was 66.21 (sd = 23.15) and the post-exercise mean score was 78.26 (sd = 20.02; Table 3), again resulting in significant improvement ( $t = 8.53, p < .05$ ).

*Age impact on self-efficacy level* The mean score for the pre-OSES older population was 144.84 (sd = 33.04) and the post mean score was 163.64 (sd = 32.11); the *t*-tests showed a significant improvement in their intent to change behaviors ( $t = 8.10, p < .05$ ; Table 4). The younger group had a pre-test mean score of 138.91 (sd = 41.38) and a post-test mean score of 161.16 (sd = 30.81), again significantly improved from their pre-scores ( $t = 4.78, p < .05$ ; Table 4).

*Ethnic impact on self-efficacy level* Table 4 shows the pre-OSES mean score for the Caucasian population was 147.93 (sd = 27.66) and the post-OSES mean score was 166.83 (sd = 24.61), resulting in a significant improvement ( $t=8.10, p < .05$ ). The non-

Caucasian group's pre-mean score was 137.01 (sd = 42.65) and their post mean score was 158.37 (sd = 36.91), reflecting their intent to change their behaviors ( $t = 5.60$   $p < .05$ ).

In order to answer the second research question, namely does an educational program influence participants' self-efficacy towards lifestyle behavioral changes, a paired  $t$ -test was performed. Table 3 shows the pre-test scores for self-efficacy for exercise and calcium intake and the post-test scores. The results showed a significant increase in influence on college-age women to adopt lifestyle behavioral changes to both exercise (pretest mean = 66.21, sd = 23.15; post-test mean = 78.26, sd = 20.02;  $t = 8.53$ ,  $p < .05$ ); (Table 3) and calcium intake (pretest mean = 76.34, sd = 19.94; post-test mean = 84.40, sd = 16.28); ( $t = 7.00$ ,  $p < .05$ ; Table 3). The total OSES score also increased from pretest (mean = 1425.54, sd = 36.11) to post-test (mean = 1629.23, sd = 31.47) and the change was statistically significant ( $t = 9.08$ ,  $p < .05$ ). The results from the  $t$ -test also demonstrate that the participants reported higher overall post-test self-efficacy levels than pre-test (Table 3). These results indicate that the osteoporosis educational program positively influenced participants' belief that they could adopt lifestyle behavioral changes, specifically in calcium intake and exercise.

Table 3.

*OSES Descriptive Statistics*


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	<b>N</b>	<b>Mean</b>	<b>Std. Deviation</b>
Pre OSES Exercise	132	66.21	23.15
Post OSES Exercise	132	78.26	20.02
Pre OSES Calcium	132	76.34	19.94
Post OSES Calcium	132	84.40	16.28
Pre OSES Total	133	1425.54	36.11
Post OSES Total	133	1629.23	31.47
Valid N (listwise)	132		

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Table 4.

*Pre and Post Osteoporosis Self-Efficacy Scale (OSES) Scores*

<b>Variable</b>	<b>N</b>	<b>Pre- Mean / SD</b>	<b>Post- Mean / SD</b>	<b>Pre / Post Std. Error Mean</b>
All	132	142.55 / 36.11	162.66 / 31.45	3.14 / 2.74
Age				
25 and younger	47	138.91 / 41.38	161.16 / 30.81	6.04 / 4.49
26 and older	84	144.84 / 33.04	163.64 / 32.11	3.60 / 3.50
Race/Ethnicity				
Caucasian	67	147.93 / 27.66	166.83 / 24.61	3.38 / 3.01
Other	65	137.01 / 42.65	158.37 / 36.91	5.29 / 4.58



## Chapter 6

## DISCUSSION

A major component of prevention is education, yet few researchers have evaluated what women know about osteoporosis, their beliefs about the disease, and to what extent they practice preventive behaviors (Kasper, 1994).

Research study results (Ailinger & Emerson, 1998; Ali, 1996; Sedlak, Doheny, & Jones, 2000; Terrio & Auld, 2002; Weiss & Sankaran, 1998) provide consistent evidence that college-age women benefit similarly from an educational program on osteoporosis. One such study supported the use of questionnaires with college-age women to measure self-efficacy towards lifestyle activities to prevent osteoporosis (Ali, 1996). In particular this study concluded that effective education needs to emphasize both strategies that young women can use to obtain the recommended daily calcium intake and the effects of exercise on building bone mass and prevention of osteoporosis as women grow older.

Results of the comparable descriptive study by Sedlak, Doheny, and Jones (2000) provided evidence that women participants in an osteoporosis health education program demonstrated significantly higher levels of knowledge after completing the program. Similar to the current study, participants demonstrated significantly higher levels of knowledge at post-test.

An international study conducted by Piaseu, Schepp, and Belza (2002) tested the effects of knowledge, attitude, and self-efficacy on exercise and calcium intake among young women enrolled in a nursing program in Thailand before and after an intervention program. Their study showed the relationship between knowledge and self-efficacy, concluding that knowledge of adequate calcium intake and exercise to prevent

osteoporosis, is a strong determinant of young women's judgment of their ability to perform healthy behaviors. The current study provides similar evidence that an educational intervention does influence both a woman's knowledge of osteoporosis and intent to make lifestyle health behavioral changes towards preventing osteoporosis.

The educational program in the current study was developed to increase the participants' basic osteoporosis knowledge. The participants' OKT scores prior to the Power Point educational intervention program showed knowledge mean of 15.20 (sd = 3.70; Table 2). The participants' OSES scores prior to the Power Point educational intervention program showed self-efficacy for both Calcium and Exercise (mean of 1425.54, sd = 36.11; Table 3). A comparative analysis of the pre-OKT and -OSES and post OKT and OSES results in the current study reflect significantly improved knowledge and self-efficacy following the educational intervention (post mean of 162.66, sd = 31.45; Table 4).

A study by Horan, Kim, Gendler, Froman, and Patel (1998) included 201 women ages 35-95 who were not diagnosed with osteoporosis. The purpose of the study was to develop and evaluate the OSES instrument to measure self-efficacy related to the osteoporosis prevention behaviors of calcium intake and exercise. In addition, the study evaluated the role of self-efficacy in modifying dietary and physical exercise activities. Their findings showed Cronbach's alpha coefficient for exercise at .94 and calcium at .93.

The findings of the current study are consistent in showing, through the results of a post-test questionnaire, that college-age women are responsive to knowledge of healthy

behaviors and report higher self-efficacy intent towards life activities to prevent osteoporosis such as calcium intake and exercise.

## Chapter 7

## CONCLUSION &amp; IMPLICATIONS

*Implications for practice*

More nurses should participate in educational interventions on osteoporosis in order to provide a foundation for their nursing practices to promote knowledge of osteoporosis and self-efficacy in their patients. Appropriate nursing practices would include pediatric clinics, Nurse Practitioner clinics, school settings, and acute care facilities. Collaboration among various health care disciplines including dietitians, physical therapists, physicians, social workers, and nurses would enhance and reinforce educational interventions with their knowledge and expertise. Risk factor identification should be incorporated into women's health care as early as adolescence, including designation of candidates for bone density testing. In addition, parents should be included in the educational intervention process by sharing written information and engaging in informal dialogues regarding health practices related to food and exercise in their home. Based on their inclusion in the educational intervention process, parents can role-model preventive behaviors in the home setting. Parents also can incorporate better dietary choices and weight-bearing exercise opportunities for their families.

*Implications for education*

Science curriculums at all educational levels (pre-school, elementary, middle-school, high school, college, and nursing school) should be developed to address risk factors and preventive behavioral health lifestyles related to osteoporosis. Exercise such as jump-roping, increased calcium intake such as drinking milk, and prevention such as no smoking and moderate alcohol intake should be incorporated into these curriculums.

In addition, nurses could lead education efforts by visiting schools and reinforcing the science curriculum. This study showed that the educational intervention significantly improved both knowledge and self-efficacy for osteoporosis prevention behaviors. Thus, educational programs as early as adolescence may have a significant impact on young women and their lifestyle behaviors.

#### *Implications for future research*

The current study used a small, convenience sample within a community college setting. Future research on osteoporosis prevention should focus on a younger population, namely adolescents, to improve their knowledge of osteoporosis early enough to influence their self-efficacy for their health lifestyle behavioral changes.

In addition, future research should examine a larger and more diverse population. Males should be included as study participants because although they are at lower risk of developing osteoporosis, men could benefit from knowledge about bone health. Recommendations for further research to reinforce the findings of the current study include incorporating a larger sample size and conducting a post-test at a longer interval to confirm self-efficacy over time.

In conclusion, nursing practice, education, and research are essential to promoting bone health. Nurses are a critical resource in the efforts to promote osteoporosis preventive lifestyle behaviors. At a minimum, nurses should role-model healthy lifestyles, including osteoporosis preventive behaviors.

#### *Limitations*

Some limitations of this study need to be addressed. It should be noted that osteoporosis affects males as well as females. The health needs of the entire community

should be addressed. Due to the fact that the convenience sample was from one location, the results from the data collected cannot be generalized to all female college students. The self-report method utilized to collect data via questionnaires posed potential issues concerning the accuracy of the information. Participants had latitude to misrepresent their intent to change their behavior.

Three of the 149 participants did not state their age. Sixteen of the 149 participants did not complete the questionnaire. Therefore it is unknown whether their responses would differ from those participants who completed the questionnaires.

Since the post-test questionnaire was administered immediately following the pre-test questionnaire and educational intervention, it is unknown whether the time interval will influence the questionnaire responses.

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## Appendix A

ID NO: \_\_\_\_\_

### OSTEOPOROSIS KNOWLEDGE TEST

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

Below is a list of things which may or may not affect a person's chance of getting osteoporosis. After you read each statement, think about if the person is:

MORE LIKELY TO GET OSTEOPOROSIS, or

LESS LIKELY TO GET OSTEOPOROSIS, or

IT HAS NOTHING TO DO WITH (NEUTRAL) GETTING OSTEOPOROSIS, or

YOU DON'T KNOW.

When you read each statement, circle one of the 4 choices for your answer.

**ML = MORE LIKELY**

**LL = LESS LIKELY**

**NT = NEUTRAL**

**DK = DON'T KNOW**

- |  |             |
|--|-------------|
| 1. Eating a diet <u>LOW</u> in milk products                 | ML LL NT DK |
| 2. Being menopausal; "change of life"                        | ML LL NT DK |
| 3. Having big bones  | ML LL NT DK |
| 4. Eating a diet high in dark green leafy vegetables         | ML LL NT DK |
| 5. Having a mother or grandmother who has osteoporosis       | ML LL NT DK |
| 6. Being a white woman with fair skin                        | ML LL NT DK |
| 7. Having ovaries surgically removed                         | ML LL NT DK |
| 8. Taking cortisone (steroids e.g. Prednisone) for long time | ML LL NT DK |
| 9. Exercising on a regular basis                             | ML LL NT DK |

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For the next group of questions, choose one answer from the 4 choices. Be sure to choose only one answer. If you think there are more than one answer, choose the best answer. If you are not sure, circle D.

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

- A. Swimming
- B. Walking briskly
- C. Doing kitchen chores, such as washing dishes or cooking
- D. Don't Know

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

- A. Bicycling
- B. Yoga
- C. Housecleaning
- D. Don't Know

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

- A. 1 day a week
- B. 2 days a week
- C. 3 or more days a week
- D. Don't Know

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

- A. Less than 15 minutes
- B. 20 to 30 minutes
- C. More than 45 minutes
- D. Don't Know

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

- A. Just a little faster
- B. So fast that talking is not possible
- C. Much faster, but talking is possible
- D. Don't Know

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

- A. Jogging or running for exercise
- B. Golfing using golf cart
- C. Gardening
- D. Don't Know

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

- A. Bowling
- B. Doing laundry
- C. Aerobic dancing
- D. Don't Know

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

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

- A. Apple
- B. Cheese
- C. Cucumber
- D. Don't Know

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

- A. Watermelon
- B. Corn
- C. Canned Sardines
- D. Don't Know

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

- A. Chicken
- B. Broccoli
- C. Grapes
- D. Don't Know

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

- A. Yogurt
- B. Strawberries
- C. Cabbage
- D. Don't Know

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

- A. Ice cream
- B. Grape fruit
- C. Radishes
- D. Don't Know

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

- A. 100 mg - 300 mg daily
- B. 400 mg - 600 mg daily
- C. 800 mg or more daily
- D. Don't Know

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

- A. 1/2 glass daily
- B. 1 glass daily
- C. 2 or more glasses daily
- D. Don't Know

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

- A. If a person skips breakfast
- B. If a person does not get enough calcium from diet
- C. If a person is over 45 years old
- D. Don't Know

Appendix B

We are interested in learning how confident you feel about doing the following activities. We all have different experiences, which will make us more or less confident in doing the following things. Thus, there are no right or wrong answers to this questionnaire. It is your opinion that is important. In this questionnaire, EXERCISE means activities such as walking, swimming, golfing, biking, aerobic dancing. Place your "X" anywhere on the answer line that you feel best describes your confidence level.

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

1. begin a new or different exercise program  
 Not at all confident |-----| Very confident

2. change your exercise habits  
 Not at all confident |-----| Very confident

3. put forth the effort required to exercise  
 Not at all confident |-----| Very confident

4. do exercises even if they are difficult  
 Not at all confident |-----| Very confident

5. maintain a regular exercise program  
 Not at all confident |-----| Very confident

6. exercise for the appropriate length of time  
 Not at all confident |-----| Very confident

7. do exercises even if they are tiring  
 Not at all confident |-----| Very confident

8. stick to your exercise program  
 Not at all confident |-----| Very confident

9. exercise at least three times a week  
 Not at all confident |-----| Very confident

10. do the type of exercises that you are supposed to do  
 Not at all confident |-----| Very confident

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

- 11. begin to eat more calcium rich foods  
Not at all confident |-----| Very confident
- 12. increase your calcium intake  
Not at all confident |-----| Very confident
- 13. consume adequate amounts of calcium rich foods  
Not at all confident |-----| Very confident
- 14. eat calcium rich foods on a regular basis  
Not at all confident |-----| Very confident
- 15. change your diet to include more calcium rich foods  
Not at all confident |-----| Very confident
- 16. eat calcium rich foods as often as you are supposed to do  
Not at all confident |-----| Very confident
- 17. select appropriate foods to increase your calcium intake  
Not at all confident |-----| Very confident
- 18. stick to a diet which gives an adequate amount of calcium  
Not at all confident |-----| Very confident
- 19. obtain foods that give an adequate amount of calcium  
Not at all confident |-----| Very confident
- 20. remember to eat calcium rich foods  
Not at all confident |-----| Very confident
- 21. take calcium supplements if you don't get enough calcium from you diet  
Not at all confident |-----| Very confident

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Appendix C



April 1, 2005

Elizabeth Rodzik  
16567 Winchester Ct  
Northville, MI 48167

Dear Elizabeth,

Thank you for your interest in the Osteoporosis Health Belief Scale (OHBS), Osteoporosis Knowledge Test (OKT), Osteoporosis Self-Efficacy Scale-21(OSES) and Osteoporosis Self-Efficacy Scale-12 (OSES). You have my permission to use the instruments. Please keep us informed of any publications and/or presentations and send us an abstract or summarize your study results when completed.

I wish you much success with your study.

Sincerely,

A handwritten signature in cursive script that reads 'Phyllis Gendler'.

Phyllis Gendler, PhD, APRN, BC, NP  
Professor and Dean  
Cook-DeVos Center for Health Science  
Kirkhof College of Nursing  
Grand Valley State University  
301 Michigan St. NE  
Grand Rapids, MI 49503

Phone: 616-331-7161  
Fax: 616-331-7362  
E-mail: gendlerp@gvsu.edu



Appendix D

Slide 1

**OSTEOPOROSIS**

Presented by  
Elizabeth Rodzik

Slide 2

**What is Osteoporosis**

Osteoporosis is a bone disease in which bones become weak due to loss of bone mineral density, and even a simple fall or bump can cause a bone to break.

Most common bones to break are the spine, hip, and wrist.

Slide 3

**Bone Basics**

Our bony skeleton is made up of an outer shell (Cortical bone, 80% of the skeleton) which is compact and tightly packed.

The other 20%, the internal structure (Cancellous or Trabecular bone), is less dense.

Slide 4

**Bone Remodeling**

- ▶ Bone is constantly changing.
- ▶ Old bone is removed and new bone is laid down. This process is called Bone Remodeling.
- ▶ A remodeling imbalance: resorption>formation, and thus bones get weak.



Slide 5

Basic Pathophysiology

- ▶ Bone Health: Peak bone mass ages 18-25
- ▶ Osteoporosis
  - ▶ Inadequate peak bone mass
  - ▶ Estrogen deficiency
  - ▶ Age
  - ▶ Disease/Medications

Slide 6

Osteoporosis Facts

- ▶ 25 million Americans
- ▶ 80 % Female
- ▶ \$13.8 billion health care dollars are spent each year in US
- ▶ Caucasian>Oriental>Hispanic>African American

Slide 7

Osteoporosis Risk Factors

- ▶ Genetic:
  - ▶ Ethnicity
  - ▶ Age at Menopause
  - ▶ Family History

Slide 8

Osteoporosis Risk Factors

- ▶ Behavioral:
  - ▶ Smoking
  - ▶ Dietary Calcium
  - ▶ Alcohol consumption
  - ▶ Sedentary Lifestyle

Slide 9

Osteoporosis Risk Factors

- ▶ Medications:
  - ▶ Steroids
  - ▶ Anticonvulsants

Slide 10

Osteoporosis Risk Factors

- ▶ Diseases:
  - ▶ Hyperparathyroidism
  - ▶ Malabsorption (Celiac Disease)

Slide 11

Modifiable Risk Factors

- ▶ Smoking
- ▶ Diet
- ▶ Sunshine
- ▶ Caffeine/Alcohol
- ▶ Exercise

Slide 12

Non-Modifiable Risk Factors

- ▶ Genetics (Family History)
- ▶ Ethnic Background
- ▶ Decreased Estrogen Production
  - ▶ Menopause
  - ▶ Amenorrhea
- ▶ Age
- ▶ Gender
- ▶ Body Size

## Slide 13

## How is Osteoporosis Measured?

- ▶ Bone Density Testing (often referred to as BMD - bone mineral density)
- ▶ DXA (Dual Energy X-Ray Absorptiometry)  
hip/spine/total body
- ▶ pDXA (Peripheral Dual Energy X-Ray)  
wrist/heel/finger
- ▶ QCT (Quantitative Computerized Tomography)  
spine/hip/total body
- ▶ Ultrasonometry  
heel/shin/bone/knee/cap
- ▶ The density of your bones is compared to the bone density of healthy young adult (20-45 years). The results are reported as a score, called a "T-score", which tells how your bones compare to what is considered normal. The lower your BMD is, the greater your risk of fracture.

## Slide 14

## Who Should Be Tested?

- Women > 65 years
- Peri/Post menopausal women with risk factors
- Men/Women on steroids
- Women who have been on hormone therapy for a long time
- Women who are considering therapy for osteoporosis
- Men/Women with a disease process that affects bone health

## Slide 15

## Osteoporosis Prevention

- ▶ Attaining Peak Bone Mass
- ▶ Maintaining Peak Bone Mass
- ▶ Preventing Bone Loss in Later Life

## Slide 16

## Calcium

- ▶ Calcium is the main building block of bone and is essential for bone health.
- ▶ Calcium needs change throughout life. During youth, when the body is growing rapidly, calcium needs are high. Postmenopausal women and older men also need more calcium.
- ▶ Aging increases the need for calcium because the body is less able to absorb calcium.

Slide 17

**Dietary Sources of Calcium**

- ▶ Dairy products (yogurt/cheese/cottage cheese/milk/ice cream/pudding)
- ▶ Fish (perch/sardines)
- ▶ Vegetables (collards/broccoli/kidney beans)

Slide 18

**Exercise**

- ▶ Exercise is important throughout life to build and maintain strong bones and muscles.
- ▶ Two types of exercise that are best for bone health are weight-bearing and resistance exercises.
  - ▶ Weight-bearing means your feet and legs are bearing your weight. Jogging/walking/stair climbing & dancing.
  - ▶ Resistance exercise uses muscular strength to improve bone strength. Weight-lifting or using free weights or weight machines is beneficial.



## Appendix F



### EASTERN MICHIGAN UNIVERSITY

September 20, 2005

Elizabeth Rodzik  
c/o Tsu-Yin Wu, PhD  
Eastern Michigan University  
Ypsilanti, MI 48197

Dear Ms. Rodzik,

The CHHS Human Subject Review Committee finds that your request entitled "Osteoporosis Education and College-age Women: A Research Study", submitted on 8/24/05, meets the Minimal Risk Standards and is approved for initiation.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen A. Sonstein".

Stephen A. Sonstein, PhD  
Chair, CHHS Human Subjects Review Committee

## Appendix G



OAKLAND  
COMMUNITY  
COLLEGE

Southfield Campus  
22322 Rutland Drive, Southfield, MI 48075-4793

(248) 233-2700 Fax: (248) 233-2913

August 15, 2005

College of Health and Human Services  
Human Subject Review Committee  
Eastern Michigan University  
Ypsilanti, MI 48197

I have received Elizabeth Byrne Rodzik's request for permission to conduct data collection for her thesis research on osteoporosis education prevention among college-age women at Oakland Community College's Royal Oak/Southfield Campus.

The administration is enthused about this effort and pleased to provide the venue for Ms. Rodzik to conduct her study, i.e., collecting data on college-age women and educating this cohort on the importance of diet and exercise habits which can lead to the maintenance of healthy bones. We are aware that this procedure requires a classroom setting and, thus, Ms. Rodzik will have access to the student body. It is our understanding that the students will complete a pre-test (questionnaire), watch a 15 minute PowerPoint presentation, and take a post-test.

I am delighted that Liz is pursuing her degree and hope that Oakland Community College will continue to reap the benefit of her current and growing skills. Please contact me at 248.233.2800 if you require further information.

Sincerely,

Martha R. Smydra, Ph.D.  
President  
Royal Oak/Southfield Campus

MRS/jmk

Appendix H

Informed Consent Form

Title of Study: Osteoporosis Education and College-Age Women : A Research Study

Principal Investigator: Elizabeth B. Rodzik

Student Advisor: Tsu-Yin Wu, Ph.D. RN

Eastern Michigan University

Associate Professor/Research Advisor

(734) 487-2297

tsu-yin.wu@emich.edu

Purpose: You have been selected to participate in a study on Osteoporosis and college-age women. Osteoporosis affects 25 million Americans, 80% are female. The purpose of the study is to identify and document the effectiveness of an osteoporosis education program for college-age women and determine if this population is influenced by the program to make lifestyle behavior changes. The goal of the proposed study is to measure knowledge of osteoporosis and self-efficacy for exercise and calcium intake.

Procedure: If you agree to participate, you will be asked to fill out two questionnaires. The questionnaires will take approximately ten minutes to complete. The questions are related to what you know about osteoporosis risk factors, symptoms, treatment, your feelings about osteoporosis, and barriers to osteoporosis prevention. After you have completed the questionnaires, you will attend a 15



minute educational program given by the researcher on osteoporosis prevention. You will then conclude by completing two questionnaires.

**Risks:** There are no known risks at this time to participate in the study. While you are completing the questionnaires, some questions about your feelings and experience with osteoporosis may bring up emotions in you that make you uncomfortable. You may choose at any time not to answer a question.

**Benefits and Compensation:**

As a participant you may benefit directly from this research power point presentation as you may increase your knowledge of osteoporosis and the preventative measures you can take to avoid problems associated with bone loss as you age. There may be no direct benefits for you; however, information from this study may benefit other people now or in the future. You may learn more about osteoporosis from the educational program. You will not be paid for taking part in this study.

**Confidentiality:** All information collected from this study will be kept confidential to the extent permitted by law. You will be identified in the research records by a code name or number. All information will be stored in a locked file cabinet in the researcher's office. The results of this study may be shared in professional journals and conferences. Any articles or presentations from this study will use group data only,

therefore, your identity will not be revealed in any public record of this study.

Voluntary Participation: Your participation in this project is strictly voluntary.

Subsequent to your consent, you may refuse to participate at any time during the study without penalty. You may obtain a copy of the study results or if you have any further questions, please contact the research advisor, Dr. Tsu-Yin Wu by e-mail at: [tsu-yin.wu@emich.edu](mailto:tsu-yin.wu@emich.edu).

This research will be reviewed and approved by the College of Health and Human Services Human Subject Review Committee. Any questions you may have about your rights as a research subject may be directed to the chair of the committee, Dr. Stephen Sonstein, by e-mail at [stephen.sonstein@emich.edu](mailto:stephen.sonstein@emich.edu).

Statement of Consent: You are making a decision whether or not to participate in this study. Your signature indicates that you have read and understand the information provided above, have had all your questions answered and decided to participate.

(Printed) Name of Participant -----

Signature -----

Date -----

(Printed) Name of Researcher -----

Signature -----

Date -----