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Evaluation of a Community-Based Osteoporosis Educational Program

Cynthia A. Smith
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Evaluation of a Community-Based Osteoporosis Educational Program

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Doctoral Research Project submitted to the
School of Nursing
at West Virginia University
in partial fulfillment of the requirements for the degree of

Doctor of Nursing Practice

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Morgantown, WV
2012

Keywords: Osteoporosis; Education; Community; Nurse Practitioner; Fitness Center
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ABSTRACT

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Cynthia A. Smith

Background

Research has shown low levels of osteoporosis knowledge and utilization of bone healthy behaviors among community members. Osteoporosis educational programs have been shown to improve osteoporosis knowledge and bone healthy behaviors. A review of the literature on community-based osteoporosis education is suggestive a onetime program led by nurse would be of benefit. The purpose of this study was to evaluate the impact of an osteoporosis workshop led by a nurse practitioner that was held in a fitness center.

Objectives

Objectives of this evaluation include enhancing subjects' knowledge about osteoporosis and bone healthy behaviors, improving participants' perception of meeting personal bone healthy goals, improving participants' daily calcium and vitamin D intake, and improving subjects' physical activity levels.

Design

A repeated-measures design with measurements taken pre-intervention, immediately post-intervention and one month post-intervention was used. Osteoporosis knowledge, subject perception of meeting bone healthy goals, daily calcium and vitamin D intake, and physical activity levels were measured. An anonymous survey was given to the subjects immediately post-intervention regarding their opinions and suggestions for the program.

Subjects

The population focus for the intervention was those at high risk for osteoporosis, post-menopausal women and men aged 50 years old and older.

Results

Subject perception of meeting personal bone healthy goals significantly improved post-intervention. Osteoporosis knowledge significantly improved immediately post-intervention and at one month post-intervention. Daily supplemental and total calcium and vitamin D intakes increased significantly post-intervention. Significant increases in the days of the week and time spent engaging in moderate physical activity levels were found. The time spent walking on a typical day increased significantly. The majority of subjects reported the workshop was helpful and would recommend it to others.

Recommendations

The results of this study indicate a community-based osteoporosis educational intervention led by a nurse practitioner and held in a fitness center does improve participant perception of meeting bone healthy goals, osteoporosis knowledge, and the bone healthy behaviors of adequate daily calcium/vitamin D intakes and increased physical activity. Further studies using this intervention in more diverse populations are recommended.

Dedication

I would like to dedicate this project to my beloved grandmother, Garnet Geneva White, whose bravery in the face of so many obstacles, including osteoporosis and multiple fragility fractures, was the inspiration for my work in nursing. It is my privilege to honor her memory by educating others with the fervent hope that to do so may aid others to avoid the potentially devastating consequences of osteoporosis.

Acknowledgements

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CHAPTER I INTRODUCTION

Osteoporosis is the most commonly diagnosed bone disease today, and is defined as “a skeletal disorder characterized by compromised bone strength, predisposing to an increased risk of fracture” (National Institutes of Health, 2000, p. 9). This disease, which is considered preventable, is often under-diagnosed and under-treated. With increased risk for an osteoporotic fracture, there is an increase in the risk for preventable morbidity and mortality (National Osteoporosis Foundation (NOF), 2010). The purpose of this project is to evaluate a community-based osteoporosis educational program led by a nurse practitioner and conducted at a health and fitness center. The program focused on enhancing knowledge of the disease and bone healthy behaviors for the participants. The population focus was for those at high risk for osteoporosis; men aged 50 years old and older and post-menopausal women (NOF, 2010).

CHAPTER II BACKGROUND AND SIGNIFICANCE

Pathophysiology of Osteoporosis/Osteopenia

Bones are continually being both torn down and rebuilt. The human skeleton is almost completely rebuilt every ten years (U. S. Department of Health and Human Services, 2004). An individual's peak bone density or mass is typically achieved between the ages of 18 to 25 years old. Bone strength is usually maintained until the late 30s to early 40s. At that time, an imbalance between bone buildup and bone destruction begins to occur with more bone being resorbed than is rebuilt. For women, the onset of menopause worsens this imbalance, particularly during the first five years post-menopause. By age 65, both women and men are losing bone at the same rate (U. S. Department of Health and Human Services, 2004). The bone building and destructive process (remodeling process) can be affected by multiple factors such as certain medications, nutritional status, physical activity level, excess intake of alcoholic

beverages, cigarette smoking, excess salt and caffeine intake, and specific diseases. With the loss of bone mineral density (BMD), there is a concurrent weakening of the bone's architecture and an increased risk for a fracture (NOF, 2010).

Osteoporosis can be diagnosed in one of two ways. The first is through the presence of a fragility type fracture (U. S. Department of Health and Human Services, 2004). These are fractures that occur in a situation where a fracture normally would not have occurred such as from a fall from standing height or less. The second is through measurement of the BMD. While there are numerous ways to measure BMD, the axial dual-energy X-ray densitometry (DXA) is the gold standard in conducting bone mineral density testing. This testing method creates the measurement unit of a T-score that is used in the World Health Organization's (1994) definition of osteoporosis and osteopenia. The T-score is obtained by comparing an individual's BMD to the mean BMD of a young normal reference group. A precursor to osteoporosis, low bone mass or osteopenia, is a DXA T-score between -1.0 and -2.5, while osteoporosis is defined as having a DXA T-score equal to or less than -2.5 (Kanis, Melton, Christiansen, Johnston, & Khaltaev, 1994). With a decrease in BMD, the fracture risk is proportionally increased. While measurement of BMD is the single most important predictor of fractures, there are other risk factors that can affect an individual's risk for a fragility fracture. The Fracture Risk Assessment Tool (FRAX) algorithm developed through sponsorship by the World Health Organization takes into account the major risk factors on an individual basis. The algorithm provides calculations for an individual's likelihood over the next ten years of either a major fracture and/or a hip fracture due to low bone mass or osteoporosis (Kanis et al., 2005).

Prevalence and Morbidity of Osteopenia/Osteoporosis

Internationally, an estimated 200 million people have osteoporosis (Cooper, Campion, & Melton, 1992). In 2000, nine million osteoporotic fractures occurred worldwide with 1.6 million affecting the hip. The largest fracture prevalence (34.8%) is in European countries. Of all fractures that occur worldwide, 15.7% of these occur in the Americas (Johnell & Kanis, 2006). In North America and Europe, 30% of postmenopausal women have osteoporosis with a 40% lifetime chance of a fragility fracture (Melton, Chrischilles, Cooper, Lane, & Riggs, 1992).

In the United States, osteoporosis and osteopenia affected 55% (44 million) of people aged 50 or older in 2002. In 2010, 52.4 million Americans had osteoporosis with a projected 61.4 million having the disease by 2020 (NOF, 2002). After the age of 50, current estimates are for one in two women and one in five men to have an osteoporosis-related fracture. Annually, 1.5 million people have a fracture due to osteoporosis (U. S. Department of Health and Human Services, 2004). Compared to the combined lifetime risk of developing ovarian, breast and uterine cancer, a woman is more likely to suffer an osteoporotic-related hip fracture (NOF, 2002).

While osteoporosis can lead to fractures in any of the bones, the most common fracture sites are vertebral, hip, and forearm. Osteoporotic fractures are often associated with chronic pain, increased mortality, and can negatively impact one's ability to perform activities of daily living (U. S. Department of Health and Human Services, 2004). Hip fractures are associated with the worst morbidity and mortality rates (NOF, 2010). One year after a hip fracture, 60% are unable to return to their full pre-fracture ambulatory status (Greendale & Barrett-Conner, 2001). Among older patients, 20% of older patients die within one year from health issues related to or worsened by the fracture (U.S. Department of Health and Human Services, 2004).

West Virginia Prevalence Data for Osteoporosis and Osteopenia

In 1996, an estimated 60.4% of West Virginia (WV) female residents, aged 50 years old or older, had either osteopenia or osteoporosis with an increase in 2002 to 77.5% (251,300). For males aged 50 years old or older, the prevalence of both osteopenia and osteoporosis increased from 17% in 1996 to 44.4% (118,600) in 2002. In 2010, 285,500 WV women and 139,300 men, aged 50 years and older, had either osteoporosis or osteopenia. This will increase to an estimated 311,600 women and 154,700 men in 2020 (NOF, 2002).

In a study of women aged 50 years old or older living in rural WV, peripheral DXA testing of the radius was used to evaluate 1,321 women. Of those screened, 317 (26.6%) were found to have osteoporosis. Of those aged 65 years old and older, 251 (56.3%) were osteoporotic (Pfister, Helmick, Saville, Welch, & Emmett, 2008).

In WV, during 2001, there were 23,394 hospitalizations due to a fracture with an estimated hospital cost of \$41.5 million for those aged 45 years old or older. Of these fractures, 65.4% were confirmed due to osteoporosis. Between 1995 and 2015, projections are for 8,400 WV women 50 years old and older to die within the first year after a hip fracture (West Virginia Department of Health and Human Resources, 2004).

CHAPTER III RISK FACTORS FOR OSTEOPOROSIS/OSTEOPENIA

Advancing age is highly correlated with the development of osteoporosis or osteopenia (NOF, 2010). In the 2010 population census, 16% of WV's population was 65 years or older (U. S. Census Bureau, 2012). Other risk factors include: being Caucasian, cigarette smoking, low physical activity, and excess alcohol intake (NOF, 2010). Census estimates for 2010 for racial diversity in WV indicated 93.9% of the population statewide was Caucasian with Kanawha County's population being 89.1% Caucasian. African Americans made up 3.4% of the state's

racial diversity and 7.3% of Kanawha County's population. The remaining populations (2.7% statewide and 3.6% Kanawha County wide) were composed of other minority groups (U. S. Census Bureau, 2012). Those residents who reported not getting any exercise included 25.8% of Kanawha County residents. Among county residents, 24.9% smoked cigarettes. In 2006, 3.2% of all WV residents reported heavy consumption of alcoholic beverages (more than one drink a day for a female and more than two drinks a day for a male) (WV Department of Health and Human Services, 2009).

CHAPTER IV OSTEOPOROSIS AND HEALTH BELIEFS

Studies have investigated osteoporosis knowledge and health beliefs of both genders and those considered at high risk for osteoporosis. Johnson, McLeod, Kennedy, and McLeod (2008) evaluated osteoporosis health beliefs between the genders and among three different age groups (aged 18 to 25 years old, 30 to 50 years old and older than 50 years old). Women scored higher on susceptibility concerns than did males, especially males aged 18 to 25 years old. Women aged 30 years or older felt they were more susceptible to the disease than younger women and males of various ages. Higher susceptibility scores were found in those women older than 50 years. No differences were found between the age groups or the genders in terms of health motivating factors or the perceived seriousness of osteoporosis (Johnson et al., 2008).

A study of women aged 40 to 95 years old found 89% perceived osteoporosis as a serious condition. However, only 29% believed they were likely to develop the disease. A recommendation from their physician was felt to be important to 90% of the women in initiating osteoporosis prevention behaviors. Participation in bone healthy behaviors to help prevent osteoporosis were found in 40% of the subjects, but 90% of the participants was willing to exercise, take calcium, and multivitamin supplementation. A positive correlation was found

between those who noted concern about developing osteoporosis and those who engaged in bone healthy behaviors ($p=.03$) (Hsieh, Novielli, Diamond, & Cheruva, 2001).

Several studies have found a positive correlation with lower levels of osteoporosis knowledge and poorer adherence to bone healthy behaviors. A study of residents, 65 years and older, living in retirement communities found 83.7% had inadequate daily dietary calcium intake. The vast majority, 95.9%, were not getting the daily recommended amount of vitamin D. On a test of osteoporosis knowledge, 64% gave the incorrect answer to more than half of the questions. There was an association found between higher osteoporosis knowledge, reduced risk of falls, a higher self-efficacy, and greater strength of the lower extremities (Burke-Doe, Hudson, Werth, & Riordan, 2008). Chang, Chen, Chen, and Chung (2003) found low levels of osteoporosis knowledge were associated with low dietary intake of calcium, perception of barriers to improved bone healthy behaviors, and intent to change the behaviors. A high positive correlation was found between one's intent to change the bone healthy behaviors and one's osteoporosis knowledge.

Terrio and Auld (2002) studied the differences among three age groups of women (25 to 35 years old, 36 to 46 years old, and 50 years old and older) regarding osteoporosis knowledge, calcium intake and physical activity levels. All three groups were found to have low levels of osteoporosis knowledge. Physical activity measures were similar among the three groups. Most subjects did not meet the daily recommended intake of calcium, and this was found to worsen with advancing age (Terrio & Auld, 2002).

In a descriptive study, Sedlak, Doheny, & Estok (2000) evaluated the osteoporosis knowledge, bone healthy behaviors, and health beliefs of males older than 65 years old. Low levels of osteoporosis knowledge were found (mean score of 50% on the osteoporosis knowledge

test) as well as a low perceived susceptibility to osteoporosis. While a moderate level of confidence in performing the bone healthy behaviors was observed, the men were noted to engage in few bone healthy behaviors. The mean intake of daily calcium was well below the recommended level. One-third of the subjects participated in some form of weight bearing exercise (Sedlak, Doheny, & Estok, 2000).

CHAPTER V BONE HEALTHY BEHAVIORS

The NOF (2010) defines bone healthy behaviors as adequate daily calcium and vitamin D intake, fall prevention behaviors, use of weight-bearing exercise, and avoidance of cigarettes and excess alcohol intake (three or more drinks a day). Information is available on the bone healthy behaviors of WV residents. In 1999, 83.3% of WV males and 85.7% of WV women, 18 years old and older, were not consuming the three daily recommended servings of dairy foods. Those taking a calcium supplement on a regular basis were 7.5% of surveyed males and 29.2% of females (WV Department of Health and Human Resources, 1999). A study of women aged 65 years and older who lived in southern WV found every subject (n=184) consumed less than the recommended amount of calcium on a daily basis (Pfister, Wulu, & Saville, 2001). Analyzing data from the Behavioral Risk Factor Survey of 1999, the WV Osteoporosis and Arthritis Program estimated seven out of ten post-menopausal women had at least three or more risk factors for osteoporosis (WV Department of Health and Human Resources, 2004). The 2006 WV Behavioral Risk Factor Survey found 25.4% of West Virginians reported smoking (26.1% males and 25.7% females), 21% did not exercise (29.9% males and 25.6% females), and 4.8% reported high intake of alcoholic beverages (1.7% males and 3.2% females) (West Virginia Department of Health and Human Resources, 2009).

Gordon, Newcomer, and Krummel (2001) found that, while many WV residents were aware of the bone healthy benefits of exercise, most did not engage in regular physical activities. More than 88% felt weight-bearing exercise was beneficial for osteoporosis, but only 20% engaged in this type of activity. No regular physical activity was reported in 18% of respondents (19% of males and 17% of females). Participation in regular physical activity was reported in 28% of respondents (26% of males and 29% of females). Subjects were asked if they endorsed physical activity as beneficial for their health. Of those who did endorse physical activities, 29.3% were regularly physically active. Males who endorsed physical activity were more likely to be active (29.2%) than those who did not endorse physical activity (16.7%). Among females, no significant difference was found in the amount of exercise among those who did and did not endorse exercise (Gordon et al., 2001).

Limited exposure to osteoporosis education from a healthcare provider has been found in WV. The 1999 WV Behavioral Risk Factor Survey of those aged 18 years old and older found 22.5% of those surveyed had received osteoporosis education from a healthcare professional (35.1% of women and 9.5% of men) (WV Department of Health and Human Resources, 1999). The 2004 WV Behavioral Risk Survey found an increase in women who had received osteoporosis education to 43.1%, but for males this had decreased to 9.2% (WV Department of Health and Human Resources, 2007).

CHAPTER VI COST OF OSTEOPOROSIS AND OSTEOPENIA

Osteoporosis is associated with significant negative economic consequences. Yearly, osteoporosis-related fractures are estimated to account for 432,000 hospital admissions nationwide. Annually, 180,000 nursing home admissions and 2.5 million medical office visits occur due to osteoporotic fractures. In 2005, the projected healthcare cost for these fractures was

\$17 billion (U. S. Department of Health and Human Services, 2004). In comparison to 2004 national data, experts predict data collected in 2010 will indicate the number of hip fractures has doubled or tripled in the United States (U. S. Department of Health and Human Services, 2004).

Healthcare costs should be improved with a reduction in fractures. During a five year period, a study done by eleven Kaiser Centers in California found increased use of DXA testing and treatment for osteoporosis correlated with a 37% reduction in the number of hip fractures. This translated to an annual \$30.8 million savings in healthcare costs (Dell, Greene, Schelkun, & Williams, 2008). Due to a reduction in the number of fractures, Kelton and Pasquaale (2009) found healthcare cost savings from \$13,932 to \$18,256, depending on the fracture type, from adherence to osteoporosis drugs. In analyzing data from the five year period after starting their comprehensive osteoporosis management program, the Geisinger Health Plan found a \$7.8 million dollar healthcare cost savings due to a reduction in post-menopausal hip fractures (Newman, Ayoub, Starkey, Diehl, & Wood, 2003).

Pfister, Sale, and Shaukat (2009) projected the cost of osteoporotic fractures for West Virginians over a five year period. Direct medical costs were estimated to be \$105 million. Taking into account proper diagnosis and subsequent adherent treatment of osteoporosis in every fracture case, a \$45 million savings was calculated. Considering the current under-diagnosis of the disease and subsequent under-treatment, the authors estimated less than \$1 million to \$3.1 million of these cost savings were being achieved (Pfister et al., 2009).

CHAPTER VII TREATMENT RECOMMENDATIONS FOR OSTEOPOROSIS AND OSTEOPENIA

Treatment recommendations for osteoporosis and osteopenia are composed of both non-pharmacological and pharmacological interventions. Limited adherence to pharmaceutical

interventions for osteoporosis has been found. After one year, adherence with oral bisphosphonates, the most commonly recommended prescription drug class for the disease, varied in one systematic review from 17.9% to 78% (Cramer, Gold, Silverman, & Lewiecki, 2007). Another systematic review found one-third to one-half of patients did not take their osteoporosis medications as ordered with many discontinuing therapy shortly after it was prescribed (Kothawala, Badamgarav, Ryu, Miller, & Halbert, 2007).

In considering non-pharmacological treatment options, the National Osteoporosis Foundation's *Clinician's Guide to Prevention and Treatment of Osteoporosis* (2010) contends that all those with, or at risk for, osteoporosis should receive education on the physiology of bone loss, factors which affect the disease's development, and use of bone healthy behaviors. The bone healthy behavior recommendations are based upon a literature review and synthesis of the body of osteoporosis research by a panel of experts. These behaviors include: weight-bearing exercises, fall prevention behaviors, adequate daily calcium and vitamin D intake, and avoiding smoking and excess alcohol intake (three or more drinks a day) (NOF, 2010).

A concurrent reduction in fracture risk and the incidence of fractures should be seen with an increase in bone healthy behaviors. A study of the effects of a community-based osteoporosis and fall prevention program was conducted in a rural Swedish community. Comparing the five years before and the ten years after the initiation of the program to the fracture rates of a similar control community, a significant decrease in the number of trochanteric hip and forearm fractures was found in the intervention group (Grahm Kronhed et al., 2005).

CHAPTER VIII LITERATURE REVIEW

Inclusion criteria for the literature search included a community-based educational intervention for those with osteoporosis/osteopenia or at high risk for the disease in comparison

to either usual care or no intervention. The population defined as being at high risk for osteopenia/osteoporosis included males aged 50 years or older and/or post-menopausal females. The role of educator could be filled by either a healthcare professional, such as a pharmacist or professional nurse, or a multi-disciplinary healthcare professional team. To be included in the literature synthesis, the educational intervention had to have pre-intervention and post-intervention measurements regarding one or more of the bone healthy behaviors.

Databases searched included the Cochrane Library, National Guidelines Clearinghouse, CINAHL, PubMed, Health and Psychosocial Instruments, Complete Biological Abstracts from 1969-present, HealthSource: Nursing/Academic, International Pharmaceutical Abstracts, Academic Search, and Medline. Searching for the keyword “osteoporosis” resulted in over 123,890 hits. Searching with the addition of the keywords “education” and “community” reduced this to 730 hits. Further searches were conducted using the keywords and combinations of keywords, including osteoporosis, osteoporosis prevention, teaching, health education, nurse, patient, and community, which reduced the number of hits. No limits were placed on the type of evidence, population, setting, or geographic location, but studies were limited to the English language. No time limits were placed on the searches and included studies up to June, 2012. Reference lists were hand-searched for further relevant studies. No meta-analyses or clinical practice guidelines were found in regards to community-based osteoporosis educational interventions.

Sixteen studies were found which met all of the inclusion criteria. There was one systematic review, seven randomized controlled trials (RCTs), four quasi-experimental trials, and four descriptive longitudinal studies (Brecher et al., 2002; Chan & Ko, 2006; Chan, Ko, & Day, 2005; Davis, White, & Yang, 2006; Driskell, Pohlman, & Naslund, 2003; Gaines, Narrett,

& Parrish, 2010; Newman & Hanus, 2001; Nielsen et al., 2008; Pearson, Burkhart, Pifalo, Palaggo-Toy, & Krohn, 2005; Ribeiro & Blakeley, 2001; Rolnick, Kopher, Jackson, Fischer, & Compo, 2001; Schousboe et al., 2005; Sedlak, Doheny, Estok, & Zeller, 2005; Smith, 2010; White, 2008; Yuskel, Majunder, Biggs, & Tsuyoki, 2010). The systematic review was written by the author, and included ten of the studies noted above (Smith, 2010). This literature synthesis is an extension of that review with inclusion of five additional studies (Brecher et al., 2002; Driskell et al., 2003; Gains et al., 2010; White, 2008; Yuskel et al., 2010) found after publication.

Excluding the systematic review, all 15 studies were appraised using an appropriate evaluation form. The seven RCTs were individually appraised for study description, internal validity, and an overall assessment of the study using the Scottish Intercollegiate Guidelines Network (SIGN) RCT form as a guide (SIGN, 2008). The four quasi-experimental and four descriptive longitudinal comparative studies were analyzed using the quantitative literature review form found in Larrabee (2009).

Randomized Controlled Trials

In their randomized controlled trial, Rolnick, Kopher, Jackson, Fischer, and Compo (2001) assessed the impact of women's health nurse practitioner-led osteoporosis education, with and without BMD testing, on the initiation of bone healthy behaviors and pharmaceutical osteoporosis treatments in post-menopausal women not currently on osteoporosis therapy. The subjects were participants in a large managed care organization. The study had three groups; a control group, an education only group, and an education and BMD testing group. The educational session (two hours long) focused on osteoporosis, bone healthy behaviors, and treatment options. The BMD test was of the forearm with interpretation of the results given to

the subjects at the time of the test. The subjects in the control group were matched to the subjects in both intervention groups. Measurements were taken pre-intervention and at six months post-intervention. There were a total of 695 subjects, all female. Ages ranged from 54 to 65 years. The education only group had 301 (43%) subjects, the education group with BMD testing had 207 subjects (30%), and 187 (27%) were in the control group. Measurements were taken regarding the subject's potential risk of osteoporosis with the Simple Calculated Osteoporosis Risk Estimation instrument (Cadarett, Jaglal, & Murray, 1999). The authors measured the bone healthy behaviors of diet/eating patterns, type and amount of exercise, calcium intake, vitamin D intake, HRT use, and use of other osteoporosis treatment medications (Rolnick et al., 2001).

Compared to the control group, both the education only group and the education with BMD group showed significant increases in bone healthy behaviors; improvement of nutrition ($p<.001$), increased calcium intake ($p<0.01$), and improved vitamin D intake ($p<.0001$). Of the 455 (90%) intervention group participants completing the study, there were no group differences in bone healthy behaviors except for use of a pharmaceutical agent for osteoporosis. Subjects in the education and BMD testing group were three times more likely to start hormone replacement compared to those in the education only group ($p=.004$). Use of other types of osteoporosis medications was not significant. For those in the education and BMD intervention group, there was a positive association for low BMD scores and starting medication ($p=.001$) and for increasing vitamin D intake ($p=.03$) (Rolnick et al., 2001).

There are several strengths and limitations of this study. Strengths include randomization of the subjects with a sample size large enough to detect differences between groups. The control group subjects were matched with subjects in the intervention group for year of birth and

home clinic. Limitations of the study include subjects' self reporting their bone healthy behaviors. No information on the validity and reliability of the questionnaires used to measure the bone healthy behaviors was noted. The non-blinding of the subjects and researchers may have impacted the results. The researchers noted many subjects reported disappointment at being assigned to the education only group as they had hoped to be in the education and BMD testing group. Those assigned to the education only group were more likely not to attend the educational activity compared to those in the education/BMD group (124 subjects or 29% versus 22 subjects or 10%, $p < .001$) (Rolnick et al., 2001).

In their randomized controlled trial, Schousboe and colleagues (2005) evaluated the impact of an osteoporosis education program held in a healthcare clinic on initiation and persistence with prescription osteoporosis treatment, calcium intake, and exercise for women at high risk for osteoporosis, independent of DXA testing. The study was composed of a nurse-led education group and a control group. Measurements were taken pre-intervention and at three months, six months, nine months, and twelve months post-intervention for those in the education group. Measurements were taken at pre-intervention and at twelve months post-intervention for the control group. There were 310 subjects, all female. In the nurse-led education group, there were 158 subjects (51%) with a mean age of 71.8 years. The control group had 152 subjects (49%) with a mean age of 73.1 years (Schousboe et al., 2005).

Those in the control group received the usual care which was the provision of two brochures on osteoporosis after their DXA testing. Those in the education group received the same two educational brochures along with a fifteen minute one-on-one osteoporosis educational session with a nurse immediately after the subject's DXA testing. The nurse educator also

discussed calcium intake, exercise habits, and medication use at three, six, and nine months post-intervention (Schousboe et al., 2005).

The Simple Calculated Osteoporosis Risk Estimation (SCORE) form was used to calculate risk of osteoporosis (Lydick et al., 1998). Questionnaires were used which asked about the subjects' use of calcium supplements/dairy products, use of hormone replacement, cigarette smoking history, exercise habits, personal and family history of fractures, and use of medications that may impact BMD. A script was used by the nurse educator in the telephone counseling sessions for the intervention group at three, six, and nine months post-intervention. The script included questions about the subjects' intake of calcium supplements and/or daily intake of calcium-rich foods, exercise frequency, and osteoporosis medication use. A script was also used when interviewing both groups at the twelve months post-intervention measurement interval. Questions were asked about the subjects' use of osteoporosis medication, changes in calcium intake, and use of weight bearing exercise. At the twelve month post-intervention measurement point, there were no significant differences between the groups for initiation and persistence with osteoporosis drug treatment. The nurse-led education group did show a significant difference for increased calcium intake ($p<.05$) and exercise frequency ($p<0.05$) (Schousboe et al., 2005).

There are strengths and limitations of the study. One strength of the study is use of the randomized controlled design. Another is the large number of study participants. One limitation is the data collector was not blinded to group assignment. The subjects also self-reported their bone healthy behaviors. No information on the reliability and validity of the questionnaires used to measure the defined bone healthy behaviors was reported (Schousboe et al., 2005).

Nielsen et al. (2008) evaluated the effect of multidisciplinary-provider education program for patients with osteoporosis on knowledge. The multidisciplinary-provider team was

comprised of physicians, dieticians, physiotherapists, and a nurse. The intervention group was provided with three educational classes on osteoporosis led by the education team. The intervention group was also given the opportunity to participate in a reinforcement program where they were called once a month and asked about issues such as pain intensity, quality of life, and physical activity level. The control group was given usual care. However, those in the control group with a history of fractures were offered instruction on exercise (Nielsen et al., 2008).

There were 300 subjects in Nielson et al.'s study (2008). The intervention group included 150 subjects (50%) with an age range from 45 to 81 years old with a median age of 63 years old. The control group was composed of 150 subjects (50%) with an age range from 48 to 80 years old with a median age of 64 years old. All of the subjects were patients with osteoporosis who had been started on medication for the disease within the past year. At three months follow-up, the intervention group had 141 subjects (127 women (90%) and fourteen men (10%)) with nine having dropped out. In the control group, 128 subjects remained with 22 having dropped out. Of those remaining, 115 were women (90%), thirteen were men (10%) (Nielsen et al., 2008).

Measurements were taken pre-intervention and at three months post-intervention. Measurements included: subjects' age, sex, educational level, and the time spent reading about health on a daily basis. Osteoporosis knowledge was measured with the Patients' Knowledge of Osteoporosis instrument (Ryg, Nissen, Nielsen, & Brixen, 2005) given at the study's beginning and three months later. Baseline osteoporosis knowledge scores were significantly associated with sex ($p=.000$) with females having higher scores. Baseline osteoporosis knowledge scores were also significantly associated with level of education with higher educational levels having more osteoporosis knowledge ($p<.001$) (Nielsen et al., 2008).

For the intervention group, there was an increase in osteoporosis knowledge post-intervention compared to the control group ($p < .001$). A subject's level of education and baseline osteoporosis knowledge score were found to be significantly and positively correlated ($p < .001$). For the intervention group, there was a significant inverse correlation between educational level and the change in osteoporosis knowledge ($p < .01$). At baseline, there was a significant association between time spent reading about health issues and osteoporosis knowledge ($p = .001$). Post-intervention, there was no significant association between time spent reading about health and a change in the knowledge measurements for either group (Nielsen et al., 2008).

There are strengths and limitations of this study. A strength of the study is its randomized controlled trial design. Osteoporosis knowledge was measured with a previously validated and reliable instrument. A possible limitation is the undetermined influence of exercise instruction for an unknown number of control group subjects. Those in the control group who had a history of previous vertebral or hip fractures were offered instruction on exercise by a physiotherapist. The authors did not report how many in the control group took part in this instruction. A second limitation is that while the subjects were asked about bone healthy behaviors such as exercise, the authors did not discuss specific post-intervention measurements in regards to changes in these behaviors. Another limitation may have been the study's setting which was not discussed. The authors did report receiving funding from several groups in Scandinavia. As it is not known if the subjects were from a rural and/or urban setting, generalization of this study's findings to these groups and to those from other countries may be more difficult (Nielsen et al., 2008).

In their randomized controlled trial, Chan, Ko, and Day (2005) assessed the effects of a nurse-led educational program with phone call follow-ups on osteoporosis prevention behaviors

and the subjects' attitude toward these behaviors. There were 41 subjects, all of whom were female, who had not been diagnosed with osteoporosis. The intervention group was composed of 20 subjects (49%) with 21 participants (51%) in the control group. Subjects were included if they were over 18 years old with the majority of recruits (36.4%) being between 41 to 45 years old (Chan et al., 2005).

The intervention group received a 45 minute educational program on osteoporosis, the importance of calcium intake, and the calcium content of different kinds of foods. The bone health behaviors of consumption of soy foods, exposure to sunlight/vitamin D rich foods, and increased physical exercise were also discussed. Follow-up phone calls were placed three to seven days post-intervention and between days 14 to 20 post-intervention to address questions and/or concerns in regards to the intervention. Data was collected for the intervention group pre-intervention, immediately post-intervention, and one month later. Data for the control group was collected at pre-intervention and one month later (Chan et al., 2005).

The researchers used a survey for both groups that was adopted from another study (Pelletier, Kundrat, & Hasler, 2003). They also used a Likert scale for attitude measurement and data regarding the four measured bone health behaviors. The immediate post-intervention survey was formatted by the researchers to be similar to the pre-survey. A frequency chart was used on which subjects marked presumed future consumption of calcium rich foods and/or supplements. The one month post-intervention survey was designed by the researchers to be similar to the pre-and immediate post-intervention surveys in questions and style (Chan et al., 2005).

At one month post-intervention, the education group had increased consumption of soy foods ($p<.001$), milk ($p<.001$), sunlight exposure/vitamin D food intake ($p<.001$), and increased

exercise frequency ($p=.003$) in comparison to the control group. The control group had no significant change in attitude scores from baseline to one month post-intervention. The intervention group showed significant increases in positive attitudes toward consumption of soy foods ($p=.005$), milk ($p=.001$), and vitamin D foods/exposure to sunlight ($p=.011$). There was no significant difference between pre-intervention attitudes and one month follow up attitude for exercise ($p=.779$). There was a significant increase in positive attitudes when comparing pre-intervention and immediate post-intervention data for consumption of soy foods ($p=.010$), milk ($p=.011$), and vitamin D/sunlight exposure ($p=.013$) (Chan et al., 2005).

Strengths of this study include the randomized controlled design. The study also had a sample size large enough to detect differences between the groups. A survey used in another study was used in this one allowing for comparison. There are several limitations. As the subjects were clients of a beauty clinic, the site of the educational intervention, these subjects may have been more motivated to learn about osteoporosis than the general population due to a greater concern with their health and appearance. This concern would have made the intervention look more powerful than it was. The data collector and the subjects were not blinded. The subjects' self-reported their bone healthy behaviors. The authors noted modifying the survey for the post-intervention measurements which may have impacted the validity and reliability of the instrument as well as the comparison to the pre-intervention measurement. The setting of the study was noted to be in an urban setting in Hong Kong which may limit the generalization of these findings to rural residents and to those of other countries (Chan et al., 2005).

In a follow-up replication study using a randomized controlled trial design, Chan and Ko (2006) found similar results. The research question was, does a nurse-led educational

program on osteoporosis prevention behaviors and two follow-up phone consultations lead to increased consumption of beneficial foods and supplements and an increased positive attitude for these behaviors? As in the 2005 study, the intervention group received the same 45 minute educational program on osteoporosis, the importance of calcium intake, and the calcium content of different kinds of foods. The bone health behaviors of consumption of soy foods, exposure to sunlight/vitamin D rich foods, and increased physical exercise were also discussed. Follow-up phone calls were placed on post-intervention days three to seven and between days 14 to 20 post-intervention to address questions and/or concerns in regards to the intervention. The control group received no education or phone call follow-ups. Data was collected for the intervention group pre-intervention, immediately post-intervention, and one month later. Data for the control group was collected at pre-intervention and one month later. The same instruments (Pelletier et al., 2003) and surveys from the 2005 study were used. There were 76 subjects, all female. The majority of the subjects were between the ages of 18 to 30 years old. Both groups had 38 subjects (50%) (Chan & Ko, 2006).

At one month post-intervention, the education group showed significantly increased consumption of soy foods ($p<.001$), milk ($p<.001$), sunlight exposure/vitamin D food intake ($p<.001$), and increased exercise ($p=.01$) when compared to the control group. The control group had no significant change in attitude scores from baseline to one month post-intervention. The intervention group showed significant increases in positive attitudes toward consumption of soy foods ($p<.001$), milk ($p=.001$), exercise ($p=.026$), and vitamin D foods/exposure to sunlight ($p=0.001$). There was significant increased positive attitudes comparing pre-intervention and immediate post-intervention data for consumption of soy foods ($p=.007$), milk ($p<.001$), doing more exercise ($p=.013$), and vitamin D/sunlight exposure ($p<.001$) (Chan & Ko, 2006).

There are strengths and limitations of this study. Strengths include the use of the randomized controlled trial design and a sample size large enough to detect differences between the groups. Another is the application of the earlier study's design which aids in validating the earlier findings. Limitations include the study setting of two beauty clinics in Hong Kong. As in the 2005 study, subject inclusion bias may have occurred as these participants may have been more motivated to learn about osteoporosis and bone healthy behaviors due an increased concern with their health and appearance. The data collector and the subjects were not blinded. The subjects' self-reported their bone healthy behaviors. It is noted that the majority of the women were younger than those in the previous study. An urban setting in Hong Kong was used which could make these findings less applicable to rural residents and/or those in other countries (Chan & Ko, 2006).

The randomized controlled trial of Brecher et al. (2002) evaluated the impact of an osteoporosis educational program on knowledge of the disease, exercise frequency, and calcium intake. Assessment was also made of the participants' perceived ability and willingness to make behavior changes. The intervention was given one time, lasted three hours, and was led by a multidisciplinary healthcare team (Brecher et al., 2002).

The study population was women aged 25 to 75 years old. Of the 97 participants, 51 (53%) were in the intervention group with 46 (47%) in the control group. The mean age of the study participants was 53 years old. Those aged 45 years to 75 years made up 76% of the intervention group (mean age 55 years old) and 76% of the control group (mean age of 51 years old) (Brecher et al., 2002).

The study used four valid and reliable instruments; the Short Food Frequency Questionnaire (Blalock et al., 1998), Minnesota Leisure Time Physical Activity Questionnaire

(Taylor et al., 1978), Osteoporosis Self-Efficacy Scale (Horan, Kim, Gendler, Froman, & Patel, 1998), and Knowledge of Osteoporosis Questionnaire (Blalock et al., 1996). Measurements were taken pre-intervention, post-intervention (immediately afterwards for the intervention group and two weeks later for the control group), and three months later (Brecher et al., 2002).

Significantly improved osteoporosis knowledge was seen in the intervention group when compared to the control group ($p=.005$) immediately post-intervention ($p<.001$) and three months later ($p<.001$). At the first testing point after the intervention, a majority of both groups reported being in the process of changing their calcium intake (62% treatment, 65% control). While this finding was not significant, a significant number of those in the intervention group who had not started changing their calcium intake were planning to do so ($p=.01$). At three months post-intervention, 83% of the intervention group and 58% of the control group reported increasing their calcium intake ($p=.05$). No significant differences were found between the groups on the other measures (Brecher et al., 2002).

A strength of this study is its randomized controlled design. Another is the use of reliable and valid instruments. There are several limitations. While a large number of those in the intervention group reported increasing their calcium intake at three months post-intervention, evaluation of their Short Food Frequency Questionnaire did not bear this out. The participants were surveyed six weeks after the intervention for their thoughts on the program. This information is reported in brief anecdotal format with the author noting that overall the remarks were positive. Of concern, there is a discrepancy between the figures published with the study and the numbers of study participants noted in the body of the text. Table 1 of the study reports a total of 97 participants. The authors' note in the text indicated a total of 110 subjects with 96 (87%) completing the post-intervention questionnaires and 86 (78%) completing those at the

three month measurement point. This discrepancy is not explained by the researchers (Brecher et al., 2002).

Another randomized controlled trial evaluated the effects of a pharmacist-led screening osteoporosis program for subjects older than 50 years old. The participants in the intervention group each received one thirty minute session. The session included a BMD heel ultrasound test and an individualized osteoporosis educational session with the provision of printed materials. The control group received only the printed materials. There were 262 subjects with 129 (49%) in the intervention group and 133 (51%) in the control group. The majority of the participants were female (n=175) (Yuksel, Majumder, Biggs, & Tsuyuki, 2010).

While the primary outcome was on utilization of DXA post-intervention, secondary outcomes of changes in daily calcium, vitamin D intake, osteoporosis knowledge, and quality of life changes specific to osteoporosis were also measured. The Facts on Osteoporosis Quiz (Ailinger & Emerson, 1998), the Osteoporosis-Specific Quality of Life questionnaire (Lydick et al., 1997), and the Changes in Generic Health Status questionnaire were used (Ware, Kosinski, & Keller, 1996). The authors do not report how calcium and vitamin D were measured. At 16 weeks post-intervention, there were no changes in osteoporosis knowledge or osteoporosis quality of life measures between the two groups. While both calcium and vitamin D intake increased among the intervention group, only calcium intake increased significantly ($p=.011$) (Yuksel et al., 2010).

Strengths of the study include its randomized controlled design. The pharmacists involved in the study were all trained by the researchers. The pharmacists performed and discussed the results of the bone density test with each participant. The attrition rate was close to 19% (20% in the intervention group and 17% in the control group) which may have impacted the

findings. The researchers noted most dropouts occurred after randomization and before the intervention was given (Yuksel et al., 2010).

Quasi-Experimental Studies

In their quasi-experimental study, Ribeiro & Blakeley (2001) evaluated the effects of an osteoporosis workshop on female subjects' osteoporosis knowledge and bone healthy practices. Bone healthy practices were defined as use of daily calcium supplements, daily vitamin D supplementation, frequent exercise use, limited caffeine intake, and use of hormone replacement. The intervention group received an educational workshop taught by a nutritionist, a rheumatologist, a natural health worker, two physiotherapists, and two nurses. The control group did not receive the educational workshop (Ribeiro & Blakeley, 2001).

The study was conducted in various Canadian communities. There were 138 female subjects with 59 (42.8%) in the intervention group, and 79 (57.2%) in the control group. In the intervention group, 81% were between the ages of 45 and 69 years old. In the control group, 71% of participants were between the ages of 45 and 69 years old. The two groups did not differ significantly for age, educational background, exercise frequency, caffeine intake, and use of hormones. The instrument used was a researcher-created two part questionnaire. The first part focused on osteoporosis knowledge. The second part focused on subjects' practices regarding calcium and vitamin D use, exercise, use of hormone replacement, and alcohol and/or cigarette consumption. There was a significant difference between the groups for osteoporosis knowledge ($p < .032$), use of calcium ($p < .011$) and vitamin D supplements ($p < .029$) pre-intervention with the intervention group's scores being higher for all noted measures (Ribeiro & Blakeley, 2001).

The educational intervention increased the subjects' osteoporosis knowledge six weeks ($p < .000$) and six months post-intervention ($p < .003$). Significant positive change regarding

osteoporosis knowledge was also seen in the control group from baseline to six months post-intervention ($p < .002$). In comparing the two groups, the intervention group scored 8% higher on osteoporosis knowledge than the control group six months post-intervention (Ribeiro & Blakeley, 2001).

Regarding the bone healthy behaviors, there was a slight increase in calcium intake ($p < .048$) and hormone replacement ($p < .032$) for the intervention group six months post-intervention compared to the control group. There were no significant differences between the two groups at six months post-intervention for exercise frequency, caffeine use, alcohol use, smoking, vitamin D, and calcium supplementation (Ribeiro & Blakeley, 2001).

A strength of this study is its strong design with inclusion of a comparison control group. There are several limitations. There was no randomization. A convenience sample was used which may limit the generalizability of the findings. The subjects' self reported on their bone healthy behaviors which may have impacted the results. Compared to the intervention group who were members of the community at large, the control group was composed of members of the various branches of the Women's Institute (Canada) who volunteered to take part in the study. It was noted that osteoporosis knowledge also significantly increased for the control group post-intervention. While the reason for this increase is unknown, the researchers theorized this may have occurred because the members of the Women's Institute felt motivated to learn more about the disease. Pre-intervention, the intervention group already had significantly more osteoporosis knowledge ($p < .032$). Another factor which may have impacted validity of the data was that the control group follow-up measurement occurred eight months post-intervention instead of the six months measurement point used for the intervention group (Ribeiro & Blakeley, 2001).

Sedlak, Doheny, Estok, and Zeller (2005) evaluated the impact of tailored nursing interventions on subjects' osteoporosis knowledge, health beliefs, calcium intake, exercise frequency, smoking, and alcohol use. The subjects in the intervention group each received a tailored nursing intervention using the subject's DXA results and baseline osteoporosis preventing behaviors measurements that focused on osteoporosis knowledge and use of bone healthy behaviors. The intervention was delivered via phone by a nurse with a copy of the content later mailed to the subjects. The control group did not receive a telephone or written intervention, but did receive a DXA scan. Measurements were taken pre-intervention and six months post-intervention using the valid and reliable instruments of the Osteoporosis-Preventing Behaviors Survey (Doheny & Sedlak, 2004), the Osteoporosis Knowledge Test (Kim, Horan, & Gendler, 1991), the Osteoporosis Health Belief Scale (Kim, Horan, Gendler, & Patel, 1991), and the Osteoporosis Self-Efficacy Scale (Horan, Kim, & Gendler, 1993).

The subjects included 124 post-menopausal women between the ages of 50 and 65 years old with a median age of 56.2 years. The majority were Caucasian (90.3%). The majority (73.4%) had either some college education or were college graduates. There were 101 subjects (84%) in the control group with 23 (16%) in the intervention group (Sedlak et al., 2005).

Post-intervention, there was no significant difference between the two groups for increased osteoporosis knowledge. No significant differences were found for perceived osteoporosis susceptibility, seriousness of the disease, benefits of calcium, exercise benefits, osteoporosis self-efficacy, and motivation to change. There were more perceived barriers to calcium and to exercise in the intervention group than the control group (both $p=.034$). For calcium intake, there was a post-intervention increase for both groups ($p=.00$) but no significant difference for the increased amount. Post-intervention weight-bearing exercises significantly

decreased in the intervention group ($p < .030$) and increased in the control group but not significantly ($p < .425$). There were no differences found for smoking and alcohol use between the two groups (Sedlak et al., 2005).

Two strengths of this study include its quasi-experimental design and use of valid and reliable instruments. Limitations of the study include lack of randomization and the unequal sample size of the two groups. Each subject in the intervention group received individualized osteoporosis counseling after having had a BMD test. However, most of the subjects, 84%, were in the control group compared to the 16% in the intervention group. This may have impacted the strength of the statistical analysis to detect change. Post intervention, significant increases in perceived barriers to calcium intake and significant decreases in exercise frequency were reported by the subjects. The authors conjectured these findings may have occurred as women in the intervention group, having become more aware of their osteoporosis risk, felt the need to justify their lack of behavior change. Additionally, the subjects' individual data regarding prior bone healthy behaviors was not factored into the intervention which may have limited its usefulness to subjects (Sedlak et al., 2005).

Gaines, Narratt, and Parrish (2010) evaluated the impact of adding an osteoporosis educational program to a screening bone density program for adults 62 years old and older. The educational intervention led by a nurse was composed of a one hour session at baseline and a half hour refresher session one year later. The 376 participants (62 men and 314 women) were all residents of two retirement communities. With a mean age of 81.4 years, there were 193 subjects in the education and screening group and 183 in the control group. The Facts on Osteoporosis Quiz (Ailinger, Lasus, & Braun, 2003) was used to assess osteoporosis knowledge. Exercise frequency and use of calcium supplementation was self-reported (Gains et al., 2010).

Measurements were taken pre-intervention, immediately post-intervention, one year, and two years post-intervention. The education class was attended by 21 men (62%) and 116 women (73%). The one year refresher education class was attended by 72 women and 18 men.

Increases in osteoporosis knowledge ($p < .001$) were found for both the intervention and control group at two years' post-intervention. Significant improvement in calcium intake ($p = .041$) was seen at one year post-intervention for the education and BMD screening group, but not at the two year post-intervention point. No changes in aerobic or strength training exercise were seen in either group (Gaines et al., 2010).

A strength of this study is its longitudinal design, which involved measurements out to two years post-intervention. There was a control group to allow for comparison. Limitations of this study include the loss over the two years of the study of 30.5% of the screening with education group and 17% of the control group. Attrition also occurred before the educational offering. Osteoporosis knowledge was noted to significantly increase for both groups even though the control group had no educational intervention (Gaines et al., 2010).

White (2008) assessed the effects of three different educational interventions on the osteoporosis knowledge and bone healthy behaviors of adults 65 years old and older. Bone healthy behaviors were defined as adequate calcium intake, use of dietary supplements, fall prevention measures, and use of exercise. There were four groups with a total of 85 participants all of whom had been recruited from eight senior centers. There were 69 women and 16 men with an age range of 65 to 95 years. All participants received a screening BMD test with every group except the control group receiving this test pre-intervention. The first group, composed of 21 people, acted as a control group with no intervention. The control group received the BMD test at the final post-intervention measurement point. The second group with 21 subjects

received two brochures on bone healthy behaviors. The third group, comprised of 19 people, was given the same two brochures along with two educational sessions on osteoporosis with two phone call follow-ups afterwards. The fourth group with 24 subjects received the same interventions as the third group but had individual attention in developing personal bone healthy goals.

Four valid and reliable instruments were used. These included the Osteoporosis Knowledge Questionnaire (Davis, 1999), Short Food Questionnaire (Blalock et al., 2003), Index of Readiness (Fleury & Cameron, 2003), and the Osteoporosis Self-Management Index-Revised (Davis, Jimenez, & Rubin, 1995). The researcher also created a fracture risk assessment questionnaire (White, 2008).

Measurements were taken pre-intervention and seven weeks post-intervention. Post-intervention, a significant difference was found for improved osteoporosis knowledge in groups three and four (both $p < .001$). In addition, bone healthy behaviors were significantly improved in group four ($p < .001$) (White, 2008).

There are several strengths and limitations of this study. One strength is its quasi-experimental design which allowed for the testing of the educational intervention in different formats. Four valid and reliable instruments were used. A limitation of the study is the small number of subjects in each group (White, 2008).

Longitudinal Studies

Pearson, Burkhart, Pifalo, Palaggo-Toy, and Krohn (2005) used a longitudinal repeated measures design in evaluating the effectiveness of a multidisciplinary educational and exercise program for individuals with osteopenia or osteoporosis. The educational intervention was composed of bi-weekly classes lasting 2 ½ hours each for a total of eight weeks. The sessions

covered topics relevant to osteoporosis such as exercise and proper body mechanics designed to reduce falls. The subjects were offered individualized counseling by healthcare providers which included a pharmacist-led counseling session on medication appropriateness. In-home safety assessments were also offered and conducted (Pearson et al., 2005).

At baseline, there were 429 subjects with 375 having osteopenia or osteoporosis. The median age was 67 years with a range from 44 to 90 years old. The majority of participants, 98%, were Caucasian. At the beginning of the study, 62% of participants were on medication for osteoporosis. Of those completing the eight week program, 98% were female (n=367) and 8 were males (2%). Measurements were taken pre-intervention, at the conclusion of the eight week program, and six months and two years post-intervention. A total of 231 participants completed the six month post-intervention instruments with 157 completing the two years post-intervention. Gender percentages were not noted (Pearson et al., 2005).

Several instruments were used including the Center for Epidemiologic Studies Depression Scale (Radloff, 1977) and the Functional Fitness Test Battery (Rikli & Jones, 1999). A researcher created, twenty item, multiple-choice test for osteoporosis knowledge was given. A two day food diary log with a structured interview by a dietician regarding calcium and vitamin D rich food consumption was completed. Using the diary, a nutritionist calculated the amount of calcium the subjects consumed from food and supplements. A weekly log on exercise and nutrition kept by the subjects was assessed. A structured interview with an exercise physiologist about exercise habits was also conducted (Pearson et al., 2005).

At eight weeks post-intervention, there were significant improvements over baseline measurements for osteoporosis knowledge ($p < .0001$), depression ($p < .0001$), and nutrition adherence for calcium and vitamin D (both at $p < .0001$). Fitness measurements showed

improvements in upper body strength ($p<.0001$), lower body strength ($p<.0001$), upper body flexibility ($p<.0001$), lower body flexibility ($p<.0001$), and balance ($p<.0001$). There was a significant increase in fitness adherence for strength training and aerobic exercise (both $p<.0001$) (Pearson et al., 2005).

The actual time period for the six month post-intervention measurement varied from five to fifteen months as the researchers were experimenting with the best intermediate measurement period while the study was ongoing. At two years' post-intervention, continued significant improvements were found for exercise frequency, calcium and vitamin D intake (all significant to at least $p<.05$). A significant improvement in DXA bone mineral density measurements for the spine was also found ($p<.0001$) (Pearson et al., 2005).

One strength of this study is its design which measured change at several testing intervals. Another strength is that two of the instruments had validity and reliability data. Structured interviews were used by the exercise physiologist and the nutritionist. There were also multiple healthcare providers of different disciplines involved in designing and implementing this intervention. The intervention was continually assessed for areas that needed improvement (Pearson et al., 2005).

There are several limitations of this study. There was no control group. Bone healthy behaviors were self-reported by the participants. Not all of the instruments used were valid and reliable. Post-intervention testing, scheduled to be done at the six month mark, varied from five to nineteen months as the researchers were experimenting with what would be the most appropriate post-intervention measurement period. This variation in the time of measurement may have affected the results (Pearson et al., 2005).

In their longitudinal study, Newman and Hanus (2001) evaluated the impact of pharmacist-led classes about osteoporosis on subjects' bone health behaviors. A standardized educational presentation with a pre-defined patient education information packet was used by the community-based pharmacists. Bone health behaviors were defined as adequate calcium intake, seeking advice of healthcare providers, having a bone density test done, and beginning osteoporosis medication if indicated. With a median age of 54 years (range 21 to 86 years old), there were 350 subjects who were participants of the Geisinger Health System in central Pennsylvania. The participants were all female and 99.4% Caucasian. Measurements were taken pre-intervention and at four to six weeks post-intervention (Newman & Hanus, 2001).

Measurements were obtained with four questionnaires. A baseline demographic questionnaire was used, which included questions on exercise frequency, use of calcium supplements, use of osteoporosis treatment medication, and previous bone density testing. The Simple Calculated Osteoporosis Risk Estimation (SCORE) (Lydick et al., 1998) form was used to calculate osteoporosis risk. The third questionnaire, also researcher created, allowed the participants to evaluate the class. The fourth component was a telephone interview, using a script, conducted four to six months post-intervention (Newman & Hanus, 2001).

At four to six weeks post-intervention, 58% of subjects who had not been taking calcium supplements had started to do so. Thirty-two percent exercised more. Fifty percent sought the advice of a health care provider. Twenty-nine percent had obtained a bone density test. For those with a finding of osteoporosis on DXA testing, 33% had started on medication therapy (Newman & Hanus, 2001).

There are several strengths of this study. The educational intervention was created by a multidisciplinary team with an in-depth analysis of the educational intervention. Participants

were asked to rate the intervention. Ranking the intervention as “excellent” was 74% of participants with 26% rating it as “good” (Newman & Hanus, 2001).

There are several limitations of this study. One is the lack of a control group. Self-reporting of the bone healthy behaviors was done by the participants. The educational intervention was performed at several different sites and with several different educators with no analysis for potential differences between the educators and/or the sites. In the mathematical analysis of the study, percentages only were used with no other statistical analyses reported (Newman & Hanus, 2001).

Davis, White, and Yang (2006) assessed the effects of a nurse-led educational intervention for older adults living in a residential setting on osteoporosis knowledge and bone healthy behaviors. The educational intervention was composed of six, one hour, nurse-led educational sessions on osteoporosis, physical activity, fall prevention measures, nutrition/nutritional supplements, use of calcium, and medications. The dependent variable included measurements of fall prevention, independent functioning, and bone healthy behaviors. The bone healthy behaviors included: use of physical activity, fall prevention measures, adequate nutrition, and medication and/or supplement adherence (Davis et al., 2006).

A longitudinal repeated measures (pre- and post-test) design was used with measurements taken at baseline and one week, six weeks, and 9 ½ months post-intervention. The settings were five residential communities for older adults. There were 54 participants with 41 completing the entire study. The mean age was 79.36 years old. The majority of subjects were female (85.1% female, 14.9% male). At the beginning of the study, 38.3% of subjects self-reported having osteoporosis (Davis et al., 2006).

There were several instruments used. These included the Osteoporosis Knowledge Questionnaire (Davis, 1999), Osteoporosis Self-Management Index, Revised (Davis, Jimenez, & Rubin, 1995), Short Food Questionnaire (Blalock et al., 2003), and the Falls Efficacy Scale (Tinetti, Richman, & Powell, 1990). The Timed Up and Go test measured basic mobility (Podsiadlo & Richardson, 1991).

There was a significant increase in osteoporosis knowledge from baseline to 9 ½ months post-intervention ($p < .001$). The greatest knowledge gain was seen between baseline and week one ($p < .001$) with some loss occurring between the week one and week six post-intervention period ($p < .04$). The greatest loss of knowledge occurred between week six and 9 ½ months post intervention period ($p = .03$). For bone healthy behaviors, the subjects showed improvement between baseline and 9 ½ months post-intervention ($p = .01$). The greatest increase in these behaviors was between baseline and one week post intervention ($p < .01$). Behaviors showing significant improvement from baseline to one week post-intervention ($p < .05$) included; eating high calcium foods, taking calcium supplements, using fall precautions, and exercising to improve strength, balance, and flexibility. At 9 ½ months post-intervention, the authors reported a continued significant improvement for fall precautions, exercising for strength and balance (p not reported). Taking a multi-vitamin, which was not significant at one week post-intervention, was found to be significant at 9 ½ months (p not reported). The behaviors of eating foods high in vitamin D and doing weight bearing exercise were found to not significantly change during the study (Davis et al., 2005).

Strengths of this study include its design and use of reliable and valid instruments. There are limitations of this study. One is the lack of a control group. Being limited to one community

setting may make generalization to other more diverse settings more difficult. Another limitation was the use of subjects' self-reported bone healthy behaviors (Davis et al., 2005).

In their longitudinal study, Driskell, Pohlman, and Naslund (2003) assessed the effects of a healthcare team-led community-based educational intervention on osteoporosis. Members of the Cooperative Extension System had initiated the program with the program held in the area's Research and Extension Center. The objectives of the osteoporosis program were developed by a team composed of registered dietitians, physicians, public health employees, extension educators, and extension specialists. The educational intervention was one session long and was given twice to a total of 92 participants. The educational sessions were led by healthcare professionals with a physician being the primary presenter. No information was provided on the gender and age range of the participants.

Measurements were obtained pre-intervention and one month post-intervention with a 59% return rate (n=54). A researcher created questionnaire was used, which included questions regarding subject perception of osteoporosis knowledge (rated as either a little, some or a lot), calcium supplement usage (rated as either a little, some or a lot), eating of a calcium-rich diet (rated as either a little, some or a lot), and partaking of weight-bearing exercise at least three times a week (rated as never, sometimes, or always). Subjects were asked additional questions regarding their age (specified in categories) and if they had had a bone density test done before and/or after the intervention.

At one month post-intervention, 82% of subjects felt they knew "a lot" about osteoporosis, an improvement from 24% pre-intervention ($p < .05$). Of those who had a bone density test before the educational session, there was an improvement from 21% perceiving knowing "a lot" about osteoporosis to 86% post-intervention. Of those who had not had a bone

density scan previous to the intervention, an improvement from 27% to 55% was seen in those participants perceiving they had “a lot” of osteoporosis knowledge. A significance at $p<.05$ was seen for improvements in usage of calcium supplements, consuming a calcium-rich diet, and partaking of weight-bearing exercise at least three times a week. Evaluation of the measured categories was conducted by age group with significant increases seen in those over 30 years of age and those aged 50 to 59 years old.

A strength of this study includes its development by a multidisciplinary healthcare team. There are several limitations of this study. One limitation is the self-reporting of the bone healthy behaviors by the subjects. Another is the lack of a control group. There was a 41% attrition rate. The questionnaire used had no reliability or validity data. As limited demographic information on the subjects was presented, generalization to other more diverse samples may be difficult.

Synthesis

Evidence from seven randomized controlled trials (RCTs), three quasi-experimental studies, and four descriptive, longitudinal, comparative studies were unanimous in strongly supporting the effectiveness of healthcare professional-led education on adherence to non-pharmacologic treatment recommendations for osteoporosis patients, or those at high risk for the disease, in comparison to usual care or no intervention (Brecher et al., 2002; Chan & Ko, 2006; Chan et al., 2005; Davis et al., 2006; Driskell et al., 2003; Gaines et al., 2010; Newman & Hanus, 2001; Nielsen et al., 2008; Pearson et al., 2005; Ribeiro & Blakeley, 2001; Rolnick et al., 2001; Schousboe et al., 2005; White, 2008; Yuskel et al., 2010). One study did find significant increases to perceived barriers to calcium intake ($p=0.034$), in intent to exercise ($p<0.030$), and decreases in exercise frequency ($p=0.034$) post-intervention. Increases in

calcium intake and use of exercise were observed in the control group, but these were not significant (Sedlak et al., 2005).

The bone healthy behaviors studied differed among the studies. This may be due in part to the evolution of understanding of which behaviors are bone healthy. In comparison to the National Osteoporosis Foundation's current recommendations (2010) regarding patient osteoporosis education, only three studies specifically noted incorporating and measuring for all of the recommended parameters (Davis et al., 2006; Pearson et al., 2005; White, 2008). Studies varied in their setting from senior centers to churches. No studies reported being conducted in a fitness center. Instruments measuring the bone healthy behaviors varied among the studies. Several did not mention the questionnaires used, used researcher created questionnaires and/or did not report the validity and reliability of the instruments (Driskel et al., 2003; Gaines et al., 2010; Newman & Hanus, 2001; Pearson et al., 2005; Ribeiro & Blakeley, 2001; Rolnick et al., 2001; Schousboe et al., 2005; Yuskel et al., 2010). Eight of the studies were conducted with a nurse as the educator, which supports the use of nurses as the healthcare professional in this role (Chan & Ko, 2006; Chan et al., 2005; Davis et al., 2006; Gaines et al., 2010; Rolnick et al., 2001; Schousboe et al., 2005; Sedlak et al., 2005; White, 2008).

The amount of education varied from a onetime educational intervention to biweekly classes for eight weeks. The evidence suggests a onetime intervention, used in ten of the fifteen assessed studies, is effective (Brecher et al., 2002; Chan & Ko, 2006; Chan et al., 2005; Driskell et al., 2003; Newman & Hanus, 2001; Ribeiro & Blakeley, 2001; Rolnick et al., 2001; Schousboe et al., 2005; Sedlak et al., 2005; Yuskel et al., 2010). When reported, the amount of time the educational intervention took varied among the onetime interventions. The shortest lasted 15 minutes (Schousboe et al., 2005); the longest was three hours (Brecher et al., 2002).

Of the six studies including both genders, one had enough male subjects to allow for statistical analysis based upon gender (Davis et al., 2006; Gaines et al., 2010; Nielsen et al., 2008; Pearson et al., 2005; White, 2008; Yuskel et al., 2010). Pre-intervention, the osteoporosis knowledge scores of female subjects were found to be significantly higher when compared to male subjects ($p < 0.01$). After the intervention, there were no significant differences between the genders (Nielsen et al., 2008). In a study specifically addressing osteoporosis knowledge in males aged 65 or older, subjects were found to have low levels of osteoporosis knowledge and did not perceive themselves as being susceptible to developing osteoporosis (Sedlak, Doheny, & Estok., 2000). These findings warrant further research as it appears that males have a higher than anticipated need for osteoporosis knowledge, and their inclusion in future educational endeavors should be encouraged.

Statewide Osteoporosis Programs

Of note, discussion was found in the literature of statewide osteoporosis programs. Many of these programs have had a large number of participants. They were excluded from the literature review as there was limited published data analysis available for these programs. At present, 35 states have laws in place regarding osteoporosis issues. Many of these states have programs to improve public awareness and osteoporosis knowledge (National Conference of State Legislatures, 2009). There is evidence that a statewide osteoporosis educational intervention based in the community setting can be helpful.

The Bone Builders Osteoporosis Prevention Program based in Arizona began in 1998. It uses volunteers to provide lectures to community members regarding osteopenia and osteoporosis. The volunteers are not necessarily healthcare professionals. The program has trained over 320 volunteers and staff members statewide. Education is provided on the disease,

use of a bone density scan, and the bone healthy behaviors of appropriate calcium intake and weight-bearing type exercises. In 2000, the program was expanded to include older men and women of all ages. In 2003, the program was further expanded with the addition of the Bone Builders Physical Activity Program. The goal of this nine week program is incorporation of physical exercise and fall prevention measures into the daily lives of older inactive adults (Day & Block, 2006).

Two published evaluations have been done of this program. A survey of 2,000 participants measured for change in osteoporosis knowledge using a scale from one to five with five being the highest. There was an improvement in osteoporosis knowledge from 2.5 pre-educational offering to 4.5 post-intervention (Day & Block, 2006). In a survey of 211 participants, 79% planned to make some type of change regarding their bone health. Pre-intervention, 16% of attendees had routinely performed some type of weight bearing exercise. Four to six months post-offering, this had improved to 36% with 39% increasing their calcium intake (Stanford et al., 2005).

Due in part to their ranking as fifth in the nation with the number of residents with osteoporosis, the state of Pennsylvania has been particularly involved in osteoporosis research (NOF, 2002). The state of Pennsylvania's Osteoporosis and Education Program has multiple osteoporosis programs in place which address osteoporosis concerns across the lifespan. One program, Strong Women, is part of a larger national program. This program provides education on weight-bearing exercises as well as educational and dietary information for women at mid-life or older (Pennsylvania Department of Health, 2008). In 2003, the Penn State Cooperative Extension and Penn State Public Broadcasting collaborated to develop the Creating Health: Osteoporosis Prevention Program. This well received program uses extension educators

throughout the state to provide osteoporosis education in a community setting (Corbin, Trainor, Liu, & Guelnder, 2008).

The “Tone Your Bones” program was developed at the University of Alabama at Birmingham Health Services Foundation. This community-based program is carried out through a multidisciplinary osteoporosis clinic. Two bi-weekly group educational sessions are presented for four weeks on osteoporosis, treatment options, and the bone healthy behaviors. Positive changes for participants’ balance, flexibility, and strength have been noted immediately following the four week educational period. The long term effects of this program are not known. The original design of the program was one session per week for eight weeks, but the attendance was poor. Evaluation of the program revealed many participants wanted a shorter length of time between the sessions (Peel, Lein, Kitchin, & Morgan, 2001).

Started in 1997, Project Healthy Bones is a joint collaboration between the Rutgers Cooperative Extension of the State University of New Jersey, the New Jersey Department of Health and Senior Services, the Association of Retired and Senior Volunteer Program Directors, and the Saint Barnabas Center for Health and Wellness. It uses older adults as both peer advocates and trainers who perform the 24 week group sessions. While the focus of the sessions is on physical activity, there is education provided on other bone healthy behaviors. In an evaluation of 217 participants, improvements in the amount of weight that could be lifted and the amount of exercise that could be done was seen at the end of the last session. After completing a calcium diary, 68% of those surveyed were found to have increases in calcium intake. As of 2001, the program had enrolled over 1400 participants (Klotzbach-Shimomura, 2001).

CHAPTER IX CAPSTONE SITE

The health and fitness center at which this educational offering was given is the largest of its kind in Kanawha County, WV. Administrators from the fitness center have given their support to the project (See Appendix A). Membership in the fitness center is open to the community at large which includes all ages and income levels with a sliding scale available for those with limited financial means. The center is open seven days a week with both early morning and late evening hours. The facility is composed, in part, of a six lane indoor pool, free weight room, fitness equipment area, two gymnasiums, a multipurpose gym, exercise studio, cycling studio, tennis courts, racquetball courts, and outdoor recreational fields for sports such as soccer and softball. The health and fitness center offers a variety of classes for all ages and interests. For example, there is a beginning free weight training course seven weeks long designed for adult females. There is also a series of classes on healthy eating. For older adults, there are programs designed with them in mind (see Appendix B). There are monthly luncheons for seniors offering both educational and socialization opportunities. The Silver Sneakers programs in yoga and strength/muscle strength training are available as are several fitness classes tailored for the older adult (YMCA of the Kanawha Valley, 2012).

CHAPTER X CAPSTONE PROJECT DESIGN

The project is a onetime educational offering lasting approximately two and a half hours. The workshop addresses the pathophysiology of osteoporosis, risk factors for the disease, and non-pharmacological and pharmacological treatment options. The educational offering particularly focuses on non-pharmacological treatment recommendations as defined by the National Osteoporosis Foundation (2010): ideal daily intake of calcium and Vitamin D, weight-

bearing exercise, fall prevention behaviors, avoidance of cigarette smoking and limiting alcohol intake to two drinks or less per day.

The evaluation of the osteoporosis workshop is a one group repeated measures design with measurements taken pre-intervention, immediately post-intervention and one month post-intervention. One objective of the evaluation is to collect basic information on those attending the osteoporosis workshop including: gender, menopausal status if female, fitness center membership status, if diagnosed with osteoporosis or osteopenia, and use of medications for osteoporosis or osteopenia, both past and current. A second objective is to enhance knowledge about osteoporosis and bone healthy behaviors for participants. A third objective is to improve the participants' perception of meeting personal bone healthy behavior goals. A fourth objective is to improve participants' daily calcium and vitamin D intake. A fifth objective is to improve subjects' physical activity levels and decrease the time attendees spent sitting on a typical weekday.

The educational offering was held in the fitness center and was led by the project director, a nurse practitioner. The population for the project was those considered at high risk for osteoporosis; post-menopausal women and men aged 50 years old and older (NOF, 2010). The recruitment goal for this project was 50 participants. Two workshops were held on the same day with a third workshop later added to reach this recruitment goal.

Theoretical Foundation of the Capstone Project

Considering the diversity of previously used theoretical foundations in regards to osteoporosis education, the Integrated Theory of Health Behavior Change (ITHBC) (Ryan, 2009) was chosen as the theoretical model for this population. The ITHBC is a midrange nursing theory which integrates elements from multiple theories. It addresses health behavior change,

self-regulation behaviors, chronic disease management, and social support. The ITHBC is currently being used as the theoretical framework in two studies. One of these studies involves an individualized osteoporosis educational intervention (Ryan, Pumilia, Henak, & Chang, 2009).

The ITHBC theory is divided into two main parts. The first part is composed of three segments; knowledge/beliefs, self-regulation skill/ability, and social facilitation. In the first segment (knowledge and beliefs), the participant's personal goals, self-efficacy, and expectations of the intervention are assessed. Specific knowledge for a chronic condition is shared (Ryan, 2009). The educational offering utilized in this project focused on knowledge regarding osteoporosis and bone healthy behaviors. Before the workshop, the participants' knowledge regarding osteoporosis was assessed using the Osteoporosis Knowledge Assessment Tool (OKAT) instrument (see Appendix C) (Winzenberg, Oldenburg, Frendin, & Jones, 2003). Pre-workshop, the participants were encouraged to explore areas of knowledge deficit and what each attendee hoped to achieve from participating in the class. Subjects were encouraged to share these objectives before the class began. Immediately post-intervention and one month post-intervention, the participants' osteoporosis knowledge was reassessed using the OKAT.

The second segment of the ITHBC (social facilitation) involves the influence and support of others in regards to the desired health behavior change. One component of social facilitation is the influence a healthcare provider could have in changing a subject's thinking and knowledge. Another component of social facilitation is the influence of one's social support system such as friends and family (Ryan, 2009). The ITHBC further posits that social facilitation can involve "emotional, instrumental, or informational support" (Ryan, 2009, p. 165). The workshops were led by a family nurse practitioner. The subjects in the group-based educational intervention could have drawn social support from each other. Reliable sources of

information about osteoporosis were reviewed with the participants to further meet their current and future learning needs. Multiple handouts regarding osteoporosis and bone healthy behaviors were given to the subjects in their workbook (see Appendix D).

The third segment of the first part of the ITHBC theory (self-regulation skills and ability) is affected by both social facilitation and knowledge/beliefs. In this segment, there is a focus on decision-making and setting goals. A plan is created which is then carried out and later evaluated by the participant (Ryan, 2009). Pre-intervention, the participants were asked to rate their perception of meeting their bone healthy goals (see Appendix E). A workbook was given to each participant before the educational offering began, and was utilized throughout the presentation. The workbook contained a copy of the PowerPoint presentation used to educate participants, sources of reliable information about osteoporosis, and handouts about bone healthy behaviors (see Appendices D & F). At the conclusion of the educational intervention, participants were encouraged to create a list of personalized goals and a plan by which to achieve these goals, with space for documentation provided in the workbooks. The instructor aided in facilitating this process as needed. One month post-intervention, participants were asked to rate where they currently perceived meeting their bone healthy goals (see Appendix G).

The second portion of the ITHBC is composed of two parts, both of which deal with outcomes. The first part focuses on early outcomes. An example of an early outcome is the initiation and maintenance of healthy behaviors. At pre-educational offering and at one month post-intervention, measurements regarding the bone healthy behaviors of adequate daily calcium and vitamin D intake and use of physical activity were obtained to evaluate for change. Vitamin D and calcium intake were measured with the Short Instrument for Assessing Dietary Intake of Calcium/Vitamin D (also referred to as the Short Food Questionnaire) (See Appendix H)

(Blalock et al., 2003). Physical activity measurements were obtained through use of the International Physical Activity Questionnaire: Short Last 7 Days Self-Administered Format (See Appendix I) (Craig et al., 2003).

The second part of the ITHBC deals with long term outcomes. In maintaining healthy behaviors, there should be a positive impact upon a participant's long term health status (Ryan, 2009). In the case of osteoporosis, this would be improvement in bone density and/or risk reduction for fractures. Because each participant's involvement in the project was for four to six weeks, the potential long term health impact this project could have was not measurable during this project's time frame. Consideration could be given for future projects using this educational offering with longer follow-up measurement intervals.

The project, its design, and objectives were explained in detail to the potential subjects following a script (see Appendix J). Written consent from those willing to participate in the workshop's evaluation was obtained with each participant receiving a copy (see Appendix K). Demographic and basic bone health information was obtained pre-intervention (see Appendix E). To make sure that the educational offering helped meet the immediate needs of the participants, participants were asked to complete an anonymous survey regarding their opinions and their suggestions for improvement of the program (see Appendix L).

At one month post-intervention, the subjects were mailed a letter about the one month post-educational offering evaluation and the instruments/questionnaires regarding their perception of meeting bone healthy goals, calcium/vitamin D dietary and supplement use, osteoporosis knowledge, and physical activity levels (see Appendix M). A postage paid self-addressed envelope for the instruments/questionnaires' return as well as a gift card (\$5) for a popular local store was included. For those participants whose instruments were not returned, a

follow-up letter was sent two weeks later along with copies of the instruments/questionnaires and a self-addressed postage paid envelope (see Appendix N).

Ethical Considerations

Approval of the project through the author's Capstone committee and the Institutional Review Board of West Virginia University (Tracking Number: H-23559) was obtained before the project was implemented. An informational letter describing the project was given to the participants before the osteoporosis workshop (see Appendix O). Participants were able to attend the osteoporosis workshop without participating in the project's evaluation. Consent to participate in the project's evaluation was obtained from the participants (see Appendix K). The subjects were advised they could skip any question that they did not wish to answer and could stop participation at any time. Each attendee's involvement was kept as confidential as legally possible. Each participant was given a unique identification number with the identifying information reported on a separate form (see Appendix P). All obtained materials from the participants were kept in a locked filing cabinet in the author's home for which she has the only key. All participant information will be shredded at the conclusion of the project's evaluation.

CHAPTER XI INSTRUMENTS/QUESTIONNAIRES

Osteoporosis Knowledge

Osteoporosis knowledge was measured by the Osteoporosis Knowledge Assessment Tool (OKAT) (see Appendix C) (Winzenberg et al., 2003). It is composed of twenty statements that are to be marked by the participant in one of three categories; true, false or don't know. Scoring is done by giving one point for each correct answer and zero points for each incorrect answer or those marked don't know (Tania Winzenberg, personal communication, September 12, 2010). This instrument has been shown to be reliable and valid (Ferguson's sigma 0.96 and Cronbach's

alpha of 0.70). It is noted that instrument was designed for use by Australian women aged 25 to 44 years. To facilitate use in the United States of America, the words “in Australia” was removed from question #20. Permission for its use has been obtained from the lead author, Dr. Winzenberg (see Appendix C).

Calcium and Vitamin D Intake

To measure calcium and vitamin D intake, the Short Instrument for Assessing Dietary Intakes of Calcium and Vitamin D was used (see Appendix H) (Blalock et al., 2003). This instrument is composed of a listing of 22 high calcium and vitamin D rich foods. The participant marks how often he or she consumes each of these foods in a one month time period. This data provides an estimate of daily dietary intake of calcium and vitamin D.

When the creators of the instrument compared it to seven day food diaries and the Block-National Cancer Institute Health Habits and History Questionnaire (Block, Hartman, & Naughton, 1990), a reliability of 0.72 and 0.66 was found respectively ($p < .001$). Predictive measurements for calcium intake were found to be 91.7% and 100% for vitamin D. The instrument was found to be more acceptable to participants than the seven day food diaries as it could typically be completed in five minutes. Drawbacks to use of this instrument include the exclusion of calcium and vitamin D fortified foods such as orange juice and some yogurts. Use of calcium and vitamin D supplements are also not queried (Blalock et al., 2003). Additional questions were asked about the consumption of calcium and vitamin D supplements to ensure accuracy of the participants’ responses (see Appendices E & G). Permission to use this instrument has been obtained from the lead author, Dr. Blalock (see Appendix H).

Weight-Bearing Exercise

For evaluation of weight-bearing exercise, the International Physical Activity Questionnaire: Short Last 7 Days Self-Administered Format was used (see Appendix I) (Craig et al., 2003). While there are four versions of the International Physical Activity Questionnaire (IPAQ), two long and two short, the IPAQ Short Last 7 Days Self-Administered Format (Craig et al., 2003) was chosen for its ease of use. The population for which the questionnaire was designed included people from 18 to 65 years old. The IPAQ: Short Last 7 Days Self-Administered Format is composed of seven questions that measures the amount of time spent sitting, walking and doing vigorous and moderate level activities (Craig et al., 2003). The questionnaire is available for use in research/evaluation studies at no charge from the website, <http://www.ipaq.ki.se/ipaq.htm>.

Reliability and validity studies have been done using this instrument. A key reliability and validity study comparing the four versions of the IPAQ was conducted among several international sites. For the United States, the short forms reliability correlation coefficients ranged from 0.66 to 0.88. The median criterion validity was 0.3 (Craig et al., 2003). Brown, Trost, Bauman, Mummery, and Owen (2004) compared the IPAQ Short Last 7 Days Self-Administered Questionnaire to the Behavioral Risk Factor Surveillance System, the Australian National Health Survey, and the Active Australia Survey. The population of the study was Australian residents of both genders aged 18 to 75 years with approximately two-thirds of participants being older than 45 years old. They found agreement among the four surveys in categorizing activity level with the IPAQ questionnaire having the highest score of 79%. Kappa statistics for this instrument were noted to be 0.47 (range 0.29-0.66).

CHAPTER XII RESOURCES

There were multiple resources available which facilitated the completion of this project. The author, a nurse practitioner, led the participants through the educational offering. In terms of content expertise, Ronald Hamdy, MD, a clinical expert in the field of osteoporosis reviewed the educational offering and provided guidance.

There were multiple sources of handouts and information used in the participant workbook that are non-copyrighted or available for a small fee (see Appendices D & Q). The National Osteoporosis Foundation offers a set of handouts covering the bone healthy behaviors for \$25 that were duplicated for the event. The National Cancer Institute has non-copyrighted information on smoking cessation that was downloaded and copied. The National Institute on Health's National Institute on Aging, the Centers for Disease Control, and the National Institute on Alcohol Abuse and Alcoholism have several handouts regarding bone healthy behaviors available at no cost. Appendix D lists the handouts that were distributed to the participants during the workshops.

CHAPTER XIII RESULTS

Analysis using SPSS version 18 statistical software (SPSS, Chicago, IL, USA) to evaluate for change(s) between the testing intervals and the significance of these changes was done. A significance level of .05 was used. A total of three workshops were given. Two workshops were held on January 25, 2012. The first workshop was held from 1:00 PM to 3:30 PM. The second workshop was from 5:30 PM to 8:00 PM. A third workshop, from 1:00 PM to 3:30 PM, was added on March 20, 2012, to obtain the recruitment goal of 50 subjects. The IRB approved protocols were followed at each workshop. A total of 74 participants attended the workshops (workshop one: n=34; workshop two: n= 14; workshop three: n=26). Of these

participants, 67 consented to be in the study (workshop one: n= 34; workshop two: n=14; workshop three: n=19).

While the workshop was attended by both genders, more women (n=62) attended than men (n=5). The men attended at the two different time offerings (workshop one: n=0; workshop two: n=3; workshop three: n=2). The attendees were predominately Caucasian (n=65 (97%); 61 females, 4 males) with a minority being African American (n=2, (3%); one female, one male).

All but three potential participants who had registered for a workshop attended. These three participants did call to cancel the day of the program (two from the first workshop and one from the second). There were no cancellations from the third workshop. The vast majority of the participants stayed for the entire program. Two subjects had to leave early from the first workshop. All participants in the second workshop were able to complete the workshop. Three participants had to leave early during the third workshop.

During the first workshop, several potential participants asked if they could still join the workshop right before the program started. There were a total of 31 participants pre-registered with two of these cancelling the day of the workshop. An additional five participants who had not pre-registered were able to be accommodated for a total of 34 in the first workshop. There were at least four potential participants who could not be accommodated as the room had reached capacity. Most of the potential participants who were not able to be accommodated presented to the fitness center's main consumer service desk instead of the check-in point for the osteoporosis workshop to see if they could attend.

The third workshop's attendance and participation in the program's evaluation was limited in comparison to the other two workshops. There was an exercise class specifically for older adults being offered at the exact time of the third workshop that many of the potential

attendees for the osteoporosis workshop wanted to attend also. This class was being offered the one time with no future classes scheduled. Of the three participants who left early, two had voiced they were planning on going to the other class. In addition, several of the participants reported having attended another program that morning. As a result of feeling tired and not sure how long they could attend the osteoporosis workshop, many of these participants did not want to participate in the workshop's evaluation portion.

Instrument/Questionnaire Return Rates

Analysis was conducted on the return rate for the instruments/questionnaires (see Appendix R). Of the 67 subjects, 67.2% (n=45) completed the instruments/questionnaires pre-intervention, immediately post-intervention, and one month post-intervention. Comparisons were made between those subjects completing the instruments/questionnaire at all three measurements points and those that had not (see Appendices S & T).

Table 1

Comparison of Subjects Completing Data Collection at All Three Measurements Points Versus Those Subjects Who Had Not

	Those Completing Forms	Those Not Completing All Forms
Age	M= 64.39 years (SD: 9.138)	M= 67.68 years (SD: 8.420)
Years of Education	M=14.70 years (SD: 2.651)	M=14.26 years (SD: 2.182)
Gender	Female: n=42 (93.3%) Male: n=3 (6.7%)	Female: n=19 (90.5%) Male: n=2 (9.5%)

Menopause Status	Menopausal: n=40 (88.9%) Non-Menopausal: n=2 (4.4%) Not Applicable: n=3 (6.7%)	Menopausal: n=19 (90.5%) Non-Menopausal: n= 0 Not Applicable: n=2 (9.5%)
Fitness Center Member	Yes: n=21 (46.7%) No: n=24 (53.3%)	Yes: 15 (71.4%) No: 6 (28.6%)
Diagnosed with Osteoporosis/Osteopenia	Yes: n=25 (55.6%) No: n=20 (44.4%)	Yes: n=13 (61.9%) No: n=8 (38.1%)
If Diagnosed, Whether Osteoporosis or Osteopenia	Yes: n=16 (35.6%) No: n=9 (20%) Not Applicable: n=20 (44.4%)	Yes: n=8 (38.1%) No: n=5 (23.8%) Not Applicable: n=8 (38.1%)
Past Medication Use for Osteoporosis or Osteopenia	Yes: n=23 (51.5%) No: n=22 (48.9%)	Yes: n=10 (47.6%) No: n=11(52.4%)
If Prescribed Medications, if Still Taking	Yes: n=11 (24.4%) No: n=12 (26.7%) Not Applicable: n=22 (48.9%)	Yes: n=4 (19%) No: n=8 (38.1%) Not Applicable: n=9 (42.9%)

The mean age of those with a complete data set was 64.39 years (SD: 9.138) compared to 67.68 (SD: 8.420) among non-completers. The educational level was similar with a grade school level of 14.70 years (SD: 2.65) for those completing the instruments and 14.26 years (SD: 2.18) for those who had not. Among subjects returning the forms at all three measurement points, the majority were not members of the fitness center (n=24 (53.3%)) compared to 28.6% (n=6) of those not returning the forms at all measurement points.

The completion rates for the instruments/questionnaires varied among the three workshops for the three different measurement periods.

Table 2

Completion Rates for the Instruments at All Three Measurements Points by Workshop

	Workshop One	Workshop Two	Workshop Three	Total for All Three Workshops
Osteoporosis Workshop Form (pre-intervention)	97.1% (n=33)	100% (n=14)	100% (n=19)	98.5% (n=66)
Osteoporosis Workshop Follow-Up Form (one month post-intervention)	91.2% (n=31)	92.9% (n=13)	68.4% (n=13)	85.1% (n=57)
OKAT (Pre-Intervention)	94.1% (n=32)	92.9% (n=13)	100% (n=19)	95.5% (n=64)
OKAT (Immediately Post-Intervention)	85.3% (n=29)	100% (n=14)	52.6% (n=10)	79.1% (n=53)
OKAT (One Month Post-Intervention)	91.2% (n=31)	92.9% (n=13)	68.4% (n=13)	85.1% (n=57)
Short Food Questionnaire (Pre-Intervention)	94.1% (n=32)	92.9% (n=13)	94.7% (n=18)	94% (n=63)
Short Food Questionnaire (One Month Post-Intervention)	91.2% (n=31)	92.9% (n=13)	68.4% (n=13)	85.1% (n=57)
IPAQ: Short Last 7 Days (Pre-Intervention)	91.2% (n=31)	92.9% (n=13)	100% (n=19)	94% (n=63)
IPAQ: Short Last 7 Days (One Month Post-Intervention)	91.2% (n=31)	92.9% (n=13)	68.4% (n=13)	85.1% (n=57)

The timing of when the one month post-intervention mailings were returned was assessed. For workshops one and two, the majority of mailings were returned within the first two weeks (n=36 (75%)). An additional twelve mailings were sent out two weeks later with

eight subjects (16.7%) returning the materials. Four participants (8.3%) of workshops one and two did not return their materials (see Appendix U). For the third workshop, less than half of subjects ($n=9$ (47.4%)) returned their questionnaires in the two week period after the one month post-intervention mailing. Two weeks later, an additional ten mailings were sent out. Of these mailings, four attendees (21%) returned the mailing. Six participants (31.6%) from the third workshop did not return their materials (see Appendix V).

Demographics

While there were male participants ($n=5$ (7.6 %)), the majority of subjects were female ($n=61$ (92.4%)). The mean age of participants was 65.38 years ($n=63$, range 40-87 years, standard deviation (SD)=8.990). The mean school grade completed was 14.56 years ($n=62$, range 12-20 years, SD=2.507).

The majority of female subjects (96.7%) were menopausal ($n=59$). While the participants were typically members of the fitness center ($n=36$ (54.5%)), 45.5% ($n=30$) of attendees were not members. The majority of subjects had been diagnosed with either osteopenia or osteoporosis ($n=38$ (57.6%)) with osteoporosis being the prevalent diagnosis ($n=24$ (63.2%)). Regarding medication use for osteoporosis and/or osteopenia, 50% of the participants had previously been prescribed these medications ($n=33$) with 22.7% ($n=15$) reporting they were currently on this type of medication (see Appendix W).

Meeting Personal Bone Healthy Goals

A Wilcoxon Signed Rank Test was used to evaluate the impact of the osteoporosis workshop on the participant's perception of meeting personal bone healthy goals (scale: always meeting goals=5, usually meeting goals=4, meeting goals about half the time=3, seldom meeting goals=2, never meeting goals=1) (see Appendices E &G). There was a significant increase in the

subjects' perception of meeting bone healthy goals from pre-intervention (median =3) and one month post-intervention (median=4), $z=-3.148$, $p=.002$ (two-tailed). There was a small to medium effect size ($r=.28$) (see Appendix W).

Osteoporosis Knowledge

A one-way repeated measures analysis of variance (ANOVA) was conducted to compare scores on the Osteoporosis Knowledge Assessment Tool (OKAT) at Time 1 (pre-intervention), Time 2 (immediately post-intervention), and Time 3 (one month post-intervention). The means and standard deviation are presented in Table 2. There was a significant effect for time, Wilks' Lambda=0.394, $F(2, 46) = 35.41$, $p < .0005$. With the multivariate partial eta squared of 0.61, a large effect size is suggested.

Table 3

Descriptive Statistics for Confidence in Osteoporosis Knowledge Assessment Tool Test Scores for Time One, Time Two, and Time Three.

	Mean	Std. Deviation	N
OKAT Pre- Intervention Total	10.40	3.331	48
OKAT Immediately Post-Intervention Total	14.23	3.899	48
OKAT One-Month Post-Intervention Total	14.06	2.513	48

A significant improvement was seen from OKAT scores pre-intervention (mean (M) =10.40, SD=0.48) and immediately post-intervention (M=14.23, SD=0.56), $p < .0005$. A significant improvement in OKAT scores was also seen pre-intervention (M=10.40, SD=0.48)

and one month post-intervention ($M=14.06$, $SD=0.36$), $p<.0005$. There was no significance between the immediately post-intervention OKAT scores ($M=14.23$, $SD=0.56$) and those from one month post-intervention ($M=14.06$, $SD=0.36$), $p=1.00$.

The scores for the individual questions on the OKAT were assessed at the pre-intervention, immediately post-intervention and one month post-intervention measurement point for those a majority of the participants (50% or more) had answered incorrectly (see Appendix X). The range of scores on the pre-intervention OKAT was from zero to sixteen (highest possible score was 20). The range of scores on the immediately post-intervention OKAT was from one to twenty. The range of scores for the one month post-intervention OKAT was seven to twenty. At all three measurement points, questions 11 and 19 were missed by a majority of subjects (see Appendix X).

Calcium and Vitamin D Intake

A paired-samples t-test was conducted to evaluate the impact of the osteoporosis workshop on calcium and vitamin D intake (dietary calcium in milligrams (mg) and vitamin D intake in international units (IU) using the Short Instrument for Assessing Dietary Intake of Calcium/Vitamin D, supplemental calcium (mg) and vitamin D (IU) intake, total calcium (mg) and vitamin D (IU) intake). Dietary calcium intake (pre-intervention: $M=886.15$ mg, $SD=493.59$) was slightly decreased at one month post-intervention, but the decrease was not significant ($M=862.55$ mg, $SD=394.95$), $t(54)=-0.41$, $p=.68$ (two-tailed). There was a significant increase in supplemental calcium intake from pre-intervention ($M=520.93$ mg, $SD=598.76$) to one month post-intervention ($M=762.45$ mg, $SD=618.56$), $t(54)=3.86$, $p<.0005$ (two-tailed). The mean change in supplemental calcium intake was 241.53 mg with a 95% confidence interval ranging from 116.163 to 366.89. Total calcium intake from both

dietary and supplemental sources also increased significantly (pre-intervention: $M=1358.73$ mg, $SD=805.1$; one month post-intervention: $M=1597.44$ mg, $SD=725.87$), $t(55) = 2.76$, $p=.008$ (two-tailed). The mean change in total calcium intake was 238.7 mg with a 95% confidence interval ranging from 65.23 to 412.17. Dietary vitamin D intake decreased slightly post-educational offering, but not significantly (pre-intervention: $M=192.93$ IU, $SD=141.06$, one month post-intervention: $M=181.8$ IU, $SD=115.06$), $t(54) = -0.6$, $p=.551$ (two-tailed). An increase in supplemental vitamin D intake one month post-intervention was found which reached significance (pre-intervention: $M=2003.6$ IU, $SD=2284.9$; one month post-intervention: $M=2730.51$ IU, $SD=3138.4$), $t(54) = 2.13$, $p=.04$ (two-tailed). The mean change in supplemental vitamin D intake was 726.91 IU with a 95% confidence interval ranging from 42.33 to 1411.5. Total vitamin D intake, one month post-intervention also significantly improved (pre-intervention: $M=2029.93$ IU, $SD=2170.22$; one month post-intervention: $M=2749.44$ IU, $SD=3122.31$), $t(55) = 2.12$, $p=.04$ (two-tailed). The mean change was 719.51 IU with a 95% confidence interval ranging from 37.67 to 1401.36 (see Appendix Y).

Activity Levels

Paired-samples t-tests were conducted to evaluate the impact of the osteoporosis workshop on amount (number of days of the week and time spent exercising on a typical day (in minutes) and type of exercise (vigorous, moderate, and walking)). A paired-samples t-test was also conducted to evaluate for changes in the amount of time spent sitting on a typical weekday. The number of days of the week spent in vigorous exercise did increase one month post-intervention, but not significantly (pre-intervention: $M=1.89$ days, $SD=2.24$; one month post-intervention: $M=1.96$ days, $SD=2.18$), $t(54) = 0.227$, $p=.82$ (two-tailed). The amount of time spent engaging in vigorous exercise also increased post-intervention, but not significantly (pre-

intervention: $M=45.18$ minutes, $SD=59.96$; one month post-intervention: $M=50.55$ minutes, $SD=69.63$), $t(54) = 0.54$, $p=.59$ (two-tailed). The number of days per week engaging in moderate physical activities increased significantly (pre-intervention: $M=2.35$ days, $SD= 2.31$; one month post-intervention: $M= 3.38$ days, $SD=2.56$), $t(54) = 3.32$, $p=.002$ (two-tailed). The mean change was 1.04 days with a 95% confidence interval ranging from 0.41 to 1.66. The amount of time spent engaged in moderate physical activities on a typical day also increased significantly (pre-intervention: $M=51.36$ minutes, $SD= 57.47$; one month post-intervention: $M=82.18$ minutes, $SD= 87.41$, $t(54) = 2.41$, $p=.019$ (two-tailed). The mean change was 30.82 minutes with a 95% confidence interval of 5.19 to 56.44. The number of days spent walking each week increased post-intervention, but not significantly (pre-intervention: $M=3.69$ days, $SD=3.04$; one month post-intervention: $M=4.16$ days, $SD=2.7$), $t(54) = 1.25$, $p=.217$ (two-tailed). The amount of time spent walking on a typical day did increase significantly one month post-intervention (pre-intervention: $M=42.91$ minutes, $SD=45.28$; one month post-intervention: $M=85.73$ minutes, $SD=110.5$), $t(54) = 3$, $p=.004$ (two-tailed). The mean change was 42.82 minutes with a 95% confidence interval ranging from 14.12 to 71.52. The amount of time spent sitting on a typical weekday did decrease post-intervention, but not reach statistical significance (pre-intervention: $M=338.64$ minutes, $SD=157.3$; one month post-intervention: $M=300$ minutes, $SD= 135.49$), $t(54) = -1.73$, $p=.09$ (two-tailed) (see Appendix Z).

Anonymous Surveys

The participants were asked to complete an anonymous survey at the end of each osteoporosis workshop (see Appendices L & AA). There were 57 returned surveys from the three workshops (85% return rate) (see Appendix AA). There were 36 comments and/or suggestions given by the subjects (see Appendix AB).

Of the 57 respondents, 100% reported the program as helpful with 98.2% (n=56) recommending the program to others (see Appendix AC). There were seventeen comments from respondents describing the workshop as helpful and/or informative. There were two comments recommending future workshops with one subject writing the “need to take this show on the road”.

All subjects (n=57 (100%)) recorded the presenter as helpful (see Appendix AC). There were fourteen positive comments about the presenter. There was one negative comment with the attendee reporting the presenter was talking a little fast for him/her with the recommendation for a microphone (see Appendix AB).

The majority of attendees (n=46 (83.6%)) felt they had learned everything they wanted to. Eight respondents (14.5%) reported they had not learned everything they wanted to. In the comment portion of the survey, there were three comments made in regards to the subjects having learned everything they had wanted to and more. One subject noted almost learning everything he/she had wanted to. One attendee reported wanting to learn more about medications with another wanting to know more about diet and foods. Another wrote “can always learn more, but learned a lot of new things.” Two participants who wrote they hadn’t learned everything they wanted to also report they felt the handouts would be of aid to address learning deficits (see Appendix AB).

The workbook was felt to be helpful by 98.2% of respondents (n=55) (see Appendix AC). Comments written about the workbook were overall positive (n=6). One participant felt there were “too many handouts in one sitting”. One participant noted he/she hadn’t looked at the workbook yet (see Appendix AB).

When asked if the length of the program was right, 96.4% (n=53) answered yes. Two subjects declined to answer the question (see Appendix AC). There were two participant comments regarding how quickly time went by or being able to listen longer. There were four comments that the length of the workshop was a little or too long with two adding comments about the program being informative and helpful for those with questions. There was one comment requesting questions be held until the end of the program. One participant requested the workshop be broken into shorter sessions given over two days.

CHAPTER XIV BUDGET

In creating an estimated budget for the osteoporosis workshop evaluation, the cost was projected to be \$755.00 (see Appendix AD). There was no cost to use the classroom, tables, and chairs available at the fitness center. There was access to a projector system. The recruitment goal for the evaluation portion of the osteoporosis workshop was 50 subjects. The initial design of the project was for two osteoporosis workshops to be held on the same day at two different times. As the recruitment goal was not met (workshops one and two: n=48), a third workshop was added. The cost of the first two workshops was \$1,007.90. This total includes an additional \$63.40, not in the initial budget, spent on promotional mailings for the first two osteoporosis workshops (final cost without the promotional mailings: \$944.50). The cost of the third osteoporosis workshop was \$472.95. The cost for all three workshops was \$1,475.85.

There were several unanticipated or unplanned for factors which affected the final cost of the workshops. One factor was related to creation of the workbooks. Copying and paper supplies for the instruments and mailings were initially estimated at \$50.00 with an additional \$30.00 budgeted for the copying of the handouts. The projected cost for the workbooks was \$100.00 which included items such as folder, labels, and paper clips. The estimate had been

based upon access to a copier. Due to a change in circumstances, access to a copier was not available. Copying had to be done instead via a home printer with an estimated cost of \$0.05 a page with each individual workbook costing \$5.75. Another unplanned budgetary item(s) were tablecloths at a total cost of \$10.00 (workshops one and two: \$5.00, workshop three: \$5.00). Incentives for participation in the follow-up measurements were utilized. As a third workshop was added, this was an additional cost of \$95.00 for the 19 subjects (see Appendix AE).

CHAPTER XV DISCUSSION

The purpose of this study was to evaluate potential changes in osteoporosis knowledge, participants' perception of meeting personal bone healthy behaviors, calcium/vitamin D intake, and physical activity levels before and after an osteoporosis workshop for individuals at high risk for the disease. The osteoporosis workshop was attended primarily by post-menopausal Caucasian females. The workshop appealed to both those with osteopenia or osteoporosis (57.6%) and those not diagnosed with the disease (42.4%). Of those who had been given pharmaceutical treatment (n=33), a majority (54.5%) were no longer taking the medication. The reasons for this warrants further evaluation.

An improvement in osteoporosis knowledge was seen with a significant improvement immediately post-intervention with continued significant improvement maintained at one month post-intervention. These improvements are consistent with other research findings on the effect of a onetime community-based osteoporosis workshop on osteoporosis knowledge (Brecher et al., 2002; Gaines et al., 2010; Riberio & Blakeley, 2001). There have been studies which found no improvement in osteoporosis knowledge after a onetime educational offering. No change was seen in osteoporosis knowledge measured 16 weeks post-intervention in a study by Yuksel et al. (2010). Sedlak et al. (2005) also found no improvement in osteoporosis knowledge six months

post-intervention. As this study also found significant increased barriers to calcium intake and decreased exercise frequency post-intervention, the authors theorized incorporating the subjects' individual data and goals may be of aid in overcoming these barriers. A consideration for future evaluation of this workshop is additional measurement points beyond the one month post-intervention period to evaluate for a sustained improvement in osteoporosis knowledge.

Analysis of incorrectly answered questions on the OKAT revealed a majority had missed questions eleven and nineteen at all three measurement points (see Appendix C). Question 11 asked about the ability to determine risk of osteoporosis by assessing one's risk factors. Question 19 asked about the use of post-menopausal hormone therapy in regards to bone loss. As these questions were missed at all three measurement periods, additional information on these two subjects should be provided to participants in future workshops.

There was significant improvement in subjects' personal perception of meeting bone healthy behaviors one month post-intervention. The majority (91.4%) perceived meeting their bone healthy behavior goals at least half the time. As this finding may not persist beyond the one month post-intervention period, consideration for future evaluation would include a longer post-intervention measurement period (see Appendix W).

Participants' supplemental and total daily calcium intake increased significantly one month post-intervention. For those aged 50 and older, the National Osteoporosis Foundation (NOF) recommends a daily calcium intake of 1200 milligrams (NOF, 2010). Dietary calcium intake, both pre- and post-intervention, was below the NOF's recommended daily intake. Dietary calcium intake was slightly decreased one month post-intervention, but not significantly. Pfister, Wulu, and Saville (2001) found in their study, of southern WV women aged 65 years and older, every subject (n=184) consumed less than the recommended daily amount of calcium.

Shea et al. (2011) found a median daily calcium intake of 739 mg in Caucasians and 681 mg in African Americans aged 70 to 81 years old.

While supplemental calcium intake in this study did significantly increase one month post-intervention, the calcium intake from supplements alone at both measurement periods was also below the NOF's recommended daily intake. The total calcium intake from both dietary and supplemental sources increased significantly one month post-intervention. At both measurement points, the total calcium intake exceeded the NOF's daily minimum calcium intake. As the preferred method of obtaining calcium is through the diet, focus in future osteoporosis workshops should be on providing additional information on ways to improve dietary calcium intake. To aid the participants in understanding their individual dietary calcium and vitamin D intake and the potential need for improvement, the subjects could be provided with their pre-intervention calculated dietary calcium and vitamin D intakes to aid in these efforts.

For those aged 50 and older, the NOF recommends a daily vitamin D intake of 800 to 1000 international units (IU) (NOF, 2010). Dietary vitamin D intake at both pre- and one month post-intervention was below the NOF's recommendations. Dietary vitamin D intake was slightly decreased post-educational offering, but not significantly. Shea et al. (2011) found 92% of Caucasians and 90% of African Americans aged 70 to 81 years old had a dietary vitamin D intake of less than 400 IU a day. The median daily vitamin D intake for Caucasians was 198 IU and for African Americans was 159 IU (Shea et al., 2011). At both pre- and one month post-intervention, the supplemental and total vitamin D intake was found to exceed the NOF's daily recommended intake of 800 to 1000 IU. Supplemental and total vitamin D intake post-intervention did increase significantly.

Physical activity levels improved in the days of the week and time spent doing moderate physical activities and the time spent when walking. Due to the possibility of a fracture from more strenuous types of exercise, more moderate physical activities and walking are encouraged for those with osteoporosis (NOF, 2010). The number of days a week of vigorous exercise did slightly increase from 1.89 days a week to 1.96 days post-intervention albeit not significantly. The amount of time spent engaging in vigorous exercise also increased from 45.18 minutes to 50.55 minutes post-intervention, but not significantly. A significant increase was seen in the number of days per week and the time spent on a typical day engaging in moderate physical activities. Pre-intervention, participants engaged in moderate exercise 2.35 days a week for 51.36 minutes at a time with an increase to 3.38 days post-intervention for 82.18 minutes at a time. While the increase in number of days from 3.69 to 4.16 spent walking each week did not increase significantly, the amount of time spent walking on a typical day did increase significantly from 42.91 minutes to 85.73 minutes. While the amount of time spent sitting on a typical weekday did decrease from 338.645 minutes to 300 minutes, this was not significant.

Overall, the majority of participants found the workshop helpful and learned everything he/she had wanted. The location, the comfort of the room, and the time(s) of the workshop were acceptable to a majority of subjects. The length of the program was perceived by most to be appropriate with the majority recommending the workshop to others. The workbook and presenter were reported to be helpful to a preponderance of attendees. The cost of the workbook was a large part of the budget, and could be a hindrance to holding future programs (see Appendix AE). Further evaluation of the workshop could be done without the workbook to evaluate the benefit of its incorporation.

Limitations

There are limiting factors in regards to this study. The instruments were self-report which may have limited the findings. Since the creation of the Short Instrument for Assessing Dietary Intake of Calcium/Vitamin D, additional high calcium and vitamin D foods are available which the participants may have had access to. For example, calcium and vitamin D fortified orange juice and breakfast bars are available at many local grocery stores as is calcium fortified bread. Many of these food items were discussed in the osteoporosis workshop, but their use would not have been captured by the Short Instrument for Assessing Dietary Intake of Calcium/Vitamin D (see Appendix H).

As the participants were primarily post-menopausal Caucasian females who were fairly well educated and members of the fitness center, the findings of this study may not be generalizable to males and to other more diverse populations. Another possible limiting factor is the one month post-intervention measurements were completed at the subjects' convenience which may have impacted the findings. While the majority of returned instruments/questionnaires (67%) were returned within two weeks at the one month post-intervention measurement point, 33% were not (see Appendices U & V). There was a 15% attrition rate at the one month post-intervention.

Personal circumstances of the attendees may have affected the outcomes. Two of the participants wrote unsolicited remarks on the returned instruments/questionnaires regarding reduced activity levels at the one month post-intervention measurement point (see Appendix AJ). During the osteoporosis workshops, several participants reported health conditions such as hypercalcemia, hyperparathyroidism, and vitamin D deficiency requiring prescription treatment which may have impacted their calcium and/or vitamin D intake. Information on health

conditions which could impact calcium and/or vitamin D intake could be collected at future osteoporosis workshop evaluations. There were two unsolicited comments written on the pre-intervention forms describing them as “unreliable”. Both of these participants partially completed the pre-intervention and immediately post-intervention questionnaires/instruments. Neither returned the one month post-intervention mailings at either mailing period. As the workshops were held in a fitness center and the majority of attendees were members of the fitness center, the subjects may have been more motivated to learn about osteoporosis and change their bone healthy behaviors.

CHAPTER XVI CONCLUSION

Osteoporosis is a preventable and prevalent disease seen nationally and among the residents of West Virginia. To aid in the care of those with the disease and to improve the bone health of the surrounding community, a Capstone project was proposed and evaluated. This project was a onetime community-based educational offering regarding osteoporosis knowledge and bone healthy behavior led by a nurse practitioner, and held in a fitness center. The focus of the intervention was on those at high risk for osteoporosis; post-menopausal women and men aged 50 and older (NOF, 2010). The participants were followed up to one month post-educational offering to evaluate for changes in osteoporosis knowledge and the bone healthy behaviors of adequate daily calcium/vitamin D intake and being physically active. The majority of the subjects reported the workshop as helpful and would recommend it to others. Significant increases in osteoporosis knowledge, daily supplemental calcium intake, total daily calcium intake, daily supplemental vitamin D intake, and total daily vitamin D intake were seen one month post-intervention. Significant improvements were also seen in the days of the week and time spent on a typical day engaging in moderate physical activities and the time spent walking

on a typical day. The effectiveness of this type of intervention needs to be replicated with a more diverse sample of participants.

References

- Ailinger, R. L., & Emerson, J. (1998). Women's knowledge of osteoporosis. *Applied Nursing Research, 11* (3), 111-114.
- Ailinger, R. L., Lasus, H., & Braun, M. A. (2003). Revision of the facts on osteoporosis quiz. *Nursing Research, 52*, 198-201.
- Bartlett, E. (2012, February 19). Exercise, education may stem bone loss. *Sunday Gazette-Mail*, Outlook Section on Health and Medicine, p. 11J.
- Blalock, S. J., Currey, S. S., DeVillis, R. F., Anderson, J. J., Gold, D. T., & Dooley, M. A. (1998). Using a Short Food Frequency Questionnaire to estimate dietary calcium intake consumption: A tool for patient education. *Arthritis Care & Research, 11*, 479-484.
- Blalock, S. J., DeVellis, R. F., Giorgino, K. B., DeVillis, B. M., Gold, D. T., Dooley, M. A., Anderson, J. J., & Smith, S. L. (1996). Osteoporosis prevention in premenopausal women: Using a stage model approach to examine the predictors of behavior. *Health Psychology, 15* (2), 84-93.
- Blalock, S. J., Norton, L. L., Patel, R. A., Cabral, K., & Thomas, C. L. (2003). Development and assessment of a short instrument for assessing dietary intakes of calcium and vitamin D. *Journal of the American Pharmacists Association, 43* (6), 685-693.
- Block, G., Hartman, A. M., & Naughton, D. (1990). A reduced dietary questionnaire: Development and validation. *Epidemiology, 1*, 38-64.
- Brecher, L. S., Pomerantz, S. C., Snyder, B. A., Jenora, D. M., Klotzbach-Shimomura, K. M., & Cavalieri, T. A. (2002). Osteoporosis prevention project: A multi-disciplinary educational intervention. *Journal of the American Osteopathic Association, 102* (6), 327-335, 354-355.

- Brown, W. J., Trost, S. G., Bauman, A., Mummery, K., & Owen, N. (2004). Test-retest reliability of four physical activity measures used in population surveys. *Journal of Science and Medicine in Sports*, 7 (2), 205-215.
- Burke-Doe, A., Hudson, A., Werth, H., & Riordan, D. G. (2008). Knowledge of osteoporosis risk factors and prevalence of risk factors for osteoporosis, falls, and fracture in functionally independent older adults. *Journal of Geriatric Physical Therapy*, 31 (1), 11-17.
- Cadarett, S. M., Jaglal, S. B., & Murray, T. M. (1999). Validation of the simple calculated osteoporosis risk estimation (SCORE) for patient selection for bone densitometry. *Osteoporosis International*, 10 (1), 85-90.
- Chan, M. F., Ko, C. Y., & Day, M. C. (2005). The effectiveness of an osteoporosis prevention education programme for women in Hong Kong: A randomized controlled trial. *Journal of Clinical Nursing*, 14 (9), 1112-1123.
- Chan, M. F., & Ko, C. Y. (2006). Osteoporosis prevention education programme for women. *Journal of Advanced Nursing*, 54 (2), 159-170.
- Chang, S. F., Chen, C. M., Chen, P. L., & Chung, U. L. (2003). Predictors of community women's osteoporosis prevention intention-A pilot study. *Journal of Nursing Research*, 11 (4), 231-239.
- Cooper, C., Campion, G., & Melton, L. J. (1992). Hip fractures in the elderly: A world-wide projection. *Osteoporosis International*, 2 (6), 285-289.

- Corbin, M. A., Trainor, J., Liu, C., & Gueldener, S. H. (2008). A model for community outreach: Cooperative extension osteoporosis prevention and screening programs. In S. H. Gueldner, T. N. Grabo, E. D. Newman, & D. R. Cooper (Eds.), *Osteoporosis: Clinical guidelines for prevention, diagnosis, and management* (pp. 187-200). New York: Springer Publishing Company.
- Craig, C. L., Marshall, A. L., Sjostrom, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., Prat, M., Ekelund, U., Yngve, A., Sallis, J. F., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. *Medicine & Science in Sports & Exercise*, 35 (8), 1381-1395.
- Cramer, J. A., Gold, D. T., Silverman, S. L., & Lewiecki, E. M. (2007). A systematic review of persistence and compliance with bisphosphonates for osteoporosis. *Osteoporosis International*, 18, 1023-1031.
- Davis, G. C. (1999). *Development of the osteoporosis knowledge questionnaire*. Unpublished manuscript, College of Nursing, Texas Women's University, Denton, Texas.
- Davis, G. C., Jimenez, C. A., & Rubin, B. R. (1995). Health status measurement in osteoporosis. [Supplemental material]. *Arthritis & Rheumatism*, 38 (9), S222.
- Davis, G. C., White, T. L., & Yang, A. (2006). A bone health intervention for older adults living in residential settings. *Research in Nursing & Health*, 29, 566-575.
- Day, S. H., & Block, L. (2006). Extension program builds on UA research. *Journal of Family and Consumer Sciences*, 98 (2), 62-63.
- Dell, R., Greene, D., Schelkun, S. R., & Williams, K. (2008). Osteoporosis disease management: The role of the orthopaedic surgeon. *The Journal of Bone and Joint Surgery*, 90, 188-194.

- Doheny, M., & Sedlak, C. (2004). *Osteoporosis preventing behavior survey*. Unpublished manuscript, Department of Nursing, Kent State University, Kent, Ohio.
- Driskell, J. A., Pohlman, H. D., & Naslund, M. M. (2003). Value of an educational program on osteoporosis. *Journal of Extension*, 41 (5). Retrieved November 5, 2009 from <http://www.joe.org/joe/2003october/rb6.php>
- Fleury, J., & Cameron, K. (2003). The index of readiness. In O. L. Strickland, & C. Dilonio (Eds.). *Measurement of Nursing Outcomes: Self Care and Coping*. (2nd ed., Vol. 3, pp. 265-275). New York: Springer.
- Gaines, J. M., Narratt, M., & Parrish, J. M. (2010). The effect of the addition of osteoporosis education to a bone health screening for older adults. *Geriatric Nursing*, 31 (5), 348-360.
- Gordon, P. M., Newcomer, R. R., & Krummel, D. A. (2001). Physical activity and osteoporosis: Disparities between knowledge and practice. *The West Virginia Medical Journal*, 97, 153-156.
- Grahn Kronhed, A. C., Blomberg, C., Karlsson, N., Lofman, O., Timpka, T., & Moller, M. (2005). Impact of a community-based osteoporosis and fall prevention program on fracture incidence. *Osteoporosis International*, 16, 700-706.
- Greendale, G. A., & Barrett-Conner, E. (2001). Outcomes of osteoporotic fractures. In R. Marcus, D. Feldman, & J. Kelsey (Eds), *Osteoporosis* (2nd ed., Vol 1) (pp. 819-829). San Diego: Academic Press.
- Horan, M. L., Kim, K. K., & Gendler, P. (1993, March). *Development and evaluation of osteoporosis self-efficacy scale*. Paper presented at the meeting of the Midwest Nursing Research Society Conference, Cleveland, Ohio.

- Horan, M. L., Kim, K. K., Gendler, P., Froman, R. D., & Patel, M. D. (1998). Development and evaluation of the Osteoporosis Self-Efficacy Scale. *Research in Nursing and Health*, 21 (5), 395-403.
- Hsieh, C., Novielli, K.D., Diamond, J. J., & Cheruva, D. (2001). Health beliefs and attitudes toward the prevention of osteoporosis in older women. *Menopause*, 8 (5), 372-376.
- Johnell, O., & Kanis, J. A. (2006). An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporosis International*, 17, 1726-1733.
- Johnson, C. S., McLeod, W., Kennedy, L., & McLeod, K. (2008). Osteoporosis health beliefs among younger and older men and women. *Health Education & Behavior*, 35 (5), 721-733.
- Kanis, J. A., Borgstrom, F., De Laet, C., Johansson, H., Johnell, O., Jonsson, B., Oden, A., Zethraeus, N., Pflieger, B., & Khaltayev, N. (2005). Assessment of fracture risk. *Osteoporosis International*, 16, 581-589.
- Kanis, J., Melton, L., Christiansen, C., Johnston, C., & Khaltayev, N. (1994). The diagnosis of osteoporosis. *Journal of Bone Mineral Research*, 9 (8), 1137-1141.
- Kelton, C. M. L., & Pasquale, M. K. (2009). Evaluating the claim of enhanced persistence: The case of osteoporosis and implications for payers. *Medical Decision Making*, 29, 690-706.
- Kim, K. K., Horan, M. L., & Gendler, P. (1991). *Osteoporosis knowledge test, osteoporosis health belief scale, and osteoporosis self-efficacy scale*. Archives of Grand Valley State University, Allendale, MI.
- Kim, K. K., Horan, M. L., Gendler, P., & Patel, M. K. (1991). Development and evaluation of the osteoporosis health belief scale. *Research in Nursing and Health*, 14, 155-163.

- Klotzbach-Shimomura, K. (2001). Project healthy bones: An osteoporosis prevention program for older adults. *Journal of Extension*, 39 (3). Retrieved June 13, 2010 from <http://www.joe.org/www.libproxy.wvu.edu/joe/2001june/iw6.php>
- Kothawala, P., Badamgarav, E., Ryu, S., Miller, R. M., & Halbert, R. J. (2007). Systematic review and meta-analysis of real-world adherence to drug therapy for osteoporosis. *Mayo Clinic Proceedings*, 82 (12), 1493-1501.
- Larrabee, J. H. (2009). Nurse to nurse evidence-based practice. New York: McGraw-Hill.
- Lydick, E., Cook, K., Turpin, J., Melton, M., Stine, R., & Byrnes, C. (1998). Development and validation of a simple questionnaire to facilitate identification of women likely to have low bone density. *The American Journal of Managed Care*, 4, 37-48.
- Lydick, E., Zimmerman, S. I., Yawn, B., Love, B., Kleerekoper, M., Ross, P., Martin, A., & Holmes, R. (1997). Development and validation of a discriminative quality of life questionnaire for osteoporosis (the OPTQoL). *Journal of Bone and Mineral Research*, 12 (3), 456-463.
- Melton, L. J., Chrischilles, E. A., Cooper, C., Lane, A. W., & Riggs, B. L. (1992). Perspective: How many women have osteoporosis. *Journal of Bone Mineral Research*, 7, 1005-1010.
- National Conference of State Legislatures. (2009). *Osteoporosis: State laws*. Washington, D. C.: Author. [on-line]. Retrieved September 29, 2010 from <http://www.ncsl.org/programs/health/whosteo.htm>
- National Conference of State Legislatures. (2009). *Osteoporosis: State Laws*. Washington, D. C.: Author. [on-line]. Retrieved February 28, 2010, from <http://www.ncsl.org/programs/health/whosteo.htm>

- National Institutes of Health. (2000). Osteoporosis *prevention, diagnosis, and therapy*. NIH Consensus Statement Online 2000 [on-line]. Retrieved September 29, 2010 from <http://consensus.nih.gov/2000/2000Osteoporosis111html.htm>
- National Osteoporosis Foundation. (2002). *America's bone health: The state of osteoporosis and low bone mass in our nation*. Washington, D. C.: National Osteoporosis Foundation.
- National Osteoporosis Foundation. (2010). *Clinician's guide to prevention and treatment of osteoporosis*. Washington, D. C.: National Osteoporosis Foundation.
- Newman, E. D., Ayoub, W. T., Starkey, R. H., Diehl, J. M., & Wood, G. C. (2003). Osteoporosis disease management in a rural health care population: Hip fracture reduction and reduced costs in postmenopausal women after 5 years. *Osteoporosis International*, 14, 146-151.
- Newman, E. D., & Hanus, P. (2001). Improved bone health behavior using community pharmacists as educators: The Geisinger health system community pharmacist osteoporosis education program. *Disease Management & Health Outcomes*, 9 (6), 329-335.
- Nielsen, D., Ryg, J., Nissen, N., Nielsen, W., Knold, B., & Brixen, K. (2008). Multidisciplinary patient education in groups increases knowledge on osteoporosis: A randomized controlled trial. *Scandinavian Journal of Public Health*, 36 (4), 346-352.
- Pearson, J. A., Burkhart, E., Pifalo, B., Palaggo-Toy, T., & Krohn, K. (2005). A lifestyle modification intervention for the treatment of osteoporosis. *American Journal of Health Promotion*, 20 (1), 28-33.

- Peel, C., Lein, D., Kitchin, B., & Morgan, S. (2001). "Tone your bones": A model for health education for older adults. *Journal of Physical Therapy Education*, 15 (2), 23-28.
- Pelletier, S., Kundrat, S., & Hasler, C. M. (2003). Effects of a functional foods nutrition education program with cardiac rehabilitation patients. *Journal of Cardiopulmonary Rehabilitation*, 23, 334-340.
- Pennsylvania Department of Health. (2008). *Annual Report to the General Assembly*. Harrisburg, PA: Osteoporosis Prevention and Education Program.
- Pfister, A. K., Wulu, J. T., & Saville, P. D. (2001). Factors determining calcium intake in elderly women of Appalachia. *Southern Medical Journal*, 94 (10), 1006-1012.
- Pfister, A. K., Helmick, K. P., Saville, P. D., Welch, C. A., & Emmett, M. K. (2008). OST risk index with forearm densitometry. *Journal of Clinical Denistometry*, 11 (4), 590-591.
- Pfister, A. K., Sale, W. G., & Shaulkat, S. (2009). The economics of fragility fractures in West Virginia. *West Virginia Medical Journal*, 105, 10-13.
- Podsiadlo, D., & Richardson, S. (1991). The timed "up & go": A test of basic function mobility for frail elderly persons. *Journal of the American Geriatrics Society*, 39, 142-148.
- Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychology Measures*, 1, 385-401.
- Ribeiro, V., & Blakeley, J. A. (2001). Evaluation of an osteoporosis workshop for women. *Public Health Nursing*, 18, (3), 186-193.
- Rikli, R. E., & Jones, C. J. (1999). Development and validation of a functional fitness test for community-residing older adults. *Journal of Aging and Physical Activity*, 7, 129-161.

- Rolnick, S. J., Kopher, R., Jackson, J., Fischer, L. R., & Compo, R. (2001). What is the impact of osteoporosis education and bone mineral density testing for postmenopausal women in a managed care setting. *Menopause*, 8, (2), 141-148.
- Ryan, P. (2009). Integrated theory of health behavior change: Background and intervention development. *Clinical Nurse Specialist*, 23 (3), 161-170.
- Ryan, P., Pumilia, N. J., Henak, B., & Chang, T. (2009). Development and performance usability of a theory-based, computerized, tailored intervention. *Computers, Informatics, Nursing*, 27 (5), 288-298.
- Ryg, J., Nissen, N., Nielsen, D., & Brixen, K. T. (2005). Patients' and population's knowledge of osteoporosis. *Ugeskr Kaeger*, 167, 282-285.
- Schousboe, J. T., DeBold, R. C., Kuno, L. S., Weiss, T. W., Chen, Y., & Abbott, T. A. (2005). Education and phone follow-up in postmenopausal women at risk for osteoporosis: effects on calcium intake, exercise frequency, and medication use. *Disease Management & Health Outcomes*, 13 (6), 395-404.
- Scottish Intercollegiate Guidelines Network. (2008). *Critical appraisal: Notes and checklists*. [on-line]. Available: www.sign.ac.uk/methodology/checklists.html
- Sedlak, C. A., Doheny, M. O., & Estok, P. J. (2000). Osteoporosis in older men: Knowledge and health beliefs. *Orthopaedic Nursing*, 19 (3), 44-46.
- Sedlak, C. A., Doheny, M. O., Estok, P. J., & Zeller, R. A. (2005). Tailored interventions to enhance osteoporosis prevention in women. *Orthopaedic Nursing*, 24 (4), 270-278.

- Shea, M. K., Houston, D. K., Tooze, J. A., Davis, C. C., Johnson, M. A., Hausman, D. B., Cauley, J. A., Bauer, D. C., Tylavsky, F., Harris, T. B., & Kritchevsky, S. B. (2011). Correlates and prevalence of insufficient 25-hydroxyvitamin D status in black and white older adults. *Journal of the American Geriatrics Society*, 59 (7), 1165-1174.
- Smith, C. (2010). A systematic review of healthcare professional-led education for osteoporosis patients or those at high risk for the disease. *Orthopaedic Nursing*, 29 (2), 119-132.
- Stanford, V. A., Hoelscher Day, S., Houtkooper, L. B., Block, L., Harris, R., Larkey, L., Metcalfe, L., Going, S., & Lohman, T. (2005, April). *Bone Builders Osteoporosis Prevention Education Program*. Poster session presented at the annual meeting of the National Osteoporosis Foundation, Washington, D. C.
- Taylor, H. L., Jacobs, D. R., Schucker, B., Knudsen, J., Leon, A. S., & Debacker, G. (1978). A questionnaire for the assessment of leisure time activities. *Journal of Chronic Disease*, 31, 741-755.
- Terrio, K., & Auld, G. W. (2002). Osteoporosis knowledge, calcium intake, and weight-bearing physical activity in three age groups of women. *Journal of Community Health*, 27 (5), 307-320.
- Tinetti, M. E., Richman, D., & Powell, L. (1990). Falls efficacy as a measure of fear of falling. *Journal of Gerontology*, 45, 239-243.
- United States Census Bureau (2012). *American Fact Finder*. Washington, D. C., Author [on-line]. Retrieved June 4, 2012, from <http://factfinder2.census.gov/faces/nav/jsf/pages/index.xhtml>

- U. S. Department of Health and Human Services. (2004). *Bone health and osteoporosis: A report of the Surgeon General*. U. S. Department of Health and Human Services: Office of the Surgeon General.
- Ware, J., Kosinski, M., & Keller, S. D. (1996). A 12-item short-form health survey: Construction of scales and preliminary tests of reliability and validity. *Medical Care*, 29, 602-608.
- West Virginia Department of Health and Human Resources. (1999). *1999 Behavioral risk factor survey report*. Charleston, WV: Health Statistics Center.
- West Virginia Department of Health and Human Resources. (2004). *The burden of osteoporosis in West Virginia*. Charleston, WV: West Virginia Osteoporosis Prevention Education Program.
- West Virginia Department of Health and Human Resources. (2007). *2004-2005 Behavioral risk factor survey report*. Charleston, WV: WV Health Statistics Center.
- West Virginia Department of Health and Human Resources. (2009). *2006 Behavioral risk factor survey report*. Charleston, WV: WV Health Statistics Center.
- White, T. L. (2008). *Improving osteoporosis knowledge and healthy bone habits of rural-dwelling older adults*. Unpublished doctoral dissertation, Texas Woman's University.
- Winzenberg, T. M., Oldenburg, B., Frendin, S., & Jones, G. (2003). The design of a valid and reliable questionnaire to measure osteoporosis knowledge in women: The osteoporosis knowledge assessment tool (OKAT). *BMC Musculoskeletal Disorders*, 4, 17-24.
- World Health Organization. (1994). *Assessment of fracture risk and its application to screening for postmenopausal osteoporosis: Report of a WHO Study Group*. (WHO Technical Report Series, No. 843). Geneva: Author.

YMCA of the Kanawha Valley (2012). *The YMCA winter/spring 2011-2012 membership*

program guide [brochure]. Retrieved January 1, 2012 from

<http://www.ymcawv.org/PDFs/YMCA-WinterSpringProgram2011.pdf>.

Yuksel, N., Majumder, S. R., Biggs, C., & Tsuyuki, R. T. (2010). Community pharmacist-

initiated screening program for osteoporosis: Randomized controlled trial. *Osteoporosis*

International, 21, 391-398.

Appendix A

Letter of Support for Capstone Project from YMCA of the Kanawha Valley

July 20, 2011

West Virginia University – School of Nursing
Attention: Nan Leslie, PhD, RN, CRNP
Health Promotion
PO Box 9600
Morgantown, WV 26506-9600

Dear Dr. Leslie and members of the West Virginia University Institutional Review Board,

The YMCA of Kanawha Valley is pleased to support Cynthia A. Smith, doctoral of nursing practice student, at West Virginia University School of Nursing, and director of Pars Osteoporosis Clinic. The YMCA of Kanawha Valley realizes the importance of health education for all age groups, in particular, older adults which is our fastest growing membership. We value programs that provide information to these older adults with regard to health issues they may be facing including osteoporosis. Given the incidence of osteoporosis among this age group and given the need to educate them on ways to preserve skeletal health, we would welcome the opportunity to assist you in this project.

Sincerely,

A handwritten signature in cursive script that reads 'Cindy Boggs'.

Cindy Boggs
Fitness Coordinator
YMCA of Kanawha Valley
100 YMCA Drive
Charleston, WV 25311
304-340-3527
www.ymcawv.org

YMCA of Kanawha Valley • 100 YMCA Drive • Charleston, West Virginia 25311
304-340-3527 • Fax 304-340-3528 • Email: info@ymcawv.org • www.ymcawv.org
YMCA Mission: To put Christian principles into practice through programs that build healthy spirit, mind, and body for all.
Caring • Honesty • Respect • Responsibility

Appendix B

Senior Classes Offered at the YMCA of the Kanawha Valley

CHARLESTON FAMILY YMCA**Senior Class Schedule 2012****Bone Building class=BB****Y'S SENIORS IN MOTION**

Monday & Wednesday at 11:00am
(Cardio and Strength) **BB**

MEET THE MACHINES

Wednesday in the Fitness Center **BB**
Anytime between 10:00am and 10:50am
(Not a class but rather a Personal Orientation to Fitness Center)

SilverSneakers MSROM

Monday at 9:30am; Tuesday and
Thursday at 1:00pm; Friday at 11:00am
(Muscular Strength & Range of Movement) **BB**

SilverSneakers YogaStretch

Wednesday at 9:30am
(Balance and Flexibility)

SENIOR SPIRIT

2nd Wednesday of each month at noon
(Pot luck luncheon with speaker)

SENIOR GAME DAY

2nd Friday of each month at noon
(Variety of board games with snacks)

**We offer one SS class each day Monday through Friday plus a weekly
orientation to fitness center and a cardio class!**

These classes are free with your SilverSneakers or Y membership. Please call
304-340-3527 for more information or visit our web site www.ymcawv.org

Senior Specific Classes with Descriptions

(Designed for Older Adults or for those with limitations) **BB=Bone Building**

Y's Seniors in Motion (formerly Senior Fit) Ready, Set, GO for this comprehensive fitness class, which encompasses the major components of a well-balanced fitness regimen: cardio, strength, flexibility, and balance/agility. This is a low impact class especially designed for older adults, with modifications given to allow for musculoskeletal differences and issues. Healthy lifestyles are emphasized, and current updates from well-known medical centers are distributed regularly. *Free to members!* Mon and Wed **BB**

Meet the Machines (formerly Senior Power) Feel intimidated by the machines in the Fitness Center? This instructional time will help put you at ease, and provide an introduction to the machines in an informal, one-on-one setting. The instructor will be in the Fitness Center each Wednesday from 10:00 to 10:50 to facilitate orientation and to ensure good form and provide tips geared to seniors. *Free to members!* Wed **BB**

SilverSneakers MSROM- Muscular Strength and Range of Movement-Have fun and move to the music through a variety of exercises designed to increase bone density, muscular strength, range of movement and activity for daily living skills. Hand-held weights, elastic tubing with handles and a ball are used for resistance, and a chair is provided for seated or standing support. Bring water. *Free to members!* Mon, Tu, Th, Fri **BB**

SilverSneakers YogaStretch- This class enhances flexibility, balance, and posture, using a chair for seated or standing support. Various stretches are combined with restorative breathing to improve individual's energy and sense of well-being. A perfect complement to the SilverSneakers MSROM classes, SS Yoga Stretch moves the joints and stretches the muscles without weights or resistance. Bring water. *Free to Members!* Wed

Senior Spirit- Calling all older adult Y members: Do you like to hear stimulating speakers, learn, laugh, eat good food, and share in camaraderie? If so, join a group of fun-loving, interesting people for a monthly potluck luncheon in the Noffsinger Room at 12:00 noon. The seniors meet the second Wednesday of each month (except in January and during the summer) to hear speakers on various topics and to enjoy food, fun, and fellowship. Please join us! *Free to members.*

Senior Game Day- Enjoy a variety of board games and plenty of fun and fellowship for Senior Game Day. Held the second Friday of each month at noon following SilverSneakers MSROM. You don't have to have participated in SilverSneakers to join us for the fun. Light snacks will be provided but feel free to pack a sandwich and bring it to Senior Game Day. *Free to members.*

Appendix C

Information on the Osteoporosis Knowledge Assessment Tool

Appendix One: The Osteoporosis Knowledge Assessment Tool (OKAT)

Please answer each of the following questions with True, False or Don't Know.

1. Osteoporosis leads to an increased risk of bone fractures. ☐ True ☐ False ☐ Don't know
2. Osteoporosis usually causes symptoms (e.g. pain) before fractures occur. ☐ True ☐ False ☐ Don't know
3. Having a higher peak bone mass at the end of childhood gives **no** protection against the development of osteoporosis in later life. ☐ True ☐ False ☐ Don't know
4. Osteoporosis is more common in men. ☐ True ☐ False ☐ Don't know
5. Cigarette smoking can contribute to osteoporosis. ☐ True ☐ False ☐ Don't know
6. White women are at highest risk of fracture as compared to other races. ☐ True ☐ False ☐ Don't know
7. A fall is just as important as low bone strength in causing fractures. ☐ True ☐ False ☐ Don't know
8. By age 80, the majority of women have osteoporosis. ☐ True ☐ False ☐ Don't know
9. From age 50, most women can expect at least one fracture before they die. ☐ True ☐ False ☐ Don't know
10. Any type of physical activity is beneficial for osteoporosis. ☐ True ☐ False ☐ Don't know
11. It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors. ☐ True ☐ False ☐ Don't know
12. Family history of osteoporosis strongly predisposes a person to osteoporosis. ☐ True ☐ False ☐ Don't know
13. An adequate calcium intake can be achieved from two glasses of milk a day. ☐ True ☐ False ☐ Don't know
14. Sardines and broccoli are good sources of calcium for people who cannot take dairy products. ☐ True ☐ False ☐ Don't know
15. Calcium supplements alone can prevent bone loss. ☐ True ☐ False ☐ Don't know
16. Alcohol in moderation has little effect on osteoporosis. ☐ True ☐ False ☐ Don't know
17. A high salt intake is a risk factor for osteoporosis. ☐ True ☐ False ☐ Don't know
18. There is a small amount of bone loss in the ten years following the onset of menopause. ☐ True ☐ False ☐ Don't know
19. Hormone therapy prevents further bone loss at any age after menopause. ☐ True ☐ False ☐ Don't know
20. There are no effective treatments for osteoporosis available in Australia. ☐ True ☐ False ☐ Don't know

To: Cynthia Smith <csmit120@mix.wvu.edu>

From: Tania Winzenberg <Tania.Winzenberg@utas.edu.au>

Dear Cynthia

Thank you for your interest in our work. We are happy for the OKAT to be used by others, provided the use is acknowledged and our BMC Musculoskeletal validation paper is cited in any publications resulting from its use. I would also be pleased to receive a copy of your results.

You can download the questionnaire from BMC Musculoskeletal: <http://www.biomedcentral.com/1471-2474/4/17>. The OKAT is located in the methods section as an additional file, which you can click on to download. If you have any problems, let me know.

We have only used the OKAT as described in Caucasian premenopausal women. While I can see no reason why it should not be effective in other populations, as with all these sorts of questionnaires, you can really only confidently state its validity for use in populations similar to that in which it was studied. So if I were using the OKAT in other populations, I would include some validation in whatever publication results if the population were very different from ours.

The answers to the OKAT are given below. We scored 1 for correct, 0 for incorrect or don't know.

Please let me know if I can be of more help

Tania

Dr Tania Winzenberg

Musculoskeletal Epidemiologist

Menzies Research Institute

Private Bag 23

Hobart TAS 7001

To: Cynthia Smith <csmit120@mix.wvu.edu>

From: Tania Winzenberg <Tania.Winzenberg@utas.edu.au>

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Please let me know if I can be of more help

Tania

Dr Tania Winzenberg

Musculoskeletal Epidemiologist

Menzies Research Institute

Private Bag 23

Hobart TAS 7001

Ph: 03 6226 7770

Fax: 03 6226 7704

tania.winzenberg@utas.edu.au

The correct answers to the questionnaire as we used it are:

1. T

2. F

3. F

4. F

5. T

6. T

7. T

8. T

9. T

10. F

11. F

12. T

13. F

14. T

15. F

16. T

17. T

18. F

19. T

20. F

From: Cynthia Smith [mailto:csmit120@mix.wvu.edu]

Sent: Monday, 13 September 2010 6:59 AM

To: Tania Winzenberg

Subject: Request From a Student About the OKAT

Dr. Winzenberg,

Hello! My name is Cynthia Smith, and I am a doctoral of nursing practice student in the United States of America at West Virginia University School of Nursing. I am currently working on my Capstone project which is part of a practice change for an osteoporosis clinic. The project is a onetime community-based group educational intervention for those with or at risk for osteoporosis led by a registered nurse. Thirty to fifty participants will be recruited. Measurements will be taken pre-, immediately post-, one month, and three months post-intervention on the effect on osteoporosis knowledge, calcium/vitamin D intake, physical activity levels, fear of falling, and use of tobacco and alcoholic products.

In researching instruments I could use to assess osteoporosis knowledge, I came across your article describing the Osteoporosis Knowledge Assessment Tool (OKAT) in the 2003 *BMC Musculoskeletal Disorders*. As the lead author, I was writing to request permission to use this instrument in my Capstone project. Any information you could supply me with how to interpret this instrument and how to obtain copies would also be greatly appreciated. Thank you for taking the time to consider my request as I truly appreciate it. Please do not hesitate to call on me with any questions and/or concerns.

Sincerely,

Cynthia A. Smith, FNP-BC, RN, MSN, CCD

Appendix D

Handouts Given in Participant Workbook

Name of Organization	Type/Name of Handouts	Cost
National Osteoporosis Foundation	Calcium Sources in Food	\$10 for 50
	Fall Prevention Checklist	\$10 for 50
	Handouts used from the Bone Basics for Osteoporosis Kit:	\$25.00 (Items available NOF website (NOF.org))
	Top 10 Myths About Osteoporosis	
	Bone Density Testing	
	What You Should Know About Calcium	
	Diagnosing Osteoporosis	
	Tips for Fall Prevention	
	Protecting the Spine From Kyphosis	
	Moving Safely	
	Osteoporosis Medicines	
	Who Gets Osteoporosis:	
	Factors That Put You at Risk	
	Osteopenia-What Does it Mean?	

	<p>Balance, Posture and Functional Exercises</p> <p>Vitamin D and Bone Health</p> <p>Can People Regain Bone Density?</p> <p>How The Food You Eat Can Affect Your Bones</p> <p>Exercise for Your Bone Health</p> <p>The Use of Exercise Machines</p> <p>Top 25 Ways to Prevent Falls</p>	
National Cancer Institute	<p>Fact Sheet: Harms of Smoking and Health Benefits of Quitting</p> <p>You Can Quit Smoking: A Personalized Quit Plan</p> <p>Fact Sheet: Where to Get Help When You Decide to Quit Smoking</p> <p>How to Handle Withdrawal Symptoms and Triggers When You Decide to Quit Smoking</p>	No Cost

National Institute on Alcohol Abuse and Alcoholism	Rethinking Drinking: Alcohol and Your Health	No Cost
National Institute of Health: National Institute on Aging	Exercise and Physical Activity: Your Everyday Guide from the National Institute on Aging Age Page: Falls and Fractures Age Page: Healthy Eating After 50 Age Page: Medicines Use Them Safely Age Page: Exercise and Physical Activity: Getting Fit for Life Age Page: Osteoporosis: The Bone Thief Age Page: Alcohol Use in Older People	No Cost
U. S. Department of Health and Human Services Centers for Disease Control and Prevention	What You Can Do to Prevent Falls Check for Safety: A Home Fall Prevention Checklist for Older Adults	No Cost

Appendix E

Osteoporosis Workshop Information Form

ID Number: _____

Osteoporosis Workshop Information Form

Age: _____

Last Grade Completed: _____

Please circle appropriate answer:

Gender	Male	Female
If Female:	Not menopausal	Post-menopausal
YMCA Member	Yes	No
Diagnosed with Osteoporosis or Osteopenia?	Yes	No
If diagnosed with Osteoporosis or Osteopenia, which one?	Osteoporosis	Osteopenia
Have you been prescribed medication for Osteoporosis or Osteopenia?	Yes	No

<p>If you have been prescribed medication for Osteoporosis or osteopenia, are you currently taking it?</p>	<p>Yes</p>	<p>No</p>
---	------------	-----------

How do you feel you are doing meeting your goals for your bone health?

Please circle appropriate answer:

Always meet goals

Usually meet goals

Meeting goals about half the time

Seldom meeting goals

Never meeting goals

If you take calcium and/or vitamin D supplements, how much and how often:

Appendix F

Osteoporosis Workshop Power Point Presentation

6/3/2012

6/3/2012

Osteoporosis: The Bone Thief

Cindy Smith, FNP-BC, RN, MSN, CCD
 Doctoral of Nursing Practice Student-
 West Virginia University School of
 Nursing

Some Thoughts:

- Think about what you would like to learn today, and don't hesitate to let the instructor know!
- What are your bone healthy behaviors goal(s)?

Top 10 Myths About Osteoporosis

- Handout in workbook (National Osteoporosis Foundation)
1. Most people don't need to worry about osteoporosis.
 2. Osteoporosis is only a problem for older Caucasian women.
 3. You don't need to worry about osteoporosis if you break a bone from a serious fall or accident.

Top 10 Myths Continued

4. People with osteoporosis can feel their bones getting weaker.
5. An osteoporosis test is painful and exposes you to a lot of radiation.
6. Children and teens do not need to worry about their bone health.

Top 10 Myths Continued

7. If you drink a lot of milk and exercise, you are not at risk for osteoporosis.
8. Osteoporosis isn't serious.
9. Taking extra calcium supplementation can help prevent osteoporosis.
10. Most people do not need to take a vitamin D supplement.

Bone Facts

- Bones are a living growing tissue that is made mostly of collagen and calcium phosphate.
 - Collagen is a protein that provides a soft frame.
 - Calcium phosphate is a mineral that provides strength and hardens the frame.

6/3/2012

Calcium in the Body

- 99% of the body's calcium is in the bones.
- 1% is in the blood.

Types of Bone

- Cortical bone (80% of the skeleton)
 - Makes up the shaft of the long bones and makes up the outer shell of all bones.

Types of Bone

- Cancellous (trabecular) bone (20% of the skeleton)
 - "shock absorbing bone" found in the vertebrae of the spine, femoral neck/total femoral region, and at the end of long bones.

Cortical and Trabecular Bone

Vertebrae

Femur

- Significant amount of trabecular bone is in the upper femur, especially the neck region.

6/3/2012

Bone Growth and Development

- Bone is a living tissue that is continuously being both built up and torn down (remodeling cycle).
- Every ten years, most of the skeleton has been remodeled.

Bone Growth and Development

- Involvement of two types of bone cells in the remodeling process:
 - Osteoclasts-remove old bone.
 - Osteoblasts-build bone.

Peak Bone Mass

- More bone is built up than destroyed for most individuals until their early 20's.
- At this point, **peak bone mass** is reached or the strongest the bones will be.

Influences on Peak Bone Mass

- Hereditary Influences (**70-80%**)
 - Gender
 - Race

Influences on Peak Bone Mass

- Lifestyle Influences (**20-30%**)
 - Smoking
 - Excess intake of ETOH
 - Exercise
 - Fall prevention behaviors
 - Nutritional (calcium and vitamin D)

Changes in Bone Over Time

- Bone is significantly built up during the teenage years.
- Bone mass remains essentially the same until the late 30's to 40's.
 - Bone loss starts to occur as more bone is broken down than is built up.

6/3/2012

Changes in Bone Over Time

- For women, with the onset of menopause, bone loss is accelerated.
 - This acceleration can last 5-10 years.
 - Some women can lose as much bone during the 5 years after menopause as they gained during their teen years.

Effect of Age on Bone Mass

U. S. Department of Health and Human Services. (2004). Bone health and osteoporosis: A report of the Surgeon General. U. S. Department of Health and Human Services, Office of the Surgeon General.

Bone Changes

While women lose bone rapidly in the years following menopause, **by age 65-70, men and women lose bone at the same rate.**

Changes in Bone

1/2 of all people over the age of 75 have osteoporosis.

Handout

- Can People Regain Bone Density?
(National Osteoporosis Foundation)

Osteoporosis:

- Osteoporosis is a skeletal disorder characterized by compromised bone strength predisposing to an increased risk of fracture.
- Bone strength reflects the integration of two main features: bone density and bone quality.

U.S. Department of Health and Human Services. (2000). NIH consensus statement: Osteoporosis prevention, diagnosis, and therapy. Bethesda, MD: Author.

6/3/2012

Handout

- Age Page: Osteoporosis-The Bone Thief

Osteoporosis

- Osteoporosis can affect any of the bones, but occurs more frequently in areas with more trabecular bone.

Normal Vs. Osteoporotic Bone

U.S. Department of Health and Human Services. (2004). Bone health and osteoporosis: A report of the Surgeon General. U.S. Department of Health and Human Services. Office of the Surgeon General.

The Most Common Osteoporotic Fracture Sites

U.S. Department of Health and Human Services. (2004). Bone health and osteoporosis: A report of the Surgeon General. U.S. Department of Health and Human Services. Office of the Surgeon General.

Fracture Rates

- An estimated 2 million fractures a year occur due to osteoporosis/osteopenia for those aged 50 years old and older:
 - 550,000-700,000 vertebral
 - 250,000-400,000 wrist
 - 300,000 hip
 - 250,000-810,000 other sites

6/3/2012

- 90% of hip fractures are associated with osteoporosis.

Diagnosis:

- Use of the World Health Organization Classification (1994)

OR

- Having a fragility fracture (low trauma)

Fragility Fractures

- A fracture that occurs in a situation where a fracture normally wouldn't have occurred or from a fall from standing height or less.

Testing Options

- Multiple tests available:
 - Peripheral quantitative computed tomography – primarily used in research.
 - Quantitative computed tomography-greater radiation exposure and requires concurrent use of a phantom scan with patient's scan.
 - Quantitative ultrasound-formula required to calculate T-score equivalent.

More Types of Bone Density Tests

- Radiographic absorptiometry-x-ray technique of hand which requires specialized equipment.
- Radiogrammetry-x-ray technique of the hand.
- Single x-ray absorptiometry-peripheral site measurement requiring the heel or forearm to be immersed in water.
- Peripheral energy dual x-ray absorptiometry (pDXA)-focused on forearm or heel.

The Gold Standard

- Dual energy x-ray absorptiometry (DXA):
 - Measures the axial skeleton (spine and hip(s)).
 - Can also measure aspects of the peripheral skeleton (forearm).
 - Can perform a total body assessment.
 - Is able to perform a vertebral fracture assessment.

6/3/2012

Handouts

- Bone Density Testing (National Osteoporosis Foundation)
- Diagnosing Osteoporosis (National Osteoporosis Foundation)

T-scores

- Obtained through DXA testing.
- The T-score compares an individual's bone mineral density to the mean of a young normal reference group.

Kanis, J., Melton, L., Christiani, C., Johnston, C., & Khaltaev, N. (1994). The diagnosis of osteoporosis. *Journal of Bone Mineral Research*, 9 (8), 1132-1141.

When T-scores Are Used

- Post-menopausal women
- Perimenopausal women
- Men aged 50 and older.

(Per International Society for Clinical Densitometry standards, 2009)

WHO Classification for Post-Menopausal Women

- Normal: T-score up to a -1.0
- Low bone mass (osteopenia):
T-score of -1.0 up to -2.5
- Osteoporosis: T-score -2.5 or worse
- Severe or established osteoporosis:
T-score -2.5 or worse with fragility fractures

Handout

- Osteopenia: What Does It Mean? (National Osteoporosis Foundation)

Z-scores

- Used in children, pre-menopausal women, and men younger than 50.
- Refers to the number of standard deviations from a matched reference group in terms of age and gender.

6/3/2012

Fracture Risk

- Osteopenia increases the risk of a fracture two-fold while osteoporosis increases fracture risk four- to five-fold.

Osteoporosis Society of Canada. (1996). Clinical practice guidelines for the diagnosis and management of osteoporosis. Canadian Medical Association Journal 155, 1113-1120.

WHO Fracture Risk Assessment Tool (FRAX)

- Came out in 2008
- Provides guidance for patients with osteopenia to help determine if pharmacological treatment should be recommended
- Takes into account major risk factors that contribute to fracture risk

FRAX Website

- <http://www.shef.ac.uk/FRAX>

Lifetime Fracture Risk

- After age 50, **one** in **two** women and **one** in **four** men are projected to have a fracture due to osteoporosis.

National Osteoporosis Foundation (2010). Clinician's guide to prevention and treatment of osteoporosis. Washington, D. C.: National Osteoporosis Foundation.

Projected Growth in U.S. of Osteoporosis and Low Bone Mass

To learn more about bone health call toll free 1-866-278-6262 or visit a free publication from the Surgeon General or visit www.surgeongeneral.gov.
Source: Bone Health and Osteoporosis: A Report on the Surgeon General. U.S. Department of Health and Human Services, Office of the Surgeon General, 2004.

Nationwide

- It is estimated by the year 2020, **50%** of all Americans over the age of 50 will have either osteopenia or osteoporosis.

U.S. Department of Health and Human Services. (2004). Bone health and osteoporosis: A report of the Surgeon General. U.S. Department of Health and Human Services: Office of the Surgeon General.

6/3/2012

Prevalence Nationally

- Nationally, ten million people have osteoporosis.
- Thirty four million have osteopenia.

National Osteoporosis Foundation. (2002). America's bone health: The state of osteoporosis and low bone mass in our nation. Washington, D. C.: National Osteoporosis Foundation.

Poor bone health is common and costly.

Fracture Consequences

- 20-24% of patients with a hip fracture **die** within a year of the fracture.
- One year after the fracture, 40% of patients have trouble walking without help.
- 60% have trouble doing necessary ADLs.
- 15-20% of hip fracture patients will still be in a long term care facility one year after the fracture.

Reality Check

A woman's risk of a hip fracture is equal to the combined risk of developing breast, uterine, and ovarian cancer.

Risk Factors

- Being female
- Being Caucasian or Asian
- Smoking
- Having a fracture as a adult (after age 45)
- Being thin/having a small frame (under 127 pounds)
- Getting older
- Family history
- Certain diseases (IE: Rheumatoid arthritis)
- Early onset of menopause
- Having anorexia or bulimia
- Low calcium intake
- Certain medications (IE: glucocorticosteroids)
- Hypogonadism
- Physically inactive
- Heavy alcohol use
- Having poor balance

National Osteoporosis Foundation. (2010). Clinician's guide to prevention and treatment of osteoporosis. Washington, D. C.: National Osteoporosis Foundation.

Handout

- Who Gets Osteoporosis: Factors That Put You at Risk (National Osteoporosis Foundation)

6/3/2012

Concerns for West Virginians

Prevalence of Osteoporosis and Osteopenia in WV in 2002

West Virginia Osteoporosis Prevention Education Program (2006). The Burden of Osteoporosis in West Virginia. West Virginia Department of Health and Human Resources.

Prevalence of Osteoporosis and Osteopenia for WV Residents in 2010

- Men with
 - Osteoporosis: 23,200
 - Osteopenia: 139,300
- Women with
 - Osteoporosis: 78,400
 - Osteopenia: 206,600
- Total: 424,300

Prevalence of Osteoporosis and Osteopenia for WV Residents in 2020

- Men with
 - Osteoporosis: 25,800
 - Osteopenia: 128,900
- Women with
 - Osteoporosis: 85,600
 - Osteopenia: 226,000
- Total: 466,300

Select Osteoporosis Risk Factors for WV Residents, 1999

Osteoporosis Treatment Options

- Pharmacological
- Non-Pharmacological:

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Secondary Workup

- Work up for secondary causes of osteoporosis or osteopenia can be done. Common problems associated with low bone mass are:
 - Low vitamin D levels
 - Hypercalciuria (excess calcium in the urine)
 - Hyperthyroidism
 - Hyperparathyroidism (primary or secondary)
 - Sluggish or overactive bone remodeling

Hormone Therapy

- Use of estrogen and if needed progestational agent for post-menopausal women.
 - Spine fracture protective.
 - Concern for increasing stroke, blood clot and breast cancer risk.
- Use of testosterone for low testosterone in males.

Pharmacologic Treatment

- Two types:
 - Antiresorptives
 - Anabolics

Antiresorptives

- Work by slowing bone loss.
- Affect the bone destroyers (osteoclasts).
- Most widely used.
- Several options available.

Calcitonin

- Available in nasal spray or injection.
- Generic or brand as Miacalcin or Fortical
- Beneficial for improving bone density in the spine.
- Side effects: nasal irritation, headaches. For some people, can improve back pain from a fracture.

Evista (Raloxifene)

- Drug class: Selective estrogen receptor modulator.
- Benefits of estrogen with less drawbacks.
- Improves spine bone density and can decrease the risk of breast cancer.
- Concern for increased risk of blood clots, leg cramps, swelling and hot flashes.

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Biphosphonates

- Depending on the drug, can improve bone density in both the spine and hip reducing fracture risk at both sites.

Biphosphonates

- Considered the Gold Standard
- Includes;
 - Boniva (monthly version, three month infusion version)
 - Actonel (weekly and monthly version)
 - Atelvia (weekly version)
 - Fosamax/Alendronate (weekly version, only generic)
 - Reclast (once a year intravenous version)

Side Effects of Biphosphonates

- Bone, joint, muscle pain.
- Stomach irritation.
- Rare reports of osteonecrosis ("jaw death").
- Rare reports of low energy fractures of the femur (typically seen in use of the drugs for five years or more).

Prolia (Denosumab)

- Newest medication approved June 1, 2010
- Drug Class: RANK ligand inhibitor
- Approved for treatment of post-menopausal osteoporosis
- Given as an injection every six months

Prolia (Denosumab)

- Contraindicated in those with low blood calcium.
- Possible concerns in vitamin D insufficiency/deficiency until restored to normal.
- Felt safest medication for those with kidney disease

Anabolic Medication

- Speed up the rate of bone growth:
 - Only one medication:
 - Parathyroid hormone (Forteo)

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Forteo

- Only used for two years during entire lifetime
- Given as daily injection
- Expensive
- Avoid use in those who have had radiation treatment
- Not to be used in those with an elevated calcium or intact parathyroid hormone level

Non-FDA Approved Medications

- Hydrochlorothiazide
- Sodium fluoride
- Etidronate
- Pamidronate
- Strontium ranelate
- Potassium chloride

Handout

- Osteoporosis Medicines (National Osteoporosis Foundation)
- Age Page: Medicines-Use Them Safely

BONE HEALTHY BEHAVIORS

Bone Healthy Behaviors

- Adequate daily calcium
- Adequate daily vitamin D intake
- Weight bearing exercise
- Fall prevention behaviors
- Avoiding tobacco use
- Avoiding excess alcohol intake (more than two drinks a day)

Bone Healthy Behaviors

AVOIDING TOBACCO AND EXCESS ALCOHOL

6/3/2012

Tobacco/Excess Alcohol Intake

- The National Osteoporosis Foundation advises patients to avoid:
 - Smoking
 - Drinking more than two alcoholic beverages a day

Handouts in Workbook

- Rethinking Drinking: Alcohol and Your Health
- Age Page: Alcohol Use in Older People
- Harms of Smoking and Health Benefits of Quitting
- You Can Quit Smoking: A Personalized Quit Plan

Handouts

- Where to Get Help When You Decide to Quit Smoking
- How to Handle Withdrawal Symptoms and Triggers When You Decide to Quit Smoking

Bone Healthy Behaviors

CALCIUM

Recommended Daily Calcium Intake

Your body needs calcium.	
If this is your age,	then you need this much calcium each day (mg).
0 to 6 months	210
6 to 12 months	270
1 to 3 years	500
4 to 8 years	800
9 to 18 years	1,300
18 to 50 years	1,000
Over 50 years	1,200

(A cup of milk or fortified orange juice has about 300 mg of calcium.)

During Pregnancy/Lactation

- During pregnancy and lactation,
 - For those 18 yo and younger: 1300 mg/day
 - For those 19-30 yo: 1000 mg/day
 - For those 31-50 yo: 1000 mg/day

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Recommended Calcium Intake

- For those aged 18 to 49 years old, 1000 mg of calcium a day is recommended.
- For those aged 50 and older, 1200 mg of calcium a day is recommended.

Food	Calcium (mg)	% of Daily Value (1000 mg/day)
1 ½ ounce cheddar cheese	306	31%
8 ounces of nonfat milk	302	30%
8 ounces whole milk	291	29%
2 cups of cottage cheese (1% milk fat)	276	28%
6 ounces of calcium fortified orange	200-260	20-26%
½ cup vanilla ice cream	85	8.5%
½ cup raw broccoli	21	2.1%

Food Labels

- Daily value of calcium is based upon recommendation for 1000 mg a day.
- If daily value is listed at 40%, that means there is 400 mg of calcium.

Handout

- Calcium Sources in Food (National Osteoporosis)

Calcium Pearls

- For those with normal serum calcium, don't want to exceed 2000-2500 mg of calcium a day.
- The body absorbs about 500-600 mg at a time.
- If on an acid suppressing medication and a supplement needed, **calcium citrate** supplementation a better choice.

Calcium Pearls

- One tablespoon of non-fat powdered milk contains about 50 mg of calcium and can be added to:
 - Casseroles
 - Cookies
 - Muffins or bread
 - Pudding

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Calcium Issues

- Supplements can often cause constipation or gas, especially when first starting. To help:
 - Increase fluids
 - Start with a small amount of calcium such as 250 to 300 mg a day for a week then gradually increase.

Interferences to Calcium Absorption

- Oxalate: Found in foods such as beet greens, spinach, and rhubarb.
- Phytate Sodium: Legumes, 100% wheat bran.
- Excess Protein Intake
- Excess Caffeine Intake
- Excess Phosphorus Intake
- Excess Sodium Intake

Handout

- How the Foods You Eat Can Affect Your Bones (National Osteoporosis Foundation)
- Age Page: Healthy Eating After Age 50

Calcium Interactions

- Do not take calcium the same time as iron supplements.
- Do not take calcium with medications that require an empty stomach (for example tetracycline).
- Avoid taking thyroid hormones for four hours after taking calcium supplements unless okayed by your provider or pharmacist.

Handout

- What You Should Know About Calcium (National Osteoporosis Foundation)
 - Calcium Calculator

Bone Healthy Behaviors
VITAMIN D

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Vitamin D

- Ways to obtain:
 - Food
 - Sunlight
 - Supplements/medication

Vitamin D Issues

- Having a tan does not guarantee your body is making enough vitamin D.
- Using a tanning bed does not help you make vitamin D.
- Sunblocks and sunscreens limit your ability to make vitamin D.
- As one gets older, less vitamin D is made.

Foods High in Vitamin D

Food	Vitamin D (IU)
3 oz of baked herring	1775
1 cup orange juice fortified with calcium and vitamin D	259
1 cup nonfat milk	100-241
3 oz of baked salmon	238

Vitamin D in Foods

- Some cereals and soymilk are fortified with Vitamin D.
- Cheese, ice cream, butter, and most yogurts are not fortified with Vitamin D.

Vitamin D Recommendations

- Adults under age 50: 400-800 IU once a day.
- Adults aged 50 and older: 800-1000 IU once a day.

Too Much of a Good Thing

- Among experts, the safe upper limit of Vitamin D is debatable. Up to 2000 -2400 IU/day of Vitamin D is thought to be safe.

6/3/2012

Vitamin D

- Other than by taking a prescription dose of Vitamin D, it is felt to be difficult to get too much Vitamin D if the previous recommendations are followed.
- Vitamin D levels can be measured with a 25-hydroxyvitamin D blood test.
 - Want to evaluate the total amount.

Handout

- Vitamin D and Bone Health (National Osteoporosis Foundation)

Bone Healthy Behaviors

FALL PREVENTION

Issues with Falling

- After age 65, one third of all adults will experience a fall.
- About half of all falls happen at home.
- Falls often occur due to hazards that are easy to fix and often overlooked.

Improving Balance

- Start a regular exercise program.
 - Tai Chi
 - If needed, physical therapy may be of benefit to improve balance and gait training.
- Have your vision checked at least once a year.

Improving Balance

- Have your healthcare provider or pharmacist review your medicines.
- Make your home safer.

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Hip Protectors

- Undergarments or pants with padding over both hips.
- Different types and styles available.
- Studies suggest these reduce the risk of a hip fracture after a fall.

Handouts

- Tips For Fall Prevention (National Osteoporosis Foundation).
- Moving Safely (National Osteoporosis Foundation)
- Fall Prevention Checklist (Inside and Outside)

Handouts

- What You Can Do To Prevent Falls (CDC)
- Check For Safety: A Home Fall Prevention Checklist for Older Adults (CDC)
- Age Page: Falls and Fractures
- Top 25 Way to Prevent Falls (National Osteoporosis Foundation)

Bone Healthy Behavior

EXERCISE

Warning

- When considering an exercise program, consult with your healthcare provider first to make sure you are healthy enough to do them. Bone strength varies from person to person, and not every exercise discussed may be beneficial.

Important Exercises for Bone

- Weight-bearing exercises
- Muscle-strengthening exercises

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Weight-Bearing Exercises

- Two Groups:
 - High Impact (best for keeping bones strong)
 - Low Impact (better for those with osteoporosis, who are frail or fall easily).

High Impact Weight-Bearing Exercise

- Volleyball
- Running
- Aerobics
- Dancing
- Lacrosse
- Jumping rope
- Racquet sports
- Stair climbing
- Tennis
- Field hockey
- Hiking
- Gymnastics
- Soccer
- Basketball

Low Impact Weight-Bearing Exercise

- Walking
- Stair-step machines
- Cross-country ski machines
- Elliptical exercise machines
- Downhill and cross country skiing
- Low impact aerobics
- Treadmill walking

How Much to Do?

- For weight bearing exercises, recommendations are for 30 minutes a day five to seven days a week.
- Okay to break it up such as 2 sessions of 15 minutes a piece.

Muscle Strengthening Exercises

- Pilates without forward bending exercises
- Yoga without forward bending exercises
- Exercise bands
- Weight lifting/resistance training
- Weight machines

How Much to Do?

- For muscle-strengthening exercises, do two to three times a week.
 - Need at least one day of rest inbetween
- Exercise each major muscle group for one to two sets of 8 to 10 repetitions.
- If bones are frail, consider using lighter weights for 10 to 15 repetitions.

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Bone, Estrogen and Strength Training (BEST) Study

- Leg Press
- Military Press
- Lateral Pulldown
- Squat
- Chest or Bench Press Back Extension
- Seated Row

Metcalf, L., Lohman, T., Going, S., Houtkooper, L., Ferreira, D., Rao-Wagner, H., Gaskin, T., Martin, J., Wright, J., & Cauley, J. (2001). Postmenopausal women and exercise for prevention of osteoporosis: The bone, estrogen, strength training (BEST) study. *ACSM's Health and Fitness Journal*, 5(3), 6-14.

BEST Study

- Available in book form: The BEST Book: The Prevention of Osteoporosis With Exercise

Sara Meeks Method

- Physical therapist who designed a program for osteoporosis.
- Focuses on body alignment, gait and balance.
 - Perching
 - EZ Posture Pillow

Sara Meeks Method

- DVD: Osteoporosis: A Program for Treatment (patient and therapist education)
- Book: Walk Tall-An Exercise Program for the Prevention and Treatment of Back Pain, Osteoporosis and the Postural Changes of Aging (2nd edition)

Sara Meeks Method

- www.sarameekspt.com
- www.optp.com (items available here also)

Exercises to be Careful of

- Military Press-*can be beneficial in patients without significant bone loss*
- Abdominal Press Machines
- Abdominal Crunches
- Sit-Ups
- Knee to Chest Exercises
- Chest Press
- Bench Press

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Exercises to be Careful of

- Seated or Standing Toe Touches
- Straight Leg Raising (except when advised by a healthcare provider)
- Raising of both legs at the same time
- Side Bending Exercises
- Hip Abductor Machines-*can be beneficial for patients without severe bone loss*

Other Exercise DVDs

- Be BoneWise Exercise (through National Osteoporosis Foundation)
- Skeletal Fitness (through National Osteoporosis Foundation)
- Exercise for Individuals with Osteoporosis or Arthritis (West Virginia Osteoporosis and Arthritis Program)

Great Article

- "Protect the Spine Through Exercise" by the National Osteoporosis Foundation and Karen Kemmis, PT, DPT

http://nof.org/sites/default/files/pdfs/ICAA_Spine.pdf

Great Book

- The National Osteoporosis Foundation has a great book on exercise called *Boning Up on Osteoporosis: A Guide to Prevention and Treatment* for \$6.50 plus shipping.
- Shows 24 different exercises
- www.nofstore.org or 1-877-868-4520

Handouts

- Balance, Posture and Functional Exercises (National Osteoporosis Foundation)
- Protecting the Spine From Kyphosis (National Osteoporosis Foundation)
- Exercise for Your Bone Health (National Osteoporosis Foundation)

Handouts

- The Use of Exercise Machines (National Osteoporosis Foundation)
- Exercise and Physical Activity: Your Everyday Guide from the National Institute on Aging
- Age Page: Exercise and Physical Activity

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Other Sources of Information

- HOPE program (Highmark Osteoporosis Prevention and Education)
 - Four classes lasting two hours long
 - Available at several sites throughout WV
 - Available at no cost for Highmark Blue Cross Blue Shield members or a small fee for non-members.
 - For more information: 1-888-234-4255

Helpful Websites

- National Institute of Health Osteoporosis and Related Bone Diseases-National Resource Center
www.niams.nih.gov/bone
- Best Bones Forever
<http://www.bestbonesforever.gov/>

Best Bones Forever!

Helpful Websites

- National Osteoporosis Foundation
www.nof.org
- West Virginia Osteoporosis and Arthritis Program
<http://www.wvbonenjoint.org/>

My Bone Healthy Behaviors Goals

- 1.
- 2.
- 3.

Please fill out the Osteoporosis Knowledge Assessment Tool and the post-educational survey. Thank you for coming!

Appendix G

Osteoporosis Workshop Follow-Up Form

Since the osteoporosis workshop, how do you feel you are doing meeting your goals for your bone health? Please circle appropriate answer:

Always meet goals

Usually meet goals

Meeting goals about half the time

Seldom meeting goals

Never meeting goals

If you take calcium and/or vitamin D supplements, how much and how often:

ID: _____

Appendix H

Information on the Short Food Questionnaire

SHORT FOOD QUESTIONNAIRE

First:

This form asks about your *usual* eating habits over the past year.
For each food listed, mark the column to show how often, on the average, you ate the food during the past year.
Please BE CAREFUL which column you put your answer in.

Second:

Mark whether your usual serving size is small, medium, or large. Please DO NOT OMIT serving size.

Additional Comments:

- Please DO NOT SKIP any foods. If you never eat a food, mark "Never or less than once a month."
- A small serving is one-half the medium serving size shown, or less.
- A large serving is about one-and-a-half times the medium serving size shown, or more.

Sample:

This person ate a medium serving of rice about twice per month and never ate squash.

Type of Food	Never or Less than Once Per Month	1 Per Month	2-3 Per Month	HOW OFTEN						HOW MUCH			
				1 Per Week	2 Per Week	3-4 Per Week	5-6 Per Week	1 Per Day	2+ Per Day	Medium Serving	Your Serving Size		
Rice			X							¾ cup	S	M	L
Winter squash, baked squash	X									½ cup			

Type of Food	HOW OFTEN								HOW MUCH				
	Never or Less than Once Per Month	1 Per Month	2-3 Per Month	1 Per Week	2 Per Week	3-4 Per Week	5-6 Per Week	1 Per Day	2+ Per Day	Medium Serving	Your Serving Size		
											S	M	L
Broccoli										½ cup			
Mustard greens, turnip greens, collards										½ cup			
Pizza, including carry-out										2 slices			
Spaghetti, lasagna, other pasta with tomato sauce										1 cup			
Mixed dishes with cheese (such as macaroni and cheese)										1 cup			
Cheeses and cheese spreads (including on sandwiches, burgers, tacos and nachos; not including cottage cheese)										2 slices or 2 ounces			
White bread (including sandwiches, bagels, burger rolls, French or Italian bread)										2 slices			
Dark bread, such as wheat, rye, pumpernickel, (including sandwiches)										2 slices			
Biscuits or muffins (including fast foods)										1 medium piece			
Ice cream										1 scoop or ½ cup			
Yogurt, frozen yogurt										1 cup			
Milk on cereal										½ cup			
Oysters										6 medium			
Shrimp										3 ounces			
Pink salmon										3 ounces			
Tuna, tuna salad, tuna casserole										½ cup			

HOW OFTEN										HOW MUCH			
Type of Food	Never or Less than Once Per Month	1 Per Month	2-3 Per Month	1 Per Week	2 Per Week	3-4 Per Week	5-6 Per Week	1 Per Day	2+ Per Day	Medium Serving	Your Serving Size		
											S	M	L
Liver, including chicken livers											4 ounces		
Eggs										1 egg=small 2 eggs=medium			
High fiber, bran or granola cereals, shredded wheat										1 medium bowl			

Please Note: Below are some beverages you may drink. When marking how often you drink a beverage, please read each column heading carefully. They are different from those above.

Type of Beverage	HOW OFTEN								HOW MUCH				
	Never or Less than Once Per Month	1-3 Per Mon	1 Per Week	2-4 Per Week	5-6 Per Week	1 Per Day	2-3 Per Day	4-5 Per Day	6+ Per Day	1/2 Medium Serving	Your Serving Size		
											S	M	L
Whole milk and beverages with whole milk (not including on cereal)										8 oz. glass			
2% milk and beverages with 2% milk (not including on cereal)										8 oz. glass			
Skim milk, 1% milk, or buttermilk (not including on cereal)										8 oz. glass			
Milk in coffee or tea										1 tablespoon			

Page 1 of 1

Subject: **Re: Request from a DNP Student**
 To: Cynthia Smith <csmit120@mix.wvu.edu>

Date: 03:25 PM
 From: Sue Blalock <blalocks@email.unc.edu>

Spreadsheet and Questionnaire.zip (162kB)

Hi Cynthia, You have my permission to use the instrument. I have attached a copy of an Access database that performs the calcium and vitamin D calculations. It is fairly large, so it is attached as a zip file. Let me know if you have trouble opening it. The database is fairly self-explanatory, but unfortunately, I do not have separate documentation that explains how the calculations are made. (All of the tables are embedded in the Access database.)

Hope you find it useful.

Sue

Cynthia Smith wrote:

>
 >Dr. Blalock,
 >
 >Hello! My name is Cynthia Smith. I am a doctoral of nursing practice student at West Virginia University School of Nursing. I am currently working on my Capstone project which is part of a practice change for an osteoporosis clinic. The project is a onetime community-based group educational intervention for those with or at risk for osteoporosis led by a registered nurse. Thirty to fifty participants will be recruited. Measurements will be taken pre-, immediately post-intervention, one month, and three months post-intervention on the effect on osteoporosis knowledge, calcium/vitamin D intake, physical activity levels, fear of falling, and use of tobacco and alcoholic products.
 >
 >In researching instruments I could use to assess intake of vitamin D and calcium, I came across your article describing the Short Instrument for Assessing Dietary Intakes of Calcium and Vitamin D in the 2003 /Journal of the American Pharmacists Association/. As the lead author, I was writing to request permission to use this instrument in my Capstone project. Any information you could supply me with how to interpret this instrument and, if possible, how to obtain copies would also be greatly appreciated. Thank you for taking the time to consider my request as I truly appreciate it. Please do not hesitate to call on me with any questions and/or concerns.
 >
 >
 >Sincerely,
 >
 >
 >Cynthia A. Smith, FNP-BC, RN, MSN, CCD
 >
 >5011 Renard Street
 >
 >Sissonville, WV 25320
 >
 >
 >Home Phone: 304-988-1986
 >
 >Work Phone: 740-315-5706
 >
 >Fax: 304-865-3700
 >
 >E-mail: csmit120@mix.wvu.edu

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 Susan J. Blalock, Ph.D.
 Associate Professor
 Division of Pharmaceutical Outcomes and Policy Eshelman School of Pharmacy
 University of North Carolina
 Chapel Hill, NC 27599-7573
 Phone 919-962-0080

Appendix I

Information on the International Physical Activity Questionnaire: Short Last 7 Days Self-Administered

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRES

IPAQ: SHORT LAST 7 DAYS SELF-ADMINISTERED FORMAT

FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS

The International Physical Activity Questionnaires (IPAQ) comprises a set of 4 questionnaires. Long (5 activity domains asked independently) and short (4 generic items) versions for use by either telephone or self-administered methods are available. The purpose of the questionnaires is to provide common instruments that can be used to obtain internationally comparable data on health-related physical activity.

Background on IPAQ

The development of an international measure for physical activity commenced in Geneva in 1998 and was followed by extensive reliability and validity testing undertaken in 12 countries (14 sites) across 6 continents during 2000. The final results suggest that these measures have acceptable measurement properties for use in many settings and in different languages. IPAQ is suitable for use in regional, national and international monitoring and surveillance systems and for use in research projects and public health program planning and evaluation. International collaboration on IPAQ is on-going and an international prevalence study is under development.

Using IPAQ

Worldwide use of the IPAQ instruments for monitoring and research purposes is encouraged.

It is strongly recommended, to ensure data quality and comparability and to facilitate the development of an international database on health-related physical activity, that

- no changes be made to the order or wording of the questions as this will affect the psychometric properties of the instruments,
- if additional questions on physical activity are needed they should follow the IPAQ items,
- translations are undertaken using the prescribed back translation methods (see website)
- new translated versions of IPAQ be made available to others via the web site to avoid duplication of effort and different versions in the same language,
- a copy of IPAQ data from representative samples at national, state or regional level be provided to the IPAQ data storage center for future collaborative use (with permission) by those who contribute.

More Information

Two scientific publications presenting the methods and the pooled results from the IPAQ reliability and validity study are due out in 2002.

More detailed information on the IPAQ process, the research methods used in the development of the IPAQ instruments, the use of IPAQ, the published papers and abstracts and the on-going international collaboration is available on the IPAQ web-site.

www.ipaq.ki.se

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE
IPAQ: SHORT LAST 7 DAYS SELF-ADMINISTERED FORMAT
FOR USE WITH YOUNG AND MIDDLE-AGED ADULTS

NOTE: EXAMPLES OF ACTIVITIES MAY BE REPLACED BY CULTURALLY RELEVANT
EXAMPLES WITH THE SAME METS VALUES (SEE AINSWORTH *ET AL.*, 2000).

INTERNATIONAL PHYSICAL ACTIVITY QUESTIONNAIRE

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. This is part of a large study being conducted in many countries around the world. Your answers will help us to understand how active we are compared with people in other countries.

The questions are about the time you spent being physically active in the last 7 days. They include questions about activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise or sport.

Your answers are important.

Please answer each question even if you do not consider yourself to be an active person.

THANK YOU FOR PARTICIPATING.

In answering the following questions,

- ♦ **vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal.
- ♦ **moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal.

4

- 1a. During the last 7 days, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling,?

Think about *only* those physical activities that you did for at least 10 minutes at a time.

_____ days per week ➡

- 1b. How much time in total did you usually spend on one of those days doing vigorous physical activities?

_____ hours _____ minutes

or

☐ none

- 2a. Again, think *only* about those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

_____ days per week ➡

- 2b. How much time in total did you usually spend on one of those days doing moderate physical activities?

_____ hours _____ minutes

or

☐ none

- 3a. During the last 7 days, on how many days did you **walk** for at least 10 minutes at a time? This includes walking at work and at home, walking to travel from place to place, and any other walking that you did solely for recreation, sport, exercise or leisure.

_____ days per week ➡

- 3b. How much time in total did you usually spend walking on one of those days?

_____ hours _____ minutes

or

☐ none

The last question is about the time you spent **sitting** on weekdays while at work, at home, while doing course work and during leisure time. This includes time spent sitting at a desk, visiting friends, reading traveling on a bus or sitting or lying down to watch television.

4. During the last 7 days, how much time in total did you usually spend *sitting* on a week day?

_____ hours _____ minutes

This is the end of questionnaire, thank you for participating.

Appendix J

Script to Group for Consent Form Review

Hello! My name is Cynthia Smith, and I am a family nurse practitioner and a doctoral of nursing practice student in the School of Nursing at West Virginia University. I am here to conduct a study that will look at the effects of a community-based osteoporosis educational program on knowledge of the disease and bone healthy behaviors.

Before we begin, I would like to take a minute to explain why I am inviting you to participate and what I will be doing with the information you provide to me. Please stop me at any time if you have any questions. After I have told you a bit more about my project, you can decide whether or not you would like to participate in the evaluation of the program. You do not have to participate in the evaluation to participate in the program.

I am doing this research as part of my studies in the Department of Health Promotion/Risk Reduction at West Virginia University. The principal investigator and my Capstone chair is Dr. Nan Leslie with West Virginia University's School of Nursing. I will be collecting data on age, gender, education level, for women, if you are menopausal, if osteoporosis/osteopenia medications have been taken and/or still being taken, osteoporosis knowledge, calcium and vitamin D intake, exercise frequency, and how you feel you are doing reaching your bone health goals. A minimum of 50 participants will be recruited. I will use this information as the basis for my doctoral Capstone project. I may also use this information in articles that might be published, as well as in academic presentations.

The osteoporosis educational program is expected to last two and a half hours. Participation in the evaluation should take about 15 to 20 minutes to complete the questionnaires. Participation is on a purely voluntary basis. You will be asked to fill out four questionnaires before the program starts and one questionnaire immediately after the program. You will be given an anonymous survey after the program ends where you can list any comments and/or suggestions. One month from now, four questionnaires

along with a \$5 gift card to Target as well as a post-paid self-addressed envelope for the questionnaires' return will be mailed to the address of your choosing. For those questionnaires not yet returned two weeks later, a second set of questionnaires with a postage paid self-addressed envelope will be mailed to you. The foreseeable risk to participating in the evaluation is minimal discomfort associated in filling out the questionnaires. All data obtained will be kept in a locked filing cabinet in my home office for which I have the only key. All data will be kept as confidential as possible.

If at any time and for any reason, you would prefer not to answer any questions, please feel free not to. If at any time you would like to stop participating, please tell me. You will not be penalized in any way for deciding to stop participation at any time.

If you have questions, you are free to ask them now or you prefer I can meet with you in private. If you have questions later, you may contact me or Dr. Leslie. If you have any questions about your rights as a participant in this research, you can contact the Compliance Office at West Virginia University. This information is listed on the consent form of which you will be given a copy.

If you are interested in participating in this study, open your workbook. In the front, there is a consent form. I will now put up slides of the consent form and read the consent form to you. Please do not hesitate to let me know of any questions/concerns.

(Putting up the PowerPoint Slides of the IRB approved consent form, and reading it verbatim to the participants).

Appendix K

Consent Form for Osteoporosis Workshop

CONSENT AND INFORMATION FORM

Osteoporosis Program Evaluation

Principal Investigator: Leslie, Nan
Department: NURSING - Health Pro/Rick Reduc.
Tracking Number: H-23559

Study Title:
 Evaluation of a Community-Based Osteoporosis Educational Program Offering

Co-Investigator(s):
 Smith, Cynthia

Sponsor

Contact Persons

In the event you experience any side effects or injury related to this evaluation program, you should contact Nan Leslie, PhD, WHNP-BC at 304-293-1390. (After hours contact Cynthia Smith, FNP-BC at 304-553-5436. If you have any questions, concerns, or complaints about this evaluation program, you can contact Dr. Nan Leslie at 304-293-1390. In addition, if you would like to discuss problems, concerns, have suggestions related to research, or would like to offer input about the research, contact the Office of Research Integrity and Compliance at 304-293-7073.

For information regarding your rights as a research subject, you may contact the Office of Research Compliance at 304/293-7073.

Introduction

You, _____, have been asked to participate in this

Tracking #: H-23559
 Approved On: 11/30/2011
 Valid Through: 11/29/2012
 Last Amended: N/A

Page 1 of 5

Initials

Date

Tracking #: H-23559

research study, which has been explained to you by Cynthia Smith, FNP-BC, RN, MSN, CCD. This evaluation is being conducted by Nan Leslie, PhD, WHNP-BC and Cynthia Smith, FNP-BC, RN, MSN, CCD in the School of Nursing at West Virginia University. This research is being conducted to fulfill the requirements for a doctoral of nursing practice degree in the School of Nursing at West Virginia University for Cynthia Smith, FNP-BC, under the supervision of Dr. Nan Leslie.

Purposes of the Study

The purpose of this study is to evaluate a community-based osteoporosis educational program. WVU expects to enroll approximately 50 participants.

Description of Procedures

This study involves an osteoporosis educational program and will take approximately 2 1/2 to 3 hours for you to complete. Before the program begins, you will be asked to fill out questionnaires regarding basic demographic and bone health information, your perception of meeting bone health goals, osteoporosis knowledge, intake of calcium and vitamin D, and exercise frequency. At the end of the osteoporosis workshop, you will be asked to complete a second osteoporosis knowledge questionnaire. It will take approximately 15 to 20 minutes to complete the questionnaires. You do not have to answer all the questions. You will have the opportunity to see the questionnaires before signing this consent form. In one month, you will be mailed to the address of your choice questionnaires on your perception of meeting bone healthy goals, osteoporosis knowledge, intake of calcium and vitamin D, and exercise frequency. It should take approximately 15 minutes to complete these forms. You will be asked to return the completed questionnaires in the provided self-addressed, postage paid envelope. If the questionnaires are not returned in two weeks, a second mailing including the questionnaires and a self-addressed postage paid envelope will be mailed to the address of your choice. On the day of the workshop after the workshop is over, you will be asked to complete an anonymous survey survey about the program and the site it was held in.

Risks and Discomforts

There are no known or expected risks from participating in this study,

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 Last Amended: N/A

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Initials

Date

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except for mild frustration associated with answering the questions.

Alternatives

You do not have to participate in this study.

You do not have to participate in this evaluation to participate in the osteoporosis educational program.

Benefits

You may not receive any direct benefit from this study. The knowledge gained from this study may eventually benefit others.

Financial Considerations

There are no special fees for participating in this study. You will be given a \$5 gift card for a local store when mailed the one month follow-up questionnaires. If you withdraw before the one month evaluation, no gift card will be sent.

Confidentiality

Any information about you that is obtained as a result of your participation in this research will be kept as confidential as legally possible. Your project evaluation records, just like hospital records, may be subpoenaed by court order or federal regulatory authorities without your additional consent. Information obtained will be kept locked up and will be destroyed as soon as possible after the research is finished. In any publications that result from this research, neither your name nor any information from which you might be identified will be published without your consent. We know that information about you and your health is private. We are dedicated to protecting the privacy of that information. Because of this promise, we must get your written authorization (permission) before we may use or disclose your protected health information or share it with others for research purposes. You can decide to sign or not to sign this authorization section. However, if you choose not to sign this authorization, you will not be able to take part in the research study. Whatever choice you make about this evaluation will not have an effect on your ability to attend the educational program.

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Approved On: 11/30/2011
Valid Through: 11/29/2012
Last Amended: N/A

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Initials

Date

Tracking #: H-23559

Persons/Organizations providing the information:

The participant

Persons/Organizations receiving the information:

The research site carrying out this study. This includes WVU and the program evaluators.

The members and staff of any Institutional Review Board (IRB) that oversees this research study.

West Virginia University Office of Research Compliance and Office of Sponsored Programs.

The following information will be used:

The evaluation forms/questionnaires.

The information is being disclosed for the following reasons:

Publication of study results (without identifying you)

You may cancel this authorization at any time by writing to the Principal Investigator:

Nan Leslie, PhD, WHNP-BC
West Virginia University School of Nursing
6515 HSS PO Box 9630
Morgantown, WV, 26506

If you cancel this authorization, any information that was collected already for this study cannot be withdrawn. Once information is disclosed, according to this authorization the recipient may redisclose it and then the information may no longer be protected by federal privacy regulations. You have a right to see and make copies of your questionnaires. This authorization will not expire unless you cancel it.

Voluntary Participation

Participation in this study is voluntary. You are free to withdraw your consent to participate in this study at any time, and will involve no penalty to you. In the event new information becomes available that may affect your willingness to participate in this study, this information will be given to you so that you can make an informed decision about whether or not to continue your participation. You have been given the opportunity to ask questions about the program evaluation, and you have received answers concerning areas you did not understand.

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Date

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Upon signing this form, you will receive a copy.

I willingly consent to participate in this research.

Signature of Subject or
Subjects Legal Representative

Printed Name

Date

Time

The participant has had the opportunity to have questions addressed. The participant willingly agrees to be in the study.

Signature of Investigator or
Co-Investigator

Printed Name

Date

Time

Tracking #: H-23559

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Approved On: 11/30/2011

Initials

Date

Valid Through: 11/29/2012

Last Amended: N/A

Appendix L

Osteoporosis Workshop Survey

To help us with future workshops like this one, we would like to know your thoughts and suggestions to help improve it. Thank you for attending today's osteoporosis educational workshop and for taking the time to complete this survey. Please put your response in the appropriate boxes below.

	Yes	No	Don't Want to Answer
Did you find the program helpful?			
Would you recommend it to someone else?			
Was it offered at a time convenient for you?			

	Yes	No	Don't Want to Answer
Did you learn everything you had wanted to learn?			
Was the length about right?			
Was the meeting place convenient for you?			
Was the room comfortable?			
Was the workbook helpful?			
Was the presenter helpful?			

Please feel free to offer any comments and/or suggestions you have for this

program:_____

Appendix M

One Month Post-Educational Offering Letter

Dear Participant,

One month ago you attended an osteoporosis workshop held at the Charleston Family YMCA. As you may recall, this workshop is being evaluated by Cynthia Smith, FNP-BC, RN, MSN, CCD, as part of a Doctorate of Nursing Practice (DNP) degree at West Virginia University School of Nursing, Department of Health Promotion/Risk Reduction. Your participation in this workshop and in filling out the pre-workshop and post-workshop questionnaires is greatly appreciated. I am enclosing the one month questionnaires along with a postage-paid envelope for their return. As a token of appreciation for your time and attention, I am enclosing a \$5 gift card for Target.

Your participation is completely voluntary. You may skip any question that you do not wish to answer and you may stop participation at any time. Your involvement in this project will be kept as confidential as legally possible. All data will be reported as a group. West Virginia University's Institutional Review Board's approval of this project is on file at the West Virginia University Research Corporation at 886 Chestnut Ridge Road, PO Box 6845, West Virginia University, Morgantown, WV 26506-6845.

I hope that you will be able to complete and return these questionnaires as it could be very beneficial in understanding how best to educate participants regarding osteoporosis and bone healthy behaviors. Thank you very much for your time. Should you have any questions about this letter or the evaluation project, please feel free to contact me (Co-Investigator) at csmit120@mix.wvu.edu or my Capstone Project Chair (Principal Investigator), Dr. Nan Leslie, at nleslie@hsc.wvu.edu or (304) 293-1390. If you have questions about your rights as a research subject, you can contact the West Virginia University Office of Research Compliance of the IRB at 304-293-7073.

Sincerely,

A handwritten signature in cursive script that reads 'Cynthia Smith, FNP-BC, RN, MSN, CCD'.

Cynthia Smith, FNP-BC, RN, MSN, CCD
DNP Student

Enclosures

Health Promotion/Risk Reduction

Phone: 304-293-5446
Fax: 304-293-2517

6500 Health Sciences South
PO Box 9630
Morgantown, WV 26506-9630

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Appendix N

Follow-Up Letter for Non-Returned Instruments/Questionnaires

Dear Participant,

Two weeks ago I sent you the one month follow-up questionnaires for the osteoporosis workshop you attended at the Charleston Family YMCA. As of today, I have not yet received your completed questionnaires.

This workshop is being evaluated as part of a Doctorate of Nursing Practice (DNP) degree at West Virginia University School of Nursing, Department of Health Promotion/Risk Reduction. Your participation in this workshop and in filling out the pre-workshop and post-workshop questionnaires is greatly appreciated. In case they are needed, I am enclosing the one month questionnaires along with a postage-paid envelope for their return.

Your participation is completely voluntary. You may skip any question that you do not wish to answer and you may stop participation at any time. Your involvement in this project will be kept as confidential as legally possible. All data will be reported as a group. West Virginia University's Institutional Review Board's approval of this project is on file at the West Virginia University Research Corporation at 886 Chestnut Ridge Road, PO Box 6845, West Virginia University, Morgantown, WV 26506-6845.

I hope that you will be able to complete and return these questionnaires as it could be very beneficial in understanding how best to educate participants regarding osteoporosis and bone healthy behaviors. Thank you very much for your time. Should you have any questions about this letter or the evaluation project, please feel free to contact me (Co-Investigator) at csmit120@mix.wvu.edu or my Capstone Project Chair (Principal Investigator), Dr. Nan Leslie, at nleslie@hsc.wvu.edu or (304) 293-1390. If you have questions about your rights as a research subject, you can contact the West Virginia University Office of Research Compliance of the IRB at 304-293-7073.

Sincerely,

Cynthia Smith
Cynthia Smith, FNP-BC, RN, MSN, CCD
DNP Student

Enclosures

Health Promotion/Risk Reduction
6500 Health Sciences South
PO Box 9630
Morgantown, WV 26506-9630

Phone: 304-293-5446
Fax: 304-293-2517

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Appendix O

Informational Letter

Dear Participant,

This letter is a request for you to take part in an evaluation project of a community-based onetime osteoporosis workshop led by a nurse practitioner. This project is being conducted by Cynthia Smith, FNP-BC, RN, MSN, CCD, as part of a Doctorate of Nursing Practice (DNP) degree at West Virginia University School of Nursing, Department of Health Promotion/Risk Reduction. Your participation in the project is greatly appreciated, and will hopefully improve osteoporosis education. Your time commitment will include attendance at the osteoporosis workshop and about fifteen minutes to fill out pre- and post-program questionnaires at the end of the project in one month.

Your involvement in this project will be kept as confidential as legally possible. All data will be reported as a group. You must be at least 18 years old or older to participate. Your participation is completely voluntary. You may skip any question that you do not wish to answer and you may discontinue at any time. West Virginia University's Institutional Review Board acknowledgement of this project is on file at the West Virginia University Research Corporation at 886 Chestnut Ridge Road, PO Box 6845, West Virginia University, Morgantown, WV 26506-6845.

I hope that you will participate in this project as it could be very beneficial in understanding how best to educate participants regarding osteoporosis and bone healthy behaviors. Thank you very much for your time. Should you have any questions about this letter or the evaluation project, please feel free to contact me at csmit120@mix.wvu.edu or my Capstone Project Chair, Dr. Nan Leslie, at nleslie@hsc.wvu.edu or (304) 293-1390. If you have any questions about your rights as a research subject, you can contact the West Virginia University Office of Research Compliance of the IRB at 304-293-7073.

Sincerely,

A handwritten signature in cursive script that reads 'Cynthia Smith FNP-BC'.

Cynthia Smith, FNP-BC, RN, MSN, CCD
DNP Student

Health Promotion/Risk Reduction

Phone: 304-293-5446
Fax: 304-293-2517

6500 Health Sciences South
PO Box 9630
Morgantown, WV 26506-9630

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Appendix P

Osteoporosis Workshop Sign In Sheet

Name: _____

Address: _____

Phone: _____

ID: _____

Appendix Q

Terms of Use for Handouts

Reproducing NOF's Educational Handouts

Terms of Use Agreement

IMPORTANT - READ CAREFULLY:

This agreement is between you and the National Osteoporosis Foundation (NOF) for reproducing any of NOF's educational materials included with this letter 1) for the NOF Professional Partners Network; 2) for NOF Support Group Leaders; and 3) that were purchased from NOF. If you reproduce (copy) these handouts, you agree to be bound by the terms in this letter.

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National Osteoporosis Foundation

1150 17th Street, NW, Suite 850 ♦ Washington, DC 20036

♦ Phone: (202) 223-2226 ♦ E-mail Request@nof.org ♦ Website: www.NOF.org

B119-0908
Bone Basics for Osteoporosis

Appendix R

Returned Instruments/Questionnaires

ID	Info Pre-	Follow- Up	OKAT Pre-	OKAT IP*	OKAT 1MP**	Ca/VitD Pre-	Ca/VitD 1MP**	IPAQ Pre-	IPAQ 1MP**
1	+	-	+	-	-	-	-	-	-
2	+	+	+	+	+	+	+	+	+
3	+	+	+	+	+	+	+	+	+
4	+	+	+	+	+	+	+	+	+
5	+	+	+	+	+	+	+	+	+
6	+	+	+	+	+	+	+	+	+
7	+	+	+	+	+	+	+	+	+
8	+	-	+	+	-	+	-	+	-
9	+	+	+	-	+	+	+	+	+
10	+	+	+	+	+	+	+	+	+
11	+	-	+	+	-	-	-	-	-
12	+	+	+	+	+	+	+	+	+
13	+	+	+	+	+	+	+	+	+
14	+	+	+	+	+	+	+	+	+
15	+	+	+	+	+	+	+	+	+
16	+	+	+	+	+	+	+	+	+
17	+	+	+	+	+	+	+	+	+
18	+	+	+	+	+	+	+	+	+
19	+	+	+	-	+	+	+	+	+
20	+	+	+	+	+	+	+	+	+
21	+	+	+	+	+	+	+	+	+
22	+	+	+	+	+	+	+	+	+
23	+	+	+	+	+	+	+	+	+
24	+	+	-	+	+	+	+	+	+
25	+	+	+	+	+	+	+	+	+
26	-	+	-	+	+	+	+	-	+
27	+	+	+	+	+	+	+	+	+
28	+	+	+	+	+	+	+	+	+
29	+	+	+	+	+	+	+	+	+
30	+	+	+	+	+	+	+	+	+
31	+	+	+	+	+	+	+	+	+
32	+	+	+	-	+	+	+	+	+
33	+	+	+	-	+	+	+	+	+
34	+	+	+	+	+	+	+	+	+
Totals Workshop One	33	31	32	29	31	32	31	31	31

Return Rate Workshop One	97.1%	91.2%	94.1%	85.3%	91.2%	94.1%	91.2%	91.2%	91.2%
35	+	+	+	+	+	+	+	+	+
36	+	+	+	+	+	+	+	+	+
37	+	+	+	+	+	+	+	+	+
38	+	+	+	+	+	+	+	+	+
39	+	+	+	+	+	+	+	+	+
40	+	+	+	+	+	-	+	-	+
41	+	+	+	+	+	+	+	+	+
42	+	+	+	+	+	+	+	+	+
43	+	+	+	+	+	+	+	+	+
44	+	+	+	+	+	+	+	+	+
45	+	+	+	+	+	+	+	+	+
46	+	-	-	+	-	+	-	+	-
47	+	+	+	+	+	+	+	+	+
48	+	+	+	+	+	+	+	+	+
Totals Workshop Two	14	13	13	14	13	13	13	13	13
Return Rate Workshop Two	100%	92.9%	92.9%	100%	92.9%	92.9%	92.9%	92.9%	92.9%
51	+	+	+	+	+	+	+	+	+
52	+	+	+	+	+	+	+	+	+
54	+	+	+	+	+	+	+	+	+
55	+	-	+	-	-	+	-	+	-
56	+	-	+	-	-	+	-	+	-
57	+	+	+	+	+	+	+	+	+
59	+	+	+	+	+	+	+	+	+
60	+	+	+	-	+	+	+	+	+
61	+	+	+	+	+	+	+	+	+
63	+	+	+	-	+	+	+	+	+
64	+	+	+	+	+	+	+	+	+
65	+	+	+	+	+	+	+	+	+
66	+	-	+	+	-	+	-	+	-
68	+	-	+	-	-	+	-	+	-
69	+	+	+	-	+	+	+	+	+
71	+	+	+	-	+	+	+	+	+
72	+	-	+	+	-	+	-	+	-
73	+	-	+	-	-	+	-	+	-
75	+	+	+	-	+	-	+	+	+

Totals Workshop Three	19	13	19	13	13	18	13	19	13
Return Rate Workshop Three	100%	68.4%	100%	68.4%	68.4%	94.7%	68.4%	100%	68.4%
Totals For All Workshops	66	57	64	56	57	63	57	63	57
Total Return Rate All Workshops	98.5%	85.1%	95.5%	83.6%	85.1%	94%	85.1%	94%	85.1%

(+ Returned Instrument/Questionnaire)

(- Non-Returned Instrument/Questionnaire)

(* Immediately Post-Intervention)

(**One Month Post-Intervention)

Appendix S

Information on Subjects Completing Questionnaires/Instruments at All Measurement Points

Table 1

Statistics on Ages of Subjects Completing Instruments at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	40	1	2.2	2.3	2.3
	48	1	2.2	2.3	4.5
	52	1	2.2	2.3	6.8
	53	1	2.2	2.3	9.1
	55	1	2.2	2.3	11.4
	56	2	4.4	4.5	15.9
	57	2	4.4	4.5	20.5
	58	1	2.2	2.3	22.7
	59	2	4.4	4.5	27.3
	60	4	8.9	9.1	36.4
	61	5	11.1	11.4	47.7
	63	1	2.2	2.3	50.0
	64	1	2.2	2.3	52.3
	65	2	4.4	4.5	56.8
	66	1	2.2	2.3	59.1
	67	1	2.2	2.3	61.4
	68	5	11.1	11.4	72.7
	70	2	4.4	4.5	77.3
	71	1	2.2	2.3	79.5
	72	1	2.2	2.3	81.8
	74	2	4.4	4.5	86.4
	76	1	2.2	2.3	88.6
	77	1	2.2	2.3	90.9
	79	3	6.7	6.8	97.7
	87	1	2.2	2.3	100.0

	Total	44	97.8	100.0	
Missing	System	1	2.2		
Total		45	100.0		

Table 2

Information on Grade Completed for Subjects Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12	15	33.3	34.9	34.9
	13	3	6.7	7.0	41.9
	14	7	15.6	16.3	58.1
	15	2	4.4	4.7	62.8
	16	3	6.7	7.0	69.8
	17	1	2.2	2.3	72.1
	18	9	20.0	20.9	93.0
	19	2	4.4	4.7	97.7
	20	1	2.2	2.3	100.0
	Total	43	95.6	100.0	
Missing	System	2	4.4		
Total		45	100.0		

Table 3

Descriptive Statistics on Age and Grade Completed for Subjects Completing Forms at All

Measurement Points

	N	Range	Minimum	Maximum	Sum	Mean	Std. Deviation
Age	44	47	40	87	2833	64.39	9.138
Grade Completed	43	8	12	20	632	14.70	2.651
Valid N (listwise)	43						

Table 4

Gender Data of Those Subjects Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	42	93.3	93.3	93.3
	Male	3	6.7	6.7	100.0
	Total	45	100.0	100.0	

Table 5

Menopause Status of Those Subjects Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Menopausal	40	88.9	88.9	88.9
	Non-menopausal	2	4.4	4.4	93.3
	NA	3	6.7	6.7	100.0
	Total	45	100.0	100.0	

Table 6

Membership Status of Those Subjects Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	21	46.7	46.7	46.7
	No	24	53.3	53.3	100.0
	Total	45	100.0	100.0	

Table 7

Descriptive Statistics Regarding Osteoporosis or Osteopenia Status among Subjects Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	25	55.6	55.6	55.6
	No	20	44.4	44.4	100.0
	Total	45	100.0	100.0	

Table 8

Descriptive Statistics for if Diagnosed, Whether Osteoporosis or Osteopenia among Subjects Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Osteoporosis	16	35.6	35.6	35.6
	Osteopenia	9	20.0	20.0	55.6
	NA	20	44.4	44.4	100.0
	Total	45	100.0	100.0	

Table 9

Descriptive Statistics for Past Osteoporosis/Osteopenia Medication Use for Those Subjects Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	23	51.1	51.1	51.1
	No	22	48.9	48.9	100.0
	Total	45	100.0	100.0	

Table 10

Descriptive Statistics for Those Prescribed Medications for Osteoporosis/Osteopenia, if They Are Still Being Taken for Those Subjects Completing Forms All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	11	24.4	24.4	24.4
	No	12	26.7	26.7	51.1
	NA	22	48.9	48.9	100.0
	Total	45	100.0	100.0	

Appendix T

Information on Those Subjects Not Returning Questionnaires/Instruments at All Tested Points

Table 1

Statistics on Ages of Subjects Not Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	53	1	4.5	5.3	5.3
	57	1	4.5	5.3	10.5
	59	1	4.5	5.3	15.8
	61	1	4.5	5.3	21.1
	63	1	4.5	5.3	26.3
	64	2	9.1	10.5	36.8
	65	2	9.1	10.5	47.4
	66	2	9.1	10.5	57.9
	68	2	9.1	10.5	68.4
	69	1	4.5	5.3	73.7
	75	1	4.5	5.3	78.9
	78	1	4.5	5.3	84.2
	80	1	4.5	5.3	89.5
	81	1	4.5	5.3	94.7
	84	1	4.5	5.3	100.0
	Total	19	86.4	100.0	
Missing	System	3	13.6		
Total		22	100.0		

Table 2

Information on Grade Completed for Those Subjects Not Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	12	6	27.3	31.6	31.6
	13	1	4.5	5.3	36.8
	14	6	27.3	31.6	68.4
	16	3	13.6	15.8	84.2
	17	1	4.5	5.3	89.5
	18	1	4.5	5.3	94.7
	19	1	4.5	5.3	100.0
	Total	19	86.4	100.0	
Missing	System	3	13.6		
Total		22	100.0		

Table 3

Descriptive Statistics on Age and Grade Completed for Subjects Not Completing Forms at All Measurement Points

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age	19	31	53	84	67.68	8.420
Grade Completed	19	7	12	19	14.26	2.182
Valid N (list wise)	19					

Table 4

Gender Data of Those Subjects Not Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	19	86.4	90.5	90.5
	Male	2	9.1	9.5	100.0
	Total	21	95.5	100.0	
Missing	System	1	4.5		
Total		22	100.0		

Table 5

Menopause Status of Those Subjects Not Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Menopausal	19	86.4	90.5	90.5
	NA	2	9.1	9.5	100.0
	Total	21	95.5	100.0	
Missing	System	1	4.5		
Total		22	100.0		

Table 6

Membership Status of Those Subjects Not Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	68.2	71.4	71.4
	No	6	27.3	28.6	100.0
	Total	21	95.5	100.0	
Missing	System	1	4.5		
Total		22	100.0		

Table 7

Descriptive Statistics Regarding Osteoporosis or Osteopenia Status among Subjects Not Returning Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	13	59.1	61.9	61.9
	No	8	36.4	38.1	100.0
	Total	21	95.5	100.0	
Missing	System	1	4.5		
Total		22	100.0		

Table 8

Descriptive Statistics for if Diagnosed, Whether Osteoporosis or Osteopenia among Subjects Not Completing Forms at All Measurement Points.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Osteoporosis	8	36.4	38.1	38.1
	Osteopenia	5	22.7	23.8	61.9
	NA	8	36.4	38.1	100.0
	Total	21	95.5	100.0	
Missing	System	1	4.5		
Total		22	100.0		

Table 9

Descriptive Statistics for Past Osteoporosis/Osteopenia Medication Use for Those Subjects

Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	10	45.5	47.6	47.6
	No	11	50.0	52.4	100.0
	Total	21	95.5	100.0	
Missing	System	1	4.5		
Total		22	100.0		

Table 10

Descriptive Statistics for Those Prescribed Medications for Osteoporosis/Osteopenia, if They

Are Still Being Taken for Those Subjects Not Completing Forms at All Measurement Points

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	4	18.2	19.0	19.0
	No	8	36.4	38.1	57.1
	NA	9	40.9	42.9	100.0
	Total	21	95.5	100.0	
Missing	System	1	4.5		
Total		22	100.0		

Appendix U

Mailing Information for Workshops One and Two

ID Number	Date First Mailing	When Received	Date Second Mailing	When Received
1	2/24/12	n/a	3/12/12	n/a
2	2/24/12	3/02/12	n/a	n/a
3	2/24/12	2/27/12	n/a	n/a
4	2/24/12	3/02/12	n/a	n/a
5	2/24/12	2/28/12	n/a	n/a
6	2/24/12	n/a	3/12/12	3/15/12
7	2/24/12	2/27/12	n/a	n/a
8	2/24/12	n/a	3/12/12	n/a
9	2/24/12	n/a	3/12/12	3/16/12
10	2/24/12	3/05/12	n/a	n/a
11	2/24/12	n/a	3/12/12	n/a
12	2/24/12	n/a	3/12/12	3/24/12 (postmarked date-was delayed in mail)
13	2/24/12	2/27/12	n/a	n/a
14	2/24/12	2/29/12	n/a	n/a
15	2/24/12	3/07/12	n/a	n/a
16	2/24/12	2/28/12	n/a	n/a
17	2/24/12	2/28/12	n/a	n/a
18	2/24/12	2/29/12	n/a	n/a
19	2/24/12	3/08/12	n/a	n/a
20	2/24/12	2/28/12	n/a	n/a
21	2/24/12	n/a	3/12/12	3/19/12
22	2/24/12	2/29/12	n/a	n/a
23	2/24/12	n/a	3/12/12	3/13/12
24	2/24/12	2/28/12	n/a	n/a

25	2/24/12	2/28/12	n/a	n/a
26	2/24/12	3/05/12	n/a	n/a
27	2/24/12	n/a	3/12/12	3/24/12
28	2/24/12	n/a	3/12/12	3/19/12
29	2/24/12	3/03/12	n/a	n/a
30	2/24/12	2/28/12	n/a	n/a
31	2/24/12	3/10/12	n/a	n/a
32	2/24/12	3/01/12	n/a	n/a
33	2/24/12	n/a	3/12/12	3/17/12
34	2/24/12	2/29/12	n/a	n/a
35	2/24/12	3/06/12	n/a	n/a
36	2/24/12	2/28/12	n/a	n/a
37	2/24/12	3/02/12	n/a	n/a
38	2/24/12	3/02/12	n/a	n/a
39	2/24/12	2/27/12	n/a	n/a
40	2/24/12	2/27/12	n/a	n/a
41	2/24/12	3/10/12	n/a	n/a
42	2/24/12	3/10/12	n/a	n/a
43	2/24/12	2/27/12	n/a	n/a
44	2/24/12	3/08/12	n/a	n/a
45	2/24/12	2/27/12	n/a	n/a
46	2/24/12	n/a	3/12/12	n/a
47	2/24/12	2/28/12	n/a	n/a
48	2/24/12	2/28/12	n/a	n/a
		Total Returned First Mailing: 36		Total Returned Second Mailing: 8

Appendix V

Mailing Information for Workshop Three

ID Number	Date First Mailing	When Received	Date Second Mailing	When Received
51	4/19/12	n/a	5/04/12	5/09/12
52	4/19/12	n/a	5/04/12	5/15/12
54	4/19/12	4/23/12	n/a	n/a
55	4/19/12	n/a	5/04/12	n/a
56	4/19/12	n/a	5/04/12	n/a
57	4/19/12	4/24/12	n/a	n/a
59	4/19/12	4/27/12	n/a	n/a
60	4/19/12	4/28/12	n/a	n/a
61	4/19/12	n/a	5/04/12	5/09/12
63	4/19/12	4/24/12	n/a	n/a
64	4/19/12	4/24/12	n/a	n/a
65	4/19/12	n/a	5/04/12	5/18/12
66	4/19/12	n/a	5/04/12	n/a
68	4/19/12	n/a	5/04/12	n/a
69	4/19/12	4/22/12	n/a	n/a
71	4/19/12	4/28/12	n/a	n/a
72	4/19/12	n/a	5/04/12	n/a
73	4/19/12	n/a	5/04/12	n/a
75	4/19/12	4/24/12	n/a	n/a
		Total Returned First Mailing: 9		Total Returned Second Mailing: 4

Appendix W

Osteoporosis Workshop Information and Follow-Up Form Statistical Analysis

Table 1

Osteoporosis Workshop Information Form Valid and Missing Data

		Gender	Menopause Status	YMCA Member	Diagnosed with Osteoporosis/ Osteopenia	If Diagnosed, Whether Osteoporosis or Osteopenia
N	Valid	66	66	66	66	66
	Missing	1	1	1	1	1
		Past Osteoporosis/ Osteopenia Med Use		If Prescribed Meds, Still Taking		
N	Valid	66		66		
	Missing	1		1		

Table 2

Gender Data for the Osteoporosis Workshop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Female	61	91.0	92.4	92.4
	Male	5	7.5	7.6	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table 3

Menopause Status for the Osteoporosis Workshop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Menopausal	59	88.1	89.4	89.4
	Non-menopausal	2	3.0	3.0	92.4
	NA	5	7.5	7.6	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table 4

Fitness Center Membership Status for the Osteoporosis Workshop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	36	53.7	54.5	54.5
	No	30	44.8	45.5	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table 5

Those Diagnosed with Osteoporosis/Osteopenia Attending the Osteoporosis Workshop

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	38	56.7	57.6	57.6
	No	28	41.8	42.4	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table 6

If Diagnosed, Whether Osteoporosis or Osteopenia

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Osteoporosis	24	35.8	36.4	36.4
	Osteopenia	14	20.9	21.2	57.6
	NA	28	41.8	42.4	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table 7

Past Osteoporosis/Osteopenia Medication Use

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	33	49.3	50.0	50.0
	No	33	49.3	50.0	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table 8

If Prescribed Medications for Osteoporosis/Osteopenia, Are They Still Being Taken

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	15	22.4	22.7	22.7
	No	20	29.9	30.3	53.0
	NA	31	46.3	47.0	100.0
	Total	66	98.5	100.0	
Missing	System	1	1.5		
Total		67	100.0		

Table 9

Wilcoxon Signed Rank Test (Descriptive Statistics) for Meeting Personal Bone Healthy Goals

	N	Percentiles		
		25th	50th (Median)	75th
Meeting Personal Bone Healthy Goals	65	2.00	3.00	4.00
One Month Post Meeting Personal Bone Healthy Goals	58	3.00	4.00	4.00

Table 10

Wilcoxon Signed Rank Test for Meeting Personal Bone Healthy Goals

		N	Mean Rank	Sum of Ranks
One Month Post Meeting Personal Bone Healthy Goals - Meeting Personal Bone Healthy Goals	Negative Ranks	25^a	17.08	427.00
	Positive Ranks	7^b	14.43	101.00
	Ties	24^c		
	Total	56		

- a. One Month Post Meeting Personal Bone Healthy Goals < Meeting Personal Bone Healthy Goals
 b. One Month Post Meeting Personal Bone Healthy Goals > Meeting Personal Bone Healthy Goals
 c. One Month Post Meeting Personal Bone Healthy Goals = Meeting Personal Bone Healthy Goals

	One Month Post Meeting Personal Bone Healthy Goals - Meeting Personal Bone Healthy Goals
Z	-3.148^a
Asymp. Sig. (2-tailed)	.002

- a. Based on negative ranks.
 b. Wilcoxon Signed Ranks Test

Table 11

Statistics for Meeting Personal Bone Healthy Goals Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never Meeting Goals	2	3.0	3.1	3.1
	Seldom Meeting Goals	20	29.9	30.8	33.8
	Meeting Goals About Half the Time	18	26.9	27.7	61.5
	Usually Meeting Goals	19	28.4	29.2	90.8
	Always Meeting Goals	6	9.0	9.2	100.0
	Total	65	97.0	100.0	
Missing	System	2	3.0		
Total		67	100.0		

Table 12

Statistics for Meeting Personal Bone Healthy Goals One Month Post-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never Meeting Goals	1	1.5	1.7	1.7
	Seldom Meeting Goals	4	6.0	6.9	8.6
	Meeting Goals About Half the Time	14	20.9	24.1	32.8
	Usually Meet Goals	34	50.7	58.6	91.4
	Always Meet Goals	5	7.5	8.6	100.0
	Total	58	86.6	100.0	
Missing	System	9	13.4		
Total		67	100.0		

Appendix X

Descriptive Statistics for the OKAT

Table 1

ANOVA Analysis for the OKAT within Subjects Factors

Measure: MEASURE_1

OKAT	Dependent Variable
1	OKATBT
2	OKATPT
3	OKATOT

Table 2

ANOVA Analysis for the OKAT Descriptive Statistics

	Mean	Std. Deviation	N
OKAT Pre- Intervention Total	10.40	3.331	48
OKAT Immediately-Post Total	14.23	3.899	48
OKAT One-Month Post Total	14.06	2.513	48

Table 3

ANOVA Analysis for the OKAT-Multivariate Tests

Multivariate Tests^b

Effect		Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
OKA T	Pillai's Trace	.606	35.412^a	2.000	46.000	.000	.606
	Wilks' Lambda	.394	35.412^a	2.000	46.000	.000	.606
	Hotelling's Trace	1.540	35.412^a	2.000	46.000	.000	.606
	Roy's Largest Root	1.540	35.412^a	2.000	46.000	.000	.606

a. Exact statistic

b. Design: Intercept

Within Subjects Design: OKAT

Table 4

Mauchly's Test of Sphericity (b) for the OKAT

Measure: MEASURE_1

Within Subjects Effect		Mauchly's W	Approx. Chi- Square	df	Sig.	Epsilon ^a		
						Greenhouse- Geisser	Huynh- Feldt	Lower- bound
dimensio n1	OKA T	.826	8.767	2	.012	.852	.881	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

b. Design: Intercept

Within Subjects Design: OKAT

Table 5

Tests of Within-Subjects Effects for Osteoporosis Knowledge

Measure: MEASURE_1

Source		Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
OKAT Error(OKAT)	Sphericity Assumed	450.667	2	225.333	26.880	.000	.364
	Greenhouse-Geisser	450.667	1.704	264.433	26.880	.000	.364
	Huynh-Feldt	450.667	1.762	254.338	26.880	.000	.364
	Lower-bound	450.667	1.000	450.667	26.880	.000	.364
	Sphericity Assumed	788.000	94	8.383			
	Greenhouse-Geisser	788.000	80.101	9.838			
	Huynh-Feldt	788.000	82.808	9.516			
	Lower-bound	788.000	47.000	16.766			

Table 6

Tests of Within-Subjects Contrast for the OKAT

Measure: MEASURE_1

Source	OKAT	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
OKAT Error(OKAT)	Linear	322.667	1	322.667	65.274	.000	.581
	Quadratic	128.000	1	128.000	10.827	.002	.187
	Linear	232.333	47	4.943			
	Quadratic	555.667	47	11.823			

Table 7
Tests of Between-Subjects Effects for the OKAT

Measure: MEASURE_1

Transformed Variable: Average

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Intercept	23947.563	1	23947.563	1511.251	.000	.970
Error	744.771	47	15.846			

Table 8
ANOVA-Estimates for the OKAT

Measure: MEASURE_1

OKAT	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	10.396	.481	9.429	11.363
2	14.292	.563	13.097	15.361
3	14.063	.363	13.333	14.792

Table 9

Pairwise Comparisons for the OKAT

Measure: MEASURE_1

(I) OKAT	(J) OKAT	Mean Difference (I- J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	d2	-3.833*	.665	.000	-5.485	-2.182
	i3	-3.667*	.454	.000	-4.793	-2.540
d2	d1	3.833*	.665	.000	2.182	5.485
	i3	.167	.632	1.000	-1.402	1.735
3	d1	3.667*	.454	.000	2.540	4.793
	i2	-.167	.632	1.000	-1.735	1.402

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

Measure: MEASURE_1

(I) OKAT	(J) OKAT	Mean Difference (I- J)	Std. Error	Sig. ^a	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
1	d2	-3.833*	.665	.000	-5.485	-2.182
	i3	-3.667*	.454	.000	-4.793	-2.540
d2	d1	3.833*	.665	.000	2.182	5.485
	i3	.167	.632	1.000	-1.402	1.735
3	d1	3.667*	.454	.000	2.540	4.793
	i2	-.167	.632	1.000	-1.735	1.402

Based on estimated marginal means

*. The mean difference is significant at the .05 level.

a. Adjustment for multiple comparisons: Bonferroni.

Table 10

Multivariate Tests for the OKAT

	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's trace	.606	35.412^a	2.000	46.000	.000	.606
Wilks' lambda	.394	35.412^a	2.000	46.000	.000	.606
Hotelling's trace	1.540	35.412^a	2.000	46.000	.000	.606
Roy's largest root	1.540	35.412^a	2.000	46.000	.000	.606

Each F tests the multivariate effect of OKAT. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Exact statistic

Table 11

Valid and Missing Data for the OKAT at Pre-Intervention, Immediately Post-Intervention and One Month Post-Intervention

		OKAT Q1 Pre-Int	OKAT Q2 Pre- Int	OKAT Q3 Pre- Int	OKAT Q4 Pre-Int	OKAT Q5 Pre-Int
N	Valid	64	64	64	64	64
	Missing	3	3	3	3	3

		OKAT Q6 Pre-Int	OKAT Q7 Pre-Int	OKAT Q8 Pre-Int	OKAT Q9 Pre-Int	OKAT Q10 Pre-Int
N	Valid	64	64	64	64	64
	Missing	3	3	3	3	3

		OKAT Q11 Pre-Int	OKAT Q12 Pre-Int	OKAT Q13 Pre-Int	OKAT Q14 Pre-Int	OKAT Q15 Pre-Int
N	Valid	64	64	64	64	64
	Missing	3	3	3	3	3

		OKAT Q16 Pre-Int	OKAT Q17 Pre-Int	OKAT Q18 Pre-Int	OKAT Q19 Pre-Int	OKAT Q20 Pre-Int
N	Valid	64	64	64	64	64
	Missing	3	3	3	3	3

		OKAT Pre- Int Total	OKAT Q1 Immed-Post	OKAT Q2 Immed-Post	OKAT Q3 Immed-Post	OKAT Q4 Immed-Post
N	Valid	64	54	54	54	54
	Missing	3	13	13	13	13

		OKAT Q5 Immed-Post	OKAT Q6 Immed-Post	OKAT Q7 Immed-Post	OKAT Q8 Immed-Post	OKAT Q9 Immed-Post
N	Valid	54	54	54	54	54
	Missing	13	13	13	13	13

		OKAT Q10 Immed-Post	OKAT Q11 Immed-Post	OKAT Q12 Immed-Post	OKAT Q13 Immed-Post	OKAT Q14 Immed-Post
N	Valid	54	54	54	54	54
	Missing	13	13	13	13	13

		OKAT Q15 Immed- Post	OKAT Q16 Immed-Post	OKAT Q17 Immed-Post	OKAT Q18 Immed-Post	OKAT Q19 Immed-Post
N	Valid	54	54	54	54	54
	Missing	13	13	13	13	13

		OKAT Q20 Immed-Post	OKAT Immed-Post Total	OKAT Q1 One-Month Post	OKAT Q2 One-Month Post	OKAT Q3 One-Month Post
N	Valid	54	57	57	57	57
	Missing	13	10	10	10	10

		OKAT Q4 One-Month Post	OKAT Q5 One-Month Post	OKAT Q6 One-Month Post	OKAT Q7 One-Month Post	OKAT Q8 One-Month Post
N	Valid	57	57	57	57	57
	Missing	10	10	10	10	10

		OKAT Q9 One-Month Post	OKAT Q10 One-Month Post	OKAT Q11 One-Month Post	OKAT Q12 One-Month Post	OKAT Q13 One-Month Post
N	Valid	57	57	57	57	57
	Missing	10	10	10	10	10

		OKAT Q14 One-Month Post	OKAT Q15 One-Month Post	OKAT Q16 One-Month Post	OKAT Q17 One-Month Post	OKAT Q18 One-Month Post
N	Valid	57	57	57	57	57
	Missing	10	10	10	10	10

		OKAT Q19 One-Month Post	OKAT Q20 One-Month Post	OKAT One- Month Post Total
N	Valid	57	57	57
	Missing	10	10	10

Table 12

*Frequency Data for OKAT Questions Pre-Intervention***OKAT Q1 Pre-Intervention**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	4	6.0	6.3	6.3
	Correct	60	89.6	93.8	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q2 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	25	37.3	39.1	39.1
	Correct	39	58.2	60.9	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q3 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	48	71.6	75.0	75.0
	Correct	16	23.9	25.0	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q4 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	15	22.4	23.4	23.4
	Correct	49	73.1	76.6	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q5 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	15	22.4	23.4	23.4
	Correct	49	73.1	76.6	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q6 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	31	46.3	48.4	48.4
	Correct	33	49.3	51.6	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q7 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	34	50.7	53.1	53.1
	Correct	30	44.8	46.9	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q8 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	26	38.8	40.6	40.6
	Correct	38	56.7	59.4	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q9 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	34	50.7	53.1	53.1
	Correct	30	44.8	46.9	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q10 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	47	70.1	73.4	73.4
	Correct	17	25.4	26.6	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q11 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	55	82.1	85.9	85.9
	Correct	9	13.4	14.1	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q12 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	20	29.9	31.3	31.3
	Correct	44	65.7	68.8	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q13 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	32	47.8	50.0	50.0
	Correct	32	47.8	50.0	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q14 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	9	13.4	14.1	14.1
	Correct	55	82.1	85.9	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q15 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	18	26.9	28.1	28.1
	Correct	46	68.7	71.9	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q16 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	43	64.2	67.2	67.2
	Correct	21	31.3	32.8	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q17 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	53	79.1	82.8	82.8
	Correct	11	16.4	17.2	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q18 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	52	77.6	81.3	81.3
	Correct	12	17.9	18.8	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q19 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	45	67.2	70.3	70.3
	Correct	19	28.4	29.7	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

OKAT Q20 Pre-Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	24	35.8	37.5	37.5
	Correct	40	59.7	62.5	100.0
	Total	64	95.5	100.0	
Missing	System	3	4.5		
Total		67	100.0		

Table 14

Frequency Data for OKAT Immediately Post-Intervention

OKAT Q1 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	1	1.5	1.9	1.9
	Correct	53	79.1	98.1	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q2 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	12	17.9	22.2	22.2
	Correct	42	62.7	77.8	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q3 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	35	52.2	64.8	64.8
	Correct	19	28.4	35.2	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q4 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	3	4.5	5.6	5.6
	Correct	51	76.1	94.4	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q5 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	4	6.0	7.4	7.4
	Correct	50	74.6	92.6	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q6 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	11	16.4	20.4	20.4
	Correct	43	64.2	79.6	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q7 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	11	16.4	20.4	20.4
	Correct	43	64.2	79.6	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q8 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	8	11.9	14.8	14.8
	Correct	46	68.7	85.2	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q9 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	11	16.4	20.4	20.4
	Correct	43	64.2	79.6	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q10 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	20	29.9	37.0	37.0
	Correct	34	50.7	63.0	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q11 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	43	64.2	79.6	79.6
	Correct	11	16.4	20.4	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q12 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	7	10.4	13.0	13.0
	Correct	47	70.1	87.0	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q13 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	15	22.4	27.8	27.8
	Correct	39	58.2	72.2	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q14 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	9	13.4	16.7	16.7
	Correct	45	67.2	83.3	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q15 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	12	17.9	22.2	22.2
	Correct	42	62.7	77.8	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q16 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	14	20.9	25.9	25.9
	Correct	40	59.7	74.1	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q17 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	9	13.4	16.7	16.7
	Correct	45	67.2	83.3	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q18 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	23	34.3	42.6	42.6
	Correct	31	46.3	57.4	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q19 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	27	40.3	50.0	50.0
	Correct	27	40.3	50.0	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

OKAT Q20 Immediately-Post Intervention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	5	7.5	9.3	9.3
	Correct	48	71.6	88.9	98.1
	16	1	1.5	1.9	100.0
	Total	54	80.6	100.0	
Missing	System	13	19.4		
Total		67	100.0		

Table 15

*Frequency Tables OKAT One Month Post-Intervention***OKAT Q1 One-Month Post**

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Correct	57	85.1	100.0	100.0
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q2 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	7	10.4	12.3	12.3
	Correct	50	74.6	87.7	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q3 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	27	40.3	47.4	47.4
	Correct	30	44.8	52.6	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q4 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	6	9.0	10.5	10.5
	Correct	51	76.1	89.5	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q5 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	5	7.5	8.8	8.8
	Correct	52	77.6	91.2	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q6 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	28	41.8	49.1	49.1
	Correct	29	43.3	50.9	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q7 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	16	23.9	28.1	28.1
	Correct	41	61.2	71.9	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q8 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	9	13.4	15.8	16.1
	Correct	48	71.6	84.2	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q9 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	20	29.9	35.1	35.19
	Correct	37	55.2	64.9	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q10 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	32	47.8	56.1	56.1
	Correct	25	37.3	43.9	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q11 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	40	59.7	70.2	70.2
	Correct	17	25.4	29.86	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q12 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	8	11.9	14.0	14.0
	Correct	49	73.1	86.0	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q13 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	11	16.4	19.3	19.3
	Correct	46	68.7	80.7	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q14 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	3	4.5	5.3	5.3
	Correct	54	80.6	94.7	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q15 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	3	4.5	5.3	5.3
	Correct	54	80.6	94.7	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q16 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	26	38.8	45.6	45.6
	Correct	31	46.3	54.4	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q17 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	17	25.4	29.8	29.8
	Correct	40	59.7	70.2	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q18 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	33	49.3	57.9	57.9
	Correct	24	35.8	42.1	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q19 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	42	61.7	73.7	73.7
	Correct	15	22.4	26.3	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

OKAT Q20 One-Month Post

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Incorrect	6	9.0	10.5	10.5
	Correct	51	76.1	89.5	100.0
	Total	57	85.1	100.0	
Missing	System	10	14.9		
Total		67	100.0		

Appendix Y

Statistical Analysis for Calcium and Vitamin D Intake

Table 1

Calcium and Vitamin D Intake, Dietary and Supplemental, Pre- and One Month Post-Intervention Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Calcium One-Month Post (mg)	862.549	55	394.9439	53.2542
	Calcium Pre-Int (mg)	886.147	55	493.5887	66.5555
Pair 2	Calcium Supplements One-Mth Post (mg)	762.45	55	618.564	83.407
	Calcium Supplements Pre-Int (mg)	520.93	55	598.755	80.736
Pair 3	Total Calcium One-Mth Post (mg)	1597.437	56	725.8696	96.9984
	Total Calcium Pre-Int (mg)	1358.734	56	805.1059	107.5868
Pair 4	Vitamin D One-Mth Post (IU)	181.796	55	115.0553	15.5141
	Vitamin D Pre (IU)	192.933	55	141.0557	19.0199
Pair 5	Vitamin D Supplements One-Mth Post (IU)	2730.51	55	3138.410	423.183
	Vitamin D Supplements Pre-Int (IU)	2003.60	55	2284.909	308.097
Pair 6	Total Vit D One-Mth Post (IU)	2749.445	56	3122.3082	417.2360
	Total Vitamin D Pre-Int (IU)	2029.934	56	2170.2229	290.0082

Table 2

Calcium and Vitamin D Intake, Dietary and Supplemental, Pre- and One Month Post-Intervention Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	Calcium One-Month Post (mg) & Calcium Pre-Int (mg)	55	.562	.000
Pair 2	Calcium Supplements One-Mth Post (mg) & Calcium Supplements Pre-Int (mg)	55	.710	.000
Pair 3	Total Calcium One-Mth Post (mg) & Total Calcium Pre-Int (mg)	56	.646	.000
Pair 4	Vitamin D One-Mth Post (IU) & Vitamin D Pre (IU)	55	.436	.001
Pair 5	Vitamin D Supplements One-Mth Post (IU) & Vitamin D Supplements Pre-Int (IU)	55	.604	.000
Pair 6	Total Vit D One-Mth Post (IU) & Total Vitamin D Pre-Int (IU)	56	.589	.000

Table 3

Calcium and Vitamin D Intake, Dietary and Supplemental, Pre- and One Month Post-Intervention Paired Samples Test

		Paired Differences		
		Mean	Std. Deviation	Std. Error Mean
Pair 1	Calcium One-Month Post (mg) - Calcium Pre-Int (mg)	-23.5982	424.9268	57.2971
Pair 2	Calcium Supplements One-Mth Post (mg) - Calcium Supplements Pre-Int (mg)	241.527	463.731	62.529
Pair 3	Total Calcium One-Mth Post (mg) - Total Calcium Pre-Int (mg)	238.7036	647.7597	86.5605
Pair 4	Vitamin D One-Mth Post (IU) - Vitamin D Pre (IU)	-11.1365	137.7596	18.5755
Pair 5	Vitamin D Supplements One-Mth Post (IU) - Vitamin D Supplements Pre-Int (IU)	726.909	2532.315	341.457
Pair 6	Total Vit D One-Mth Post (IU) - Total Vitamin D Pre-Int (IU)	719.5107	2546.0790	340.2341

		Paired Differences		t	df	Sig. (2-tailed)
		95% Confidence Interval of the Difference				
		Lower	Upper			
Pair 1	Calcium One-Month Post (mg) - Calcium Pre-Int (mg)	-138.4720	91.2756	-.412	54	.682
Pair 2	Calcium Supplements One-Mth Post (mg) - Calcium Supplements Pre-Int (mg)	116.163	366.891	3.863	54	.000
Pair 3	Total Calcium One-Mth Post (mg) - Total Calcium Pre-Int (mg)	65.2324	412.1747	2.758	55	.008
Pair 4	Vitamin D One-Mth Post (IU) - Vitamin D Pre (IU)	-48.3782	26.1051	-.600	54	.551
Pair 5	Vitamin D Supplements One-Mth Post (IU) - Vitamin D Supplements Pre-Int (IU)	42.329	1411.490	2.129	54	.038
Pair 6	Total Vit D One-Mth Post (IU) - Total Vitamin D Pre-Int (IU)	37.6663	1401.3551	2.115	55	.039

Appendix Z

Statistical Analysis for the IPAQ

Table 1

Paired Samples Statistics for the IPAQ Pre- and One Month Post-Intervention Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	# of Days/wk Vigorous Physical Activities Pre-Int	1.89	55	2.242	.302
	# of Days/wk Vigorous Physical Activities One-Mth Post	1.96	55	2.177	.294
Pair 2	Time Minutes Vigorous Physical Activities Pre-Int	45.18	55	59.96	8.085
	Time Minutes Vigorous Physical Activities One-Mth Post	50.55	55	69.626	9.388
Pair 3	# of Days/wk Moderate Physical Activities Pre-Int	2.35	55	2.311	.312
	# of Days/wk Moderate Physical Act One-Mth Post-Int	3.38	55	2.564	.346
Pair 4	Time Minutes Daily Moderate Physical Activities Pre-Int	51.36	55	57.465	7.749
	Time Minutes Daily Mod Physical Act One-Mth Post	82.18	55	87.410	11.786

Pair 5	# of Days/wk Walking Pre-Int	3.69	55	3.042	.410
	# of Days/wk Walking One-Mth Post-Int	4.16	55	2.706	.365
Pair 6	Time Minutes/Daily Walking Pre-Int	42.91	55	45.284	6.106
	Time Minutes/Daily Walking One-Mth Post-Int	85.7	55	110.497	14.899
Pair 7	Total Minutes Sitting Average One Day Last Week Pre-Int	338.64	55	157.302	21.211
	Total Minutes Sit Average One Day Last Week One-Mth Post	300.00	55	135.493	18.270

Table 2

Paired Samples Statistics for the IPAQ Pre- and One Month Post-Intervention Paired Samples Test

		Paired Differences		
		Mean	Std. Deviation	Std. Error Mean
Pair 1	# of Days/wk Vigorous Physical Activities Pre-Int - # of Days/wk Vigorous Physical Activities One-Mth Post	.073	2.379	.321
Pair 2	Time Minutes Vigorous Physical Activities Pre-Int - Time Minutes Vigorous Physical Activities One-Mth Post	5.364	73.225	9.874
Pair 3	# of Days/wk Moderate Physical Activities Pre-Int - # of Days/wk Moderate Physical Act One-Mth Post-Int	1.036	2.317	.312
Pair 4	Time Minutes Daily Moderate Physical Activities Pre-Int - Time Minutes Daily Mod Physical Act One-Mth Post	30.818	94.784	12.781
Pair 5	# of Days/wk Walking Pre-Int - # of Days/wk Walking One-Mth Post-Int	.473	2.808	.379

Pair 6	Time Minutes/Daily Walking Pre-Int - Time Minutes/Daily Walking One-Mth Post-Int	42.818	106.170	14.316
Pair 7	Total Minutes Sitting Average One Day Last Week Pre-Int - Total Minutes Sit Average One Day Last Week One-Mth Post	-38.636	165.947	22.376

		Paired Differences		t	df	Sig. (2-tailed)
		95% Confidence Interval of the Difference				
		Lower	Upper			
Pair 1	# of Days/wk Vigorous Physical Activities Pre-Int - # of Days/wk Vigorous Physical Activities One-Mth Post	-.570	.716	.227	54	.822
Pair 2	Time Minutes Vigorous Physical Activities Pre-Int - Time Minutes Vigorous Physical Activities One-Mth Post	-14.432	25.159	.543	54	.589
Pair 3	# of Days/wk Moderate Physical Activities Pre-Int - # of Days/wk Moderate Physical Act One-Mth Post-Int	.410	1.663	3.317	54	.002

Pair 4	Time Minutes Daily Moderate Physical Activities Pre-Int - Time Minutes Daily Mod Physical Act One-Mth Post	5.194	56.442	2.411	54	.019
Pair 5	# of Days/wk Walking Pre-Int - # of Days/wk Walking One-Mth Post-Int	-.286	1.232	1.249	54	.217
Pair 6	Time Minutes/Daily Walking Pre-Int - Time Minutes/Daily Walking One-Mth Post-Int	14.116	71.520	2.991	54	.004
Pair 7	Total Minutes Sitting Average One Day Last Week Pre-Int - Total Minutes Sit Average One Day Last Week One-Mth Post	-83.498	6.225	-1.727	54	.090

Appendix AA

Returned Surveys

Table 1

Workshop	Number Returned	Percentage
Workshop One	34	100% (34/34)
Workshop Two	14	100% (14/14)
Workshop Three	9	47.4% (9/19)
Totals For All Workshops	57	85.1% (57/67)

Appendix AB

Osteoporosis Workshop Survey Comments

1. "Learned everything wanted to and more. Length a little long. Presenter talks a little fast for me. A microphone would be helpful."
2. "Thank you. Very informative, interesting. The time went really fast."
3. "Great presenter!"
4. "Would like more re medications. Room too warm. Haven't looked at workbook yet."
5. "Learned everything wanted to and more! Presenter very helpful! Excellent source of information. Thank you!"
6. "The class was awesome and very informational! Presenter very helpful."
7. "Can always learn more but learned a lot of new things. Need to take this show on the road."
8. "A very good program. Well presented."
9. "You did a great job! Thank you! Could improve on seating space. Wonderful workbook. Wonderful presenter."
10. "Great job! Very informative! Room too small."
11. "Excellent! Thank you!"
12. "I would like more information on diets and foods."
13. "Very informative. Presenter very personable and knowledgeable. Materials extra nice and informative. Length a little long but helpful to people with questions."
14. "Very beneficial! Helpful. Speaker was enthusiastic, knowledgeable, helpful, answered questions. Learned everything wanted to and more!"

15. "I really enjoyed this and think it was very helpful for me. Ms. Smith was an excellent person to do it. She is excellent."
16. "Room a bit warm and crowded. Workbook absolutely helpful. Presenter helpful!"
17. "Good learning process. A lot to absorb. Good handouts and workbook for additional help. Room a little crowded."
18. "Room a little crowded."
19. "Presenter excellent."
20. "Very informative. Great information. Didn't learn everything wanted to but have been given the resources and material to increase knowledge. Valuable presentation! Thank you!"
21. "I wish this class had been available ten years ago. I learned more now than I did from my talk with my doctor before I began treatment for osteoporosis."
22. "Liked all of the handouts and visual. Lots of good, practical advice. Cindy knew answers to questions-very informative."
23. "Wonderful speaker and very good teacher. Very informative. Presented in a manner that was interesting. Would recommend this to others."
24. "I would have liked to have a class at 6:30 PM or 7:00 PM. I didn't learn everything I wanted to, because I am sure there is so much more for me to learn with the handouts."
25. "I thought you did an excellent job and should do more workshops. Make more people aware. Excellent speaker."
26. "Very helpful. Was presented very well on my level."
27. "Would absolutely recommend. Presenter wonderfully helpful."
28. "Would like shorter sessions divided into two days instead of one long session in one day. Concentration would be better. Too many handouts in one sitting."

29. "Almost learned everything wanted to."
30. "Length a little long."
31. "Very informative. Am looking forward to reading the materials from the workshop!"
32. "Thank you!"
33. "I thought that this seminar was very informative. I could have listened longer.
Thanks!"
34. "Room a little too warm."
35. "Presenter very helpful."
36. "Bigger room. Ask questions after presentation. Too long but good information."

Appendix AC

Descriptive Statistics for the Osteoporosis Workshop Survey

Table One

Valid and Missing Data for Osteoporosis Workshop Survey

		Program Helpful	Recommend to Others	Time Convenient	Learn Everything Wanted To	Was the Length Right
N	Valid	57	57	57	55	55
	Missing	0	0	0	2	2

		Meeting Place Convenient	Room Comfortable	Workbook Helpful	Presenter Helpful
N	Valid	57	57	56	57
	Missing	0	0	1	0

Table 2

Statistics for Question of the Program Being Helpful

		Frequen cy	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57	100.0	100.0	100.0

Table 3

Statistics for Question of the Program Being Recommended to Others by the Participants

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	56	98.2	98.2	98.2
	Don't Want to Answer	1	1.8	1.8	100.0
	Total	57	100.0	100.0	

Table 4

Statistics for Question of the Osteoporosis Workshop Time Being Convenient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	56	98.2	98.2	98.2
	No	1	1.8	1.8	100.0
	Total	57	100.0	100.0	

Table 5

Statistics for Question of the Participants Learning Everything Wanted To

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	46	80.7	83.6	83.6
	No	8	14.0	14.5	98.2
	Don't Want to Answer	1	1.8	1.8	100.0
	Total	55	96.5	100.0	
Missing	System	2	3.5		
Total		57	100.0		

Table 6

Statistics for Question of Was the Length Right

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	53	93.0	96.4	96.4
	No	2	3.5	3.6	100.0
	Total	55	96.5	100.0	
Missing	System	2	3.5		
Total		57	100.0		

Table 7

Statistics for Question of the Meeting Place Being Convenient

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57	100.0	100.0	100.0

Table 8

Statistics for Question of the Room Being Comfortable

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	50	87.7	87.7	87.7
	No	7	12.3	12.3	100.0
	Total	57	100.0	100.0	

Table 9

Statistics for Question of the Workbook Being Helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	55	96.5	98.2	98.2
	Don't Want to Answer	1	1.8	1.8	100.0
	Total	56	98.2	100.0	
Missing	System	1	1.8		
Total		57	100.0		

Table 10

Statistics for Question of the Presenter Being Helpful

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	57	100.0	100.0	100.0

Appendix AD

Estimated Versus Actual Expenditures

Estimated Original Budget Cost per Item	Actual Cost Workshops One/Two	Actual Cost Workshop Three
Food: \$125	Total Food Cost: \$90.00 (including bottled water)	Total Food Cost: \$40.00 (including bottled water)
Plates, Napkins, Cups, Silverware: \$20.00	\$30.00	\$0.00 (used remaining from first two workshops)
Tablecloths: Not budgeted	Tablecloths: \$5.00	Tablecloths \$5.00
Copying/Paper Supplies/Workbook Creation: \$180.00	\$403.00	\$255.85
NOF Handouts: \$25.00	\$25.00	n/a
Postage Costs: \$150.00 (one month post-intervention, second mailings, and return postage)	\$144.00 (not including promotional mailings)	\$69.60 (not including promotional mailings)
Gift Cards: \$250.00	\$240.00	\$95.00
Pens: \$5.00	\$2.50	\$2.50

Envelopes: Not budgeted	\$10.00	\$5.00
Promotional Mailings: Not budgeted	\$63.40	n/a
Totals: \$755.00	Totals: \$1007.90	Totals: \$472.95

Appendix AE

Expenditures

Item	Cost For Workshops One/Two	Cost for Workshop Three	Total Cost All Workshops Per Item
Post-It Notes	\$5.00	\$4.00	\$9.00
Labels	\$9.00	\$6.00	\$15.00
Copying Paper	\$25.00	n/a	\$25.00
Copying Costs (\$0.05 a page) For Workbooks (115 pages total)	\$287.50 (50 workbooks)	\$201.25 (35 workbooks)	\$488.75
Copying Costs For Article on Exercise (\$0.05 a page, 11 pages total)	\$27.5	\$19.25	\$46.75
Copying Costs for Flyers (\$0.05 a page)	\$12.50 (250 flyers)	\$5.00 (100 flyers)	\$17.50
Copying Costs for First Mailing (\$0.05 a page, 8 pages total)	\$19.20 (for 48 mailings)	\$7.60 (for 19 mailings)	\$26.80
Copying Costs for Second Mailing (\$0.05 a page, 8 pages total)	\$4.80 (for 12 mailings)	\$4.00 (for 10 mailings)	\$8.80

Pens for Attendees Use	\$2.50	\$2.50	\$5.00
Folders	\$7.50	\$8.75	\$16.25
Paper Clips	\$5.00	n/a	\$5.00
Gift Cards (\$5.00 each)	\$240.00	\$95.00	\$335.00
Envelopes	\$10.00	\$5.00	\$15.00
One Month Post- Intervention Mailings (\$1.30 each)	\$62.40 (for 48 mailings)	\$24.70 (for 19 mailings)	\$87.10
One Month Post- Intervention Return Postage (\$1.10 each)	\$52.80 (for 48 mailings)	\$20.90 (for 19 mailings)	\$73.70
Second Mailing Cost (\$1.30 each)	\$15.60 (for 12 mailings)	\$13.00 (for 10 mailings)	\$28.60
Second Mailing Return Postage (\$1.10 each)	\$13.20 (for 12 mailings)	\$11.00 (for 10 mailings)	\$24.20
Bottled Water	\$10.00	\$10.00	\$20.00
Vegetable Trays	\$40.00	\$20.00	\$60.00
Fruit Trays	\$30.00	n/a	\$30.00
Nuts	\$10.00	\$10.00	\$20.00

Plates	\$8.00	n/a	\$8.00
Cups	\$4.00	n/a	\$4.00
Tablecloths	\$5.00	\$5.00	\$10.00
Plastic Utensils	\$8.00	n/a	\$8.00
Napkins	\$5.00	n/a	\$5.00
NOF Handouts	\$25.00	n/a	\$25.00
Costs	\$944.50	\$472.95	\$1417.45 (total cost of all three workshops)

Appendix AF

Flyer About the Presentation

Worried About Osteoporosis?

Want to learn more about this disease,
and what you can do about it or to
prevent it?

Instructor: Cindy Smith, FNP-BC, RN, MSN, CCD

Date

My Event Date Here

Time(s)

My Event Time Here

Location

Charleston Family YMCA

Additional Info:

Free and open to the public. Limit of 30 participants per class. Pre-registering is requested.

Join Us!

Join us for this wonderful event where you will learn more about osteoporosis and about bone healthy behaviors .

Workbook Provided!

Participants will be given a workbook including all of the discussed materials. The class is expected to last 2 ½ hours including breaks. Light refreshments will be provided.

For More Information:

This class is being evaluated by the instructor as part of her doctor of nursing practice studies through WVU School of Nursing. Participation in this evaluation is requested but not required for attendance.

Contact Cindy Smith at :

(304) 553-5436

E-mail:

csmit120@mix.wvu.edu

Appendix AG

Promotional Mailings for Workshops One and Two

Mailed To	Cost
WV Osteoporosis and Arthritis Program	\$1.30
Kanawha-Charleston Health Department (two locations)	\$2.60
American Association of Retired Persons (Charleston Division)	\$1.10
Women's Club of Charleston	n/a (e-mail sent regarding osteoporosis workshop)
Women's Club of Nitro, WV	n/a (e-mail sent regarding osteoporosis workshop)
Presbyterian Woman-The Presbytery of WV	\$1.10
Central WV Aging Services, Inc.	\$1.30
YWCA of Charleston-Encore Program	\$1.30
United Methodist Women, Charleston, WV	\$1.10
WV Bureau for Senior Services	n/a (e-mail sent regarding osteoporosis workshop)
WV Women's Commission	\$1.30
WVU Extension Service, Kanawha County office	\$1.10
YWCA of Charleston	\$1.30

Partnership for a Health WV	n/a (e-mail sent regarding osteoporosis workshop)
Ripley Senior Center (Jackson County)	\$1.10
Ravenswood Senior Center (Jackson County)	\$1.10
Kenna Grange Senior Center (Jackson County)	\$1.10
Tiskelwah Center, Charleston, WV	\$1.30
Kanawha Valley Senior Services	n/a (e-mail sent regarding osteoporosis workshop)
Putnam Aging Services, Inc. (Putnam County)	\$1.10
34 local healthcare provider offices including rheumatologists, gynecologists, orthopedists, family practice, internal medicine, endocrinologists, and gerontologists.	\$44.20
	Total: \$63.40

Appendix AH

Advertising Script

Osteoporosis Workshop Being Offered.

Worried about osteoporosis? Want to learn more about this disease and what you can do about it or to prevent it? The Charleston Family YMCA at 100 YMCA Drive Charleston, WV 25311 is hosting an osteoporosis workshop. Join us for this wonderful event where you will learn more about osteoporosis and about bone healthy behaviors. Participants will be given a workbook including all of the discussed materials. The workshop is free and open to the public. There is a limit of 30 participants per class. Pre-registration is requested. The class is expected to last 2 1/2 hours including breaks. Light refreshments will be provided.

Instructor: Cindy Smith, FNP-BC, RN, MSN, CCD.

Date: (event date)

Time(s): (event time(s))

This class is being evaluated by the instructor as part of her doctor of nursing practice studies through WVU School of Nursing Health Promotion/Risk Reduction. Participation in this research study is requested but not required for attendance. WVU IRB approval is on file.

For More Information: Contact Cindy Smith at (304) 553-5436

E-mail: csmit120@mix.wvu.edu

Appendix AI

Additional Promotional Efforts

Workshops One and Two	Workshop Three
Posting on Radio Station Electric 102.7's Community Bulletin Board	Posting on Radio Station Electric 102.7's Community Bulletin Board
Posting on Radio Station WKWS 96.1's Community Bulletin Board	Posting on Radio Station WKWS 96.1's Community Bulletin Board
Posting on WQBE 97.5's Community Bulletin Board	Posting on WCHS Channel 8's Community Bulletin Board
Posting on WCHS Channel 8's Community Bulletin Board	Posting on WOWK Channel 13's Community Bulletin Board
Posting on WOWK Channel 13's Community Bulletin Board	Posting on WSAZ Channel 3's Community Bulletin Board
Posting on WSAZ Channel 3's Community Bulletin Board	Posting in the <i>Charleston Gazette's</i> Community Event Section
Posting in the <i>Charleston Gazette's</i> Community Event Section	Posting in the <i>Kanawha Valley Neighbors'</i> Community Event Section
Posting in the <i>Kanawha Valley Neighbors'</i> Community Event Section	Article in Charleston Gazette (Bartlett, 2012)

Appendix AJ

Spontaneous Comments Written on Instruments/Questionnaires

1. On Osteoporosis Workshop Information Form: “Not reliable instruments”
2. On One Month Follow-Up: “Changed from prescription vitamin D to daily vitamin D”
3. On Osteoporosis Workshop Information Form in section regarding calcium and vitamin D supplement use: “Don’t remember”.
4. On Pre-intervention IPQA: "I have been unable to exercise due to hip-leg pain; usually I do."
5. Written on Osteoporosis Workshop Information Form: “Not a reliable instrument.”
6. Included note: "Thank you so much for the all the information. The workshop was one of the best I've ever attended. Thanks, too, for the Target gift card.”
7. On one month post-intervention IPAQ: “Not typical due to exhaustion from family illness.”
8. On one month post-intervention IPAQ: “Please note: Due to knee surgery in January, I have been unable to participate in my regular exercise program.”
9. Note enclosed: “Thanks for such a helpful and informative workshop.”
10. On one month post-intervention OKAT: “Thank you. I really learned a lot!”
11. Attached Post-It Note: “Thanks for a very informative session!”
12. Attached note: “I enjoyed the workshop so much. Thank you for an abundance of information. I am trying to improve my level of physical activity and I have started to include a couple of the Citracal gummies each day.”