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RESULTS OF A "STAGES OF CHANGE" PILOT SURVEY FROM AN OSTEOPOROSIS PREVENTION OUTREACH PROGRAM

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Abstract:

Osteoporosis is a serious health problem and crippling condition that often results in premature mortality and significant morbidity that may be manifested in the form of fractures, bone deformity, and pain. Osteoporosis affects almost 44 million people in the United States, 80% of whom are women. The purpose of this project was to test a pilot survey using the Stages of Change Model for health behaviors that may affect the risk of osteoporosis. Current research is lacking in use of the Stages of Change model for studying behaviors related to the prevention and reducing the risk of osteoporosis.

Three surveys were developed to evaluate behavior changes and behavior change intentions resulting from an osteoporosis outreach program for middle-aged women. The program provided educational classes, screening, individual counseling, and referral for 342 women in Northwest Arkansas. The program took place from January to October 2001. The stages surveyed included contemplation, preparation, and action stages, referring to them respectively, as thinking, planning, and have made changes. Subjects were surveyed regarding behavior changes and behavior change intentions that occurred as a direct result of the program.

Behaviors surveyed included nutritional habits, specifically calcium intake, level of physical activity, and other behaviors, such as hormone replacement therapy, smoking, and prescription drug use, which affect osteoporosis. Results regarding nutrition variables concluded, 60% started consuming more dairy products, 29% started eating more calcium-rich vegetables, 42% began consuming calcium fortified products such as orange juice, 39% started taking a calcium supplement, 28% started eating more calcium-rich vegetables, and 25% modified their food preparation techniques to include more calcium. Reports of physical activity changes include, 20% started yard work, 19% began walking and 14% began a weight-training program, 13% reported making some other change in their activity level that was not listed on the survey. Regarding other behavior changes, 7% started on hormone replacement therapy and 26% reported

some other behavior change that was not listed on the survey. An osteoporosis outreach program may be instrumental in facilitating behavior changes that support bone health and, therefore, osteoporosis prevention.

Introduction:

Osteoporosis:

Osteoporosis is also known as *the silent thief* because it often goes undetected. It is a crippling condition that often results in premature mortality and significant morbidity that may be manifested in the form of fractures, bone deformity, and pain (1). Osteoporosis and low bone mass are serious public health problems in the United States that affect 44 million men and women aged 50 and older in the United States, 80% of whom are women (2). Estimates indicate that osteoporosis is responsible for more than 1.5 million fractures annually (2). It also contributes to 90 percent of hip fractures in women and 80 percent of hip fractures in men (3,4). According to the National Osteoporosis Foundation, the estimated national direct expenditures, which include hospitals and nursing homes, for osteoporosis and associated fractures was \$17 billion (\$47 million daily). Considering the growth of the elderly population most afflicted by this disease, the cost is estimated to triple by the year 2040 (4). Research indicates that an increase in bone mass density by five percent may decrease the risk of fractures by up to 25 percent (4, 5). Physical activity, nutrition, hormone replacement therapy, and other behaviors may contribute to an increase in BMD, therefore, these behaviors were surveyed in this project (6).

Osteoporosis is a multifaceted disease, which is characterized by low BMD, and is usually found in postmenopausal women (6). During the immediate years following the termination of menses there is an express loss of bone density associated with decreased levels of estrogen in the body (6). Women lose up to one percent of bone mass per year after age 35; by age 50 that figure rises three to five percent per year and continues to rise for about 15 years (7).

There are also other significant risk factors including race, lifestyle, diet, and physical inactivity (8). Non-Hispanic white women are disproportionately afflicted with this disease, although the rate of osteoporosis in other races and ethnic groups is also significant (2). People who smoke or consume alcohol in excess are also considered to be more at risk for osteoporosis as well as people with a diet low in calcium (9). Sedentary lifestyle and lack of weight bearing physical activity are also risk factors for low bone mass and osteoporosis (6, 7, 10, 11). It is often recommended that women include a regimen of hormone replacement therapy, along with an adequate calcium intake and weight-bearing exercise to prevent osteoporosis.

The federal government has noted in its Health Objectives for the Nation an urgent need to reduce deaths due to falls, reduce the incidence of hip fractures, and increase the amount of women educated about osteoporosis (12). Goals for osteoporosis in the *Healthy People 2010* report include a 20% reduction of the proportion of adults with osteoporosis (4). The major risk factor for hip fracture is osteoporosis. Practically all persons with a hip fracture require hospitalizing for treatment, and 20% of persons who fracture a hip die within a year (4, 13).

Health Behavior Theory:

Health behavior theory can provide the foundation for various stages of planning, implementing, and evaluating a program (14). Theories are guides to help health educators answer *why* a population is not following public health and medical advice, *what* needs to be done to reach a population, and *how* to get a population to change their behavior. Theories can provide insight for shaping programs and strategies to reach specific populations (14).

The Stages of Change model (developed by Prochaska) is based on a theory used to describe the motivational readiness of a person to change a health behavior (15). The model suggests that people move through five stages to achieve behavior change: *precontemplation*, *contemplation*, *preparation*, *action*, and *maintenance*. Each stage translates, respectively, to the following: not intending to change, intending to change within 6 months, actively planning to change, overtly making changes in their behavior, and changing behavior for six months with increased confidence and self-efficacy (16). The Stages of Change model is a spiral in which people may move forward and backward along the continuum at anytime.

The Stages of Change model is appealing because it helps identify the type of intervention that is most effective in each of the stages (17). Healthful dietary and physical activity changes are different than smoking and other addictive behaviors (17). A person may be in the maintenance stage of meeting requirements of five servings of fruits and vegetables a day, but in the contemplation stages of increasing their dairy intake to meet daily calcium requirements. Ideally, the health educator should first assess each individual behavior (dietary, physical activity,

hormone replacement therapy, smoking, etc.) that affects osteoporosis, and map out a well-defined sequence of interventions to help move the client through each stage for each behavior (see Table 1).

Since many things affect bone health, there are multiple behaviors that can be changed to reduce the risk of osteoporosis. This is why the Osteoporosis Prevention Outreach Program focused on behavior change and the reason for using the Stages of Change model for the surveys.

Purpose:

The purpose of this project was to pilot test a survey using the Stages of Change model for health behaviors that may affect the risk of osteoporosis. Documentation of the model for addictive behaviors, such as smoking, is abundant, but research on the model for behaviors such as exercise and dietary change is limited (17, 18, 19, 20). Current research is lacking in use of the Stages of Change model for studying behaviors related to the prevention and reduction of osteoporosis risk.

Methods:

Subjects for the pilot study were participants in the Osteoporosis Prevention Outreach Program conducted in Northwest Arkansas by Lori Turner, Ph.D. from January 2001-December 2001. They were surveyed regarding behavior changes and behavior change intentions that occurred as a direct result of the program.

Participants were recruited from the University of Arkansas, Fayetteville; Springdale school district, Tyson Foods, the Jones Center for Families, and local beauty and tanning salons. Different types of media were utilized for recruitment including the University of Arkansas's daily e-mail announcements, the Jones Center for Families' television network, and flyers including a photograph of a woman with osteoporosis characteristics. This resulted in the 392 women from Northwest Arkansas registering for the Osteoporosis Prevention Outreach Program. Three hundred and forty-two participants completed the program. Program components included four educational classes, screening, and individual consultation.

Each participant attended one class per month from February to May 2001. Participants were responsible for making their own appointments for the classes and bone scan. No reminders were provided in between classes or before bone density scan appointments. The last class was held in May 2001, and some participants from that class were not scanned until October 2001. The final 342 women who had been through the educational classes were then scanned using dual energy x-ray absorptiometry (DEXA). These subjects were also administered the three stages of change tests. As the participants came in for their bone scan they were given instructions on how to fill out the surveys. There was a least one person available at all times so participants could ask questions.

The principle investigator, Lori Turner, developed the Stages of Change questionnaires. Questions were tested for face validity. The survey format was multiple choice, and participants were asked to circle all of the changes that applied. Participants were asked about the same behavior change on each stage. Only three of the five stages of the model were evaluated: contemplation, preparation, and action, referring to them as thinking, planning, and making changes, respectively. Subjects were surveyed regarding behavior changes and behavior change intentions that occurred as a direct result of the program. Dietary habits, physical activity, and other behaviors that relate to osteoporosis were surveyed.

The dietary behaviors surveyed on the nutrition questionnaire asked participants if they had added, were planning to add, or were thinking about adding the following: servings of milk or other dairy products, soy milk, tofu, calcium-rich vegetables, calcium-fortified food products, calcium supplements, and/or food preparation techniques to include more calcium.

The physical activity behaviors questionnaire asked subjects if they were making, were planning to make, or were thinking about making changes in the following activities: walking a mile or more without stopping, jogging or running, riding a bike (or exercise bike), swimming, aerobics, calisthenics or yoga, gardening or yard work, and weight training.

Participants were also asked if they were making, were planning to make, or were thinking about making any other changes in the following: taking hormone replacement therapy, quitting smoking, taking Fosamax or another prescription drug for osteoporosis. Each survey included an opportunity for participants to list any other change not mentioned in the survey and included a no-change option.

Results:

Retention rate was 87 percent for the entire program. Subjects were mostly middle-aged, married, Caucasian women, with moderate levels of education. The level of education varied greatly, from nine to twenty-six years, with a mean of 16 years. See Table 2 for more demographic information.

Ninety-nine percent of participants responded to the activity change and other behavior change surveys, and 95 percent responded to the nutritional change survey. A reason for 95% response on the nutrition survey could be due to an open-ended questionnaire before it, which may have led participants to think it was the last page. Large changes in behavior were reported regarding nutrition and activity variables. See Table 3 for nutrition variable results and Table 4 for activity variable results.

Regarding other behavior changes, 7% started on hormone replacement therapy and 26% reported some other behavior change that was not listed on the survey. Five percent reported planning on hormone replacement therapy, 4% are planning to quit smoking, 11% are planning to start another behavior not

listed. Eight percent are thinking about taking hormone replacement therapy, 4% are thinking about taking a prescription drug for osteoporosis, and 7% are thinking about another change not listed on the survey.

Discussion:

A large percentage of participants reported changes in their dietary habits. This is probably due to the behavior requiring a small amount of effort to change for most people. Most women go to the grocery store and prepare the meals for their families; therefore, it is easy for them to purchase calcium-rich foods and change their food preparation techniques to increase calcium intake.

Changes in physical activity were not as common. It takes a great amount of effort to make changes in physical activity levels for some people. Finding time and finding an activity that is enjoyable is necessary for long-term results but is often difficult for people who are busy with multifaceted lives (4).

The figures for the other behaviors are low. Many women may not be thinking about hormone replacement therapy yet because they are not postmenopausal. Few participants were smokers so they would not be thinking about quitting. Most women at the time the survey was given did not know their bone density so they would not be considering taking any prescription drug to combat the effects of osteoporosis.

Some limitations of this study include self-reported data and no pre-test data. Self-reported data can be inaccurate, for example, consider a report by Green and colleagues in which self-rated low-fat diet was compared with actual nutrient intake (30% or less calories from fat) (21). Sixty percent reported themselves in the action or maintenance stages, while nutrient intake only classified 20% in either of those stages.

Participants were not pre-tested based on the Stages of Change model. In future studies pre-testing needs to be done to find any significant differences in self-reporting behavior change. Future research needs to address this by being more accurate when assessing participant behavior change based on classes in an osteoporosis prevention outreach program. Monitoring actual nutrient intake, amount of physical activity, and other behaviors over the course of the classes would be an ideal way to collect accurate data. Participants could keep a log of diet, physical activity, and other behaviors or meet with nutritionists, personal trainers, and doctors to keep reporting as accurate as possible and to measure consistency between self-report and true measurement.

The results from this study imply that an osteoporosis outreach program may be instrumental in facilitating behavior changes that support bone health and, therefore, osteoporosis prevention. The combination of educational classes and screening may have been affective in launching behavior change. There are plans to do a follow-up survey in 18-24 months to see how long

the behavior changes have lasted or if there has been an increase in participants moving to action stages.

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Table 1: The Stages of Change Model

Stage	Behavior-increasing daily calcium intake through foods
Precontemplation	Not aware of the necessity of consuming daily requirements of calcium
Contemplation	Thinking about consuming more dairy products to increase calcium intake, gets information on daily requirements of calcium and calcium-rich foods
Preparation	Purchases milk, cheese, yogurt, and calcium-rich vegetables
Action	Prepares food with milk, eats yogurt for breakfast, eats at least two servings of calcium-rich vegetables a day
Maintenance	Keeps a log of calcium-rich foods consumed over a period of 6 months



Amy Gray

Table 2: Demographics of Participants N=342	
Characteristic	Percentage
EthnicityRace/	
White	93.0
Asian	2.5
Latino	1.5
Other	3.0
Age	
30-39	10.0
40-49	41.1
50-59	41.3
60-64	7.6
Marital Status	
Married	72.0
Divorced	13.0
Single	11.0
Widowed	3.0

Table 3: Reported Nutritional Behavior Change N=326

Behavior (added or modified)	Action (making)	Preparation (planning)	Contemplation (thinking)
1 or more servings of milk or other dairy products each day	60%	12%	5%
Calcium fortified products, such as orange juice each day	42%	20%	11%
Calcium supplement	39%	19%	10%
Calcium-rich vegetables	28%	29%	15%
Modified food preparation techniques to include calcium	25%	16%	
Tofu to diet	6%	7%	13%
Soy milk to diet	11%	7%	9%

Table 4: Reported Physical Activity Changes

Behavior	Action (making)	Preparation (planning)	Contemplation (thinking)
Yard work or gardening	20%	10%	4%
Walking	19%	29%	15%
Weight training	14%	27%	17%
Yoga	5%	16%	10%

Faculty Comments:

Ms. Gray's faculty mentor, Lori Turner, made the following remarks about Ms. Gray's work:

I have known Ms. Gray for 2 years, as she has been a student in our Health Science Program. I have been impressed with her academic skills and keen mind. Ms. Gray displays high intellectual ability, breadth and depth of knowledge, and outstanding presentation ability, both orally and in written form. Last year Ms. Gray received our Outstanding Undergraduate Student Award in Health Science.

Over the past year I have supervised Ms. Gray's internship activities. She has proven to be a valuable assistant for the implementation of my Osteoporosis Outreach Program that served 392 women. She assisted with the implementation of a variety of classes as well as facilitated data collection of survey data and body composition measures. Ms. Gray was also involved in data entry, data analysis of the Stages of Change behavior intentions survey and other various surveys. She was responsible for the development of an impressive poster presentation for our state AHPERD conference last November. I have been impressed with her enthusiasm, creativity, and ability to work independently. In addition, Ms. Gray has demonstrated responsibility, initiative, reliability and dependability.

Ms. Gray is self-motivated and shows great promise as a health professional. While she is self-directed and able to work independently, she also works well with others. Her interpersonal skills are strong, and she demonstrates a high level of emotional maturity. She communicates well and has a pleasant disposition.

Another of her Health Science faculty members, Michael Young, had much to say about Ms. Gray's abilities. He wrote:

Ms. Gray is an undergraduate student in our community health program. She is on-track to graduate in May 2002 with a GPA just short of 4.0. Last spring we named her our undergraduate major of the year. It was no contest. All faculty agreed that she was the clear choice for the award. In fact, we wanted to give her the award this year too, but thought it unfair to other students. This spring she will represent the University of Arkansas in San Diego as our AAHE undergraduate major of the year.

Ms. Gray has been the recipient of several scholarships, including a scholarship from our state AAHPERD organization and the Brandon Burlsworth Scholarship. These are both noteworthy because of the competitive nature of the scholarships. The AAHPERD scholarship places emphasis on academic achievement and character. This is indeed a young woman who makes good grades, but there is far more to Amy Gray than a great GPA. Ms. Gray has helped provide her own financial support for herself while pursuing her education. She worked as a customer service clerk in

the HPER service center, and did so well she was moved to the position of building supervisor. The building is the recreation center for the campus, with basketball courts, Olympic swimming pool, racquetball courts, and a fitness center. There are also classrooms, faculty offices, and much equipment. During the shifts for which Ms. Gray is responsible, she supervises at least seven employees, and addresses any problems that arise with the facility or with "customers" (students, faculty, dependents, and guests) using the facility.

Ms. Gray has also been involved in professional development service activities. She has worked extensively with one of the most productive young faculty members in the country, Lori Turner, Dr. Turner is currently leading a project designed to reduce risk of osteoporosis. This involves several components including bone scans and a series of educational classes. Ms. Gray has played an important role in the project. She has assisted in facilitating some of the classes and has been actively involved in data collection and data entry. She is the co-author in a recent presentation from the project and co-author on a paper. She also was responsible for a poster presentation at this year's state AAHPERD conference. In addition, she has served as the Chair of the University Health Center's Advisory Board. This is the type of involvement that we like to see, but do not often receive, from our graduate students. In my over 20 years at the University of Arkansas, I have seen few, if any, undergraduate students who have evidenced Ms. Gray's degree of commitment and professional involvement. In addition to her professional involvement, she has found time to volunteer in other areas on campus and in the community. On campus, she has been involved with the Office of Student Involvement and Leadership and has worked with new student orientation. In the community, she has been a volunteer for Habitat for Humanity.

Ms. Gray's submission to *Inquiry* is based on important work relative to osteoporosis prevention, which she has undertaken with Dr. Lori Turner. Dr. Turner's work in this area has received more publicity than any other recent research conducted at the University of Arkansas. Ms. Gray has played a significant role in this overall work that Dr. Turner is leading. Ms. Gray's manuscript deals with an aspect of the project, "stages of change" in which she has taken a leading role. The stages of change model is an important model to explain health behavior and readiness to adopt a change in behavior. The model has been applied to numerous health concerns, but there is relatively little in the literature related to behavior change specific to osteoporosis prevention. Thus, her work is significant, not only because it is research conducted by an undergraduate student, it is research that can make a contribution to the professional literature.