

# Older Adults' Knowledge and Beliefs About Osteoporosis: Results of Semistructured Interviews Used for the Development of Educational Materials

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**ABSTRACT. Objective.** Although osteoporosis and associated fractures have been recognized as a significant public health problem, underdiagnosis and undertreatment are common. We investigated older adults' knowledge and beliefs regarding osteoporosis and its prevention, in order to develop effective osteoporosis health education messages and materials. These messages will be used as part of a trial that will test the efficacy of both public and doctor education to improve osteoporosis management.

**Methods.** We conducted semistructured one-on-one interviews with 15 older adult volunteers. A standard interview guide was developed and used for all interviews, which were audiotaped and transcribed. Key themes were extrapolated by 3 study staff using data abstraction forms. The data forms were then compared for consistency.

**Results.** We found that the term "osteoporosis" was well recognized, but many participants had only a fragmented understanding of its meaning. All participants identified osteoporosis as a serious condition, but many did not perceive themselves to be at personal risk for developing the condition. Many participants were confused about the difference between osteoporosis and osteoarthritis. Participants expressed reservations about taking prescription medications because of concerns over cost, side effects, and interactions with their current medications.

**Conclusion.** Osteoporosis awareness is high, but the older adults interviewed had an incomplete understanding of the condition. This could hinder efforts to improve prevention and treatment of osteoporosis. (J Rheumatol 2005;32:673-7)

## Key Indexing Terms:

OSTEOPOROSIS

AWARENESS

EDUCATION

PREVENTION

Ten million people in the United States have osteoporosis and another 34 million have osteopenia<sup>1</sup>. As the population ages, osteoporosis is becoming a greater concern. Direct expenditures for osteoporosis and related fractures are estimated to be \$17 billion each year in the US, and these costs will continue to increase<sup>2</sup>. Despite effective prevention and treatment methods, both underdiagnosis and undertreatment are common<sup>3,4</sup>. Improved utilization of existing prevention and treatment strategies may reduce the incidence of fractures and their associated morbidity and mortality.

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*Supported by the Arthritis Foundation, Atlanta, GA; and the National Institutes of Health (K23-AR48616).*

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*Accepted for publication November 22, 2004.*

Currently, little is known about older adults' knowledge of osteoporosis and preventive measures and how this knowledge might influence fracture management. We postulated that osteoporosis health education for older adults and their physicians might facilitate more appropriate osteoporosis management, and designed a public health intervention trial to improve osteoporosis management. As an initial step, we conducted formative qualitative research to better understand older adults' knowledge, attitudes, and behaviors with regard to osteoporosis. This report gives the results of this formative research. We used a theory-guided approach in development of our research materials, because increasing knowledge of a health issue alone has been found to be insufficient for behavioral change<sup>5,6</sup>. It is crucial to use health behavior theory and formative research to guide the development of health education messages and materials<sup>7</sup>.

Formative research is the process for collecting in-depth information to develop more effective interventions. Obtaining information regarding knowledge and attitudes of even a small sample of older adults allows us to develop materials that better match the specified target population<sup>8</sup>. Our work was guided by the Stages of Change Model and the Extended Parallel Processing Model behavioral frameworks<sup>7,9</sup>. The Stages of Change Model, which has been successfully applied to address a range of health behavior prob-

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lems, identifies 5 stages of personal “readiness” that an individual can occupy to receive and act upon a targeted health message. The 5 stages are precontemplation, contemplation, preparation, action, and maintenance. In the precontemplation stage, an individual will not change their behavior because the risks are not obvious to them, and the individual is not conscious of alternative behavioral options. When the risks do become apparent, a transition to the contemplation stage occurs. At this time, the individual begins to consider the possibility of changing behavior. During the preparation stage, the individual seeks out more information to make the anticipated behavioral changes. When a person is able to integrate the new health behavior into daily life, there is a shift to the action stage. Finally, in the maintenance stage, the individual continues to engage in the new behavior and attempts to avoid relapse. Tailoring a health message to the stage of change that best matches the readiness of the target audience may increase the likelihood that the message will address his/her concerns and motivational needs.

According to the Extended Parallel Processing Model (Figure 1), successful health messages promote behavioral change by moving people towards the “danger control process.” In this stage, they “accept the message” and act to control the danger by carrying out the recommended response, such as taking calcium to strengthen their bones<sup>7</sup>. Danger control is a cognitive process that moves people to take protective action based on appraisals of (1) the threat posed by a given health problem and (2) the efficacy of the recommended behavioral response to avert the health threat. In this model, threat consists of a person’s perceived severity of the health problem and perceived susceptibility to the health problem; efficacy consists of a person’s perceived response efficacy plus his/her perceived self-efficacy of the recommended response (Table 1). The danger control process is activated when a message elicits equally high levels of both perceived threat and perceived efficacy (Figure 1).

The interviews were designed to assess participants’ per-

Table 1. Definitions of key health risk message concepts (adapted from Witte, *et al*<sup>7</sup>, with permission).

Health Risk Message Concept	Definition
Perceived severity	A person’s beliefs about the significance or magnitude of a specified health threat
Perceived susceptibility	A person’s beliefs about his or her chances of experiencing a specified health threat
Perceived response efficacy	A person’s beliefs about the effectiveness of a recommended action to avert or lessen a specified health threat
Perceived self-efficacy	A person’s confidence in his or her ability to perform a specific recommended action

ceptions about the threat posed by osteoporosis and the efficacy of recommended responses to avert or lessen the threat. Some of these recommended responses were having a bone density test to assess bone health, taking calcium, taking vitamin D, home fall-proofing, and exercise. We also sought to gauge participants’ readiness to change, and to gain a general understanding of the tone, phrasing, and words being used by participants to discuss osteoporosis and fractures.

## MATERIALS AND METHODS

**Participants.** A total of 15 participants were selected for the study. Participants were recruited from the general medicine and arthritis practices of an academic medical center. We chose these locations because our study physicians working in these practices were able to easily identify and recruit suitable participants for our study. We also contacted selected older adults who had expressed an interest in research through the Harvard Cooperative Project on Aging. We attempted to recruit persons representative of the target population for our public health intervention trial: age ≥ 65 years, both women and men, persons with lower socioeconomic status, some with known osteoporosis and others without. In exchange for their participation we offered participants free transportation and a \$25 honorarium. The study was approved by the Brigham and Women’s Hospital Ethics Committee.

**Data collection interviews.** We employed semistructured interviews for qualitative data collection. A standardized guide was used to ensure that the

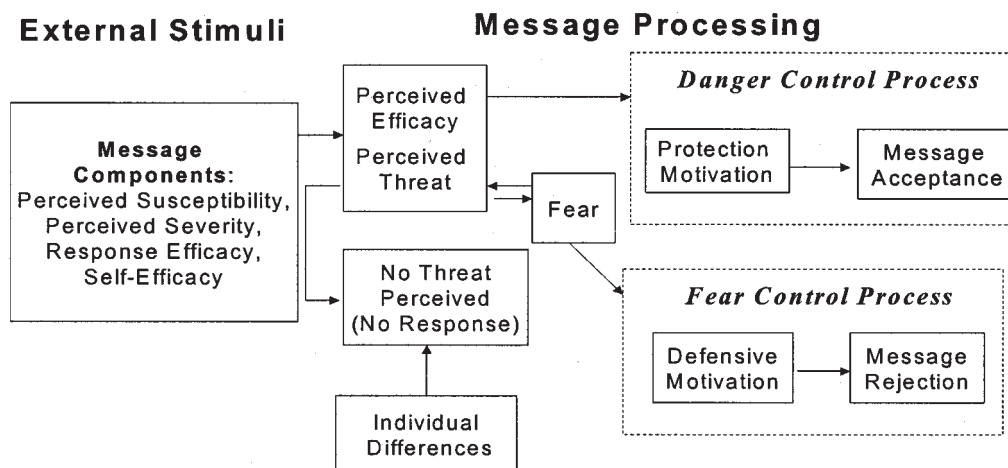


Figure 1. Behavioral framework: the Extended Parallel Processing Model<sup>7</sup>.

same topics were covered in all interviews (available upon request). The guide was designed to assess participants' knowledge and beliefs about osteoporosis prevention, diagnosis, and treatment. Questions were also developed to assess the 4 key constructs of the Extended Parallel Processing Model: perceived severity of the condition of osteoporosis, perceived personal susceptibility to osteoporosis, perceived efficacy of actions to prevent or control osteoporosis, and perceived self-efficacy for carrying out these actions (Table 1). A behavioral scientist and a trained research assistant (MA, MB) conducted all interviews; interviews each lasted between 30 and 45 minutes. Notes were taken at all interviews. All interviews were audiotaped with permission from the participants; audiotapes were later transcribed.

*Study analyses.* We generated hypotheses a priori and revised them post-hoc through transcription review. Three study staff members (MB, DHS, DC) conducted multiple close readings of all 15 transcripts and individually used data abstraction forms to extrapolate key themes. Data were then compared by all study staff members for consistency. Whenever discrepancies were noted, transcripts were rereviewed by study staff members and further discussion on discrepancies followed until a consensus was reached.

We assessed the proportion of participants who had each response. Not all questions were answered by all participants, so denominators vary by question.

## RESULTS

Of the 15 participants, 11 were women. The mean age was 75.5 years. Six were enlisted from the arthritis clinic and 9 from a database of older adults interested in participating in health research. Based on the interviews, several themes emerged about participants' views of osteoporosis and prevention.

*Knowledge of osteoporosis.* Many participants were able to grasp isolated concepts regarding osteoporosis, but few had a complete understanding of the disease. Thirteen of 15 participants provided some explanation of osteoporosis, but 2 men were unable to offer any. Twelve out of 15 participants described osteoporosis as a thinning, weakness, or loss of bone. Fractures were mentioned in describing osteoporosis by 10 of 15 participants. Calcium was also mentioned by 10 of 15 participants as being related to osteoporosis. Six of 15 participants reported that pain was associated with osteoporosis. Many people could identify factors related to osteoporosis only in an abstract manner, and most did not have a clear understanding of the clinical consequences of osteoporosis.

A prime example is seen in 2 separate consecutive quotations from a female participant. Initially she seemed to have a good understanding of osteoporosis, but when she was asked a second time what she knew about the condition she said, "actually, I don't even know...what it [osteoporosis] actually does to your body or your bones or whatever it is." When asked what she would like to know about osteoporosis, she said, "I wouldn't know what to ask 'cause I really don't know what it is." (Female Participant 12).

Of the 10 participants who discussed osteoporosis and osteoarthritis, 6 had difficulty differentiating the 2. Even after interviewers explained to participants that these were 2 different conditions, participants continued to confuse them, as illustrated below:

Response to knowledge about osteoporosis: "I have degenerative arthritis, so I would think osteoporosis would be part of it." (Female Participant 11).

When asked if the participant had heard of osteoporosis, the response was, "No, that's why I have it [written] down to find out what osteoarthritis is." (Male Participant 15).

*Perceived threat about osteoporosis, falls, and fractures.* Many participants viewed osteoporosis, falls, and fractures as a source of great concern, but few believed that they were personally at risk for osteoporosis. Of participants asked if osteoporosis was serious, all 12 said it was. Concerns about falling were mentioned by 11 out of 14 participants. Even though 5 of 11 of the participants reported that they had experienced a fracture during the last few years, only 4 out of 12 were concerned about getting osteoporosis. Several quotations illuminate this finding:

Response to seriousness of osteoporosis: "It's very serious. I have 2 friends with osteoporosis and...the shapes of their bodies have changed..." (Female Participant 14).

Response regarding concerns about falls: "I'm just careful with what I do and try not to let it [falls] happen." (Male Participant 7).

Responses to personal likelihood of getting osteoporosis: "Well, so far I'm 82 and it looks like I don't have it, so I'm one of the lucky ones." (Male Participant 7).

"I don't think so [that I will develop osteoporosis] because I'm coping with [lumbar] stenosis...that's enough, that's enough. And my mother didn't have osteoporosis..." (Female Participant 14).

"I really don't think I will [develop osteoporosis], because it is really not in my family at all. I've never broken a bone in my life." (Male Participant 3).

*Barriers to prevention and treatment of osteoporosis.* Participants varied on their current use of osteoporosis prevention and treatment options. Most participants were only utilizing one or 2 preventive measures and many were engaging in these behaviors inconsistently or inadequately. Twelve of 15 participants thought it was possible for people over the age of 65 to strengthen their bones, yet the percentage of affirmative responses to questions about specific preventive actions varied greatly. Fourteen out of 15 participants informed us that they exercised. Only 2 of 15 participants stated that they were taking prescription medication to strengthen their bones. Nine of the 15 told us they were taking calcium, 6 were taking vitamin D, and 7 had taken action to reduce the risk of falls in their homes. Several barriers to osteoporosis prevention and treatment mentioned by participants are noted below:

Response for reason not doing exercise: "I don't exercise because my knees are sore." (Female Participant 1).

Response to taking vitamin D and calcium: "No, I don't take anything... I don't like taking pills. I take too many. I didn't get sick until I was about 75, before then I never took anything." (Female Participant 10).

Response to effectiveness of taking calcium: "I don't care how much calcium you got... I don't care how strong it [the bone] is, even an iron can break." (Female Participant 7).

Various barriers to taking prescription medication for

osteoporosis were mentioned, such as cost, side effects, taking too many/too much medication already, and believing that one does not need to take prescription medication to strengthen bones. Of participants who mentioned cost, 3 out of 4 believed this would be a barrier and 4 out of 5 mentioned that side effects would deter them from taking medication. Adding yet another medication to their current regimen was a concern for 3 out of 4 participants. Three of 15 participants volunteered that they believe they did not need prescription medication to strengthen their bones.

The following quotations highlight various barriers to treatment described by participants.

Responses regarding taking prescription medication to strengthen bones: "I've heard [about them] but I haven't paid much attention to them, because it wasn't my problem." (Female Participant 13).

"It would depend again on whether or not my physician thought that was something I needed... you begin to feel like a drugstore after awhile. You know? How many more pills are you going to take?" (Female Participant 5).

## DISCUSSION

We conducted qualitative research to help develop effective osteoporosis education materials for older adults. Interview participants perceived osteoporosis as a severe medical condition, but had a low perception of their own personal susceptibility. Many participants' sense of susceptibility was not solely based on their medical understanding of the disease. Participants' self-assessment was based on concepts of luck and family background instead of actual risk. Their perception about the efficacy of recommended responses and their ability to perform these behaviors was highly variable. Barriers mentioned with regard to preventive measures indicated low self-efficacy. In other words, participants lacked confidence in their ability to prevent osteoporosis.

According to the Extended Parallel Processing Model, low perceived susceptibility prevents people from experiencing threat and thereby hinders the move towards action (Figure 1). The Stages of Change Model does not dictate that people move through stages in a linear fashion; thus, people may fall back multiple stages or jump forward stages given current experiences taking place in their lives. For example, we would anticipate that even precontemplators who sustain a fracture might jump forward into the action phase because of this event. Most people were found to be in the precontemplation stage of the Stages of Change Model because they did not fully understand osteoporosis or preventive measures associated with it.

There was a general lack of knowledge about osteoporosis among the older adults we interviewed that may represent a major barrier to getting people to take preventive measures. An example was Female Participant 12, who in fact had a good understanding of osteoporosis, yet still felt she did not have a sufficient understanding to talk to her

physician about osteoporosis. This feeling may create a barrier for her in discussing osteoporosis with her physician.

Once we were able to get a baseline for their current knowledge of osteoporosis, all participants were provided with an accurate definition during the interview process. Our goal was to educate people about osteoporosis for the large scale randomized controlled trial, and thus we used these interviews as a means of recreating what would happen in our future trial. Providing people with an understanding of osteoporosis during the interview allowed us to see participants' interest level, their concern upon learning about osteoporosis, and how they responded to the information given about osteoporosis and fracture management.

The information obtained from these interviews was used to develop materials for a mailed osteoporosis education intervention for people over age 65 who are enrolled in a prescription drug program for older adults. The mailings consist of letters, supplementary educational materials to promote osteoporosis awareness, and 6 recommended actions to detect, prevent and treat osteoporosis. Based on our findings and the Extended Parallel Process Model, we designed the materials to increase perception of the threat posed by osteoporosis, and the efficacy of the recommended responses. For example, based on our finding that people mistakenly believed that osteoporosis produces warning signs, and that the absence of those expected symptoms may delay preventive action, we highlighted the advisory that osteoporosis often has no symptoms and added the phrase, "You may have it and not even know." In response to reported concerns about the ability to pay for a bone density test (low perceived self-efficacy), we noted in the materials that the cost of tests is covered by Medicare in most cases. Cost concerns regarding medication were also addressed in the materials by informing participants that their prescription drug program covers bone-strengthening medications. Concerns regarding taking too much medication were addressed by informing participants that there are bone-strengthening medications that need only be taken on a weekly basis. The interviews allowed us to craft the appropriate motivational messages throughout the educational materials to increase self-efficacy and response efficacy.

Even though our subjects were aware of the severity of osteoporosis and were concerned about falling, most were not concerned about getting osteoporosis, even though some had already experienced fractures. Many were unable to make the connection between falls and osteoporosis as risk factors and fractures as the clinical sequelae. We attempted to take advantage of the general concern about falling by incorporating specific strategies for fall prevention in our educational materials.

Previous research indicates that many women have an inadequate knowledge of osteoporosis, risk factors associated with osteoporosis, and preventive behaviors<sup>10,11</sup>. One study found that women with a basic understanding of osteo-

porosis still did not perceive themselves to be susceptible to osteoporosis<sup>12</sup>. Research also has found that women who understand the efficacy of prevention behaviors were more likely to act in accord with these types of behaviors<sup>13</sup>. Many of the participants in our study lacked knowledge about benefits of preventive behaviors. Educational materials shown to increase knowledge of osteoporosis were not successful in promoting behavior change<sup>6</sup>. The entire health communications/health behavior literature provides evidence that knowledge alone is rarely enough to change behavior, which is why we are following a user-centered and theory-guided process to develop our intervention plan and materials<sup>14</sup>.

This study had several important issues common to qualitative research. We recruited a purposive sample of participants, similar in attributes to our population targeted for intervention, but they may not be representative of all older adults at risk of osteoporosis<sup>15</sup>. We attempted to recruit older persons, from a variety of socioeconomic strata, focusing on women, given that these are the characteristics of our target population. The sample size of this interview study was relatively small; however, sample size need not be large to be effective in providing valuable information for material development<sup>7</sup>. Qualitative methods are very useful in understanding particular details and less useful in creating generalizable information. We attempted to interview people who best represent our target population. The objective was to obtain detailed information from participants that could help confirm or refute our expectations. The information obtained allows us to get an insider's perspective, which helps to better tailor our educational materials to the specified target population.

During the interviewing process, some questions were revised to take into account new observations. Qualitative research often involves changing data collection instruments during the study period as investigators are themselves gaining more understanding about the item under study<sup>8</sup>. In addition, not all participants answered every question asked of them during the interview. This study focused on an area that has not yet been well examined, and therefore as we obtained more information, we altered our data collection instrument during the execution of the study.

It is important to note that the information obtained through qualitative research can be extremely useful. Although not as useful for generalizability, qualitative research allows us to identify themes not identified by the study staff prior to the interview process<sup>8</sup>. Qualitative research allows one to reevaluate basic assumptions and assists in tailoring educational materials.

In conclusion, we conducted qualitative face-to-face interviews to assess older adults' attitudes and knowledge regarding osteoporosis. We used the Extended Parallel Processing Model and the Stages of Change Model to develop the interview guide and to interpret the results<sup>7,9</sup>. While awareness about osteoporosis was high among participants,

knowledge was incomplete. Participants' perceived severity of osteoporosis was high, but perceptions of personal susceptibility were low. The actual risk of getting osteoporosis is high for older adults in general, with one out of every 2 women and one out of every 4 men over the age of 50 years experiencing osteoporosis-related fractures in their lifetime<sup>2</sup>. Participants' level of confidence to prevent osteoporosis and fractures was not high. We used these observations to create patient educational materials (available upon request) based on these findings. These materials are being tested in a community-based randomized controlled trial.

#### ACKNOWLEDGMENT

Suzanne Gauthier and Joel Finkelstein provided helpful comments on the project. We also acknowledge Lawren Daltroy, DrPH, (deceased), who inspired us to listen carefully to our patients and provided valuable insight at all stages of this work.

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