Healthy risk awareness motivates fracture prevention behaviour: A grounded theory study of women with osteoporosis

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Abstract
Osteoporosis is a public health problem implying an increased risk of fractures. Successful fracture prevention contributes to prevention and treatment of osteoporosis as well as reduction of accidents from falling. Determinants such as lifestyle and environmental factors depend on human behaviour. In order to obtain a deeper understanding of the behavioural changes needed for fracture prevention, the aim of this study was to explore women’s experience of living with osteoporosis and related lifestyle changes. In-depth interviews with 13 women diagnosed with osteoporosis were analysed according to the grounded theory method. The data formed a pattern in which developing healthy risk awareness is the key to motivating risk reduction behaviour as part of a fracture preventing lifestyle. The other five categories are elements in achieving healthy risk awareness: accepting having fragile bones, living with fear, needing to learn, and having confidence as well as experiencing a sense of social context. These findings might be useful to understand better the motivational process underpinning fracture-preventing behaviour among women with osteoporosis.

Key words: Osteoporosis, behaviour change, motivation, fracture prevention, grounded theory

Introduction
Osteoporosis implies an increased risk of skeletal fractures attributable to low bone mass and micro-architectural deterioration of bone tissue resulting in increased bone fragility. It generates public health problems with consequences both for individuals and at community level (Johnell, Kanis, Oden, Johansson, De Laet & Delmas, 2005; Reginster & Burlet, 2005; Lee, Dargent-Molina & Breart, 2002; Cummings, Nevitt, Browner, Stone, Fox & Ensrud, 1995). In Sweden, every third woman between 70 and 79 years of age suffers from osteoporosis, and the risk for Swedish women having an osteoporosis fracture sometime at 50+ is 50% (SBU, 2003). Since the incidence of fractures is increasing, partly because of demographic determinants, the health care system needs to systematize prevention strategies (Kannus, 2003; Nordell, Jarnlo, Jetsen, Nordström & Thorngren, 2001; Allander, Gullberg, Johnell, Kanis, Ranstam & Ellfors, 1998). The management of fracture prevention in relation to Scandinavian women born in the 1940s is a challenge not only for the health care system but also for the community as a whole. Successful fracture prevention contributes to prevention and treatment of osteoporosis and reduction of accidents from falls, where women with osteoporosis can be seen as a high-risk group for fractures (Kannus, 2003; Lips, 1997). Lifestyle and environmental factors are two major preventable determinants of fracture, attributable to health behaviour. Compliance with pharmacological treatment to prevent fractures is another behavioural factor reported as low (Cortet & Benichou, 2006; Rossini, Bianchi, Di Munno, Giannini, Minisola & Sinigaglia, 2006). Therefore, there is a need to learn more about the processes of behavioural change for fracture prevention.

There has been a great deal of medical research to investigate the risk factors for osteoporosis and accidents from falls. This research has resulted in recommendations based on biomedical knowledge for fracture prevention emphasizing lifestyle changes.

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such as physical activity focused on balance and muscle strength, non-smoking, good nutrition with plenty of calcium and vitamin D (Compstone, 2004; SBU, 2003) and instructions on how to prevent falls (Gillespie, Gillespie, Robertson, Lamb, Cumming & Rowe, 2003). So far, this biomedical knowledge has taught us how to identify the preventable factors but not how to implement the guidelines. Health education programmes have been shown to improve self-management by increasing knowledge, physical activity and calcium intake and according to the European Union, might contribute to the promotion of lifestyle improvements (Compstone, 2004). Compliance with the suggested interventions has been evaluated for short periods, and the findings indicate that there is potential for lifestyle change after educational programmes for people with osteoporosis (Chan, Chung & Day, 2005; Laslett, Neil & Lynch, 2004; Sedlak, Doheny & Jones, 2000; Curry, Hogstel, Davis & Frable, 2002).

In our opinion, there is a lack of knowledge concerning implementation of recommendations reference to osteoporosis. One way to improve this situation would be to explore the implementation of and adherence to these recommendations and further supplement the biomedical facts with experience from individuals living with osteoporosis. As far as we know very few studies have explored narratives of living with osteoporosis and individual processes of fracture prevention. For this reason, the aim of this study was to explore women’s experience of living with osteoporosis and related lifestyle changes.

Method

A qualitative method is useful to generate new understanding (Strauss & Corbin, 1998) about the processes that interact to form health promoting and risk-taking behaviour in individuals with osteoporosis. Grounded theory is one qualitative method particularly suitable to study people’s lifeworlds through social processes and social interactions. The method is built on symbolic interactionism, which means that meaning is constructed and developed through social interactions (Strauss & Corbin, 1998). Grounded theory strives to generate substantive theories valuable in clinical practice (Strauss & Corbin, 1998; Dellve, Abrahamsson, Trulsson & Hallberg, 2002) and, therefore, it was suitable for this study, since this approach has not been much used in osteoporosis research.

Participants and procedure

In-depth interviews were conducted with 13 Swedish women (age range 60–81 years) who knew that they had osteoporosis. The participants were encouraged to speak freely about their experience and impressions. Some questions were written down and used as support during the interviews, such as “Would you like to tell me about your experience of having osteoporosis?” “In what way do you think knowing you have osteoporosis makes differences in your everyday routines?” “What has changed owing to your experience of living with osteoporosis?” The interviews were conducted in the informants’ homes or at a primary health care centre, taped and transcribed verbatim.

The informants were selected from a primary health care register. According to open sampling, with the aim of maximal variation of the informants’ experiences, variations were initially chosen regarding ages, living conditions and time of participation in the Osteoporosis Programme (Strauss & Corbin, 1998). For ethical reasons, variations with regard to risk factors for fracture, physical skills, drugs, number of fractures and chronic diseases were determined when the informants had granted us access to their medical records. The woman we selected first had had several fractures, lived alone in an apartment, was retired, physically impaired and had no chronic diseases. The following women were then chosen in a comparative way in order to provide depth and different dimensions for rich categories. In addition to open sampling we also used theoretical sampling in order to focus the data collection, enrich the categories that emerged and guide “where to go” for the coming data collection (Strauss & Corbin, 1998). Theoretical sampling was used in three ways: first, as the interviews proceeded, new questions emerged from data in order to explore and saturate the dimensions and properties of the categories that emerged; meaning in lifestyle changes, picture of oneself, plans for the future. Second, questions arose regarding the ways in which participating in an Osteoporosis Programme might affect the processes studied. Therefore, we framed the theoretical sample to include four women who were not participating in an Osteoporosis Programme. Thirdly, we reanalysed all data after the last interview once again to make constant comparisons for saturating the gaps among categories that emerged (Charmaz, 2006).

The study was approved by the ethics committee at Karlstad University (UFO 2004/124).

Analysis

The analytic process was carried out manually and simultaneously with the data collection. Coding as used here means identifying and conceptualizing
events, actions and meaning through a process that first fractured the raw data and thereafter analyzed it. The categories were then divided and rebuilt from these broken-down concepts. Finally, the categories that emerged were integrated into an explanatory theory. Three main analytical tools were used during this entire process of open, axial and selective coding namely: constant comparison, repetitive questioning and “memo-writing” (Strauss & Corbin, 1998). Memos, as theoretical reflections and ideas based on the data, were written down after every interview, during the analysis and subsequently during the framework, and written in a free way (Charmaz, 2006).

Open coding

The process began with open coding including line-by-line analysis of the whole text from every interview, in order to reveal items significant to the phenomenon explored. These items were written down in the margins, compared with each other, classified for similar properties and dimensions, labelled as concepts and transferred onto cards. Concept cards were then grouped according to their similarities and differences for conceptualizing relationships in a higher order. Common characteristics within an action, feeling, or happening were then placed into new groups, at a higher level of abstraction, for development and enrichment of the emerging subcategories (Strauss & Corbin, 1998).

Axial coding

In this phase of coding the aim was to clarify how the subcategories that emerged were related to preliminary categories, and then to compare how the preliminary categories were integrated with each other. The category was seen as the centre of the phenomenon and the subcategories were theoretically compared with this centre around an abstract axis, “axial coding”, to sort out similarities and differences for conceptualizing relationships in a higher order. Common characteristics within an action, feeling, or happening were then placed into new groups, at a higher level of abstraction, for development and enrichment of the emerging subcategories (Strauss & Corbin, 1998).

Selective coding

In this final part of the analysis, we focused on meaningfulness and social interactions of a higher order to find a pattern based on social actions (Charmaz, 1990; 2006). The categories that emerged were organized and compared to assess that their characteristics were sufficient to explain the phenomenon studied. One central category emerged that related to the other categories, presented here. This core category became the focus for explaining the meaning in the narratives of women with osteoporosis and their processes of behaviour change. While we wrote the story and tried to present these findings in a substantive theory, the core category with its subcategories was compared to the raw data again. The analytical process ended when categories seemed to relate to each other and to explain theoretically a process that brings some new understanding to the phenomenon explored. The substantive theory generated was then considered as theoretically saturated in this context (Strauss & Corbin, 1998).

Results

The outcomes mirror a pattern of driving forces within these women that seem to affect an ongoing motivational process of awareness for preventing fractures. Six categories are integrated to initiate and subsequently to support and maintain motivation. The core category generated is labelled developing a healthy risk awareness, which in these data, guides motivation for risk reduction behaviour and lifestyle changes. The other five categories are structural elements in this process of achieving healthy risk awareness, namely accepting having fragile bones, living with fear, needing to learn, having confidence and experiencing a sense of social context (see Figure 1).

Developing healthy risk awareness

Healthy risk awareness is developed through the interaction of emotional and cognitive processes initiated by being aware of having osteoporosis. The new condition of being a woman who has to accept having fragile bones is the first phase in this motivational process of acting in preventive ways. Driving forces are actively involved in overcoming barriers during this motivational process. Repressing one’s osteoporosis never leads to healthy risk awareness. Difficulty with accepting having fragile bones leads to fear. Fear impedes learning, developing
confidence and experiencing social meaning. This state might result in unhealthy absence of risk awareness, increased fear, physical inactivity and social isolation (see Figure 1).

People with healthy risk awareness are not paralyzed by fear. Instead, they use the desire to overcome this fear to initiate a learning process that facilitates physical and social activities. There are repeated examples in our data of the development of risk reduction behaviour. People learn to avoid activities like carrying heavy things or climbing on chairs, which before they knew they had osteoporosis, were part of their everyday lives. There is a balance between being aware of the risks remaining active, and maintaining one’s social context. Although she has suffered three fractures, this woman continues her horse riding, guided by her healthy risk awareness:

I bought myself anti-slip shoe grips for my shoes at the pharmacy. You’re done for if you fall! I think more about those things now. When I horseback ride I ride more calmly, look at the path, trot carefully on the track. Nothing could tempt me to gallop on this wet ground.

Resilience factors like having confidence and using the ability to experience a sense of social context make it possible to transform this new state of accepting having fragile bones and feeling fear into needing to learn and develop greater awareness. Having confidence then interacts with learning and experiencing a sense of social context to contribute to healthy awareness. Managing fear by learning how to prevent fractures and still experiencing a sense of social context increases confidence. Therefore, healthy risk awareness also generates greater confidence thanks to learning to feel safe with one’s new risk reduction behaviour: “I tell myself I need to get rid of my fear. I take my supplements every day for my skeleton and my medication once a week to build up my bones. And I think, now my skeleton is stronger, that feels good.” This transformation leads the informants to healthier behaviour, with a risk reduction strategy including both thoughts and actions, as indicated in our data. The underlying gain achieved from this healthy risk awareness is that the women maintain their sense of social context. Social coherence brings meaning to lifestyle changes and preventive habits. Our informants, through developing healthy risk awareness, have grown in their confidence and ability to both understand and experience the social benefits of acting preventively. This helps them control their fear. Below the meaning of the categories is described.

Accepting having fragile bones

In our data, accepting having osteoporosis means living with the awareness of having fragile bones and the consequences of fractures. The informants had different experience from the day they got their diagnosis. One informant who met other women with osteoporosis in an educational programme said:

I was crestfallen when they told me I had osteoporosis, I hadn’t expected it. I grew up in the country and we were active all the time compared with young people living today. I felt it wasn’t fair. Then when I got to the Osteoporosis Programme I could see that even young people can have osteoporosis. That gave me new perspective.

Some informants had to fight for the right to be examined while others did not believe their diagnosis. This 60-year-old woman who had had several fractures, had to be tested three times before she was convinced that she has osteoporosis.

I was very upset and said your instruments must be wrong, you have to do the test over. So she did a second measurement and I was still in the red area. Before I knew about the tests at the hospital I had made an appointment at a private clinic to be on the safe side, since my sister has osteoporosis. Then (after the hospital test) I thought I’d better get a second test done because they are wrong at the hospital, but they weren’t. They were right and I started accepting the thought that I have osteoporosis.

Vertebral fractures lead to physical changes in posture, shorter stature and back pain which affect
identity and body perception. The informants also talked about their grief about the consequences of living with osteoporosis: “You don’t recognize your own body. I’m 13 cm shorter. You get bent over and your stomach protrudes, your posture goes all wrong. I’ve never been overweight or fat. I’ve always been tall and slim but now I’m bent.”

Although they had different experiences, the common line in their stories is that their way of handling acceptance seems to affect their motivation to change behaviour. There is a tension in the data between accepting and denying having osteoporosis. Repressing one’s bone fragility seems to further impede motivation, since denying does not generate fear, which for these women was a driving force to achieving healthy risk awareness.

Living with fear

All the informants had experienced some fear of falling. Having fear influences motivation based on emotional memories about losing physical control, being isolated, having to rely on others and poor self-worth. This woman expresses fear and frustration about understanding the low bone density in her backbone, which triggered a fear of vertebral fractures. She is wondering what consequences this low bone density will have for her everyday life:

The last test showed that my backbone was −3.6 (standard deviation, SD), and that has affected my way of life the last two years, because I got scared. I asked, so what’s going to happen now? The nurse said: 'I think you should be careful. Don’t go to the store and buy a sack of potatoes and lift up a heavy package of soft drinks, because that could cause you vertebral compression.' But I’ve been doing those things all my life. I’ve always done the lifting and carrying.

Traumatic physical experiences such as falling and fractures trigger fear and decrease confidence in one’s physical capacity. Efforts to prevent falling, such as checking the ground and being physically tense; decrease one’s faith in one’s own body:

Since I was told about my osteoporosis I am scared more often than before, more frightened of falling because I had so much trouble after this fracture. I broke my shoulder in three places and was in really bad shape. So now I am more scared when I move around.

Fear also affects the compliance with medical recommendations. For some women low compliance with osteoporosis medicines goes hand in hand with the fear from the feeling of not having support: “She (the doctor) gave me a prescription, but I was afraid to take the medicine. When I read about the side effects I thought they seemed terrible.” Fear is a serious negative feeling for women with osteoporosis. However paradoxically, fear also seems to facilitate constructing healthy risk awareness. In our data, being reminded about the risks, emotionally based on fear, motivated fracture prevention behaviour. Fear triggered cognitive processes, and the informants began to seek information about their osteoporosis. This informant contacted the Osteoporosis Programme when she realized having osteoporosis could have caused her fracture: “I got involved right away because I thought it would help me to recover and to avoid future fractures.”

Needing to learn

In the process of accepting the fragility of their bones, the informants expressed needs to learn more about osteoporosis, based on curiosity or frustration. This need seemed to increase further for those who had experienced one or more fractures: “I thought the Osteoporosis Programme was great. I phoned the physiotherapist at the health care centre right away after my fracture.”

Knowledge and new ideas can generate insights into other prevention possibilities and thereby give hope of health benefits and maintaining social values based on risk reduction behaviour. This search for knowledge is an ongoing process since life goes on, and recommendations regarding osteoporosis keep developing. Participation in an Osteoporosis Programme also gave the informants insights into themselves in relation to other women with osteoporosis, in contrast to the women who did not participate. The programme worked with balance, muscle strength, exercise, and group discussions. The physical tests gave the women insight into their physical weaknesses and resources, helped them to know themselves better and to integrate the facts about their osteoporosis into their lives. The programme also gave them a sense of community and helped them feel that if others coped, so could they. Women who did not participate in an Osteoporosis Programme missed out on these benefits and expressed the need to learn. They found other ways to seek knowledge in the mass media and via the Internet. When the informants understood their possibilities of self-management, they expressed a feeling of taking responsibility and having control over their own health:

I’m going to be sure that for however long I live I am in as good shape as possible. No one can do
that for me but me, myself. I can’t ask the physiotherapist or the doctor to do it. I have to do it myself.

**Having confidence**

To our informants, having confidence in their capacity means having the cognitive and emotional power to deal with fear of fractures. This includes having the courage to still being physically and socially active. Achieving such confidence requires cognitive training to overcome uncertainty. Preoccupation with the risks associated with fragile bones is transferred to a focus on the possibilities of preventing fractures. Having such an improved mental self-confidence generates self-esteem. The women begin to give themselves credit for their efforts instead of blaming themselves for their failures as in this excerpt:

“I’m so happy when I have been for a walk. It makes me feel I have accomplished something, and I think, I’m glad I was able to have my walk. I managed to walk for half an hour today which was wonderful for me and for my skeleton. I know now that walking is good both because of the exercise and for getting daylight.”

Informants with confidence felt they could rely on their body’s abilities. They described not having physical confidence, as loss of balance or muscle capacity, implying increased fear of falling. Some women regularly use health professionals to help them improve their confidence. Having a bone density scan every second year is one way of getting the necessary feedback. Health professionals thus support informants’ confidence in their capacities and abilities to maintain fracture-preventing behavior: “Now I’d like to do a new test, because I’d like to know if all the walking, the sun and being outside has affected my results.”

**Experiencing a sense of social context**

The informants described that experiencing a sense of social context through social coherence facilitates the ability to establish goals in relation to behavioral change. A sense of social context then, is associated with participation in the community, which generates social values about staying physically, socially and intellectually active. In contrast, being weaker and less fit could lead to fractures and dependency that affect this sense of social context negatively. Dependence after a fracture thereby has consequences at the individual level, as in the case of this woman, and leads to experiencing of decreased self-esteem:

“I couldn’t do anything by myself, not get dressed or anything. I was like a little baby. Getting out of bed was really hard. I couldn’t cut my food myself. That was the most difficult part, it was terribly tough on me. Not being able to take care of myself was a deep psychological blow.

Independence thus became a goal in the process of constructing healthy risk awareness. Maintaining social roles was another important social driving force in our data, described as striving to remain able to be an active grandmother, a good caring wife or to take care of a friend’s dog regularly. These daily social interactions gave the informants a sense of being someone, a sense of social context. Indirectly, they motivated lifestyle changes for fracture prevention. One informant expressed her strong will to keep being active and to maintain positive contact with her grandchild in spite of her back pain and her worries about osteoporosis:

“You want to be in on things. I want to be able to be out and about, and I like doing things. I also have grandchildren, that’s such a treat . . . she has given me so much, and she still does. Now she’s in England. When she was going over there, I wanted to help. So her mom and I went with her. She had to carry my clothes (because of the osteoporosis in my backbone, they were too heavy for me). It was wonderful to be able to go along.

The informants also described experiencing a sense of social context through their social interests, as another driving force for obtaining the cognitive skills to prevent fractures. Long-term goals with dreams and future hopes also encourage everyday efforts to develop healthy risk awareness. One informant described how she used her social interests to motivate herself for self-management:

“Travelling and meeting new people has been my life. It’s so much fun to go to Spain, to Tenerife, things are so relaxed there, you meet people and you may never see them again in your whole life but you have fun while you’re there. I have always dreamt of California, and now I’ve been there. It was fantastic! Now I want to get strong enough to travel again, that’s one of my incentives.”

**Discussion**

The core category generated, *developing healthy risk awareness*, explains how women with osteoporosis empower themselves to deal with the new knowledge about their fragile bones. Our informants managed to transform emotional and cognitive experience of
living with osteoporosis into an inner motivational compass guiding them on the right course ward to risk reduction behaviour.

The categories that emerged provided the structure described of an empowering process to acquire healthy risk awareness (Zimmerman & Rappaport, 1988; Zimmermann & Warschausky, 1998; Laverack, 2004). Our informants described finding the balance between being aware of the risks, emotionally based on fear, and being physically and socially active with a high quality of life. They also managed to experience the benefits of social context in this process, which further empowered them to maintain their risk reduction behaviour. Our findings can also be seen in a salutogenic perspective (Antonovsky, 1991) where accepting the risks of bone fragility and the consequent fear are stressors. In coping with that fear, our categories needing to learn, having confidence in one’s capacity and experiencing a sense of social context are valuable salutogenic factors for behaviour change.

Hvas, Reventlow, Jensen and Malterud (2005) found, in a qualitative study, that being aware of having osteoporosis might increase worry and uncertainty in healthy women. Our findings corroborate that conclusion, but in our view, the tension between acceptance of bone fragility and the consequent fear needs to be further explored. Our findings indicate that in addition to worry and uncertainty, women also begin to change their behaviour after they realize they have osteoporosis (Hvas et al., 2005; Winzenberg, Oldenburg, Freidin, De Wit, Riley & Jones, 2006; Gerend, Erchull, Aiken & Maner, 2006; Rossini et al., 2006). If they had not been diagnosed, the motivational driving forces would probably have been weaker. Based on our data developing healthy risk awareness is the key to fracture prevention behaviour in women with osteoporosis, and acceptance appears to be the trigger for this empowering process (Zimmermann & Warschausky, 1998).

The phases when our informants expressed being paralysed with fear can also be compared with powerlessness, helplessness, not having enough skills and resources to take control over one’s life (Strandmark, 2004; Wallerstein, 1994). Excluding clinical investigations of osteoporosis based on the concepts of worry and uncertainty (Hvas et al., 2005; Dalsgaard, Hvas & Malterud, 2006), according to our data, would be to deny the potential prevention process that acceptance and fear generate. Moreover, statistically, every second woman over 50 in Scandinavia will suffer an osteoporoses fracture (SBU, 2003). Therefore, we cannot go on denying this huge public health problem. Since osteoporosis is asymptomatic, bone density measure-
do not conclude that having confidence in one’s capacity is more important, with regard to motivation for fracture prevention behaviour, than the other categories generated in this present study. Further research is needed in this area. Schwarzer (2001) and Litt, Kleppinger and Judge (2002) point out that self-efficacy is especially valued for the maintenance of health behaviour. According to our data, confidence interacts in several ways to encourage behavioural change. We highlight the pattern where having confidence in one’s capacity seems to facilitate managing fear. Further, having confidence interacts with experiencing a sense of social context, to stimulate a process of constructing healthy risk awareness. According to our findings, having confidence is part of early behaviour change and later helps to maintain healthy risk awareness that promotes fracture prevention behaviour.

This social cognitive perspective for lifestyle change has been very little studied among women with osteoporosis. One study in elderly persons found associations between high self-efficacy, strong social functions and a more physically active lifestyle (Litt, Kleppinger & Judge, 2002). In research using quantitative research approach social support, knowledge and self-efficacy have all proven to contribute to a lifestyle that prevents osteoporosis in young women (Ievers-Landis, Burant, Morgan, Trapl & Kwoh, 2003). Those variables are comparable to our categories experiencing social meaning, having confidence and needing to learn. In post-menopausal women with osteoporosis, such a quantitative approach remains to be explored.

Method

To generate a theory based on data, we used guidelines taken from a combination of post positivist and constructivist grounded theory (Strauss & Corbin, 1998; Charmaz, 2006, 1990; Hallberg, 2006). Constant comparisons were our main guide to keep the analysis grounded in the data, for shaping credibility and trustworthiness using this method (Dellve et al., 2002). We also hope the credibility was strengthened by using two analytical foci: (a) the post positivist traditions as way of a helping to systematically build theory from raw data using the hierarchical systematic with open, axial and selective coding (Strauss & Corbin, 1998); and (b) the more constructivist grounded theory, facilitating creativity with free memo-writing. We particularly stressed this constructivist focus during the axial and selective coding process, in order to understand the relationships between the categories that emerged from social processes in meaningfulness and action. Like Charmaz (2006), we believe that this substantive theory has been constructed in a socially interactive process between the interviewer and the informants. In the analytical process, our efforts have been to be inductive, and therefore we identified our preconceptions before analysing the data. We also used reflexivity to compare constantly the categories that emerged as being grounded in data (Hallberg, 2006).

The present findings represent our interpretation of the voices of women who know they have osteoporosis and their different experiences of living with this insight and the related lifestyle change. The findings do not represent all women with osteoporosis. Our informants were independent and active both physically and socially since they lived in their own homes without extra community support. Transferability of our findings to clinical practice therefore does not include transferability to frail elderly women with osteoporosis (Malterud, 2001). However, the majority, over 90%, of the elderly (65+) in Sweden live in this independent way. Nine of our informants participated in an Osteoporosis Programme, which probably affected their experience and motivational forces. The data included four women who have not attended an Osteoporosis Programme but still managed to focus on developing healthy risk awareness. However, our sample may represent women with higher motivation for behaviour changes than the general population and might not represent women who totally deny the risks or, for other reasons, are not motivated enough to go from acceptance of bone fragility to needing to learn more. Our findings represent a substantive theory explaining a process of motivation for fracture prevention behaviour in women with osteoporosis, valuable in clinical practice (Strauss & Corbin, 1998; Dellve et al., 2002). In future research, we welcome grounded theory studies of women with osteoporosis for comparisons with our own.

Conclusions and implications

The core category, developing healthy risk awareness, explains how women with osteoporosis empower themselves and achieve fracture prevention behaviour. According to the substantive theory presented here, adherence to such risk reduction behaviour might increase when women accept having fragile bones and experience fear as giving them potential emotional power to acquire healthy risk awareness. We believe that preventive activities can be successful if they manage to encourage women with osteoporosis to learn more about their osteoporosis, and give them greater confidence to managing fear and facilitating behavioural change. Experiencing a sense of social context in this motivational process is another
salutogenic factor that seems to empower women with osteoporosis to develop fracture-preventing behaviour. In health promotion activities, it would therefore be interesting to broaden the biomedical focus and further explore the association between a sense of social context and risk of fractures.

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