

## Falling Between the Cracks: Attitudes and Perceptions toward Osteoporosis Prevention among Postmenopausal Women

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### Abstract

**Background:** This study explored women's attitudes and perceptions about osteoporosis prevention to inform the continued development of community based exercise and education programs.

**Methods:** A focus group was conducted with nine community dwelling postmenopausal women who resided outside of Hamilton, Ontario's urban core.

**Results:** The findings suggest that these women associated aspects of their nutrition and exercise behaviours with maintaining healthy bones, but most did not feel that they were at risk of osteoporosis. Their lack of engagement in osteoporosis prevention behaviours was explained by comparing osteoporosis risk to diseases and health outcomes that were perceived as more severe. **Conclusion:** The women's perceptions toward osteoporosis indicated that a knowledge gap exists with regard to the role of exercise for healthy bones that is compounded by an overarching confusion related to osteoporosis risk factors.

**Keywords:** Focus group; Aging; Women's health; Bone health; Osteoporosis; Exercise; Canada; Qualitative

### Introduction

Osteoporosis is a systemic disease characterized by bone becoming increasingly porous and weak, which leads to bone fragility and elevated fracture risk. While osteoporosis affects both men and women, the rapid bone loss experienced by women during menopause results in a significant loss of bone mineral density (BMD) by the end of the menopausal transition [1]. Subsequently, the majority of persons with or at risk of osteoporosis are women over 50 years of age [2]. Indeed, the increased risk of bone fragility experienced by women has led to osteoporosis information being tailored for an older female audience. Educational events and materials delivered through Canadian governmental and non-governmental organizations is targeted at postmenopausal women because of their high fracture risk.

Prevention education is the cornerstone of osteoporosis management in Canada because bone loss can be challenging to arrest or reverse once it has occurred. The focus of osteoporosis prevention and treatment education is on developing healthy lifestyle habits, specifically engaging in weight bearing physical activity, supplementing with vitamin D, and consuming sufficient amounts of dietary calcium to prevent bone loss [3]. Exercise, or purposeful physical activity, is an important lifestyle behaviour because it aids in osteoporosis prevention through multiple avenues: increasing BMD, reducing bone fragility, and mitigating the risk for falls by improving balance, reaction time, and muscle strength [3-7]. Community based osteoporosis prevention programs aim to encourage weight bearing exercise by promoting its benefits to postmenopausal women. However, developing targeted programs requires investigating the role that osteoporosis plays in the

lives of older women and their attitudes toward exercise as strategy for preventing osteoporosis and fractures.

Hamilton is among Ontario and Canada's most densely populated cities, located along the western end of Lake Ontario between Toronto and Niagara. The suburban communities surrounding the city of Hamilton comprise 150 000 people and represent an important site for osteoporosis education. In areas of suburban sprawl, a larger population of young families may preclude older adult programming in the community centers. Although Hamilton houses a growing number of suburban communities, its industrialized city centre is home to an increasing number of adults over the age of 50 [8]. Subsequently, governmental and non-governmental osteoporosis prevention programs are active in the city centre, but access to osteoporosis education, support, and exercise programs may vary depending on which area of the city one resides. Statistics Canada data suggest that there may be a gap between health promotion and behaviours in this age group, since only half of all women over 50 years of age living in the Hamilton-Niagara region report being active in their leisure time [9]. Furthermore a study conducted in Hamilton surveyed adults with fragility fractures, comprised mostly of postmenopausal women, suggested that there is a deficit in osteoporosis knowledge, particularly in relation to its risk factors [10].

The development of community based osteoporosis prevention and education programs requires consultation with community dwelling women. This is an important step to understand their beliefs about osteoporosis and the barriers they experience in order to identify and implement the types of programs that would benefit them. In Hamilton and similar cities in southern Ontario, the implementation of community based osteoporosis programs is evolving. Investigating the knowledge, beliefs and perceptions women have toward

osteoporosis and the importance of exercise is needed in order to develop accessible community based programs. This study was developed to explore the attitudes and perceptions that postmenopausal women had toward osteoporosis prevention. Women residing outside of Hamilton's urban core were invited to a focus group that would inform the continued development of bone health education and exercise programs in the community.

## Theoretical Framework

The Health Belief Model (HBM) was selected as a framework for this study because it is used to investigate the relationship between perceptions of disease and participation in prevention behaviours [11]. The HBM states that beliefs about a specific illness and its associated prevention behaviours will affect the likelihood of engaging in those prevention behaviours [11]. According to the HBM, beliefs about the susceptibility and seriousness of a condition will increase the perceived risk of the disease and motivate individuals to participate in prevention behaviours. For osteoporosis, perceptions relating to individual susceptibility, benefits of prevention activities, barriers to prevention, motivation to engage in prevention, and severity of the disease all act to influence the application of osteoporosis knowledge to behaviour [12]. The degree to which each of these factors influences health behaviour varies by group and is the result of the interaction of social constructions of disease risk with other social determinants of health. The greater the difference between the perceived barriers to and benefits from a health behaviour influences engagement with prevention. A number of modifying factors including demographic and psychosocial variables also influence the individual's perceptions at different stages of the HBM.

Applying an HBM to older women's beliefs and perceptions about osteoporosis and the role of community engagement facilitates the investigation of the relationship between perceptions of osteoporosis and the attitudes toward community based prevention education. In order to identify the types of community based programs that would support the acquisition and application of osteoporosis related knowledge by women in the community it is necessary to explore how older women perceive the threat of osteoporosis and the importance of exercise as a prevention behaviour.

## Methods

### Participants

Recruitment targeted a recreational centre (Rec Centre) in a suburban area of Hamilton, located approximately 15 km from the city centre. Poster advertising and an announcement at the Retiree Club general meeting addressed women aged over 50 years. The Rec Centre was chosen because it does not offer exercise programs tailored for persons with or at risk of osteoporosis.

### Data collection

The study was approved by the institutional research ethics board. All participants provided written informed consent and agreed to be audio recorded during the discussion. Focus group methodology was selected to probe human attitudes and perceptions that cannot be captured quantitatively. Focus groups facilitate dynamic and interactive conversation among participants based on open ended questions posed by the moderator to generate a rich source of information [13,14]. Nine women volunteered to participate in the

focus group. To encourage participation and accommodate the volunteers, the focus group was conducted in a Rec Centre meeting room following a Retiree Club gathering. Women were unaware of the focus group questions prior to participating, to ensure spontaneous responses. In lieu of an honorarium, participants were offered a complimentary lunch prior to the focus group.

The chairs in the meeting room were arranged to create a comfortable forum for discussion and permit all focus group members to see each other. The facilitator led a 45-minute discussion about bone health, osteoporosis, and exercise using predetermined, open ended questions. The co-facilitator observed participant behaviours and maintained an electronic record of important aspects of the dialogue (i.e., field notes).

### Analyses

The focus group data were analyzed following the method for qualitative content analysis outlined by Graneheim and Lundman [15]. This method of thematic analysis involves the identification of salient themes within the interviews through a process of assigning codes to specific phenomena, objects or events that represent their interpreted meaning. These codes are then grouped into categories and further into larger themes. The audiotape was transcribed verbatim and, in combination with field notes, thematic analysis was conducted. NVIVO 10 qualitative software was used to manage the data. Verification of the trustworthiness of the analysis was conducted through a member checking process in which participants provided feedback on the themes and direct quotes.

### Result

All women (n = 9) in the focus group were aged over 50 years (min and max, 54 y and 82 y; mean, 61 y). The majority (n = 7) were retired but two women were employed part time. All women were community dwelling and resided within a 20 km radius of the Rec Centre; most (n = 5) lived with family members, while others lived alone (n = 4). Three women reported a family history of osteoporosis; one of which indicated she was currently taking a bone sparing medication. The overall focus group atmosphere was friendly, relaxed and positive. Women contributed to the focus group discussion by providing examples of personal experiences related to osteoporosis risk, screening, and prevention. Four central themes emerged from the analyses.

#### Theme 1: Osteoporosis is not one of 'the big ones'

The overall perception of osteoporosis was of "a weakness in your body", but it was not perceived as serious. Osteoporosis was consistently characterised as not one of "the big ones" as it did not carry the life threatening consequences associated with serious diseases. One woman said, "[osteoporosis] is not like heart disease or cancer or something like that, that you can really identify with, unless you have someone close to you or you yourself are diagnosed". The association of disease seriousness and personal identification with experiencing a disease was echoed by other women. One woman mentioned that her family is well aware of her osteopenia and the association between falls and fractures, so that the men in her family always remind her to hold the handrail when negotiating stairs. Some women indicated that their sister, aunt, or daughter had osteoporosis, yet they did not feel at risk for osteoporosis themselves:

Observed [have a family history of osteoporosis] on my mother's side but it's distant, it's not immediate family. It's not something that see every day or hear about. It's my aunt. So once in a while heard about them, but because it's not up in front of me all the time it is something that really don't pay much attention to.

The age of the women did not affect their perceptions of the seriousness of osteoporosis; however, age was associated with a need for heightened awareness of general health. All the women cited age 50 as the point at which they needed to start being concerned about age related diseases, but they did not identify advancing age with an increased risk of osteoporosis. Age 50 was viewed as a turning point where a checklist of potential problems required attention in order to "take care" of their perceived increased risk of chronic diseases, "in my mind it's more like a checklist, which mean we all know to get our cholesterol checked, our blood work checked, at least in our 50's". While bone density scans were acknowledged as a part of this list, the scans were viewed as insurance against a potential problem being missed rather than a legitimate fear of developing osteoporosis.

The women without osteoporosis or low BMD indicated that they were not concerned and did not consider themselves at risk of osteoporosis. Some women indicated that they were physically active or consumed calcium or vitamin D, while others cited their lack of symptoms or normal bone density scans as a reason for being unconcerned. Women described osteoporosis with a sense of removal; it was viewed as a disease that was not visible within the community and was something that happened to other people. "If you're not talking to someone who has it, or haven't had any experience with it, you don't know anything about it", "Really think [osteoporosis] is something that can't happen to me". While some women identified height loss, fractures, and falls as concerns related to osteoporosis, these consequences were described as nuisances, rather than threatening disease outcomes. Contributing to this sense of removal, the women said that osteoporosis and bone health were not topics that are discussed with peers or family members. A sub-theme that emerged was a lack of urgency toward preventative behaviours, characterized by the attitude that "osteoporosis can't happen to me" and "hoping for the best". Women openly recognized and discussed preventative behaviours for osteoporosis, but most admitted that these were not priorities and did not feel the need to justify their inaction. Further, the women did not perceive their inaction to have consequences for their immediate or distant futures.

## **Theme 2: 'Falling between the cracks'**

When women were prompted to consider osteoporosis prevention, a perceived lack of information was raised. The women agreed that more information about osteoporosis and its prevention is now available, as compared to 10 years ago. However there was a sense of frustration concerning the amount and consistency of the information. For example, the inconsistent information provided by their doctors caused concern over their doctor's familiarity and knowledge regarding osteoporosis. One woman reported that her doctor asked her if she thought she needed a bone density test, while another indicated that her doctor has never mentioned osteoporosis as a potential concern. Adding to this frustration, several women were worried about the changes to BMD screening intervals in Ontario, which were recently increased from every two to every five years. These women expressed the feeling of "falling between the cracks" of the healthcare system based on the modified osteoporosis screening intervals and minor perceived risk of osteoporosis expressed by their doctors.

Women contested the role of doctors and the broader medical community in disseminating osteoporosis information. Initial responses to finding osteoporosis information suggested that doctors, because of their authoritative medical knowledge, were the most reliable source. Doctors were viewed as responsible for delivering risk and prevention information about osteoporosis as part of general health maintenance. The women began by espousing the belief that they should wait for their doctors to raise medical issues. The impression was that if the doctor is not concerned about osteoporosis, then it is not a priority. "The doctors never brought it up at physicals or anything like that. Like maybe there was never a need for it". As the differing recommendations that women received were shared, the discussion shifted toward taking individual responsibility, being investigative, and asking more questions about their health instead of waiting for their doctor to initiate the conversation. Participants contradicted their earlier comments and expressed their independence in searching for information because they felt that doctors could be fallible and that the onus for being informed was their personal responsibility. Later, they acknowledged that the degree to which they felt at risk affected the type of information they sought:

think it's more a case of you need to look after yourself and if you need information or you think something's missed and your doctor hasn't thought to take care of it then you have to speak up for yourself and do it. It seems that there's a lot of information there about everything so you're not going to cover every item, just the ones that might pertain to you with your history.

The sense of being overwhelmed by disease information was pervasive, leading women to only focus on the diseases that posed the greatest threat of mortality, "the big ones". The perception that resonated within the group was: "If it's not something you're concerned with, it's not something you're going to go out and look for information for".

Though the participants claimed they were unconcerned about osteoporosis, they also felt that there was a dearth of information concerning the disease. There was a perception that if osteoporosis was serious then it deserved more attention because by not knowing about conditions like osteoporosis, one is at danger of doing more harm to themselves. There was also an overall sense that osteoporosis was not at "the forefront of women's health", which was responsible for the paucity of information. Media visibility was viewed as a measure of the importance of a disease, and when osteoporosis was compared to other chronic conditions they felt that osteoporosis was consistently absent from media coverage. The women were unsure if osteoporosis was represented by an organization in Canada, with one woman commenting, "don't think [osteoporosis] has an organization – does it?" The participants believed that patients and medical organizations should have an active role in educating the public. They explained that there were no organizations for osteoporosis that were "doing media things, like cancer's always doing or MS you know, it's always on the news". The lack of availability of information on osteoporosis contributed to the perception that women were not being appropriately educated on the risks of osteoporosis and that those at risk were potentially being missed.

## **Theme 3: 'As long as you do something'**

"As long as you do something [active] once a day Something. You can read a book for the rest of the day". This comment illustrates the relaxed approach to exercise as an osteoporosis prevention strategy. Another woman added, "Was trying to be good since retired and am

over 50, over mid 50's now, so thought ok to go make myself do that physical stuff". While the second comment indicates some effort in modifying lifestyle habits, it seemed to portray osteoporosis prevention as relatively simple or, for the most part, out of one's control. The women often referred to osteoporosis risk as something that was easily "taken care of" through modifications to their lifestyle. "Think about it [osteoporosis], and take care of it with calcium and bone density scans and then forget about it". The majority of women could name a number of lifestyle modifications that were specifically intended to benefit their bone health; however, their suggestions focussed on nutrition and required prompting to discuss physical activity and exercise. Examples of healthy behaviour modifications included: calcium and vitamin D supplementation, weight bearing or "pounding" exercises, resistance training, and a healthy diet.

Knowledge regarding the importance and types of physical activity for osteoporosis prevention varied greatly. In general, women agreed that exercise is important; however, its benefits were identified as an indicator of a healthy lifestyle, rather than exclusively associated with bone health. Once one woman mentioned her weight bearing exercise regimen that helps treat her osteopenia, two women added that they perceived some importance to weight bearing exercise for keeping bones strong. Confusion emerged when the group attempted to identify specific exercises that are considered beneficial for bone. Although "pounding" exercises were emphasized, some women in the group remained unsure of what exercises would be considered bone building as well as sceptical of their benefit.

Along with weight bearing, muscle strengthening was also mentioned as an important reason for engaging in exercise. One woman explained why she exercises: "to increase my muscle strength, so if fall I've got something to hold me without my bone breaking". A woman, who identified herself as an active member of the fitness industry demonstrated further knowledge of the importance of other exercise:

Just think that, of course what she said, weight bearing is really important. know it's out there for women. But to me, don't think women realize how important it is to do resistance training because sometimes the perception is that don't want to look bulky. The other thing is, also think that balance exercises aren't emphasized enough.

The other participants reacted to this comment with surprise, since the importance of balance was not something that they felt had been emphasized by their doctors, peers, or other sources of osteoporosis information.

#### **Theme 4: 'I'm sure people would show up'**

Since the women were members of the Rec Centre, there was an immediate link between the topics discussed and the possibility of a bone health program being planned for the complex. Though involved in the community, most women were unaware that targeted bone health exercise programs were offered at community centres in the Hamilton city centre. Women were asked about the types of programs for osteoporosis they felt would be beneficial at the Rec Center, but were unable to provide specific details, speaking instead in generalizations.

It would be nice even if they had sessions at different places, even [if] it was a video or something where people could just actually go and spend the time that they need to do the things that they have like light weights or whatever. Not necessarily have to have an instructor there all the time – an instructor would be nice, but if they even had

videos or just a place where people could get together to do things. And some way of getting it out to the people to say this is available, because right now really don't know what's available out there.

The woman's comment also supports the importance of independence and the assumed responsibility these women have for finding preventative health information.

Overall, the women expressed positive reactions to initiating a bone health program because it may inspire individuals to adopt appropriate osteoporosis prevention behaviours. They felt that the specific dimensions of the program should be decided upon by the entire membership of the Rec Center through the use of a survey. A pilot program with an experienced instructor was endorsed as a way to gauge interest and response prior to full program implementation. Though the women discussed the idea of a program with enthusiasm, a comment voiced by one woman indicates the continued underlying view of osteoporosis as a minor problem, "if a specific bone class was offered I'm sure some people would show up".

While several women supported the implementation of a program, not all women echoed this desire. One woman expressed her frustration with feeling like a targeted demographic. She did not agree that the Rec Centre needed another program and remarked defensively:

think this facility in itself, if anyone's coming, they're doing something physical. So you're coming for a specific reason. To throw in another thing for your bones and that, well I'm already here for two hours I'm not going to have further workouts for that. don't know if that's something that really applies here because it's a physical place.

The comment also serves to highlight the confusion surrounding the relationship between specific types of exercise and bone health. Language such as "to throw in another thing", once again minimizes the importance of activities for improving bone health and indicates that time is a barrier to engagement in exercise. Bone health is construed as unimportant and not necessarily worth extra time.

## **Discussion**

The current study was designed to investigate the beliefs and attitudes that older women held about osteoporosis and prevention behaviours, with the goal of improving the design of community based exercise and education programs in the Hamilton area. Although limited in size, the focus group revealed important information about the role that bone health played in the exercise practices of these suburban women and aids in shaping the direction of future research. As indicated by the HBM, women's perceptions and beliefs about osteoporosis risk ultimately determined their decisions regarding preventative behaviour. The perception among these women was that osteoporosis was not one of "the big ones" and therefore was not targeted by these women for behaviour modification. Risk perception underscored these women's beliefs and attitudes about the severity of osteoporosis and as a result they were less likely to engage in preventative behaviour. While postmenopausal women represent a high risk population for osteoporosis, decisions about osteoporosis prevention are the result of individual perceptions of risk based on experience and education. According to the HBM, the greater the perceived severity, susceptibility and benefits to prevention, the greater the potential for adopting positive health behaviours [12]. The women's attitudes toward prevention were framed by their perception of osteoporosis as insignificant and to some, the belief that they were not

personally at risk. The knowledge these women had about osteoporosis was framed in a way that minimized the consequences of fracture. While women recognised that fractures were an outcome of osteoporosis, the consequences of fractures were not addressed directly. Minimization of perceived risk was accomplished through the process of 'othering', where responsibility and risk of disease is transferred to a group to which the individual does not belong. Instead, osteoporosis was a problem of older, unhealthier and frail persons. Women's attitudes toward osteoporosis prevention reflected this notion. While these women had some knowledge about osteoporosis, they had redefined its context. Osteoporosis was 'othered' and constructed as a problem about which they could rationalise not being concerned. These attitudes were supported by encounters with doctors and peers who did not express significant concern about osteoporosis risk. Women with osteopenia or osteoporosis in their families had greater knowledge, but shared similar attitudes that minimized the importance of osteoporosis in their lives. Preventative behaviours were viewed as a way of "taking care" of the nuisance of osteoporosis and non-participation in exercise was rationalised by relegating the etiology of osteoporosis to genetic determination and therefore immutable.

Osteoporosis is typically asymptomatic until a fracture occurs and is identified clinically. The invisibility of osteoporosis makes it difficult to communicate its seriousness, both for healthcare providers and those affected. As a society, we are most sympathetic toward diseases of which we can see the signs and symptoms [16]. While osteoporotic fractures can be debilitating and result in mobility deficits, pain, changes in self image, and poor quality of life [17,18], these are often considered to be natural and expected changes associated with the aging body [19]. Curiously, the importance of aging and osteoporosis was expressed using the threshold of age 50. Risk of osteoporosis was viewed as beginning at age 50, but there was no discussion of greater risk with increasing age. This is discordant with previous literature that has found age to be a predictor of self-efficacy for osteoporosis preventative behaviours [6].

While the women expressed 'laissez faire' attitudes toward prevention based on their perceived low risk, these attitudes were tempered by the belief that they should be doing more to prevent osteoporosis. Although they were generally active, emphasis was placed on nutrition – even when physical activity was discussed. This overarching focus on nutrition reflected the types of osteoporosis education these women had internalised, which emphasized the importance of nutrition and their own understanding of bone health. Attitudes toward weight bearing exercise reflected an overall lack of belief in its importance. A dissociation between osteoporosis and exercise emerged from the belief that any activity is good enough. Further, the polarized responses regarding a community based bone health program were underscored by the women's understandings of the overall importance of bone health. While some women expressed an interest in specific programs, others did not consider them beneficial and in their explanations reinforced the disconnect identified between exercise, bone health, and osteoporosis. The attitude "as long as you do something" gives women a false belief that that they are engaging in prevention, when in reality they might not be engaging in activities that are beneficial to bone. Most women were unable to clearly connect the benefits of weight bearing exercise with osteoporosis prevention, demonstrating a lack of understanding of how muscle and gravitational forces benefit bone health. The lack of understanding of how the different parts of the body are connected speaks to a deeper issue of an absence of the ability to relate their

physical body to its operation within space. Understanding disease requires an embodied experience, allowing women to locate disease within their bodies [20]. Osteoporosis represents an embodied risk, as it is a metabolic disease and so comes from within the body, rather than as a foreign pathological body. These women viewed both, the disease of osteoporosis and their own bodies, as discrete entities that were separate from themselves. The inability to visualize osteoporosis made the experience of osteoporosis a disembodied one to which women who had not experienced a fracture could not relate. Within the HBM, experience with a disease is an important contributing factor to interpretation of the severity of a disease. Since the severity of osteoporosis could not fully be appreciated by these women, the result was less emphasis being placed on the need for preventative exercise. The disconnect suggests a problem in the way knowledge is translated about the role of exercise in osteoporosis prevention. The development of prevention education should explicitly target the relationship between disease and the biological self in order to increase the internalization and application of prevention education.

Although these women constructed osteoporosis as nonthreatening to rationalize their decision to not engage in preventative behaviours, they recognized that they were considered 'at risk' as postmenopausal women. Perceptions of individual risk varied and, similar to previous reports and following the HBM [12,21], the women in this study who identified more osteoporosis risk factors expressed greater perceived susceptibility than those without risk factors. Women with more risk factors also demonstrated a greater degree of knowledge and more confidence in the accuracy of their responses. The relationship between knowledge and susceptibility suggests that educating women to spur behavioural change with respect to osteoporosis prevention seems to lie heavily in translating knowledge into a relevant context. Though perceptions of individual risk varied, when the topic of prevention was raised there was a strong and unanimous concern with the way in which osteoporosis was identified and treated by medical personnel, specifically, through BMD screening. The apparent contradiction between the lack of individual perceived risk and a strong desire for preventative screening suggests that women are aware of and concerned, on some level, about the threat posed by osteoporosis. While women rationalised their non-participation in health behaviours by the absence of individual risk factors, it may be that they viewed BMD screening as an essential decision tool for their continued non-participation. Each screening test that produced 'normal' results would reinforce their ability to justify non-participation in prevention activities.

Ideas about individual risk were tied to communication of incomplete and contradictory prevention information. The lack of information became a barrier to engagement and reduced motivation to alter behaviour. The focus group raised a series of concerns women had about the availability of osteoporosis prevention information and how this information is being communicated to them by their health care providers. Developers of the HBM predict that engagement in health behaviours is a result of their perceived effectiveness. In the case of osteoporosis, positive health behaviours are therefore not adopted because their perceived effectiveness has been undermined by multiple sources of conflicting information. When sources of information were discussed, women vacillated between an adherence to the idea of the 'doctor as authority' and the belief that they are responsible for finding their own information. Doctors appeared to be assigned the role of barometers of risk, therefore responsible for monitoring and communicating to their patients whether or not they are at risk of osteoporosis. This contrasted with the belief that if individuals were

concerned about a specific issue then they were responsible for gathering this information. While women perceived themselves as responsible for gathering health information about conditions their doctors considered them 'at risk' for, the women heavily relied on doctors to communicate which conditions should be investigated. However, in the case of conflicting information, it was unclear whether women felt they should trust their practitioner or their own research. When preventative behaviours are not being discussed at the doctor's office, women's perceptions about osteoporosis are transformed and disease severity reduced. As a result, the immediacy of risk is not communicated and the severity and susceptibility to osteoporosis is downplayed.

### Limitations

It is important to note that the perceptions, needs, and attitudes of women expressed in the focus group are limited in their generalizability. Participant selection plays an integral role in the focus group dynamic and ideally, participants are strangers but represent a population of interest based on defined inclusion criteria [14]. The group recruited for this study may have yielded improved results by separating participants into active and non-active groups or by bone health status. We acknowledge that no information about education or economic status was collected from participants. This limitation reduces the generalizability of our results and we cannot comment on the influence these factors had on our volunteers' views. Finally, the facilitators' attributes are also an important consideration for future focus groups. As young women with an interest and perceived knowledge level in the area of bone health, participants may have tailored their responses. This factor may have limited the level of detail provided by participants regarding risk factors or information about preventative behaviours, which would suggest we have underestimated their level of knowledge on the topic of bone health.

### Conclusion

The information gathered has made an important contribution to informing the continued development and implementation of osteoporosis education and prevention programs in the Hamilton area. To boot, it offers insight into the perceptions and beliefs held by suburban populations who have different levels of access to urban resources. The women associated aspects of their nutrition and exercise behaviours with maintaining healthy bones; however, most did not feel at risk of osteoporosis and explained their lack of engagement in prevention by comparing osteoporosis risk to more serious diseases. The prevalence of contradictory information on osteoporosis was viewed as a barrier to engagement in exercise as a prevention behaviour. Women expressed difficulty in discerning which prevention behaviours were beneficial and deciding which information sources were authoritative. The women's perceptions toward osteoporosis indicated that a knowledge gap exists with regard to the role of exercise for healthy bones that is compounded by an overarching confusion related to osteoporosis risk factors. The lukewarm response to a targeted bone health program suggests that exercises aimed at osteoporosis prevention would be better received if they were integrated into existing programs. The community center represents a promising site for the integration of osteoporosis prevention education and activities in this area.

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