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**RELATIONSHIP OF OSTEOPOROSIS KNOWLEDGE
AND PERCEIVED SUSCEPTIBILITY TO OSTEOPOROSIS
AMONG HISPANIC WOMEN**

By

Johannie M. Troncoso

A THESIS

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ABSTRACT

**RELATIONSHIP BETWEEN OSTEOPOROSIS KNOWLEDGE
AND PERCEIVED SUSCEPTIBILITY TO OSTEOPOROSIS
AMONG HISPANIC WOMEN**

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The purpose of this descriptive study was to examine the relationship of osteoporosis knowledge to perceived susceptibility to osteoporosis among Hispanic women. The Health Belief Model (Rosenstock, Strecker, & Becker, 1994) was the theoretical framework for the study. Data were collected from a convenience sample of 54 Hispanic women, ages 18 years and older, from two different areas in a Mid-Western state. The final sample, based on the inclusion criteria, constituted 41 subjects. The participants completed the Osteoporosis Knowledge Test (OKT) developed by Kim, Horan, and Gendler (1991) and the Osteoporosis Health Belief Scale (OHBS) also developed in 1991 by Kim, Horan, Gendler, and Patel.

Statistical analysis of data did not indicate a significant correlation and did not support the working hypothesis. Findings suggest a knowledge deficit about osteoporosis risk factors and preventive behaviors among Hispanic women, which implies a need for osteoporosis education targeting the needs of this population. Recommendations for further research include a larger sample size and further refinement of the instruments for Hispanic populations.

Dedication

This thesis is dedicated to mami and papi, whom since childhood taught me the value of education and instilled in me the desire to reach for the sky. Also to my husband Cris, whose understanding and support have been instrumental in the completion of this thesis and my education. Thanks to my family for their love and encouragement, and for believing in me. A special thank you to my aunt Menorca for her advise: "siempre se tu misma".

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Table of Contents

List of Tables	vii
List of Figures	viii
List of Appendices	ix

CHAPTER

1	INTRODUCTION	1
	Purpose of the Study	4
2	CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW	6
	Conceptual Framework	6
	Knowledge Related Research	10
	Osteoporosis Knowledge	13
	Osteoporosis Knowledge and Health Beliefs	16
	Perceived Susceptibility	18
	Summary	23
	Hypothesis	24
	Definition of Terms	24
3	METHODOLOGY	25
	Research Design	25
	Sample and Setting	26
	Instruments	27
	Procedure	29

4	RESULTS	32
	Sample Characteristics	32
	Data Analysis	34
	Descriptive Statistics	35
	Test of Research Hypothesis	36
5	DISCUSSION AND IMPLICATIONS	38
	Discussion	38
	Threats and Limitations	40
	Contributions of the Study	42
	Implications and Recommendations	42
	APPENDICES	45
	REFERENCES	54

List of Tables

Table 1:	Characteristics of Subjects.....	33
Table 2:	Identification of the Source of Osteoporosis Information (N = 35*).....	34
Table 3:	Total Scores of Two Variables in the Study (N = 41)	36
Table 4:	Comparison of Knowledge Scores Between Health Professionals and Others	36

List of Figures

Figure 1:	Correlation Between Mean Scores of Osteoporosis Knowledge and Perceived Susceptibility to Osteoporosis.....	37
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List of Appendices

Appendix A: Script to Explain the Study	45
Appendix B: Demographic Data Questionnaire.....	46
Appendix C: Data Collection Tool: “Osteoporosis Knowledge Test”	48
Appendix D: Data Collection Tool: “Osteoporosis Health Beliefs Scale”.....	51
Appendix E: Grand Valley State University Human Subjects Approval Letter	52
Appendix F: Permission to use Osteoporosis Knowledge Test and Osteoporosis Health Beliefs Scale	53

CHAPTER ONE

INTRODUCTION

Osteoporosis is a skeletal disease characterized by a reduction in bone mass and an alteration in bone architecture leading to increased susceptibility to fractures (Masi & Bilezikian, 1997). With its significant mortality and disability, it is an increasing healthcare problem that affects one in three women (Keen & Kelly, 1997). The public impact of osteoporosis stems from its association with fractures of the hip, spine, and forearm (Lau & Cooper, 1996).

Osteoporosis is the most common metabolic bone disorder. It affects 25 million Americans, of whom 80% are women (Lane & Nydick, 1999). Osteoporosis is a leading cause of fractures in elderly women resulting in pain, disability, reduced quality of life, and costly rehabilitation. The lifetime risk of a hip fracture in women is larger than the sum lifetime risk of having breast, endometrial, and ovarian cancer. In men, lifetime risk of hip fracture is greater than that of prostate cancer (Samsioe, 1997). Loss of bone mass is silent and symptoms only become overt when a fracture has occurred. During the year following hip fracture, mortality is about 15%. Up to 70% of hip fracture survivors never regain pre-fracture function. The overall reduced quality of life may contribute to reactive depression. Such emotional suffering, often affecting family members as well, is underreported (Vardy & Cosman, 1999).

Osteoporosis yields high individual health care costs for treatment, as well as high social costs because of potential dependency, and high economic impact. In the United States “osteoporosis causes approximately 1.3 million fractures annually at a cost of approximately 1.5 billion dollars per annum” (Samsioe, 1997, p.190). Melton indicates that “direct medical expenditures for osteoporotic fractures alone were estimated at \$13.8 billion in 1995... These costs are likely to rise in the future as the number of elderly people increases” (1997, p. 8S).

Osteoporosis is to a great extent a preventable disease. Currently there is no cure, but there are measures that can prevent or deter the development of the disease (Mayo Foundation for Medical Education and Research, 2000). While there are several drugs that have been approved to treat osteoporosis, the best approach is prevention, which is centered on general principles of good health.

The majority of osteoporosis research findings have been on Caucasian postmenopausal women with less focus on prevention research for young women (Sedlak, Doheny, & Jones, 1998). Because increased peak bone mass is usually achieved by age 35 (Masi & Bilezikian, 1997), it is of concern that young women may not be aware of osteoporosis risk factors and may not engage in preventive behaviors. Focus on osteoporosis prevention for young women is consistent with the objectives for health promotion and disease prevention published in Healthy People 2010 by the U. S. Department of Health and Human Services Public Health Service (2000).

Since its introduction in 1950, the Health Belief Model (HBM) has been used in a variety of studies of health behavior including disease prevention and detection (Kim, Horan, Gendler, & Patel, 1991) and for the present study will be used as the theoretical

framework. The HBM (Rosenstock, 1990) was developed to provide a framework for explaining why some people engage in disease prevention activities, while others fail to take protective action. The model predicts that people are not likely to take preventive action unless (a) they believe they are susceptible to a disease, (b) they believe the disease could seriously affect their lives, (c) they believe that taking preventive action would reduce the likelihood of getting the disease, (d) they see few difficulties in engaging in the recommended action, and (e) they feel competent to implement the necessary changes (Rosenstock, 1990).

The risk of osteoporosis-related fractures varies widely among ethnic groups and this must be taken into account when assessing the need for prophylactic interventions for osteoporosis. "There have been few studies of risk factors for hip fractures in ethnic groups other than Caucasians" (World Health Organization Task-Force for Osteoporosis, 1999, p. 261). A report from a large study of osteoporosis in postmenopausal women indicates that Hispanic American women are significantly more likely to have low bone mineral density than are White women. The question that remains is whether the risk of fracture is the same for Hispanic women as it is for White women (Kim, 1999).

Although Hispanics are the second largest minority in the U. S., few studies have been done to better understand the risk factors and assist in developing adequate preventive strategies for the Hispanic population (Villa, 1994). Until nurses and other health care professionals are aware of the practices, osteoporosis knowledge, and beliefs of Hispanic women, the needs of this population will not be fully met.

Knowledge and health beliefs about osteoporosis can influence what actions women will take to prevent osteoporosis. Nursing interventions related to osteoporosis

have primarily consisted of education to encourage preventive exercise and healthy nutrition in order to decrease major risk factors. However, knowledge does not always translate into positive behavior changes. It is important to consider the influence of other psychological variables that could affect behavior. According to the HBM healthy behaviors are more likely to occur if an individual believes in personal susceptibility to a condition (Kim, Horan, Gendler, & Patel, 1991).

In order for health education programs to be successful in changing behavior, the program must match the need of the population. An assessment that includes demographic variables, health beliefs, knowledge and source of information in the target population provides the foundation for program development. Determining what Hispanic women know and believe about osteoporosis can help determine strategies and interventions that will be effective in encouraging preventive health behaviors, therefore reducing the risk of osteoporosis morbidity and mortality.

Purpose of the Study

This study builds on a previous study conducted by Kim, Horan, Gendler, and Patel (1991) by using instruments designed to measure osteoporosis knowledge and personal attitudes and beliefs related to developing osteoporosis. Some of these variables were examined using a sample from a different population. This study was conducted with Hispanic women, aged 18 years and older, residing in a Mid-Western state.

The main purpose of the study was to describe the relationship between osteoporosis knowledge and perceived susceptibility to osteoporosis in a convenience sample of Hispanic women, aged 18 years and older in Western Michigan. Furthermore, the researcher believes that because this population has not been studied, information

gained in the study provides the basis for developing cost-effective health education programs to prevent osteoporosis among Hispanic women in this area.

CHAPTER TWO

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

This chapter focuses on the key background issues that frame the study. The review of literature is divided into three sections. The first section examines The Health Belief Model, which provided the conceptual framework for this research study. The second section focuses on research related to knowledge and perceived susceptibility. It addresses studies in which these variables were examined in relationship to osteoporosis and/or the Health Belief Model. The final section summarizes the significance of the review of literature.

Conceptual Framework

The Health Belief Model (HBM) was developed in the 1950s by social psychologists Rosenstock, Hochbaum, Kegeles, and Leventhal at the U. S. Public Health Service. It was originally developed to explain and predict health behaviors related to preventive health, but has since been extended to apply to illness and sick role behaviors. The model has been used extensively in research and continues to be revised since its introduction in the 1950s. The HBM "...has been one of the most influential and widely used psychosocial approaches to explaining health-related behavior" (Rosenstock, 1990, p. 39). Most studies have supported relationships among HBM variables and health behaviors. The following paragraphs include an overview of the HBM, including the variables specific to this study.

Rosenstock (1974) indicates that the development of the HBM was heavily influenced by the earlier theories of Kurt Lewin in the 1940s. Lewinian theory sustains that how an individual perceives the surrounding world determines what he will or will not do. The probability of behavior being exhibited is influenced by the individual's perception of the positive or negative value of that behavior. The four major concepts of the original HBM that evolved from this background and were thought to predict personal action to avoid a disease included: (a) perceived susceptibility to the disease, (b) perceived severity of the disease if it occurred (c) perceived benefits of behavior to avoid the disease, and (d) perceived barriers that had to be overcome to initiate behaviors to decrease susceptibility to the disease. These concepts are subjective perceptions that could vary in intensity and frequency of occurrence among different persons (Becker, 1974).

The HBM can be divided into three areas: individual perceptions, modifying factors, and action-taking variables. Individual perceptions entail perceived susceptibility to and perceived seriousness of a given problem. Modifying factors reflect demographic, personal, and structural variables that affect a person's motivation and perception of the disease. Action-taking variables are perceived benefits and perceived barriers that influence the probability of an individual taking recommended action of a health behavior (Williams, 1988). The HBM suggests that incentive to engage in a health promotion task is a function of the benefit obtained for participating in the behavior less the barriers associated with it (Williams).

Perceived susceptibility refers to an individual's estimated probability that he or she will experience a specific health condition (Rosenstock, 1990). There is a wide

variation from high to low in estimating personal degree of risk for acquiring a specific health problem. A person may be convinced that he or she will develop the condition or may deny any possibility of the condition occurring. In a review of studies using the HBM, Janz and Becker (1984), and Rosenstock (1990) noted that a number of these studies have supported the importance of perceived susceptibility as a strong predictor of preventive health behaviors.

Perceived seriousness is thought to be affected by how emotionally aroused a person becomes when cognitively considering the disease and the difficulties it could create if it could not be avoided or controlled (Rosenstock, 1974). While few studies have shown a positive relationship between perceived seriousness and preventive behaviors, other studies have shown a negative relationship, and some have shown no relationship at all (Champion, 1985; Janz & Becker, 1984; Marlenga, 1992; Rosenstock, 1990). In general, perceived seriousness has been the least powerful predictor of preventive health behaviors (Rosenstock, 1990).

Perceived benefit involves the individual's belief regarding the effectiveness of the recommended preventive actions in reducing the threat of the disease (Rosenstock, 1974). If an individual believes that a preventive action will reduce susceptibility or severity of the disease, it is more likely that the individual will engage in preventive behaviors. Some studies have shown this variable to be an important predictor of preventive behavior (Janz & Becker, 1984; Rosenstock, 1974). In contrast, Marlenga's (1992) study, as with perceived severity, showed no evidence that perceived benefits were important predictors of preventive behavior.

Perceived barriers are the negative aspects, perceived or real, of a recommended health action that inhibit preventive behavior (Rosenstock, 1974). When barriers are perceived as overwhelming, the probability of engaging in preventive behavior is low. The concept of perceived barriers was the most powerful dimension of the HBM across all studies in predicting preventive behavior (Champion, 1985; Janz & Becker, 1984; Kim, Horan, Gendler, & Patel, 1991; Marlenga, 1992; Rosenstock, 1990; Tirrell & Hart, 1980).

Demographic, personal and structural variables constitute the modifying factors. These variables "...are believed to have an indirect effect on behavior by influencing the perception of susceptibility, severity, benefits, and barriers" (Rosenstock, 1990, p. 44). However, the influence of the modifying factors on a person's perceptions related to the four major variables is considered indirect and not causal in nature. Examples of demographic factors are age, gender, education, and marital status. The influence of these variables on preventive behavior is not clear. Gender is the demographic variable most predictive of behavior, with women having a tendency to engage in preventive behavior more frequently than men (Rosenstock, 1990). Personal variables may include personality, social class, and peer group pressure. Structural factors presumed to influence preventive behavior include knowledge about the target disease and prior contact with the target disease (Rosenstock, 1974).

Knowledge is the information an individual possesses about a particular condition or disease that has an indirect effect on health beliefs and behavior. According to Rosenstock (1974) "perceived susceptibility and severity have a strong cognitive component and are at least partly dependent on knowledge" (p. 331). Although few

studies have addressed these variables, the HBM proposes that knowledge and prior contact with the disease will increase the likelihood of undertaking preventive actions.

In summary, the HBM is a psychosocial model that provides a useful framework for explaining and predicting health behaviors that are due to attitudes and beliefs (Janz & Becker, 1984). It also provides structure for assessing the effect of knowledge on health behavior. For example, the level of knowledge about the risk factors and consequences of osteoporosis may affect the degree of susceptibility a woman perceives to osteoporosis. Therefore the HBM can be utilized to study the relationship between osteoporosis knowledge and perceived susceptibility to osteoporosis in Hispanic women.

Knowledge Related Research

Studies using the HBM as a framework often examine knowledge as well. Although studies exist analyzing the relationship of knowledge and health beliefs, no studies were found that used the HBM as a framework to investigate osteoporosis knowledge and osteoporosis health beliefs among Hispanic women. This review includes (a) prior studies in which knowledge was examined within the HBM framework, or that looked at knowledge in relationship to osteoporosis; (b) studies in which the relationship between osteoporosis knowledge and health beliefs about osteoporosis were examined; and (c) previous research focusing on perceived susceptibility, along with the HBM or in association to osteoporosis.

Barnes and Thomas (1990) conducted a study to test the effect of a modified cancer education program on cancer knowledge and beliefs of elderly adults. They found that although cancer education led to an increase in knowledge from pre-test to post-test, there was no significant difference between the two intervention groups and the control

group which received education about nutrition. The researchers reported that the perception of the utility of diagnosis and treatment (perceived benefits) was positively correlated with the level of education completed.

In a large study using the HBM to examine factors which might be related to participation in a screening program for early identification and prevention of cardiovascular disease and diabetes, Sutterer, Carey, Silver, and Nash (1989) explored to what degree was knowledge of risk factors associated with either initial risk or change in risk. A 15.2% reduction of serum cholesterol at the end of 1.5 years among those individuals who were considered high risk at the initial screening, led the researchers to speculate that "an individual's knowledge of risk might be associated with perceived susceptibility and hence the individual's risk status" (p. 145). However, the collected data did not support the hypothesis that the level of knowledge would be associated to initial risk status or to subsequent self-initiated change in risk over time. This study had several methodological problems such as unknown reliability and validity of the instrument employed to assess knowledge of risk status. Nonetheless it provides grounds to further examine the relationship of knowledge to preventive health behaviors.

Tirrell and Hart (1980) investigated the relationship of health beliefs and knowledge to exercise compliance of patients who had undergone coronary artery bypass. Data collected included subjects' perception of severity of condition and susceptibility, and benefits of and barriers to treatment. These researchers report that although knowledge of the exercise regimen and barriers to the regimen showed the strongest relationship to compliance levels, "the relationship found between knowledge of a regimen and compliance with that regimen were not at a level that would allow for

reliable clinical prediction. However, the findings did indicate that knowledge seemed to be operating as an enabling factor in compliance” (p. 492). It is important to mention that the study only measured knowledge related to the patient’s prescribed regimens.

Collateral knowledge about underlying illnesses, their impact on life expectancy, or benefits from therapy was not measured. Therefore, how this ancillary knowledge relates to compliance is not appreciated by this study.

Champion (1987) has directed studies to test the relationship between concepts of the HBM and self-breast examination (SBE). Recently, knowledge was added as one of the variables. The investigator hypothesized that a combination of the health beliefs of susceptibility, severity, benefits, barriers, and motivation, together with concepts of control and knowledge, would be significantly correlated to frequency of SBE. Multiple regression and discriminant function analysis showed that 28% variance in the frequency of SBE was explained by the combination of the studied health beliefs. The construct of barriers accounted for 22% of variance, knowledge accounted for 4%, leaving the concepts of susceptibility, seriousness, benefits, health motivation, and control adding insignificant amounts to the total variance. A finding worth noting was that women taught SBE by a doctor or nurse were more likely to perform it.

Knowledge is a factor that is addressed in several of the more recent studies regarding SBE. Williams (1990) reported that knowledge is significantly related to frequency of SBE, and Champion (1991) later suggested that knowledge of SBE might be an important factor in practicing the SBE correctly.

Osteoporosis Knowledge

Cook, Noteloviz, Rector, and Krischer (1991) sent a questionnaire on osteoporosis knowledge to female patients enrolled in several medical practices. The purpose of the study was to determine their knowledge level of osteoporosis before and after an educational intervention, which included screening, and whether increased knowledge would result in behavior modification that could prevent the disease. The target population consisted of White females age 30 years and over (N = 512). Those respondents with a diagnosis of osteopenia or osteoporosis were excluded. The tools to collect data were developed by the investigators for this study based on findings from an education assessment survey previously conducted by the researchers. The three questionnaires consisted of multiple-choice questions addressing general knowledge about osteoporosis, risk factors, and prevention, detection and cure. An interesting finding was that knowledge levels before educational intervention were significantly lower among patients of the health department compared to private practice respondents.

Another finding reported by Cook et al. (1991) suggests that the educational program significantly increased respondent's knowledge about osteoporosis. Also positive behavioral lifestyle changes (in daily habits such as dietary, exercise, and smoking) were reported even one year after educational material was distributed. It is notable that screened patients with low bone mass had an increased frequency of lifestyle changes which leads the writer to believe that the behavior changes were influenced by an increased perceived susceptibility of the subjects. Consistent with Cook et al.'s report, Cummings (1992) found that when women with low bone mass were given information on osteoporosis they increased their preventive behavior (in Ailinger & Emerson, 1998).

Sedlak, Doheny, and Jones (1998) used a classic experimental design with a treatment group and a control group among young college women to test the efficacy of an osteoporosis prevention program based on the Health Belief and Self-Efficacy Models. The investigation represented preliminary work about how to promote knowledge and health beliefs for osteoporosis prevention. To measure the variables of the study, the researchers used the Osteoporosis Knowledge Test (Kim et al., 1991), Osteoporosis Health Belief Scale (Kim et al., 1991), and Osteoporosis Self-Efficacy Scale (Horan, Kim, Gendler, Froman, & Patel, 1998). Sedlak et al. concluded that the osteoporosis prevention program was effective in increasing participants' knowledge (F-ratio = 15.08, $p < .001$) as well as perceived benefits of exercise (F-ratio = 5.45, $p < .027$) related to osteoporosis. Total health belief score also showed a significantly greater increase post-test for the intervention group (F-ratio = 16.60, $p < .001$). Limitations of the study include high attrition rate and the authors caution that findings should not be generalized to other population.

Ailinger and Emerson (1998) directed a descriptive study to assess women's knowledge of osteoporosis risk factors and preventive behavior. The sample of 247 women ranged from 22 to 84 years of age. The majority of the respondents were Caucasian (79.4%), but the sample included Hispanics (5.3%) among the minorities represented in the study. According to the researchers, the outcomes indicated, "that the majority of these women did not have adequate knowledge about osteoporosis and associated risk factors and preventive behaviors" (p. 113). It was also found that respondent's exposure to another person with osteoporosis was positively correlated with

higher knowledge scores and that those who had received previous information about osteoporosis were more knowledgeable about it.

The review of literature also produced a few studies addressing osteoporosis knowledge among health care providers. An interim report by the World Health Organization Task-Force for Osteoporosis (1999) sustains that ignorance about osteoporosis is still common among health care professionals, patients, and the public. Therefore, it is recommended to target all these groups when planning osteoporosis education.

Hunt and Repa-Eschen (1998) support the need for continuing education to inform nurses and patients about osteoporosis prevention, detection, and management. The investigators inquired about perceived need for osteoporosis education as well as knowledge of osteoporosis. The respondents were 139 Registered Nurses in acute, ambulatory, and long-term care settings, mostly females, and 35% of them had advanced degrees. Nurse experts in osteoporosis developed and refined a tool for this research study. The 5-page questionnaire assessed respondents' knowledge of and educational need related to the topic of osteoporosis. The subjects found their own knowledge on 22 out of 27 topics in osteoporosis as less than adequate.

A cross-sectional survey investigated potential ethnic differences in knowledge and attitudes of the benefits of estrogen replacement therapy (ERT) against osteoporosis and other diseases (Ransom, Guerin, Holmes-Rovner, Dodson, & Padonu, 1996). The participants were perimenopausal Black and White nurses from the Detroit area. One of the findings indicated that Black nurses were less likely to recognize ERT as protective against osteoporosis. Ransom et al. point out that even though each sample belonged to

the health care profession, there was much less acceptance of ERT as proven treatment among Black nurses compared to White. The researchers sustain that this may be reflective of cultural values, and these discrepancies highlight areas for potential improvement in the provision of health care to minority women.

Osteoporosis Knowledge and Health Beliefs

With another cross-sectional survey of 127 college women Kasper, Peterson, Allegrante, Galsworthy, and Gutin (1994) assessed knowledge of osteoporosis risk factors, beliefs about the disease, and practice of preventive behavior. The participants were enrolled in an undergraduate health course at a mid-western state university. The sample was primarily Caucasian (92%) and no information is given about the other 8%. Kasper et al. found a significant relationship between osteoporosis information received by the participants and their ability to correctly identify risk factors. This was most notable for calcium intake. No significant relationship was found between risk factors identification and the subjects' exercise habits, calcium intake, or beliefs about osteoporosis. Nonetheless, the study confirms that knowledge alone is not necessarily related to health behaviors. The researchers sustain that consistent with findings of other reports, women in the study have not been sufficiently motivated to engage in preventive behavior in the absence of a threat to their health (perceived susceptibility to the disease). An interesting observation is these women believed that people are as responsible for getting osteoporosis as they are for getting a common cold.

Taggart and Connor (1995) used a descriptive, correlational study to determine exercise habits, osteoporosis knowledge, and health beliefs (perceived susceptibility and seriousness, exercise barriers and benefits, and health motivation) in females.

Participants were a convenience sample of 113 college students enrolled in a health course. The investigators concluded that while there was no statistically significant relationship between frequency of exercise and either osteoporosis knowledge or health beliefs, there were positive correlations between osteoporosis knowledge and understanding of the benefits of exercise, and of personal susceptibility to osteoporosis and perceived seriousness. Students who perceived osteoporosis as serious were more likely to be aware of their own susceptibility. It was also found that the older the student, the greater the knowledge of osteoporosis, which according to the authors may indicate that the older participants had read more about osteoporosis, leading to a higher level of knowledge.

In a South Australian community, Phillipov, Phillips, Leach, and Taylor (1998) directed a large survey to determine the prevalence of, attitudes to, and perceptions of osteoporosis. The 3,016 female and male participants were 15 years and older. The findings indicate that there was a significant association between knowledge of the definition of osteoporosis and identification of correct risk factors. Women aged 45 – 54 years old were more likely to answer correctly than any other age group of women. And those who perceived themselves at low risk to develop osteoporosis were significantly more likely to be involved in preventive behavior. Phillipov et al. presume that this inverse association implies that women may expect their preventive strategies to offer full protection against osteoporosis.

A high proportion (90%) of women in the South Australian community identified lack of calcium as an important risk factor for osteoporosis. This is consistent with previously mentioned findings from the Kasper et al.'s (1994) study. Phillipov et al.

(1998) attribute this finding to media influence from the dairy industry advertising that links lack of calcium to osteoporosis. Media influence could also explain Kasper's findings among college students since the dairy industry has a similar campaign in the United States. It is important to mention that women of the Phillipov et al. study who were born overseas showed decreased awareness about osteoporosis, which "may reflect language and cultural differences that limit the impact of media advertising campaigns" (p. 555).

Perceived Susceptibility

The results of research using the HBM with disease detection and preventive behaviors have been varied, but indicate that certain HBM variables are useful in predicting specific behaviors. In a meta-analysis of 46 HBM studies (review of 29 studies published between 1974 and 1984, with a formulation of 17 studies conducted before 1974) Janz and Becker (1984) found perceived barriers to be the most powerful HBM dimension, followed closely by perceived susceptibility. However, it was noted that, frequently, studies using the HBM as the theoretical approach have lacked consistent operationalization and measurement of the variables. The variability in measures makes it difficult to interpret and compare findings across the studies. Refinement and standardization of instruments to measure condition-specific beliefs were recommended for future studies.

Using Champion's (1984) instrument as a basis, Kim et al. (1991) developed the Osteoporosis Health Belief Scale (OHBS) to measure health beliefs related to osteoporosis. The study was a pioneer study in the application of the HBM to assess beliefs related to osteoporosis. The instrument consists of seven sub-scales: Perceived

Seriousness, Susceptibility, Health Motivation, Calcium Benefits, Calcium Barriers, Exercise Benefits, and Exercise Barriers. The researchers concluded that barriers and health motivation were statistically significant constructs in explaining both calcium intake and exercise behaviors.

The HBM has been criticized for producing conflicting results requiring further work with the model. Perceived susceptibility may be a difficult variable to assess. As cited under "knowledge related research" Champion (1987) reported that the 28% of total variance in frequency of SBE was explained by barriers, knowledge, and in a small percentage by susceptibility ($R = .52$; $p < .001$). In a later study Champion (1988) used the same instrument and added the concept of control to examine relationships between attitudinal variables specified by the HBM and the variables of proficiency, intent, and frequency of SBE in 380 women, aged 35 years and older. The results again identified perceived susceptibility and barriers, along with health motivation as predictors of frequency and proficiency of SBE. Notwithstanding, in 1985 Champion had found that perceived susceptibility to (as well as seriousness of) breast cancer was not related to the frequency of SBE.

Allard's study (1989) adapted Champion's instrument (1984) to examine prevention practices and beliefs about AIDS within the HBM framework. Perceived susceptibility to AIDS and perceived severity of the disease were significantly correlated with AIDS prevention practices. In an Internet report (Jan. 2000) Col. Johnson summarized a study that tested the relationships among AIDS health beliefs, knowledge of transmission, and risk behaviors among special Navy students. As in the Allard study, the HBM served as the theoretical approach to collect the data from the 148 subjects.

The conclusion indicates that the Navy students were not very knowledgeable about HIV transmission, and knowledge about the subject was not significantly correlated with risk behaviors. Perceived susceptibility on the other hand, was correlated with risk behaviors ($r = .2142, p = .0061$), which means that individuals who believed their susceptibility was low had higher risk scores.

Still analyzing knowledge and beliefs of HIV/AIDS within the HBM frame, Rose (1995) found contrasting results in a different population. The sample included a total of 458 White, African American, and Hispanic older adults. The researcher found that the participants did not feel highly susceptible to HIV/AIDS. There was no statistically significant relationship between sexual behavior or risk scores and perceived susceptibility. A *t* test indicated that those interested in learning more about AIDS had significantly higher perceived susceptibility scores than those not interested in AIDS education. Also those who had been tested for HIV had higher perceived susceptibility than those who had never been tested. Rose stresses the need to increase awareness of older people's perceived susceptibility and need for AIDS preventive health actions, mostly through educational strategies. However, it is important to note that the majority of the respondents in this study were aware of the facts about AIDS, but there were no significant correlations between knowledge and perceived susceptibility, or behavior (risk scores).

Nemcek (1990) wrote a review of research literature on health beliefs and preventive behavior. Under the HBM, the author summarized eight studies, all of which included perceived susceptibility as a variable. In six of these studies, perceived

susceptibility yielded statistically significant reports (Aho, 1979; Becker, 1974; Becker, 1977; Larson, 1979; Rundall, 1979; Weinberger, 1981).

Perceived susceptibility has been found to be positively related to taking preventive measures in other health behaviors such as screening for tuberculosis (Hochbaum, 1956 in Nemcek, 1990). In a more recent study Poss (2000) used an interview approach to analyze the relationship between variables from the HBM and the Theory of Reasoned Action (TRA) and participation by Mexican migrant farm-workers in a tuberculosis-screening program. The 206 participants, aged 18-27 years, were interviewed in Spanish by the principal investigator using an instrument developed for the study. Based on logistic regression analysis, participation in screening was best predicted by a model containing only two variables: intention and susceptibility.

McCausland (1990) completed a doctoral dissertation on the subject of behavior to prevent osteoporosis. Using an instrument including questions derived from the HBM concerning perceptions of osteoporosis and health motivation, 384 women 20, years and older were interviewed via telephone. One of the hypotheses predicted a positive relationship between belief in susceptibility to osteoporosis and current preventive behavior of the participants. "The correlation coefficient of $-.12$ ($p < .01$) provided no support for this hypothesis" (p. 77). McCausland contends that the result may be due to the fact that many of these women were participating in osteoporosis preventive behaviors and therefore, felt less vulnerable to the disease. Sixty percent of the participants agreed with the item "I do not feel susceptible to osteoporosis because I am doing something to help prevent it", which confirms the researcher's rationale.

The study conducted by Phillipov et al. in 1998 (previously discussed under “osteoporosis knowledge and health beliefs”) produced comparable findings.

Determination of the relationship of perceived susceptibility as a motivator for action has been a problem in retrospective HBM data collection. It may be difficult to establish the sequence of belief in susceptibility and participating in preventive actions, that is, whether the belief came before the action.

A large study by Rozenberg, Twagirayezu, Paesmans, and Ham (1999) assessed the perception of osteoporosis in a group of Belgian women. The 623 women were employees in a university hospital in Brussels; 46.5% of them were nurses, 11% of them were physicians, and 15.5% were paramedical personnel. The mean age was 37.7. The researchers declare, “even among a population of women who benefit from superior conditions for information and screening, the perception of osteoporosis remains low, as does the uptake of osteoporosis screening” (p. 312). They identify the following as factors that influence uptake of screening procedures: education, perceived susceptibility to disease, physician recommendation, cost of the procedure, and accessibility to screening tests.

The studies in this section require caution with interpretation of the findings. Limitation of these studies include conceptualization, homogeneous sampling which prevents generalization of findings, and measurement problems. An obstacle with retrospective design, used in some of the studies, is that causality can not be implied as individuals sometimes rationalize their beliefs and feelings to fit their behavior. Some of the studies that examine knowledge in relationship to the HBM concepts assume that once people have appropriate information, they will develop desirable attitudes and

beliefs, and subsequently engage in desired behavior. However, research evidence supports that while knowledge is linked to attitudes and beliefs, knowledge gained from intervention programs does not necessarily lead to subsequent change in beliefs or behavior. Another underlying assumption of the model is that health is highly valued by everyone, which may not be true for all people.

One more limitation found in some of these studies relates to self-administration of the questionnaires and self-report of behavior. Additionally, there is inconsistency regarding measurement of the health belief variables. When interpreting these studies it is also important to highlight that “while beliefs and attitudes are amenable to change, it is not known whether attitudes precede behavior change or vice-versa” (Tirrell & Hart, 1980, p. 492).

Summary

In summary, a review of the literature in relation to knowledge and health beliefs indicates that knowledge plays an important role in attitudes and beliefs. Knowledge has been identified to have an effect in HBM related studies, but overall the effect is indirect mainly through perceived susceptibility and perceived severity. Although its effect is probably indirect, the influence of osteoporosis knowledge on health beliefs may in turn lead to osteoporosis preventive behaviors, and the effect of knowledge on the decision process is important. The research literature also supports that healthy behaviors are likely to occur if an individual feels susceptible to a disease, in this case osteoporosis. Because there appears to be a lack of research that examines osteoporosis knowledge and health beliefs among Hispanic women, this study helps fulfill the need for additional investigation in this area.

This study examined the relationship of osteoporosis knowledge to perceived susceptibility to osteoporosis. One might expect a positive relationship between an increase in osteoporosis knowledge and osteoporosis health beliefs, specifically perceived susceptibility.

Hypotheses

There is a positive relationship between the level of osteoporosis knowledge and the level of perceived susceptibility to osteoporosis among Hispanic women, aged 18 years and older.

Definition of Terms

1. Osteoporosis knowledge implies the familiarity, awareness, and understanding of correct information about osteoporosis in general as well as nutrition and exercise behaviors that prevent osteoporosis.
2. Perceived susceptibility to osteoporosis refers to the individual's perceived risk of developing osteoporosis (Kim et al., 1991).

CHAPTER THREE

METHODOLOGY

Research Design

A descriptive, correlational research design was used to examine the relationship of osteoporosis knowledge and perceived susceptibility to osteoporosis in Hispanic women. A self-administered questionnaire was given to the participants to measure osteoporosis knowledge and perceived susceptibility to osteoporosis.

Benefits of a non-experimental form of research include: (a) minimal risks identified to the subjects in the absence of invasive procedures, (b) convenience for collecting adequate amount of data in a short time frame, (c) minimal training required for the participants and those involved in the study, and (d) limited costs associated with the research.

Problems anticipated while conducting the study included: (a) obtaining an adequate sample size, (b) clear communication of instructions and adequate understanding of the procedure by participants, and (c) lack of experimental control which can create difficulty in interpreting the findings. Participants may answer questions in an inconsistent manner depending on external influences such as distractions while completing the questionnaire, or time constraints.

Threats to internal validity were also foreseen. Family or personal history of osteoporosis, history of chronic illness, cultural health beliefs, level of education, and age

were some of the possible elements that can influence subjects' perceived susceptibility to osteoporosis. Threats to external validity could have included the Hawthorne effect and the measurement effect (Polit & Hungler, 1995). The participants might have completed the survey based on being part of a research study, answering questions the way they presume they are expected to answer them instead of how they really believe (the Hawthorne effect). Measurement effect refers to the possibility that "results may not apply to another group of people who are not also exposed to the same data collection procedures" (p. 223). In this case it could be reflected by the study acting as a trigger to perceived susceptibility to osteoporosis among the participants, therefore the subjects' results may not apply to women who have not participated in similar research. In addition, the use of a convenience sample limits generalizability of research findings. Individuals that volunteer to participate may be different to those who choose not to.

Sample and Setting

A convenience sample of 54 Hispanic women was obtained from two locations in a Mid-Western state. To be included in the study, subjects needed to be Spanish speaking Hispanic females, aged 18 years and older. The age criterion is imposed to avoid difficulties with parental consents. The ability to read at a 6th grade level was necessary to complete the questionnaires. Subjects with a diagnose of osteoporosis were excluded from the sample in an attempt to reduce threats to internal validity.

Subjects were recruited from local Hispanic churches. The sites were selected in order to obtain a cross-section of people from various social, economic, and employment groups. The student researcher had previously visited the selected churches to assess that

there was diversity among the members. Leaders of the churches also confirmed that members came from varied social, educational, and economic backgrounds.

Instruments

Data for the study were gathered with two instruments. A demographic questionnaire was also included. Kim, Horan, and Gendler developed the Osteoporosis Knowledge Test (OKT) in 1991. It was used to measure the subject's knowledge about osteoporosis risk factors and preventive behaviors. "The OKT has two sub-scales: Osteoporosis Knowledge Test Calcium Scale (items 1-9 and 17-24) and Osteoporosis Knowledge Test Exercise Scale (items 1-16). That is the OKT Calcium and OKT Exercise sub-scales both share 9 common items (items 1-9)" (1991). The reliability coefficients for internal consistency established for each sub-scales were .72 and .69, respectively. For the current study the reliability coefficients for internal consistency were .62 for the Calcium intake portion, and .75 for the Exercise sub-scale. Content validity of the OKT was established through a review of the literature and input from nursing faculty and nurses in practice.

Perceived susceptibility to osteoporosis was measured by a section of the Osteoporosis Health Belief Scale (OHBS). Using the Self-Breast Exam instrument (Champion 1984) as a basis, the OHBS was developed in 1991 by Kim, Horan, Gendler, and Patel. The instrument uses a 5-point Likert scale to rate the six items in the "perceived susceptibility" section from strong disagreement (1) to strong agreement (5). Internal consistency of the sub-scales was evaluated to establish reliability. Cronbach alpha coefficients for perceived susceptibility were .82, for both the OHB calcium sub-scale and the OHB exercise sub-scale. For the current study reliability coefficient for

internal consistency was established at .88. Construct validity for both scales were evaluated by factor analysis. The percentages of variance in behaviors accounted by susceptibility were 14.4 for the calcium scale and 15.9 for the exercise scale.

Discriminant function analysis was used to evaluate concurrent validity of both scales.

A Spanish translation of the instrument was developed over the period of one year. Dr. Lorraine Rodrigues-Fisher was responsible for overseeing the translation process. A hired Mexican-American translator did the initial translation from English to Spanish. The translated version was revised for phrasing and clarity of the questions, and back translated by bilingual staff. The Spanish version was given to Spanish speaking subjects in Nicaragua, and Argentina, as well as to bilingual volunteers in Western Michigan to ensure that the instruments were readily understood. This last step helped identify unclear questions or instructions, and difficulties with translations due to cultural influences. The researcher since then has adjusted the Spanish version to reflect the changes recommended during the last step of the process. For example synonyms have been added to some of the items, to reflect language inherent of the different Latin American countries, thus providing word choices to ensure easy understanding by all participants regardless of country of origin. Finally, an elementary teacher with a Masters in special education revised the instruments to assure readability at a sixth grade level.

The Demographic Data Sheet was developed for this study. Demographic variables were measured on a nominal and ordinal level (see Appendix B). It includes subjects' age, country of origin, level of education, occupation, diagnosis of osteoporosis or chronic illness (such as DM, HTN, Cancer, or other), and length of time residing in

USA. Participants were also asked if they knew someone diagnosed with osteoporosis, since previous contact with osteoporosis may influence knowledge about the disease.

Procedure

Prior to the start of the study, permission to conduct the research was obtained from the Grand Valley State University Human Research Review Committee (see Appendix E). Study subjects were approached through churches in the community. The investigator contacted Spanish speaking church leaders from the community offering a health educational program for members in their congregation. A list of Spanish speaking churches was obtained from the Hispanic Center in one of the communities. Two Spanish-speaking churches were located in other area. Those leaders willing to get involved were asked to announce the activity, location, and date for three consecutive weeks. The investigator planned to hold three informal gatherings for a health talk on the topic of stroke prevention. Presentation length was planned for approximately 30-40 minutes. At the end of the meetings, attendants were to be informed of the study and its purpose, inviting them to volunteer their participation. Those agreeing to participate were to be asked to complete the questionnaire following the presentation. However, due to the poor response from the members in all three churches, church leaders suggested collecting data at the end of a regular service.

During regular church services, the student researcher was given an opportunity to explain the purpose of her study, and invite female members to participate by completing the questionnaires at the end of the service. Tables were set at the entrance of the churches to provide an adequate area for those who volunteered to fill out the questionnaires. In that way the student investigator had the chance to give instructions

and answer participant's questions on a one-to-one basis. Volunteers also had the choice of reading the script explaining the study instead of receiving verbal instructions. The OKT questionnaire was administered prior to the OHBS questionnaire to avoid possible influence from information of the latter on the subjects' answers about osteoporosis knowledge. The participants were offered the choice to complete a questionnaire in English or Spanish according to their preference. All attendants were thanked regardless of their choice of participation in the study.

Copies of the Demographic Data Questionnaire, the OKT, and the OHBS were distributed to those who agreed to participate, along with written directions for completion. The nurse researcher provided verbal review of the instructions when needed. Completion of the instruments required approximately 20 minutes in each situation. Subject's confidentiality was maintained through the use of identification numbers to code the survey instruments instead of using the subjects' names. Upon finishing, participants were asked to place the demographic data in a labeled envelope. There was a designated box for the participants to deposit the other two instruments. This ensured anonymity, both to participants who completed the study and to those who chose to withdraw from the study by not completing the questionnaire.

Ethical considerations in the procedure of this study included subjects' consent and explanation of risks to subjects. Consent was implied by completion of the questionnaires. This was stated in the instruction sheet as well as verbally explained to the volunteers. A possible risk to the participants may have been that they had questions about the study or may have become anxious about osteoporosis. The instruction sheet provided information for a contact person in case subjects had questions. Information

about how the data collected would be used was explained by the student investigator and also stated in the instruction sheet in order to decrease the subjects' risk of fear about how the information from the questionnaires would be used. It was explained that the study is part of the development of a nursing research thesis and may assist in guiding practice.

CHAPTER FOUR

RESULTS

The purpose of this descriptive, correlational study was to examine the relationship of osteoporosis knowledge with perceived susceptibility to osteoporosis among Hispanic women. Data were collected with three instruments, the Osteoporosis Knowledge Test (Kim, Horan, & Gendler, 1991), the Osteoporosis Health Beliefs Scale – Perceived Susceptibility section (Kim, Horan, Gendler, & Patel, 1991), and the Demographic Data Questionnaire. All quantitative analyses of the data collected were performed using the Statistical Package for the Social Sciences (SPSS) software, Version 9.0.

Sample Characteristics

Fifty-four subjects consented to participate in the study. Three of the participants had a diagnosis of osteoporosis and were excluded from the analyses. Ten of the questionnaires were unfinished leading to incomplete data and unreliable results. Therefore only 41 questionnaires met the criteria for data analysis.

The ages of the final sample (N = 41) ranged from 19 to 77 years old with the mean age of 39 years old (SD = 13.9). All subjects were Hispanic females, representing 9 different Latin American countries. The length of stay in the United States ranged from 1 to 77 years with the mean of 17 years (SD = 13.6). Educational level was mainly college/university (51.2%) followed by 31.7% with high school, an additional 14.6% had

a masters or doctorate degree, and 2.4% had no formal education. Work status (N = 40) included 12.5%, who were housewives, 10%, who were retired, 7.5%, who were students, and, 70% who were employed (see Table 1).

Table 1

Characteristics of Subjects

<u>Characteristic</u>	<u>Number of women</u>	<u>Percent</u>
Country of Origin	N = 41 *	
United States	2	4.9
Mexico	8	19.5
Dominican Republic	13	31.7
Puerto Rico	10	24.4
Colombia	3	7.3
Guatemala	1	2.4
Venezuela	1	2.4
Costa Rica	1	2.4
Argentina	2	4.9
Level of Education	N = 41 *	
None	1	2.4
High School	13	31.7
College/ University	21	51.2
Master or Doctorate	6	14.6
Occupation	N = 40 *	
Students	3	7.5
Employed	28	70
Housewives	5	12.5
Retired	4	10

*N represents sample included in analysis

Forty-four percent of the respondents had a friend or relative who had been diagnosed with osteoporosis and 88% indicated that they had previously heard or read about osteoporosis. The respondents were asked to indicate sources of information about osteoporosis. The sources of osteoporosis information most frequently identified by the sample were magazines or books (15), school or seminars (11), and TV (10), followed by medical literature (4), friends or family (4), work (3), and lastly the radio (1) (see Table 2).

Table 2

Identification of the Source of Osteoporosis Information (N=35*)

<u>Source of knowledge</u>	<u>Frequency**</u>
TV	10
Radio	1
At work	3
Magazine or books	15
Health care provider	3
Medical literature	4
School or seminar	11
Friends or family	4

* *Represents all subjects who met criteria for inclusion in this analysis*

** *Subjects were able to select more than one option*

Women were also asked to indicate history of chronic health problems. From the final sample of 41, arthritis and heart disease were the most common (10%), followed by high blood pressure (5%), and diabetes (2%). The four conditions listed under "other" (10%) were asthma, scoliosis, diverticulitis, and allergies.

Data Analysis

Data were collected in three different occasions over a 1-month period during July and August 2000. The questionnaires were numerically coded after collection from participants. The Osteoporosis Knowledge Test (Kim, Horan, & Gendler, 1991) was

used to measure the independent variable and the Osteoporosis Health Beliefs Scale (Kim, Horan, Gendler, & Patel, 1991) was used to measure the dependent variable in this research project. The Osteoporosis Knowledge Test (OKT) encompasses 24 items, which were scored after determining whether the subject had answered the questions correctly. Correct answers were coded as 1, incorrect as 0. The possible total scores for the OKT range from 0 to 24. From the Osteoporosis Health Beliefs Scale (OHBS) only the 6 items related to perceived susceptibility were used. These were placed on a five point scale ranging from strongly disagree (1) to strongly agree (5). Thus the possible total scores range from 6 to 30.

SPSS was used to perform statistical analysis and reliability measurements of the instruments. The Pearson's correlation coefficient was used to examine the relationship between the variables. Reliability of the exercise portion of the OKT was established at .746, while the Calcium intake portion was established at .621, and .877 for the perceived susceptibility scale from the OHBS.

Descriptive statistics. The maximum, minimum, mean and median scores, and the standard deviation for the OKT, and the OHBS-perceived susceptibility scale are presented in Table 3. The sub-scales of the OKT were analyzed separately to determine if the participants had a higher level of knowledge on either of the sub-scales. However the mean scores were very similar, with 53.7% correct answers for the Exercise sub-scale and 52.1% for the Calcium intake sub-scale. Also, knowledge scores of the seven health professionals who participated in the study were examined to determine if their level of knowledge was significantly different from the rest of the sample. The mean and median for knowledge score in this sub-set of the sample was 17.86 and 18.00 respectively. This

was significantly higher than mean and median (13 each) for the rest of the sample (see Table 4).

Table 3

Total Scores of Two Variables in the Study (N = 41)

<u>Measure</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>Median</u>	<u>SD</u>
OKT	1	20	13.51	14.00	4.26
Perceived Susceptibility	6	28	15.29	15.00	5.04

Table 4

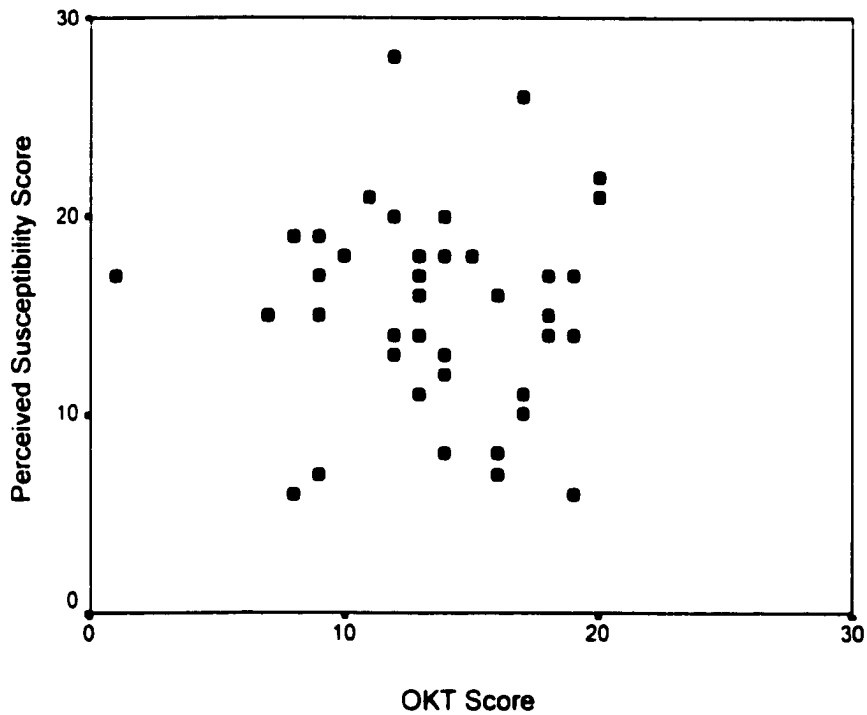
Comparison of Knowledge Scores Between Health Professionals and Others

<u>Group</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>Median</u>	<u>SD</u>
Health Professions (<u>n</u> = 7)	13	20	17.86	18.00	2.41
Other Occupations (<u>n</u> = 34)	7	19	13.00	13.00	3.46

Test of the research hypothesis. The research hypothesis tested was: there is a positive relationship between the level of osteoporosis knowledge and the level of perceived susceptibility among Hispanic women, aged 18 years and older. The correlation coefficient was $-.026$ ($p = .436$), thus the hypothesis was not supported. The scatter plot shown in Figure 1 represents the correlation between the two variables.

Figure 1

Correlation Between Mean Scores of Osteoporosis Knowledge and Perceived Susceptibility to Osteoporosis



In summary, although the information from this study is important, the relationship between osteoporosis knowledge and perceived susceptibility to osteoporosis was not statistically significant.

CHAPTER FIVE

DISCUSSION AND IMPLICATIONS

The purpose of this study was to describe the relationship between osteoporosis knowledge and perceived susceptibility to osteoporosis among Hispanic women, aged 18 years and older in a Mid-Western state. The findings of this study did not show a correlation between osteoporosis knowledge and perceived susceptibility to osteoporosis. This chapter includes a discussion section in which the results of the study are interpreted in relation to theory and related research findings. The discussion section will be followed by a discussion of threats and limitations, contributions of the study, and recommendations for research, education, and practice.

Discussion

Since the review of literature did not produce any studies that examined osteoporosis knowledge and osteoporosis health beliefs among Hispanic women, it is difficult to compare results from this study to previous research. When comparing Health Belief Model research, it is important to differentiate the influence of knowledge on health beliefs from influence on behavior. One cannot assume that if knowledge can alter behavior, it can also change the beliefs. Most studies look at knowledge and/or perceived susceptibility in relation to behavior such as preventive action, screening, and compliance (Allard, 1989; Champion, 1987; McCausland, 1990; Nemcek, 1990; Poss, 2000; Williams, 1990).

In a study that explored the association of knowledge of risk factors of cardiovascular disease and diabetes to initial risk status, Sutterer, Carey, Silver, and Nash (1989) speculated that knowledge of risk might be related to perceived susceptibility and therefore to risk status. However findings of the study did not show association of level of knowledge to risk status. It is difficult to know if the study yielded these results because there was truly no association between level of knowledge about risk factors and perceived susceptibility (in which case those findings would be consistent with this study's findings), or because there was no association between perceived susceptibility and the risk status of an individual. It is important to consider that the authors report unknown reliability and validity of the instrument employed to assess knowledge of risk status.

Perceived susceptibility along with perceived severity is recognized as having a strong cognitive component (Becker, 1974). Therefore, the researcher expected to find a correlation between level of knowledge about osteoporosis and perceived susceptibility. Findings from this study are similar to Rose's (1995), who examined knowledge and health beliefs of HIV/AIDS within the HBM frame and reports that there were no significant correlations between knowledge and perceived susceptibility.

In spite of the fact that the majority of the subjects in the current study had an educational level of high school and higher (98%), and had received previous information about osteoporosis (88%), and 44% had been in contact with someone who had osteoporosis, the results of this study clearly indicate that there is a knowledge deficit (mean score of 13.5 out of 24) related to osteoporosis among Hispanic women in a Mid-Western state. Ailinger and Emerson (1998) had similar results in their study. The

researchers assessed women's knowledge about osteoporosis risk factors and preventive behaviors in a sample that included 5.3% Hispanic and found that the majority of these women did not have adequate knowledge. Results from this investigation are consistent with the World Health Organization Task-Force for Osteoporosis (1999), who maintained that ignorance about osteoporosis is still common among health care professionals and the public. Findings from the current study indicate that although health care professionals demonstrated a higher level of knowledge about osteoporosis, there is still a need for osteoporosis education among this group. Educational efforts may be useful in addressing the knowledge gaps identified in this survey.

Although this study did not find significance in relation to the research question, it provides information about this population in terms of osteoporosis knowledge. This is important considering that the Hispanic population is the second largest and fastest growing minority in the United States. There is still much to learn about the practices, osteoporosis knowledge, and beliefs of this population. The data obtained may be used to better understand level of osteoporosis knowledge and health beliefs among Hispanic women and guide further research and education.

Threats and Limitations

Internal validity threats included self-selection bias due to the fact that subjects volunteered to be part of the study. Also, testing bias was a threat. This could have occurred if participants wanted to score well on the questionnaire, which they might have viewed as a test. Threats to external validity included the Hawthorne effect, which would be reflected by the subjects answering the questionnaire in a way they felt they should answer because they were participating in this study, instead of their true perceptions.

The questionnaire was self-administered but one of the subjects volunteered to participate if the researcher would read the questionnaire to her because she did not know how to read or write. The researcher tried to administer the questionnaire in a non-biased manner as not to lead the subject. However, in this particular case there is a threat to external validity through the experimenter effect.

A limitation of this study concerned the data collection questionnaire that was employed. Instrument clarity was a possible source of measurement error. Although the instrument went through an extensive translation from the English to the Spanish language, it is possible that the Spanish translation still had questions that were not clear or could be misunderstood. The researcher is also not sure of how accurate the level of education of the subjects was measured. Though instructions read to circle the highest level of education *completed* subjects may have chosen instead their *current* level of education. For example, a sophomore may have chosen University as level of education although High School is the highest level completed. This may have altered the percentages of levels of education by possibly skewing it to a more advanced level.

On repeated occasions, participants approached the student researcher with questions on how to complete portions of the questionnaires that involved graded alternatives or a Likert scale. Also, the missing data on the unfinished questionnaires were mostly found in the sections comprising these sorts of questions. There were no specific items identified as frequently missing, instead the majority of times the complete section with graded alternatives or Likert scale was left unanswered. This led the student researcher to believe that these type of questions were not readily understood by this sample.

Generalization of the findings was limited by several factors. Use of a relatively small convenience sample (N = 41) of subjects from two geographic locations was a limitation. The fact that the subjects were all volunteers, rather than randomly selected subjects, added to this limitation.

Contributions of the Study

No other study was found that investigated osteoporosis knowledge and osteoporosis health beliefs among Hispanic women in United States. Hence, findings from this study are unique contributions. The study generated some significant implications for nursing practice and education. These implications, along with recommendations for future research, will be described in the following section.

Implications and Recommendations

Suggestions for nursing practice should be regarded as tentative due to limited generalizability of the findings. Nonetheless, results of the investigation point out the need for osteoporosis education for Hispanic women in the studied region. Findings from this research study provide a knowledge base that could help design education programs and interventions targeting the needs of this population.

Research is necessary to recognize and address the specific healthcare needs of the Hispanic population. Little attention has been paid to this population. This study may stimulate additional exploration about osteoporosis knowledge and health beliefs of Hispanic women that would impact osteoporosis preventive health behavior. It also provides groundwork in exploring the strength and limitations of the use of the HBM in Hispanic populations. Additional research should be done to expand nursing knowledge in this arena.

Several recommendations for further research were identified from the results of the study. Sample size in the current study was relatively small, limiting meaningful calculations and generalizability of results. Recruitment of a larger number of subjects from diverse sites would be recommended for future studies. Sample sizes of Hispanic subjects will need to be large enough to conduct meaningful statistical analysis. This study used a non-random sample for convenience and efficiency. In future studies, it would also be helpful to obtain a randomly selected sample. Also, considering different methodology to improve recruitment should be contemplated.

Nursing practice and research should take into account the importance of exploring a patient's beliefs. It is important to assess what a patient knows and moreover, what the patient believes. Beliefs are central to a person's decision to act. Therefore, additional research in this area may contribute to developing adequate strategies for the health care of this population.

Lastly, further research with psychometric testing of the tools is recommended. It is important to point out that, although the tools were translated to Spanish for this investigation, reliability coefficients were very similar to those of the original instruments. Though the reliability coefficients of the instruments used in this study are encouraging (according to Polit and Hungler, 1995, reliability coefficients about .70 are considered acceptable) and comparable to those of Kim et al. (1991), research is needed to further refine and standardize instruments that would appropriately assess the knowledge and health beliefs of Hispanics.

In conclusion, the main purpose of this study was to examine the relationship of osteoporosis knowledge to perceived susceptibility to osteoporosis among Hispanic

women. The findings indicated that there is no significant correlation between the two variables as measured by the Osteoporosis Knowledge Test and the Perceived Susceptibility Scale. However, the study provides a glimpse of the osteoporosis knowledge and health beliefs of Hispanics indicating a lack of knowledge about osteoporosis risk factors and preventive behaviors in this sample. Although there is continued need for research directed toward health issues of Latino women, reports from this investigation help nurses to better understand Hispanic patients in order to meet their healthcare needs.

APPENDICES

APPENDIX A

Script to Explain the Study

Hello, I am Johannie Troncoso, a graduate student in the Kirkhof School of Nursing working with the Osteoporosis Research. I am conducting a study to better understand Hispanic women knowledge and health beliefs about osteoporosis. The study is part of my thesis.

I would like your participation in the research. It means you would fill out two questionnaires. It will take approximately 15-20 minutes to complete both questionnaires.

Your participation is voluntary. You have the right to refuse your participation in this study without any fear of prejudice or negative consequences. In addition, after agreeing to participate in the study you may change your mind and withdraw at any time. The information will be confidential and will not be associated with your name. When you complete the questionnaires, please separate the demographic sheet from the rest of the questionnaire and place them in the corresponding marked boxes. Completing the questionnaires means you have given your consent to use this information for the study and understand your rights in this study.

If you have any questions about the study, you may contact me at (616) 243-4501. For information or questions about your rights in the study you may contact Paul Huizenga, Chair of the Human Research Review Committee, Grand Valley State University. The telephone number is (616) 895-2472.

I appreciate your cooperation and thank you for your presence.

APPENDIX B

DEMOGRAPHIC DATA

Id# _____

Date _____

Please complete the following questions by filling in the blanks or circling in the correct answer. Do not write your name on this page.

1. What is your age? _____
2. Country of Origin _____
3. Length of time residing in the United States _____
4. Education completed:
 1. Elementary school
 2. High School
 3. College degree
 4. Masters or higher
5. Occupation _____
6. Do you know anyone who has osteoporosis? 1. Yes 2. No
7. Have you heard or read about osteoporosis before? 1. Yes 2. No
8. If you answered yes to the previous question, from where have you heard or read about osteoporosis? _____
9. Have you ever been diagnosed with osteoporosis? 1. Yes 2. No
10. Do you have any of the following illnesses:
 1. Diabetes
 2. High blood pressure
 3. Cancer
 4. Arthritis
 5. Heart Disease
 6. Other (name) _____

Thanks for your participation. Please be certain to answer all of the questions on both questionnaires.

DATA DEMOGRAFICA

Id# _____

Fecha _____

Por favor complete las siguientes preguntas llenando los espacios en blanco o encerrando en un círculo la respuesta correcta.

- I. Cuantos años tiene? _____
- II. Cual es su pais de origen? _____
- III. Cuanto tiempo hace que vive en E. U.? (en años) _____
- IV. Educacion completada:
 1. Escuela elemental
 2. Escuela secundaria
 3. Colegio o Universidad
 4. Maestria o Doctorado
- V. Cual es su ocupacion? _____
- VI. Conoce a alguien que tiene osteoporosis? 1. Si 2. No
- VII. Su doctor le ha dicho que Ud. tiene osteoporosis? 1. Si 2. No
- VIII. Ha escuchado o leído acerca de la osteoporosis? 1. Si 2. No
- IX. Si contesto que "Si" a la pregunta anterior, donde ha escuchado o leído acerca de la osteoporosis? _____
- X. Si Ud. tiene cualquiera de las siguientes enfermedades, por favor encierre en un círculo (puede escoger mas de una):
 1. Diabetes
 2. Alta presión
 3. Cáncer
 4. Artritis
 5. Enfermedad del corazón
 6. Otra (indique cual) _____

Gracias por su participación! Por favor asegurese de contestar todas las preguntas en los cuestionarios.

APPENDIX C

DATA COLLECTION TOOL: "OSTEOPOROSIS KNOWLEDGE TEST"

Id# _____

ENCUESTA SOBRE SU CONOCIMIENTO ACERCA DE LA OSTEOPOROSIS

La Osteoporosis es una enfermedad en la cual los huesos se vuelven muy porosos y debiles, por lo tanto se rompen facilmente.

La siguiente es una lista de cosas que pueden o no afectar la posibilidad de que una persona contraiga osteoporosis. Despues de leer cada una de las declaraciones, decida si la declaracion indica que una persona tendria:

Muchas Posibilidades de contraer osteoporosis, o

Pocas Posibilidades de contraer osteoporosis, o

La declaracion no tiene nada que ver con osteoporosis (Neutral), o

Ud. No Sabe que relacion hay entre la declaracion y la posibilidad de contraer osteoporosis.

Encierre en un circulo una de las 4 opciones que mejor describa lo que Ud. piensa.

MP = muchas probabilidades

PP = pocas probabilidades

NT = Neutral

NS = No se

- | | | | | |
|--|----|----|----|----|
| 1. Comer una dieta con un contenido bajo en productos lacteos | MP | PP | NT | NS |
| 2. Estar en la menopausia | MP | PP | NT | NS |
| 3. Tener huesos grandes | MP | PP | NT | NS |
| 4. Comer una dieta con un contenido alto en verduras | MP | PP | NT | NS |
| 5. Tener madre o abuela que tenga osteoporosis | MP | PP | NT | NS |
| 6. Ser una mujer de piel blanca | MP | PP | NT | NS |
| 7. Haber tenido cirugia (extraccion quirurgica) para sacar los ovarios | MP | PP | NT | NS |
| 8. Usar cortisona (esteroides como la Prednisona) | MP | PP | NT | NS |
| 9. Hacer ejercicios regularmente | MP | PP | NT | NS |

Para el siguiente grupo de preguntas se le pedira que escoja una respuesta entre varias opciones. Por favor elija solamente una respuesta. Si piensa que hay mas de una respuesta, escoja la mejor. Si no esta segura, encierre en un circulo la opcion D ("No se").

10. Cual de los siguientes ejercicios es el mejor para reducir el riesgo de contraer osteoporosis?

- A. Nadar
- B. Caminar rapidamente
- C. Hacer trabajo de cocina como lavar platos o cocinar
- D. No se

11. Cual de los siguientes ejercicios es el mejor para reducir el riesgo de contraer osteoporosis?

- A. El ciclismo (correr bicicleta)
- B. El Yoga
- C. Limpiar la casa
- D. No se

12. Cuantos dias a la semana piensa que una persona deberia hacer ejercicios para fortificar los huesos?

- A. 1 dia a la semana
- B. 2 dias a la semana
- C. 3 o mas dias a la semana
- D. No se

13. Cual es la menor cantidad de tiempo necesario cada vez que se hace ejercicio para fortificar huesos?

- A. Menos de 15 minutos
- B. 20 a 30 minutos
- C. Mas de 45 minutos
- D. No se

14. Para que el ejercicio ayude a fortalecer los huesos debe ser suficiente vigoroso para hacer que la respiracion mientras se hace ejercicio sea:

- A. Un poquito mas rapida
- B. Tan rapida que es imposible hablar
- C. Mucho mas rapida, pero es posible hablar
- D. No se

15. Cual de los siguientes ejercicios es la mejor manera de reducir el riesgo de contraer osteoporosis?

- A. Trotar o correr
- B. Jugar al golf, usando un carro de golf
- C. Jardinaria
- D. No se

16. Cual de los siguientes ejercicios es la mejor manera de reducir el riesgo de contraer osteoporosis?

- A. Jugar los bolos o boliche
- B. Lavar la ropa
- C. Baile o danza aerobica
- D. No se

El Calcio es uno de los nutrientes que nuestro cuerpo necesita para mantener los huesos fuertes.

17. Cual de estos alimentos es una buena fuente de calcio?

- A. Manzana
- B. Queso
- C. Pepino o pepinillo
- D. No se

18. Cual de estos alimentos es una buena fuente de calcio?
A. Sandía o melon de agua
B. Elote (maiz o choclo)
C. Sardinas enlatadas
D. No se
19. Cual de estos alimentos es una buena fuente de calcio?
A. Pollo
B. Brocoli
C. Uvas
D. No se
20. Cual de estos alimentos es una buena fuente de calcio?
A. Yogur
B. Fresas (frutillas)
C. Repollo (col)
D. No se
21. Cual de estos alimentos es una buena fuente de calcio?
A. Helado (nieve)
B. Toronja (pomelo)
C. Rabanos
D. No se
22. Cual de las siguientes cantidades es la dosis de calcio recomendada para un adulto?
A. 100mg – 300mg diario
B. 400mg – 600mg diario
C. 800mg o mas diario
D. No se
23. Cuanta leche debe tomar un adulto para obtener la cantidad de calcio recomendada?
A. ½ vaso al dia
B. 1 vaso al dia
C. 2 o mas vasos al dia
D. No se
24. Cual de las siguientes es la mejor razon para tomar suplementos de calcio?
A. Si la persona no desayuna
B. Si la persona no consume suficiente calcio en su dieta
C. Si la persona es mayor de 45 años
D. No se

APPENDIX D

DATA COLLECTION TOOL: "OSTEOPOROSIS HEALTH BELIEF SCALE"

Id# _____

CREENCIAS SOBRE LA SALUD RELACIONADAS A LA OSTEOPOROSIS

A continuacion hay una serie de preguntas sobre lo que tu crees en cuanto a la osteoporosis. Todos tenemos diferentes experiencias que influyen como nos sentimos y lo que creemos. No hay ninguna respuesta correcta o incorrecta.

Luego de leer cada declaracion piensa si estas TOTALMENTE EN DESACUERDO, EN DESACUERDO, NEUTRAL, o si estas DE ACUERDO, o COMPLETAMENTE DE ACUERDO con la declaracion.

Es importante que respondas de acuerdo a lo que crees y no de acuerdo a como piensas que deberias creer, o a lo que otros quieren que creas. Necesitamos que elijas la respuesta que mejor exprese lo que tu crees.

Despues de leer cada declaracion, encierra en un circulo las opcion (letras) en la izquierda que mejor explica lo que tu crees.

TD = TOTALMENTE EN DESACUERDO
D = EN DESACUERDO
N = NEUTRAL
A = DE ACUERDO
CA = COMPLETAMENTE DE ACUERDO

- | | |
|-------------|--|
| TD D N A CA | 1. Las probabilidades de que desarrolles osteoporosis son altas. |
| TD D N A CA | 2. Debido a tu consistencia fisica, tienes mas posibilidades de desarrollar osteoporosis. |
| TD D N A CA | 3. Es casi seguro que vas a tener osteoporosis. |
| TD D N A CA | 4. Hay bastante probabilidad de que desarrolles osteoporosis. |
| TD D N A CA | 5. Tu tienes mas probabilidades que la persona promedio de desarrollar osteoporosis. |
| TD D N A CA | 6. Tu historial familiar hace que aumenten las probabilidades de que desarrolles osteoporosis. |

APPENDIX E

GRAND VALLEY STATE UNIVERSITY HUMAN SUBJECTS
APPROVAL LETTER



GRAND VALLEY
STATE UNIVERSITY

1 CAMPUS DRIVE • ALLENDALE, MICHIGAN 49401-9403 • 616/895-6611

July 27, 2000

Johannie Troncoso
Kirkhof School of Nursing
388C DEV

RE: Proposal #00-243-H

Dear Johannie:

Your proposed project entitled **Relationship of Osteoporosis Knowledge and Perceived Susceptibility to Osteoporosis Among Hispanic Women** has been reviewed. It has been approved as a study which is exempt from the regulations by section 46.101 of the Federal Register 46(16):8336, January 26, 1981.

Sincerely,

[Redacted signature]

Paul A. Huizenga, Chair
Human Research Review Committee

APPENDIX F

PERMISSION TO USE OSTEOPOROSIS KNOWLEDGE TEST AND
OSTEOPOROSIS HEALTH BELIEF SCALE



GRAND VALLEY
STATE UNIVERSITY

401 W. FULTON STREET • GRAND RAPIDS, MICHIGAN 49504-6431

August 18, 2000

Dear Johannie Troncoso
3447 Brook Trail, S. E.
Grand Rapids, MI 49508

Dear Johannie Troncoso,

Thank you for your interest in using the Osteoporosis Knowledge Test (OKT) and the Osteoporosis Health Belief Scale (OHBS) for your thesis. You have my permission to use these instruments. Continue to keep us informed of any results you obtain using the instruments. In that way we hope to continue to serve as a clearinghouse for information about the instruments.

I wish you much success with your study.

Sincerely,

Phyllis Gendler, PhD, RN, CS, FNP, GNP
Professor
Kirkhof School of Nursing
Grand Valley State University
Phone: 616-895-3516
E-mail: gendlerp@gvsu.edu

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