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THE RELATIONSHIP BETWEEN THE FREQUENCY OF EXERCISE AND NUMBER AND LEVEL OF BOTHER OF MENOPAUSAL SYMPTOMS.

By

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ABSTRACT

THE RELATIONSHIP BETWEEN THE FREQUENCY OF EXERCISE AND NUMBER AND LEVEL OF BOTHER OF MENOPAUSAL SYMPTOMS.

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This study analyzed the relationship between exercise and the symptoms of menopause: hot flashes, weight gain, difficulty sleeping, flooding, vaginal dryness, irregular periods, depression, fluid retention, mood swings, headaches, fatigue and tender breasts. This secondary analysis, included 200 women, 40 to 65 years of age and used data from the Decision Making in Menopause Study (Rothert, 1990). Participants identified their frequency of exercise, the number and level of bother of menopausal symptoms utilizing a questionnaire. The conceptual framework for this study was Newman's System Model. A relationship was found between the frequency of exercise and the number of menopausal symptoms the women reported, and with the level of bother that they reported experiencing menopausal symptoms.

To Ken, Michael, Lisa and Dad

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INTRODUCTION

Menopause is a natural occurrence in all women as they age. It is the time when a decreasing number of ovarian follicles produce less of the female hormones, estrogen and progesterone. Menstrual periods change in characteristic and finally cease completely (Walsh & Schiff, 1990). It usually occurs between 40 to 55 years of age with the average age being 51.4 years (Uphold & Graham, 1994). Greenblatt stated in 1966 that "the life history and destiny of each woman are dependent to a great degree on the intensity and duration of her ovarian function." In the 1990's many women are looking at menopause not as the end of youth, but as the beginning of new opportunities (Friedan, 1993; Jacobowitz, 1993; & Sheehy, 1992).

There has been a change in age distribution of U.S. females. In 1900 only 14.9% of the female population were 40 and 64 years of age (U.S. Bureau of Census, 1975). By 1970 26.8% of the female population were between 40 and 64 years of age (U.S. Bureau of Census, 1975). It is projected that by the year 2000, 39% of the female population will be of the ages 40 to 65 years (U.S. Bureau of Census, 1994). This includes the female "baby boomers" born between 1946 and 1964 who are now entering the menopausal years. Over the next decade approximately 16 million American women will enter menopausal years (Scharbo-DeHaan, 1994).

With the life expectancy of a woman at 79.7 years of age, about one third of a woman's life will occur after menopause (U.S. Bureau of Census, 1994). An increase in the life expectancy of a woman does not ensure good health in a woman's later years. The quality of life she experiences in these later years may be affected by the lifestyle choices she makes at menopause. One important choice is to live a sedentary lifestyle or to be physically active through exercise.

After menopause, women have an increased risk of cardiovascular disease, osteoporosis and deterioration of glucose tolerance (Skouby, 1994). Bush (1990) reports that nearly 53% of deaths in women over fifty years of age are due to cardiovascular disease. Obesity is one of the risk factors for cardiovascular disease (Gorodeski & Utian, 1994). Exercise can lead to decreased weight.

Osteoporosis can be found in half of the women in the United States over 50 years of age (Paganini-Hill, 1994). Osteoporosis results from calcium loss in bones which occurs at a rate of 2%-4% per year for the first three years following menopause and then 1% each year after that (Wren, 1984; Carlucci, 1991). This loss of bone mass leaves a woman susceptible to fractures such as a femoral neck fracture or vertebral fracture (Lindsay, Hart, Abdalla and Dempster, 1986). Studies show that hormone replacement therapy prevents or slows bone loss (Weiss, Ure, Ballard, Williams & Daling, 1980; Notelovitz, 1990). Exercise not only prevents loss, but when exercise is continued, a modest increase in bone mass can be achieved (Forward & Burr, 1993; Caplan & Ward, 1993; Grove & Londeree, 1992, Notelovitz; 1986).

Not all the adverse side effects of menopause are long term. The symptoms of menopause can be felt at the early stages of menopause. The symptomatology of menopause varies with each woman. Kronenberg (1990) uses the estimates that 75% of American women experience symptoms of menopause and that 15% of these women are affected severely. The symptoms of menopause come from a progressive decrease in hormones that leads to vasomotor instability and target tissue atrophy. Common symptoms of menopause include hot flashes, night sweats, difficulty sleeping, headaches, irregular periods, heavy menstrual flow, vaginal dryness, swelling, fluid retention, tender breasts, and weight gain. This study will focus on the relationship between the frequency of exercise to the number of menopausal symptoms, and to the level of bother of the menopausal symptoms women report.

Exercise

In spite of a growing body of evidence supporting the health benefits of exercise, less than half of the American population exercise at least three times per week for 20 minutes or more (U.S. Department of Health and Human Services, 1994). Exercise is defined in The Webster's Dictionary (1981) as "bodily or mental exertion designed for training, developing or keeping in condition." The American College of Sports Medicine states that exercise, to be of health benefit, needs to involve repetitive use of large muscle groups at a moderate intensity for at least 20 minutes or more, three to five times per week (U.S. Department of Health and Human Services, 1994).

The effects of exercise on health are the foci of many studies (Pronk,

Crouse, & Rohack, 1995; Kottis, Rosen, Cosgrove, Shindler, & Wilson, 1994; Maroulakis & Zervas, 1993; Pronk, Crouse, & Rohack, 1995; Choi, VanHorn, Picker, & Roberts, 1993; Thomas, Londeree, Lawson, Ziogas, & Cox, 1993). These studies on exercise used a specific training program for a limited time. The problem with this approach is one of practicality. In order for exercise to be of long term benefit, it must become part of a person's lifestyle (U.S. Department of Health and Human Services, 1994). An exercise program, therefore, must be enjoyable, convenient and realistic. If the exercises are found to be fun and enjoyable a person is more apt to incorporate them into his/her daily activities, than exercises that are tedious and/or difficult. A barrier to exercise can be inconvenience. If an exercise program requires expensive equipment, high-priced health club fees or long, time consuming commutes, the person is less apt to continue with the program. The exercise program needs to fit the person's present level of fitness. A program that is too physically demanding will cause frustration and lead to defeat. The focus should be on the enjoyment and the benefits of the exercise, not on the preparation, expense or pain.

In this study each participant designed the exercise program that fit her lifestyle. If, after starting her exercise program, the participant found it did not work as she planned, she was allowed to revise the program. Exercise was defined as any aerobic physical activity that involves the repetitive use of large muscle groups. The exercises did not need to be weight bearing for this study. The level of exercise was defined by the number of times per week the participant identified she was involved in the planned exercise.

Menopause

The terms menopause, perimenopause, and climacteric have been used interchangeably (Hargarten, 1994 and Notelovitz & van Keep, 1986), although they do have different meanings. Menopause is the permanent cessation of the menstruation. It results from the loss of ovarian response to gonadotropic hormone stimulation and leads to a decrease in estrogen and progesterone production. Surgical menopause occurs with the removal of both ovaries. Natural menopause occurring before the age of forty years is considered premature menopause (Notelovitz & van Keep, 1986 and Walsh & Schiff, 1990).

The perimenopausal or climacteric years can be divided into three phases, premenopausal, perimenopausal and postmenopausal. Premenopausal is the time prior to the menopause, when follicular activity is decreased enough to cause some hormonal change. Menstrual periods may become irregular in timing and character. This usually occurs between the ages of 35 and 45 years (Bachmann, 1991; Diczfalusy, 1986 and Hargarten, 1994). Perimenopause is the time immediately prior to the cessation of menstruation and continues for one year following the menopause (Speroff, 1994; Notelovitz, 1986). Perimenopause usually occurs between the ages of 45 and 55 years.

Postmenopausal years continue after the cessation of menstruation to 65 years old. After 65 is traditionally considered the "geriatric years" (Notelovitz, 1986). Cessation of hormone production becomes evident with the cessation of menstruation. Postmenopausal years follow the perimenopausal time and usually occur between the ages of 55 and 65 years of age. Long term side

effects resulting from a loss of estrogen may begin to become evident, such as an increase risk of cardiovascular disease, osteoporosis, and glucose intolerance (Bachman, 1991; Diczfalusy, 1986; & Hargarten, 1994).

In summary, menopause is the permanent cessation of menstruation. The symptoms of menopause can occur, however, in the premenopausal years and continue through the postmenopausal years. The premenopausal years can begin as early as 35 years of age with menopause, itself, occurring after the age of 40 years. Postmenopausal years may last beyond the age of 65 years, however, the years after the age of 65 are traditionally considered the "geriatric years." Women between 40 and 65 years of age were included in this study. Using this age group eliminated women experiencing premature menopause.

Hot Flashes And Exercise

The hallmark symptom of menopause is the hot flash or flush. Kronenberg (1994) reports the prevalence of hot flashes increases throughout the time of the menopause. Of premenopausal women, 6% to 63% will experience hot flashes, while the percent of women reporting hot flashes during the time of postmenopause is 58% to 93%. A hot flash is an unpredictable, recurring episode where a woman has the feeling of warmth starting in her upper torso and sweeping upward to her head. It may or may not be preceded by an aura. The woman's face may turn red and she begins to sweat. Some women sweat to the point of soaking their garments. This sweating is followed by the body cooling down causing the woman to feel chilled and to even shiver. This can be embarrassing and intrusive. It is reported that hot flashes can affect

sleep (Kronenberg, 1994). Hot flashes can cause the woman to sweat to the extent of requiring a change of bedding and may occur several times in one night (Erlik, Tatartyn, Meldrum, Lomax, Bajorek & Judd, 1981). This interference with sleep leads to daytime fatigue, irritability, impaired memory, and poor concentration (Walsh & Schiff, 1990).

The exact cause of hot flashes is not known. Estrogen therapy is currently the most effective treatment (Kronenberg, 1994). Campbell and Whitehead (1977) found estrogen therapy to decrease hot flashes by 40 to 50%. There is a paucity of studies on treatments for hot flashes other than hormone replacement therapy (HRT). In a study by Hammar, Berg and Lindgren (1990) it was found that physically active women enrolled in a gymnastic club reported less frequent hot flashes than the sedentary control group. Hammar included postmenopausal women with natural menopause who did not use hormone replacement therapy.

In summary, hot flashes can occur throughout the menopausal years. Hot flashes can be not only embarrassing, but lead to difficulty sleeping, fatigue, irritability, impaired memory and poor concentration. HRT is the current choice of treatment. There has been a paucity of studies on treatment for hot flashes outside of HRT. This study will look at the relationship of exercise to hot flashes for women who use HRT as well as for those women who do not use HRT.

Genitourinary Symptoms And Exercise

Bachman (1990) states that the genitourinary mucosa can be affected by menopause and become dryer, less elastic, and thinner. These changes can

cause an increase in discomfort and an increase in incidence of infections. As the vaginal walls become smoother, dryer and less elastic, the menopausal woman is more susceptible to vaginal infections. The vagina shortens and narrows. Vaginal discharge can cause irritation and burning or intense itching. This irritation can interfere with sleep (Bachman, 1994). The vaginal dryness can lead to a decrease in libido. Hormone replacement therapy is currently the most effective treatment (Bachman, 1994).

Changes in the urinary tract can lead to an increase in urinary tract infections as well as irritation and burning on urination or even bladder dysfunction. The effects of hormone replacement therapy on the female urinary tract are being studied (Formosa, Brincat, Cardozo, & Studd, 1994). There were no studies found demonstrating that strenuous exercise leads to uterine, rectal or vaginal prolapse.

Strengthening the pelvic muscles, with specific pelvic muscle exercises, can eliminate or at least decrease urinary stress incontinence in some women (U.S. Department of Health and Human Services, 1992; Burns, Pranikoff, Nochajski, Desotelle & Harwood, 1990). Pelvic muscle exercises called Kegel exercises are performed by contracting the pubococcygeus muscle.

In summary, hormone replacement therapy is currently the most effective treatment for the genitourinary symptoms of menopause. Specific exercises, such as pelvic muscle exercises have been shown to have a positive effect on urinary stress incontinence. No other studies were found regarding the effects of exercise on the genitourinary symptoms of menopause.

Weight Gain And Exercise

Women tend to gain weight at a rate of .8 kg/year in the perimenopausal years. It is questioned if weight gain is a result of aging or directly related to menopause (Gorodeski & Wulf, 1994). Weight is gained when the caloric intake exceeds the calories expended by the body. An increase in weight, especially in the abdominal area is associated with an increased risk for cardiovascular disease, hypertension, impaired glucose tolerance, and diabetes. One of the side effects of estrogen is weight gain (Kuhn, 1991).

Caloric restriction will lead to weight loss. The weight loss results from a loss of fat and muscle (Shangold, 1994), As women age, their bodies naturally lose lean muscle mass and gain fat (Kart, Metress & Metress, 1992). Increasing physical activity by exercising can burn calories, increase muscle strength, raise resting metabolism and decrease the appetite (Kart, Metress & Metress, 1992).

In summary, women tend to gain weight during the menopausal years. HRT can lead to further weight gain. Exercise can have a positive effect on the weight gained during the menopausal years by burning calories, increasing muscle strength, raising resting metabolism and decreasing the appetite.

Psychological Symptoms And Exercise

The psychological symptoms of menopause are more controversial than the physical symptoms of menopause. It has been argued that psychological symptoms such as anger, rage, anxiety, depression, nervousness, mood swings and difficulty sleeping are a result of life events. Life events that a woman may experience during menopause include children leaving home, death or illness of

a spouse or parent, changes in job roles and the perceived loss of her own youthfulness. Several studies have failed to document any change in psychological symptomology during the time of menopause (Neugarten & Kraines, 1965; McKinlay, Brambilla & Posner, 1992). Other studies have shown that the majority of women seeking medical assistance related to menopause demonstrate psychological symptomatology (Ballinger, 1975; Anderson, Hamburger, Lui & Rebar, 1987; Montgomery, Bincat, Tapp, Appleby, Versi, Fenwick & Studd, 1987). The data from these studies show that not all women experience noticeable psychological symptomatology, but that the majority of women who are seen by a health care professional for menopause do exhibit psychological symptoms. Menopause is the result of changes in the body. These changes cause stress in the body. A woman will, therefore, have less tolerance of sources of stress outside of the body (Cobb, 1990).

Caplan, Ward and Lord (1993) studied postmenopausal women and exercise. They found women who voluntarily enrolled in an exercise program, consisting of exercise three times per week scored significantly higher on the "Life Satisfaction Index" than the control group who did not join the exercise program. Exercise as simple as walking can reduce anxiety, depression, and fatigue (Carlucci, Goldfine, Ward, Taylor & Rippe, 1991; Hargarten, 1994).

In summary, the psychological symptoms, whether caused by a reaction to life events or directly by menopause may be decreased by regular exercise. In this study the psychological symptoms included were: depression, mood swing, difficulty sleeping, and fatigue.

Symptoms Checklist

Just as the symptomology of menopause varies with each woman, so do the lists of symptoms used in research differ with each study. The problem with the symptoms of menopause is that the majority of symptoms are subjective. Very few menopausal symptoms lend themselves to the objectivity of clinical tests.

Three menopausal symptoms checklists have been used most consistently in menopause research: the Blatt Menopausal Index (1953) called the BMI, the Neugarten and Kraines Checklist (1965), and the International Health Foundation Index (1975). Researchers have adapted these lists to their studies. Rothert et al. (1990), in The Decision Making in Menopause Study did not use the BMI, the Neugarten and Kraines Checklist or the International Health Foundation Index. The list of menopausal symptoms used for this study were: hot flashes or flushes, weight gain, difficulty sleeping, flooding (heavy menstrual flow), vaginal dryness, irregular periods (bleeding), depression, swelling or fluid retention, mood swings, headaches, fatigue-tiredness, and painful or tender breasts. This list was derived from a previous study by Rothert et al. (1990), The Women's Use of Information Regarding Hormone Replacement Therapy Study. The original symptom list included 55 items. These 12 symptoms were found to be the most bothersome.

A summary comparison to the BMI, the Kraines and Neugarten Checklist and the International Health Foundation Index can be found in Figure 1. Nine of the symptoms on the Rothert menopausal symptom list (hot flashes, weight gain,

difficulty sleeping, heavy menstrual flow, depression, mood swings, headaches, breast pain and fatigue) are common to the other checklists. Vaginal dryness, irregular periods and fluid retention were not found on the other checklists. These symptoms were among the symptoms women reported as most bothersome in The Women's Use of Information Regarding Hormone Replacement Therapy Study (Rothert et al., 1990). These three symptoms are also cited in literature as symptoms of menopause (Bachman, 1990; Walsh & Schiff, 1990). In this study, the Rothert checklist of menopausal symptoms was employed.

Symptoms	Blatt (1953)	Neugarten & Kraines (1965)	International Health Foundation Index (1975)	Rothert (1990)
Vasomotor flashes/night sweats/perspiration	x	x	x	x
Weight gain		x		x
Difficulty sleeping	x	x	x	x
Heavy menstrual flow		x		x
Vaginal dryness				x
Irregular periods				x
Depression	x	x	x	x
Fluid retention				x
Mood swings			x	x
Headaches	x		x	x
Breast pain		x		x
Fatigue	x	x	x	x

Figure 1. The Rothert List of symptoms for menopause compared to three symptom checklists used most consistently in previous menopausal studies.

Summary of Conceptual Definitions of Variables

Menopausal years

Menopausal years for this study was defined by age. Women between 40 and 65 years of age, regardless of menopausal status or use of HRT were included. Using this age group eliminated women experiencing premature menopause (Notelovitz & van Keep, 1986; & Walsh & Schiff, 1990).

Menopausal status was defined using the same terms as used by Wilbur, Dan, Hedricks and Holm (1990):

Premenopausal: still having natural menstrual periods or last menstrual period was less than 3 months ago.

Perimenopausal: last menstrual period was 3 to 12 months ago.

Postmenopausal: last menstrual period was more than 12 months ago or had both ovaries removed.

Menopausal Symptoms

Menopausal symptoms included: hot flashes, weight gain (over 10 lbs), difficulty sleeping, flooding (heavy menstrual flow), vaginal dryness, irregular periods, depression, swelling or fluid retention, mood swings, headaches, fatigue-tiredness, and painful or tender breasts (Rothert et al., !990).

Level of Bother

Bother is a subjective feeling. Webster (1981) defines bother as an annoyance or causing a disturbance. In a study by Hammar in 1990 the degree to which menopausal symptoms affected the participants was measured using the term "severity." Severity was defined by the participant as "no symptoms,

mild, moderate and severe symptoms." Webster defines severity as the state of being in extreme distress. For this study the term bother was considered less subjective.

Exercise

Exercise can involve both physical and/or mental exertion for the purpose of training (Webster, 1981). Exercise in the original study included mental activities, such as meditation, as well as physical activities. For the purpose of this study exercise followed the guidelines of the American College of Sports Medicine. Exercise was defined any aerobic physical activity that involves the repetitive use of large muscle groups (U.S. Department of Health and Human Services, 1994).

Frequency of Exercise

Exercise can be measured by numerous methods, including physical measurements, i.e. heart rate, or by a set of defined activities, i.e. walking on a treadmill. The original study encouraged each participant to design an exercise program to fit her individual lifestyle, therefore strict clinical measurements were not possible. The American College of Sports Medicine states that exercise, to be of health benefit, needs to involve repetitive use of large muscle groups, three to five times per week (U.S. Department of Health and Human Services, 1994). In keeping with this guideline, this study measured the number of times per week the participant identified she was involved in aerobic physical activity.

Research Question

For most of history menopause was looked at as a natural and unfortunate occurrence in women (Wilson, 1966; Utian, 1990). With the advent of hormone replacement therapy, menopause was looked at in a new light. It was now being described as an endocrine problem, a hormone deficiency (Wilson, 1966). Wilson (1953) stated that women no longer had to suffer the effects of estrogen deprivation which were "physically and emotionally devastating." Menopause had a "cure." The cure was hormone replacement therapy.

Hormone replacement therapy does not completely eliminate menopausal symptoms. Some women still report symptoms such as hot flashes, genitourinary problems and psychological symptoms (Kronenberg, 1994). Women on hormone replacement therapy who are still experiencing symptoms of menopause may also need to find methods to further decrease their symptomatology. Many women do not use hormone replacement therapy. Kronenberg found that only 10 to 15% of women eligible for hormone replacement therapy use hormone replacement therapy. For some women hormone replacement therapy is contraindicated. Hormone replacement therapy is contraindicated in women with a history of breast cancer, recent endometrial cancer, vaginal bleeding of unknown etiology, acute liver disease or acute vascular thrombosis. (Shoupe & Mishell, 1994). This leaves a large group of women who are not receiving the benefits of hormone replacement therapy and need an alternative method of managing their menopausal symptoms

and preventing the long term effects. Exercise may be of benefit to those women not using hormone replacement therapy. It may also benefit women using hormone replacement therapy who may or may not be experiencing menopausal symptoms.

The research question for this study is:

Is there a relationship between the frequency of exercise reported by women during the menopausal years to:

a. the number of menopausal symptoms identified by these women?
b. the level at which these women describe menopausal symptoms bothersome?

It is hypothesized that there is a relationship between the level of exercise and the number of menopausal symptoms identified by women. It is further hypothesized that there is a relationship between the frequency of exercise and the level at which women describe menopausal symptoms bothersome.

Study Relevance

Hormone replacement therapy is presently the treatment of choice for menopausal symptoms. Many women, however, do not use hormone replacement therapy . Exercise may be able to help these women to decrease or alleviate menopausal symptoms. It may also be of use to those women who use hormone replacement therapy and may or may not be still experiencing menopausal symptoms.

By employing the nursing process, the Advanced Practice Nurse (APN) would be able to assess those women who would benefit from exercise. The

APN would also assess the patient for the type and amount of exercise most appropriate for each patient and evaluate the effectiveness of the exercise plan.

Cost containment is very important in the plan of care for the patient. An exercise program can be designed to fit within economic restraints. An exercise program can be designed to be simple and inexpensive.

With proper assessment and planning an exercise program has few, if any, negative side effects. Research has demonstrated that the benefits of exercise can be far reaching to include reducing long term risk factors such as cardiovascular problems, osteoporosis and impaired glucose tolerance and diabetes.

CONCEPTUAL FRAMEWORK

The conceptual framework for this study was Neuman's Systems Model (Neuman, 1995). Neuman uses a holistic approach to the patient, whom she calls the client. The client's health or wellness is described as system stability. A client's wellness is protected by lines of defense beginning with a central core. Neuman uses concentric rings to diagram this idea (Figure 2). The central core of a person consists of basic survival factors common to all human beings. Surrounding this core Neuman describes three levels of defense. The rings closest to the core are the lines of resistance. At this level the person's system attempts to stabilize the system and return to the normal level of resistance. The next group of rings represent the normal lines of defense and lie between the lines of resistance and the flexible lines of defense. This level represents the person's normal level of wellness or system stability. It is the level of wellness

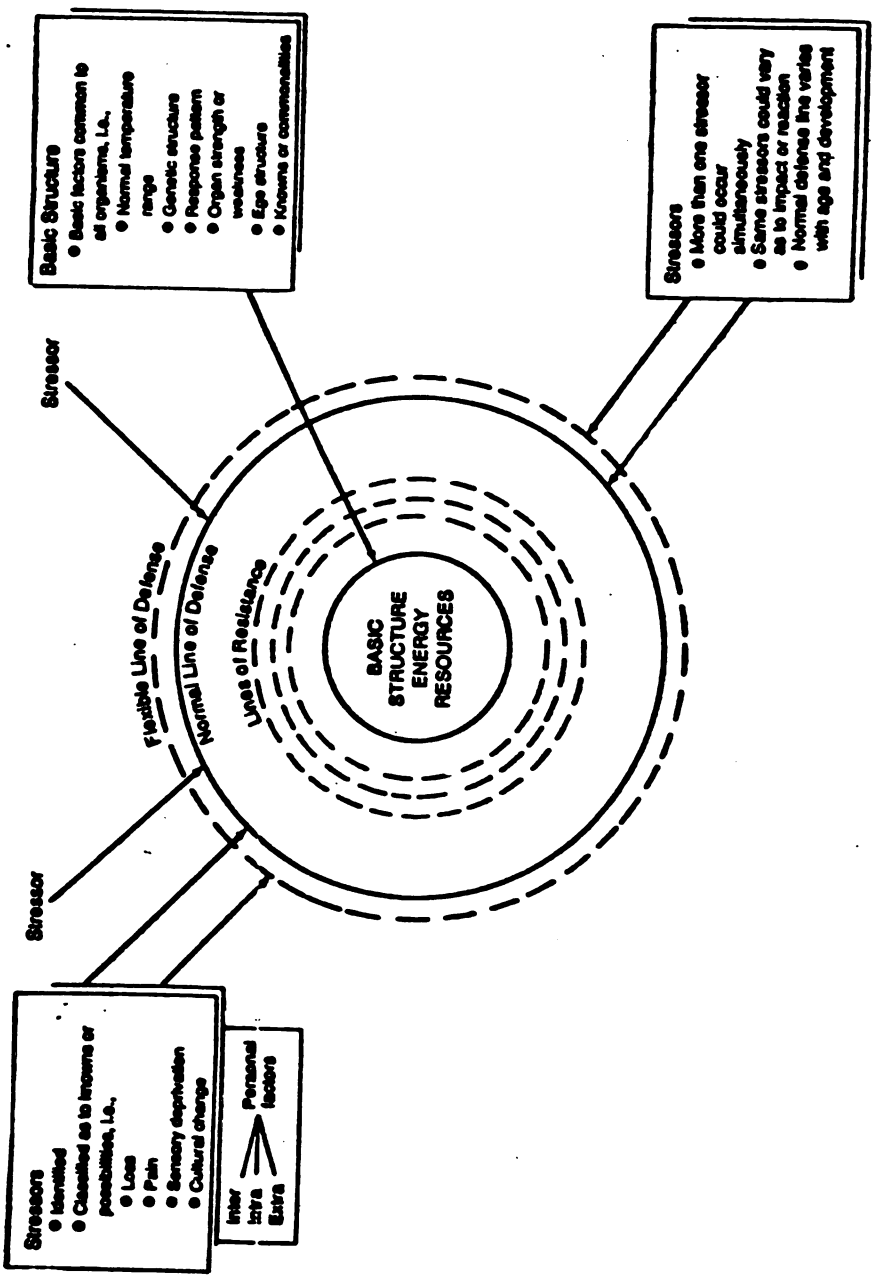

Figure 2 The Neuman Model (Neuman, 1995. p. 27).

that the person has developed over their lifetime to this point. This is the level at which a standard of wellness can be used to compare any subsequent changes in system stability. The outer rings represent the flexible lines of defense and are the lines that protect the person's normal lines of defense. This is the first line of defense a person has against the stressors encountered. The flexible lines of defense are the most dynamic. They can be altered over a short period of time. Its effectiveness can be decreased by negative factors, such as lack of sleep or poor nutrition. Its effectiveness can be strengthened by positive factors such as adequate sleep, balanced nutrition, or exercise (Ross & Bourbonnais, 1980; Cross, 1990).

The client interacts with the environment on a continuous basis. The relationship between the client and the environment is reciprocal. The environment and the person are continuously influencing each other. Neuman divides the environment into the internal and the external components. The internal component consists of all the forces that are contained within the person. The external component consists of all the forces that are contained outside of the client.

Stressors can come from either the internal or external environment or from both. Stressors are divided into intrapersonal, interpersonal and extrapersonal. The intrapersonal stressors are those stressors found within the person. This could include factors such as physiological, psychological or developmental stressors. The interpersonal stressors are those that occur between the client and another individual or group of people. This could include

the relationship with family members or social groups. The extrapersonal stressors are those that occur outside of the individual system. This would include social norms, laws, or job status.

In the Neuman Systems Model the goal is system stability, which can be threatened by stressors. These stressors are resisted by person's lines of defense. The stronger the flexible lines of defense, the more resistant to stressors the client will be.

Following the Neuman Systems Model, wellness in this study was defined as being free of menopausal symptoms (Figure 3). The intrapersonal stressors would be the decrease in estrogen and progesterone and possibly a perceived loss of youthfulness. Interpersonal stressors can involve changes in family relationships, spouse relationships and midlife events such as children leaving home, job changes, illness or death of a spouse, or aging parents. Extrapersonal stressors, those occurring outside the individuals's system, include cultural expectations of women of menopausal age and world events. A symptom occurs when stressors break down the normal lines of defense. This is a felt response to the invading stressor (Meleis, 1991). In Neuman's System Model, the relationship between the client and the environment is reciprocal. Using this framework, when a woman experiences menopausal symptoms she will react with her environment. This reaction will affect her relationship with others as well as herself and may further increase her stressors.

Strong flexible lines of defense can prevent stressors from reaching the normal lines of defense, thereby, preventing or stopping symptoms from

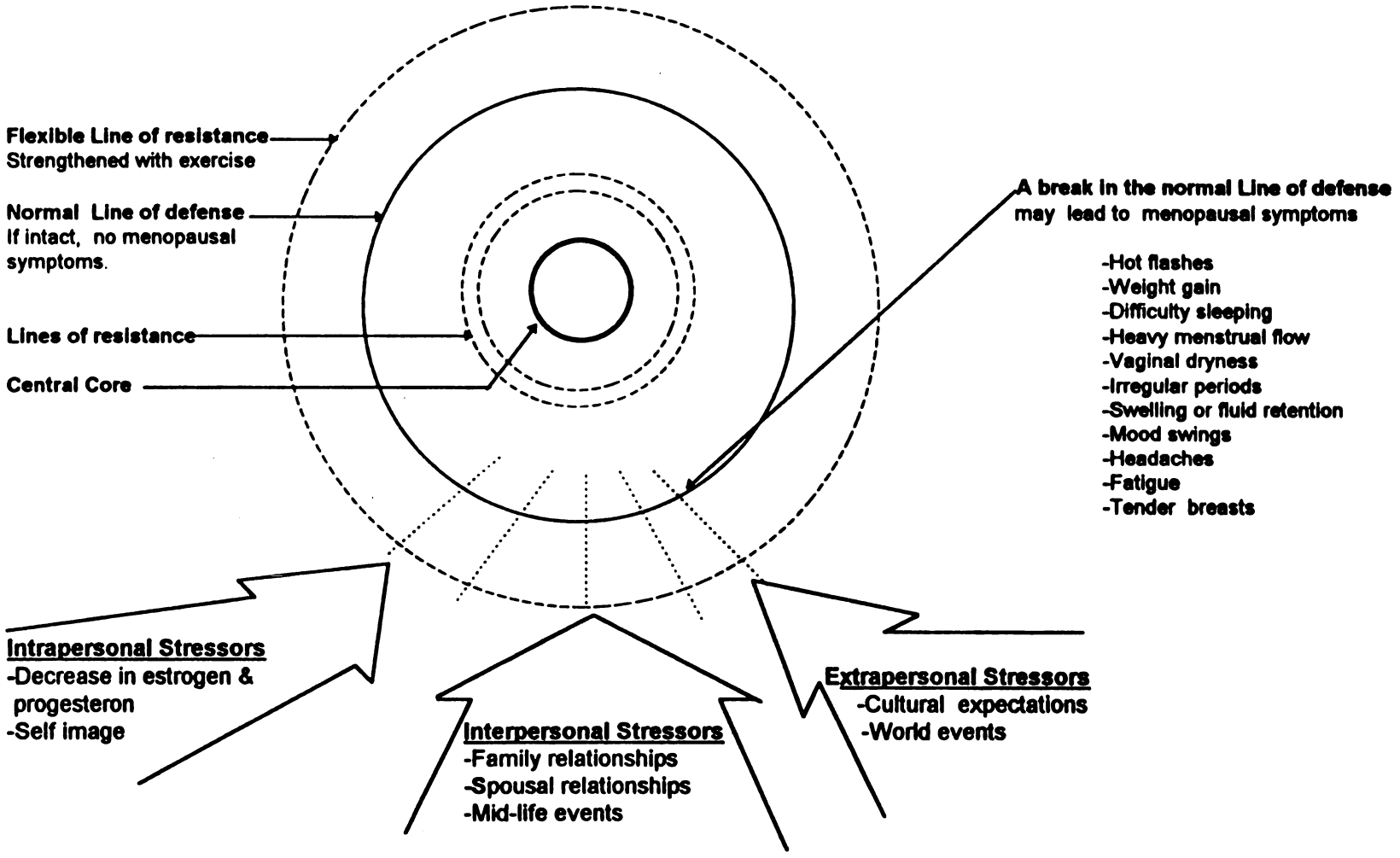

Figure 3. Neuman's System Model as it relates to menopause and exercise.

occurring (Cross, 1990). The flexible lines of defense can be strengthened with exercise (Ross & Bourbonnais, 1980).

It is hypothesized that the menopausal woman can strengthen her flexible lines of defense with exercise and thereby decrease or eliminate menopausal symptoms.

REVIEW OF LITERATURE

Although numerous studies have been conducted on menopause and exercise, the majority of these have been on the long term effects of menopause, such as cardiovascular disease and osteoporosis (Bush, 1990; Forward & Burr 1993; Grove & Londeree, 1992). Only three studies on the relationship between exercise and the acute symptoms of menopause were found. Hammar (1990) studied 79 women who were going through natural menopause. The participants had no history of using hormone replacement therapy. A self-selected group of women participated in physical exercise at a gymnastics club an average of three hours per week. Physical activity for the control group was not monitored. The control group consisted of women who did not want to join the gymnastics club. The percentage of women reporting no hot flashes was higher in the physically active group than in the control group. The most significant difference was in the severity of the hot flashes. The physically active group reported less severe and less frequent hot flashes than the control group. The weakness of this study was the failure to monitor the physical activity of the control group. It is difficult to determine if the decrease in frequency and severity of hot flashes was actually due to physical activity or to social interaction

at the gymnastics club.

A second study on exercise and acute menopausal symptoms was conducted by Wilbur, Dan, Hedricks and Holm (1990). The study of 386 women looked at menopausal status, menopausal symptoms, energy expenditure and aerobic fitness. Menopause was defined as:

> "Premenopausal: normal menses during the 12 months preceding the study.
>
> Perimenopausal: irregular or infrequent menses over the past 12 months.
>
> Postmenopausal: no menopause over the past 12 months and self-description as postmenopausal.
>
> Hysterectomy: uterus removed and at least one ovary intact." (p. 69).

Menopausal symptoms were defined using the Kaufert and Syrotuik Symptom Index. The menopausal symptoms in this scale are: hot flashes, night sweats, fatigue, irritability, nervousness, depression, headaches, and trouble sleeping. Weight gain, menstrual flow, vaginal dryness, fluid retention or breast pain were not included in the study. Energy expenditure was measured using an "intensity code" (p.70). This was an estimated amount of energy expended relative to the resting metabolic rate. Included in this study was energy expended during occupational activities, leisure time, and household activities. Aerobic fitness was measured by the "submaximal heart rate exercise test on a bicycle ergometer" (p.70). American Heart Association guidelines were used to control for age effects.

Wilbur et al. (1990) did not find a change in hot flashes or night sweats

related to physical activity. Exercise, however, was found to decrease the non-vasomotor symptoms: fatigue, irritability, nervousness, depression, headaches, and trouble sleeping. This supports the findings of others related to exercise having a positive affect on the psychological health (Blair, Kohl Paffenbarger, Clark, Cooper, & Gibbons, 1989; Taylor, Sallis, & Needle, 1985).

The third study was conducted by Wallace, Lovell, Talano, Webb and Hodgson (1982). Wallace studied pre-menopausal women (mean age 43.1 $\pm$ 2.8 years) and post-menopausal women (mean age 53.7 $\pm$ 3.7 years). Blood samples were drawn before and after a physical conditioning program to measure hormone levels. It was found that exercise significantly increased estradiol for both pre-menopausal and post-menopausal. The conclusions drawn were that exercise:

"1) appears to change climacteric symptomatology in post-menopausal women

2) may delay the onset of menopause in pre-menopausal women" (p. 154).

The weakness of this study was the short report did not give enough detail. It is, therefore, impossible to evaluate appropriateness of the research process. The strength of this research project was the objective method of measuring the effect of exercise, a blood test.

In summary, a review of the literature found three studies on the relationship between exercise and the symptoms of menopause. All three studies found exercise to have a positive affect on the symptoms of menopause.

Exercise was most reported to affect the non-vasomotor such fatigue, mood swings, depression, sleep difficulty and headaches. None of these studies, however, examined the affect of exercise on weight gain, menstrual flow, vaginal dryness, fluid retention or breast pain.

METHOD OF STUDY

Study Design

This study was a secondary analysis using the data from the Decision Making in Menopause Study (Rothert et al., 1990), funded by National Institute of Health, National Center for Nursing Research, grant number NR 0124-04A2. The overall objective of the study was to develop and test an educational intervention to inform women about hormone replacement therapy and empower them to interact positively with the health care system. The purpose of this study is to describe the relationship between the frequency of exercise reported by women during the menopausal years, the number of menopausal symptoms identified and the level at which these symptoms were rated as bothersome.

Sample

The original study used a non-probability convenience sample. Three hundred women over the ages of 40 years were recruited from a moderate sized Michigan city by using newspaper, radio, and television announcements. Letters were sent to those women who were interested in participating in the study. Of the 300 women recruited, 252 completed the study. For this secondary analysis, complete data were available on 200 participants. Participants were primarily of

the white race (193 or 96.5%), three (1.5%) were African-American and one (.5%) was Hispanic. Over ninety-six percent had incomes of $15,000 or above. Most of the participants (198 or 99%) had a high school or higher education. The demographics of race and education were not reflective of the community. The participants included in this study were: 1) female, 2) 40 years of age or older, 3) able to read and speak English. Menopausal status or use of medications were not included as participation criteria.

Variable Operational Definitions and Instruments of Measurement

The original study used a self administered questionnaire. The instruments used were tested in a pilot study (Rothert, et.al., 1990). Measures were taken four times during twelve months: pre-intervention (T1), 3 months post-intervention (T2), 6 months post-intervention (T3), and 12 months post-intervention (T4). In this study, only the items on the original questionnaire collected at T4 and related to menopausal symptoms and exercise were utilized.

Menopausal Status

The participants were asked to identify when their last natural menstrual period occurred using the following scale: 1 = still having natural menstrual period; 2 = less than 3 months ago; 3 = 3 to 12 months ago; 4 = more than 12 months ago; and 5 = not sure (Appendix A). Only those answering 3 or 4 were considered to be menopausal.

Hormone Replacement Therapy (HRT)

To identify those who were using HRT, the women were asked to describe their present experience with HRT as 1 = currently taking; 2 = have never taken;

3-7 = have taken in the past but discontinued for various reasons (Appendix B) . Only women currently taking estrogen or estrogen/progesterone at Time 4 were considered as using HRT.

Symptoms of Menopause

Each participant was asked to rate the menopausal symptoms she was experiencing using the Decision Making in Menopause Study Menopausal Symptom Instrument. This instrument listed the following twelve menopausal symptoms: hot flashes or flushes, weight gain (over 10 lbs.), difficulty sleeping, flooding (heavy menstrual flow), vaginal dryness, irregular periods, depression, swelling or fluid retention, mood swings, headaches, fatigue-tiredness, and painful or tender breasts (Appendix C). These twelve symptoms were found to be the most frequently identified as bothersome in the Use of Information Regarding Hormone Replacement Therapy Study (Rothert et al., 1990).

Level of Bother

Each participant was asked to rate how much she was bothered by each one of the twelve menopausal symptoms on a scale of 1 to 5, with 1 = she was not experiencing this symptom or didn't believe it was related to menopause; 2 = does not bother her at all; 3 = bothers her a little; 4 = bothers her somewhat; and 5 = bothers her a great deal (Appendix C).

Frequency of Exercise

Each participant was asked to identify her frequency of exercise. Exercise was defined as any aerobic physical activity that involves the repetitive use of large muscle groups. The frequency of exercise was rated by the

participant on a scale of 1 to 5 with 1 = never; 2 = sometimes but less than once a week; 3 = 1-3 times per week; 4 = 4-6 times per week and 5 = everyday. (Appendix D). There were two ways that the participants were asked about exercise frequency. The first, asked if the participant exercised for health promotion and the second, if she exercised for menopausal symptoms. The results of both of these items were analyzed.

Data Collection

The women recruited for the Decision Making in Menopause Study were given a questionnaire to complete. The questionnaire included the Decision Making in Menopause Study Symptom Index and the Self Care Instrument. The participants met at the university to complete the questionnaires. A member of the research team was present to describe the purpose of the study, obtain an informed consent, give instructions on completing the questionnaire, answer questions, and to collect the completed questionnaires. It is the data collected from the Decision Making in Menopause Study Symptom Index and the Self Care Instrument at Time 4 that were used in this study.

In the original study, the participants were randomly divided into three groups. All three groups received the same intervention, but the method and intensity of delivery varied. The intervention was educational in nature. The first group (Group A, N=88) received a written brochure describing menopause, menopausal symptoms, long term postmenopausal risk factors, hormone replacement therapy and methods to improve their health. The brochure encouraged the participant to eat balanced meals which included 800 to

1000 mg. of calcium daily and to perform "regular weight bearing exercises such as biking or yoga...for at least 20 minutes....three times per week" (p. 4). The second group (Group B, N=81) was given the same brochure as the Group A, plus participated in a lecture/discussion program. The third group (Group C, N=83) was also given the same brochure as Group A, and participated in interactive sessions designed to support the participant's decision making process. All three groups were given similar information regarding exercise and its benefits. Knowledge scores for the three groups did not vary significantly according to the intensity of the mode of delivery. For the purpose of this study Groups A, B, and C, were combined and only the participants with complete data were included (N=200).

Data Analysis

Data collected from the 200 participants in the Decision Making in Menopause Study Symptom Index and the Self Care Instrument at Time 4 were utilized. Using SPSS for Windows program, the data were analyzed to determine the relationship between exercise and the number of menopausal symptoms and the relationship between exercise and the level of bother of menopausal symptoms as identified by the participants. The effect of HRT was controlled. The level of statistical significance was set at .05. Descriptive statistics were utilized to show the demographic characteristics of the participants. The demographic characteristics included age in years, ethnicity, education, marital status, employment, household income, menopausal status, and use of HRT.

The relationship between the experimental groups and the level of exercise was examined using one-way ANOVA. The analysis of variance revealed no significant differences between Group A, B, or C (F Prob. = .7551, 2-tail significance = .750). For the purpose of this study the three groups were combined (N=200).

Multiple regression was used to determine the relationship between the variables and to accept or reject the null hypothesis with the significance level set at $p \leq .05$. The null hypotheses are:

Ho^1 = There is no relationship between the frequency of exercise and the number of menopausal symptoms the participants report.

Ho^2 = There is no relationship between the frequency of exercise and the level of bother of menopausal symptoms the participants report.

In analyzing exercise and the number of menopausal symptoms, HRT was entered as the first independent variable and exercise as the second independent variable. The number of menopausal symptoms was the dependent variable. To test the second hypothesis, HRT was entered as the first independent variable, with exercise entered as the second independent variable. Level of bother was the dependent variable.

Introducing HRT as the first independent variable reduced the potential of a Type I Error, that is, observing a significant relationship between exercise and the dependent variables that actually were due to HRT. As discussed earlier, HRT is the treatment of choice for most women experiencing hot flashes and vaginal dryness. Since HRT was entered as the first independent variable, the

variance shared in common by HRT and exercise were attributed to HRT.

HUMAN SUBJECT PROTECTION

The original study was approved by the University Committee on Research Involving Human Subjects (UCRIHS) on 5/10/94. A letter of permission to use the data from the Decision Making in Menopause Study for this secondary analysis was obtained. This study was approved by UCRIHS on 6/3/96 (Appendix E). Protection of the rights of the participants was guaranteed by following the protocol. Data utilized was in aggregate form. There were no subject identifiers, thereby, maintaining confidentiality.

RESULTS

Study Sample

The study used a non-probability convenience sample. Of the 300 women recruited, 252 completed the study and complete data were available on 200 participants (N = 200). Demographic characteristics collected included: age in years, ethnicity, education, marital status, employment, household income, menopausal status, and use of HRT (Table 1).

Table 1. Frequency of Demographic Variables of Participants.

Characteristic	n	Frequency	
Age	200	**Number**	**Percent**
40 - 45		62	31
46 - 50		83	41.5
51 - 55		48	24
56 - 60		5	2.5
61 - 65		2	1
Race	200		
African-American		3	1.5
Hispanic		1	.5
American Indian		1	.5
White		193	96.5
Other		2	1
Education	200		
High School Graduate		15	7.5
Greater than 12 years		53	26.5
Technical trade		25	12.5
Bachelor's Degree		52	26
Master's Degree		37	18.5
Ph.D/Professional Degree		16	8
Other		2	1
Marital Status	200		
Married		136	68
Divorced		47	23.5
Single		15	7.5
Widowed		2	1

Table 1 (continued).

Employment	200		
Full-time		125	62.5
Part-time		40	20
Retired		12	6
Not employed		19	9.5
Other		4	2
Household Income	200		
Under $14,000		9	4.5
$15,000 - $29,999		21	10.5
$30,000 - $49,999		54	27
$50,000 - $99,999		92	46
$100,000 - $200,000		18	9
Over $200,000		4	2
Not answered		2	1
Using HRT	200		
Yes		65	32.5
No		135	67.5
Menopausal Status	200		
Premenopausal		115	57.5
Perimenopausal		20	10
Post-menopausal		65	32.5

Participants were primarily of the white race, between the ages of 40 and 55 years (N = 193), and married (N = 136). The sample was highly educated, with the majority having completed greater than 12 years of education (N = 183), and 26.5% (N = 43) had obtained a master's degree, Ph.D., or other professional degree. Only 4.5% (N = 9) had household incomes under $14,000. The majority had household incomes greater than $29,999 (N = 170; 85%).

Most of the participants were premenopausal (N = 115; 57.5%), or post-menopausal (N = 65; 32.5%). This was reflected in the number of participants who were using HRT at Time 4 (N = 65; 32.5%). The participants identifying as post menopausal did not make up the entire group taking HRT.

When measuring the status of menopausal symptoms, a large number of participants reported that they were not bothered or experiencing menopausal symptoms (N = 98 to N = 141; 34% to 70.5%). This may be related to 115 (57.5%) of the participants being premenopausal. Weight gain was the symptom identified as bothering most of the participants to the greatest degree (N = 33; 16.5%). Flooding or having heavy menstrual flow was identified as least bothersome by the largest number of participants (N =141; 70.5%) (Table 2).

In evaluating the number of symptoms reported, a large number of participants reported no symptoms (N = 45; 22.5%). Only two (1.0%) participants reported experiencing all twelve symptoms (Table 3).

Table 2. The Level of Bother That Participants Identified They Experienced with Menopausal Symptoms.

Variable	Not Experiencing or No Bother	Little Bothered	Somewhat Bothered	Great Bother
Depression	124 (62.0%)	38 (19.0%)	23 (11.5%)	15 (7.5%)
Difficulty Sleeping	125 (62.5%)	30 (15.0%)	29 (14.5%)	16 (8.0%)
Flooding	141 (70.5%)	18 (9.0%)	27 (13.5%)	14 (7.0%)
Headache	125 (62.5%)	37 (18.5%)	22 (11.0%)	16 (8.0%)
Hot Flashes	124 (62.0%)	44 (22.0%)	13 (6.5%)	19 (9.5%)
Irregular Periods	133 (66.5%)	37 (18.5%)	21 (10.5%)	9 (4.5%)
Mood Swings	114 (57.0%)	43 (21.5%)	25 (12.5%)	18 (9.0%)
Breast Pain	129 (64.5%)	48 (24.0%)	20 (10.0%)	3 (1.5%)
Swelling	128 (64.0%)	42 (21.0%)	18 (9.0%)	12 (6.0%)
Tiredness	98 (49.0%)	48 (24.0%)	32 (16.0%)	22 (11.0%)
Vaginal Dryness	132 (66.0%)	32 (16.0%)	25 (12.5%)	11 (5.5%)
Weight Gain	125 (62.5%)	21 (10.5%)	21 (10.5%)	33 (16.5%)
Mean	124.83	36.5	23.0	15.67
Std. Dev.	9.79	8.95	4.86	7.07

n=200

Table 3. Number of Menopausal Symptoms Participants Identified as Experiencing.

Number of Symptoms	Responses	Percentage
0	45	22.5%
1	14	7.0%
2	11	5.5%
3	15	7.5%
4	21	10.5%
5	14	7.0%
6	10	5.0%
7	18	9.0%
8	23	11.5%
9	10	5.0%
10	10	5.0%
11	7	3.5%
12	2	1.0%
Total		100.0%

n=200 Mean=4.43 Std. Dev.=10.13

Findings

Question 1

Is there a relationship between the frequency of exercise reported by women during the menopausal years to the number of menopausal symptoms identified by these women?

In analyzing the relationship between the frequency of exercise and the number of menopausal symptoms reported, multiple regression was utilized. In the multiple regression equation (N = 200), HRT was entered as the first independent variable and exercise as the second independent variable. The number of menopausal symptoms was the dependent variable. The R^2 change for exercise, controlling for HRT was .047, F Change (1,197) = 9.74 with $p<.05$, at p = .0024, indicating that there was a relationship between exercise and the number of menopausal symptoms. In summary, the hypothesis was supported.

Question 2

Is there a relationship between the frequency of exercise reported by women during the menopausal years to the level at which these women describe menopausal symptoms bothersome?

In analyzing the relationship between the frequency of exercise and the level of bother for each of the twelve menopausal symptoms, HRT was again entered first in the multiple regression equation. Exercise was entered as the second independent variable in the equation. Twelve regressions were performed. Each of the twelve symptoms was entered into a separate regression equation as the dependent variable. The results of the regression

analysis indicated that R^2 values and the associated p values for the variables; flooding, headache, hot flash, irregular periods, breast pain, swelling, vaginal dryness and weight gain were greater than the accepted .05 level of statistical significance, and therefore were not statistically significant. However, for the dependent variables; depression, difficulty sleeping, mood swing, and tiredness, the R^2 values and the associated p values of less than the .05 level demonstrated statistical significance. Refer to Table 4 for the specific statistical results of each symptom.

Table 4. Multiple Regression Analysis of Menopausal Symptoms and Exercise with Control for HRT.

Symptom	R^2 Change	Beta	p value
Depression	.042	-.206	.0009
Difficulty sleeping	.063	-.254	.0003
Flooding	.0001	-.012	.8702
Headache	.012	-.112	.1142
Hot flash	.014	-.123	.150
Irregular period	.006	-.077	.183
Mood swings	.061	-.248	.0004
Breast pain	.003	-.055	.744
Swelling	.013	-.115	.105
Tiredness/fatigue	.056	-.239	.0001
Vaginal dryness	.007	-.087	.440
Weight gain	.002	-.047	.505

n=200; $p \leq .05$

DISCUSSION

This study investigated the relationship between exercise and the number of menopausal symptoms women reported and the level at which these symptoms became bothersome. Previous studies demonstrated a potential effect of exercise on the severity of hot flashes (Hammar et al., 1990). Wallace et al., (1992) found that exercise increased estradiol both in pre-menstrual and post-menstrual women. The results from this study indicated no significant correlation between changes in the dependent variables; flooding, headache, hot flashes, irregular periods, breast pain, swelling, vaginal dryness, or weight gain and the independent variable; exercise. As HRT is the treatment of choice for the physical symptoms of menopause, HRT was entered into the multiple regression equation as the first independent variable and exercise as the second independent variable. The variance, therefore, shared in common by HRT and exercise were attributed to HRT.

Wilbur et al., (1990) also found a decrease in the non-vasomotor or psychological symptoms: fatigue, irritability, nervousness, depression, headaches, and trouble sleeping. This study did find a positive correlation between the independent variable; exercise and the dependent variables; depression, difficulty sleeping, mood swings and fatigue. Difficulty sleeping, mood swings and fatigue can be symptoms of depression (U.S. Department of Health and Human Services, 1993). Using a Pearson Correlation between depression and difficulty sleeping, mood swings and fatigue would have demonstrated if these were related to menopause or more closely to depression.

This could mean that depression was measured twice, first as depression and secondly by the symptoms of depression. Studies by Carlucci, Goldfine, Ward, Taylor and Rippe (1991) and Hargarten (1994) found that exercise can reduce psychological symptoms, irrelevant of the cause of the symptoms. This finding is clinically significant as earlier studies have shown that the majority of women seeking medical assistance related to menopause demonstrate psychological symptomalogy (Ballinger, 1975; Anderson, Hamburger, Lui & Rebar, 1987; Montgomery, Bincat, Tapp, Appleby, Versi, Fenwick & Studd, 1987).

The results of this study may have been stronger with the elimination of the 45 (22.5%) participants who identified experiencing no menopausal symptoms. The mean number of symptoms reported in this study was 4.3 symptoms with a standard deviation of 10.13. With the removal of the 45 participants experiencing no symptoms, the mean number of symptoms identified is 5.72 symptoms with a standard deviation of 5.65. Removing the 45 participants would improve the clarity of the results.

In summary, there was not a significant relationship between exercise and the menopausal symptoms of flooding, irregular periods, headache, hot flashes, breast pain, swelling, vaginal dryness or weight gain. The R^2 for depression, fatigue, mood swings, and difficulty sleeping were very small after controlling for HRT (.042, .056, .061, .063) but significant. This study supports using a combination of HRT and exercise to decrease the number and level of bother of menopausal symptoms.

The conceptual framework for this study was Neuman's Systems Model

(Meleis, 1991; Cross, 1990; & Fawcett, 1989). A client's wellness is protected by lines of defense. The flexible lines of defense are the most dynamic. They can be altered over a short period of time. Its effectiveness can be strengthened by positive factors such as exercise (Ross & Bourbonnais, 1980; Cross, 1990). This conceptual framework was supported by previous studies and by this study. Wallace et al. (1982) studied the physiological effects exercise has on women's hormone levels. An increase in the client's estradiol level resulted in a decrease in the amount of intrapersonal stress exerted on the flexible line of defense. Wilbur et al. (1990) and Hammar et al. (1990) found a correlation between exercise and a decrease in the severity of menopausal symptoms. Hammar et al. (1990) concluded that social interaction as well as exercise played a role in the decrease in severity of menopausal symptoms. In relationship to Neuman's model, Wilbur and Hammar's studies intervened at the flexible lines of defense. A decrease occurred in the interpersonal and the extrapersonal stressors. This resulted in the strengthening of the flexible lines of defense, thus protecting the normal lines of defense.

In summary, this study indicated no significant relationships between exercise and physical menopausal symptoms when controlling for HRT. It did demonstrate a positive correlation between exercise and the psychological symptoms of menopause. While HRT can decrease the physical symptoms of menopause, exercise can improve a women's psychological well-being. Her lines of defense can be strengthened, thus enabling her to cope with all the stressors of menopause.

Assumptions

1. The women participating gave accurate answers.

2. The women were literate and understood the questions on the questionnaire.

3. This study was a secondary analysis of data from the Decision Making in Menopause Study (Rothert et al., 1990). It is, therefore, assumed that the data were handled and recorded properly.

Limitations

1. This study was a secondary analysis of data from the Decision Making in Menopause Study (Rothert et al., 1990). The original tool was not designed to measure specifics of exercise. The definition of exercise needed to be more clearly defined.

2. The duration and intensity of physical activity was not defined or evaluated.

3. The convenience sample was not reflective of the community. The results of this study cannot be generalized beyond the sample.

4. Using secondary analysis, it was not possible to correct or control extraneous variables such as calcium intake, or diet.

5. As the study analyzed data from Time 4, it was the fourth time that the participants had completed the questionnaire. It is possible that the participants answers were influenced by the Hawthorne effect.

6. No menopausal symptoms were experienced or found bothersome by 22.5% of participants.

7. Co-linearity of depression may have occurred with mood swings, difficulty sleeping and fatigue.

In summary, this study was limited by being a secondary analysis. The study did support previous studies (Wilbur et al.,1990 & Hammar et al, 1990) on the positive relationship between of exercise and menopausal symptoms. The conceptual framework of this study, Neuman's System Model was supported by this study.

Implications for the Advanced Practice Nurse

By the year 2000, 39% of the female population will be between the ages of 40 and 64 (U.S. Bureau of Census, 1994). Kronenberg (1990) uses the estimate that 75% of American women experience symptoms of menopause. This study demonstrated a positive correlation between exercise and the psychological symptoms of depression, mood swings, difficulty sleeping and fatigue. This is supported by previous studies (Wilbur et al.,1990; & Hammar et al., 1990). Beyond these studies, exercise has been found to decrease the long term results of menopause, such as the risk factors for cardiovascular disease, osteoporosis, impaired glucose tolerance and diabetes.

Employing the nursing process, the Advanced Practice Nurse (APN) can use history-taking and physical assessment skills to assess menopausal symptoms and those women who would benefit from exercise as well as the type and amount of exercise most appropriate for each patient. This creates an opportunity for the APN to use patient counseling and teaching skills, approaching the patient in a caring and non-judgmental manner. During

subsequent office visits the APN could evaluate the effectiveness of the exercise plan with the patient.

Menopause is a complex phenomenon. The choices to use or not to use HRT or other therapies can be very confusing for a women. The APN must listen to the concerns of the women experiencing or questioning menopausal symptoms. Using patient education, the APN can empower the patient to make self care decisions that will promote positive health outcomes.

An exercise program is an important part of a woman's treatment plan. Exercise plans can be designed to fit within economic constraints. An exercise program can be designed to be simple and inexpensive. Health promotion prior to permanent consequences is cost-effective and an important role of the APN. With proper assessment and planning an exercise program has few, if any, negative side effects but many potential positive effects.

The APN can also serve as a role model for the patient by participating in health promoting activities, such as regular exercise. An exercise plan is important for the individual APN as well as for the patient.

In summary, this study supports the role of the APN as a primary health care provider, including the areas of a role model, patient advocate, counselor, and as an educator for patients, their families and the community.

Further Studies

The area of exercise and menopausal symptoms needs further research. Although HRT is the treatment of choice for most women with menopausal symptoms, not all women can or chose to use HRT. This study found a positive

relationship between exercise and depression, difficulty sleeping, mood swings and fatigue, however, it was unable to generalize this beyond a similar population of women.

Future research could be designed as longitudinal studies to specifically measure the effect that the intensity and duration of exercise has on menopausal symptoms. When designing such a study, the sample needs to reflect a larger, more diverse population of women. The criteria for admission could be limited to perimenopausal women or women presently experiencing menopausal symptomology.

Future studies including longitudinal and clinical studies on defining the symptoms of menopause are needed. The present lists of symptoms varies among studies making comparison between studies or building on past studies cumbersome. Depression or symptoms of depression could be used, but not both. Participants could be screened for depression due to other underlying causes.

As research continues to evaluate the appropriate hormone replacement therapy most beneficial to women, alternative or conjunctive therapies need to be further studied. Such studies could evaluate the effects of diet, mineral/vitamin supplements, support groups, diversional activities or the effect of employment, marriage, financial status or cultural on menopause.

In summary, this study only touched a small area of the needed research on menopause. As more women enter the menopausal years, the impact of appropriate health care choices will effect not only the health of the individual

woman, but this of this nation as a whole. Healthy women are better able to contribute to this nation's future than women compromised by the effects of menopause.

APPENDICES

APPENDIX A

APPENDIX A

Measure for Menopausal Status

Check your answer sheet. You should now be filling in row number 9

HEALTH BACKGROUND

9. How many months ago was your last natural menstrual period (unrelated to hormone therapy)?

   1 = Still have natural menstrual period
   2 = Less than 3 months ago
   3 = 3 to 12 months ago
   4 = more than 12 months ago
   5 = Not sure

10. Using the scale below, indicate how severe you think your menstrual problems are or were prior to menopause.

   1 = No Problems
   2 = Minor Problems
   3 = Moderate Problems
   4 = Severe Problems
   5 = Very Severe Problems

11. Do you currently consider yourself to be experiencing menopausal symptoms?

   1 = No, have never experienced menopausal symptoms
   2 = Yes, currently experiencing menopausal symptoms
   3 = Not presently experiencing menopausal symptoms but have in the past
   4 = Not sure

12. Have you had a hysterectomy (an operation where the doctor removed all or part of your uterus)?

   1 = Yes
   2 = No
   3 = Not sure

13. Have one or both of your ovaries been removed?
   1 = Yes, both ovaries removed
   2 = Yes, one ovary removed
   3 = No
   4 = Not sure

APPENDIX B

APPENDIX B

Measure for HRT

Check your answer sheet. You should now be filling in row number 14

For items 17-21, please indicate your experience with hormone replacement therapy by choosing one of the following responses for each type of therapy listed.

1 = I am currently taking this.
2 = I have never taken this.
3 = I have taken this in the past but discontinued it because of side effects.
4 = I have taken this in the past but discontinued it because I no longer needed it for symptoms.
5 = I have taken this in the past but discontinued it because I re-evaluated the safety of taking it.
6 = I have taken this in the past but discontinued it because my health care provider recommended that I discontinue taking it.
7 = I have taken this in the past but discontinued it for reasons not listed above.

17. Estrogen pills and progestogen pills (e.g., premarin and provera).

18. Estrogen patch and progestogen pills.

19. Progestogen pills alone.

20. Estrogen patch alone.

21. Estrogen pills alone (e.g., Premarin).

APPENDIX C

APPENDIX C

DECISION MAKING IN MENOPAUSE STUDY
MENOPAUSAL SYMPTOMS INSTRUMENT

* We would like to know what menopausal symptoms you are experiencing and how bothersome they are to you. Listed on the next few pages are a number of symptoms which sometimes occur in women as they go through menopause. Please read the list and identify which of these symptoms you are experiencing.*

* If you are not experiencing the symptom, because you are pre-menopausal, on hormone therapy, past menopause or have had a hysterectomy, **PLEASE ANSWER "1".***

* If you are experiencing the symptom but you do not think it is relate to menopause, **PLEASE ANSWER "1".***

* If you are currently experiencing the symptom **AND** you believe it is due to menopause, please use the following scale to indicate how bothersome the symptom is.*

* We are interested in knowing only those symptoms which you believe are caused by menopause or which you believe are directly related to menopause.

Use the following scale to respond to items 50-61.

1 = I am **NOT EXPERIENCING** this symptom or I don't believe that it is related to menopause.
2 = **DOES NOT BOTHER ME AT ALL.**
3 = **BOTHERS ME A LITTLE.**
4 = **BOTHERS ME SOMEWHAT.**
5 = **BOTHERS ME A GREAT DEAL.**

50. Hot Flashes or Flushes

51. Weight gain (over 10 lbs)

52. Difficulty sleeping

53. Flooding (heavy menstrual flow)

Check your answer sheet. You should now be filling in row 54

Use the following scale to respond to items 54-61.

Use the following scale to respond to items 50-61.

1 = I am **NOT EXPERIENCING** this symptom or I don't believe that it is related to menopause.
2 = **DOES NOT BOTHER ME AT ALL.**
3 = **BOTHERS ME A LITTLE.**
4 = **BOTHERS ME SOMEWHAT.**
5 = **BOTHERS ME A GREAT DEAL.**

54. Vaginal Dryness

55. Irregular Periods, Bleeding

56. Depression

57. Swelling or Fluid Retention

58. Mood Swings

59. Headaches

60. Fatigue-Tiredness

61. Painful or Tender Breasts

sc/12MOPOST
October 27, 1992

APPENDIX D

APPENDIX D

DECISION MAKING IN MENOPAUSE STUDY
SYMPTOM MANAGEMENT AND SELF-CARE INSTRUMENT

Please choose the extent to which you use each of these **for general health promotion** or disease prevention. Do not include items you are taking for a specific disease or for occasional aches and pains such as headaches.

Use the following scale to respond to items 62-67.

1 = Never
2 = Sometimes but less than once a week
3 = 1-3 times per week
4 = 4-6 times per week
5 = Every Day

FOR HEALTH PROMOTION

62. I watch my diet

63. I do planned exercises

64. I take vitamins, mineral supplements or calcium supplements.

Please fill in the circle on your answer sheet that indicates the frequency of each of these for helping with menopausal symptoms. Use the scale above.

FOR MENOPAUSAL SYMPTOMS

65. I watch my diet

66. I do planned exercises

67. I take vitamins, mineral supplements or calcium supplements

68. I take medications (prescription and non-prescription)

APPENDIX E

APPENDIX E

UCHRIS Approval

MICHIGAN STATE
UNIVERSITY

June 5, 1996

TO: Luanne M. Kraus
1870 Crestwood Ln.
Muskegon, MI 49441

RE: IRB#: 96-352
TITLE: THE RELATIONSHIP BETWEEN FREQUENCY OF EXERCISE AND THE NUBMER AND LEVEL OF BOTHER OF MENOPAUSAL SYMPTOMS
REVISION REQUESTED: N/A
CATEGORY: 2-H
APPROVAL DATE: 06/03/96

The University Committee on Research Involving Human Subjects'(UCRIHS) review of this project is complete. I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the UCRIHS approved this project and any revisions listed above.

RENEWAL: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must use the green renewal form (enclosed with the original approval letter or when a project is renewed) to seek updated certification. There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB # and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/ CHANGES: Should either of the following arise during the course of the work, investigators must notify UCRIHS promptly: (1) problems (unexpected side effects, complaints, etc.) involving human subjects or (2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of any future help, please do not hesitate to contact us at (517)355-2180 or FAX (517)432-1171.

Sincerely,

David E. Wright, Ph.D
UCRIHS Chair

DEW:bed

cc: Marilyn Rothert

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LIST OF REFERENCES

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Anderson, E., Hamburger, S., Liu, J.G., & Rebar, R.W. (1987). Characteristics of menopausal women seeking assistance. American Journal of Obstetrics and Gynecology, 1(156). 428-433.

Bachmann, G.A. (1990). Sexual issues at menopause. In M. Flint, F. Kronenberg, and W. Utian (Eds.), Annals of the New York Academy of Sciences: Multidisciplinary perspectives on menopause (pp. 87-94). New York: The New York Academy of Sciences.

Bachmann, G.A. (1991). Prevention of Menopausal Sequelae. New Jersey Medicine, 88(3) 181-184.

Bachmann, G.A. (1994). Vulvovaginal complaints. In R. Lobo (Ed.) Treatment of the postmenopausal women: Basic and clinical aspects. (pp. 137-142). New York: Raven Press.

Ballinger, C.B. (1975). Psychiatric morbidity and the menopause: Screening of a general population sample. British Medical Journal, 3, 344-346.

Blatt, M.H.G., Wiesbader, H., & Kupperman, H.S. (1953). Vitamin E and climacteric syndrome. American Medical Association Archives of Internal Medicine, 91. 792-799.

Burns, P.A., Pranikoff, K., Nochajski, T., Desotelle, P., & Harwood, M.K. (1990). Treatment of stress incontinence with pelvic floor exercises and biofeedback. Journal of the American Geriatrics Society, 38(3). 341-344.

Bush, T.L. (1990). The epidemiology of cardiovascular disease in postmenopausal women. In M. Flint, F. Kronenberg, and W. Utian (Eds.), Annals of the New York Academy of Sciences: Multidisciplinary perspectives on menopause (pp. 263-271). New York: The New York Academy of Sciences.

Campbell, S. & Whitehead, M. (1977). Oestrogen therapy and the menopausal syndrome. Clinical Obstetrics and Gynecology, 4. 31-47.

Caplan, A., Ward, J.A., & Lord, S.R. (1993). The benefits of exercise in postmenopausal women. Australian Journal of Public Health, 17(1). 23-26.

Carlucci, D., Goldfine, H., Ward, A., Taylor, P., & Rippe, J. (1991). Exercise: Not just for the healthy. The Physician and Sportsmedicine, 19(7). 46-

55.

Choi, P. Y. L., Van Horn, J. D., Picker, D. E., & Roberts, H. I. (1993). Mood changes in women after an aerobics class: A preliminary study. Health Care for Women international, 14. 167-177.

Cobb, J.O. (1990). Education of community and health-care providers. In M. Flint, F. Kronenberg, & W. Utian (Eds.), Annals of the New York Academy of Sciences: Multidisciplinary perspectives on menopause (pp. 221-227). New York: The New York Academy of Sciences.

Cross, J.R. (1990). Betty Neuman. In J.B. George (2nd ed.) Nursing Theories: The base for professional nursing practice. (pp. 259-278). Englewood Cliffs, New Jersey: Prentice Hall International Inc.

Diczfalusy, E. (1986). Keynote address: Menopause and the developing world. In M. Notelovitz & P. van Keep (Eds.), The Climacteric in Perspective (pp 1-15). Boston: MTP Press Limited.

Erlik, Y., Tararyn, I.V., Meldrum, D.R., Lomax, P., Bajorek, J.G., & Judd, H.L. (1981). Association of waking episodes with menopausal hot flushes. JAMA, 245. 1741-1744.

Fawcett, J. (1989). Analysis and evaluation of conceptual models of nursing. (2nd ed.). Philadelphia: F.A. Davis Co.

Formosa, M., Brincat, M.P., Cardozo, L.D., & Studd, J.W.W. (1994). Collagen: The significance in skin, bones, and bladder. In R. Lobo (Ed.) Treatment of the postmenopausal women (pp. 143-151). New York: Raven Press.

Forward, M.R., & Burr, D.B. (1993). Physical activity and bone mass: Exercise in futility? Bone and Mineral, 21 89-112.

Gideon, C.A., & Ward, J.A., and Lord, S.R. (1993). The benefits of exercise in postmenopausal women. Australian Journal of Public Health, 17(1). 23-26.

Gorodeski, G.C., & Wulf, H. U. (1994). Epidemiology and risk factors of cardiovascular disease in postmenopausal women. In R. Lobo (Ed.) Treatment of the postmenopausal women: Basic and clinical aspects. (pp. 199-222) New York: Raven Press.

Grove, K.A., & Londeree, K.A. (1992). Bone density in postmenopausal women: High impact vs low impact exercise. Medicine and Science, 24(11),

1190-1194.

Hammar, M., Berg, G., & Lindgren, R. (1990). Does physical exercise influence the frequency of postmenopausal hot flushes? Acta Obstet Gynecol Scand. 69, 409-412.

Hargarten, K.M. (1994). Menopause: How exercise mitigates symptoms. The Physician and Sportsmedicine, 22(1) 49-56.

Jacobowitz, R.S. (1993). 150 Most asked questions about menopause. New York: Hearst Books.

Jaszmann, L., van Lith, N.D., & Zaat, J.C.A. (1969). The perimenopausal symptoms. Medical Gynecological Sociol, 4. 268-277.

Kart, C.S., Metress, E.K., & Metress, S.P. (1992). Human aging and chronic disease. Boston: Jones & Bartlett Publishers.

Kaufert, P. & Syortuik, J., (1981). Symptom reporting at the menopause. Social Science Medicine, 15E. 173-184.

Kosits, J. B., Rosen, R.C., Cosgrove, N. M., Shindler, D. M., & Wilson, A. C. (1994). Nonpharmacologic therapy improves function and emotional status in congestive heart failure. Chest, 106(4). 996-1001.

Kronenberg, F. (1994). Hot flashes. In R. Lobo (Ed.) Treatment of the postmenopausal women: Basic and clinical aspects. (pp. 97-117). New York: Raven Press.

Kronenberg, F. (1990). Hot flashes: Epidemiology and physiology. In M. Flint, F. Kronenberg, and W. Utian (Eds.), Annals of the New York Academy of Sciences: Multi disciplinary perspectives on menopause. (pp. 52-86). New York: The New York Academy of Sciences.

Kuhn, M.M. (1991). Hormones: Male and female. In Kuhn, M.M. (Ed.). Pharmaco-therapeutics: A nursing process approach, (2nd ed.). (pp. 1102-1138). Philadelphia: F.A. Davis Co.

Lindsay, R., Hart, D.M., Abdalla, H., & Dempster, D. (1986). Pathogenesis of postmenopausal osteoporosis. In M. Notelovitz & P. van Keep (Eds.), The Climacteric in Perspective (pp 79-86). Boston: MTP Press Limited.

Lobo, R. (1990). Estrogen and cardiovascular disease. In M. Flint, F. Kronenberg, and W. Utian (Eds.), Annals of the New York Academy of Sciences:

Multi disciplinary perspectives on menopause. (pp. 286-294). New York: The New York Academy of Sciences.

Maroulakis, E. & Yannis, Z. (1993). Effects of aerobic exercise on mood of adult women. Perceptual and Motor Skills, 76. 795-801.

McKinlay, S.M., Brambilla, D.J., & Posner, J.G. (1992). The normal menopause tradition. Maturitas, 14. 102.

Meleis, A.I. (1991). Theoretical Nursing: Development and Progress. (2nd ed.). Philadelphia: J.B. Lippincott Co.

Montgomery, J.C., Brincat, M., Tapp, A., Appleby, L., Versi, E., Fenwick, P.B.C., & Studd, J.W.W. (1987). Effect of oestrogen and testosterone implants on psychological disorders in the climacteric. Lancet, 297-299.

Neugarten, B. (1995). The Neuman Systems Model. (3rd ed). Norwalk, Connecticut: Appletom & Lange.

Neugarten, B.L. & Kraines, R.J. (1965). Menopausal symptoms in women of various ages. Psychosomatic Medicine, 27, 266-273.

Notelovitz, M. (1986). Climacteric medicine and science: a societal need. In M. Notelovitz & P van Keep (Eds.), The Climacteric in Perspective (pp. 19-21). Boston: MTP Press Limited.

Paginini-Hill A. (1994). Morbidity and mortality changes with estrogen replacement therapy. In R. Lobo (Ed.) Treatment of the postmenopausal women: Basic and clinical aspects, (pp. 399-404). New York: Raven Press.

Pronk, N. P., Crouse, S. F., & Rohacks, J. J. (1995). Maximal exercise and acute mood response in women. Physiology and Behavior, 57(1). 1-4.

Ross, M.M. and Bourbonnais, F.F. (1985). The Betty Neuman Systems Model in nursing practice: A case study approach. Journal of Advanced Nursing, 10, 199-207.

Rothert, M., Rovner, D., Holmes, M., Schmitt, N., Talarczyk, G., Kroll, J., & Gogate, J. (1990). Women's use of information regarding hormone replacement therapy. Research in Nursing & Health, 13, 355-366.

Rothert, M., Kroll, J., Holmes-Rovner, M., Rovner, D., Schmitt, N., & Talarczyk, G. (1992). Menopause: Taking care of your health. East Lansing, Michigan State University.

Scharbo-DeHaan, M. (1995). Management strategies for hormonal

replacement therapy. The Nurse Practitioner, 19(12), 47-57.

Schmitt, N., Gogate, J., Rothert, M., Rovner, D., Holmes, M., Talarcyzk, G., Given, B., and Kroll, J. (1991). Capturing and clustering women's judgment policies: The case of hormonal therapy for menopause. Journal of Gerontology: Psychological Sciences. 40(3). 92-101.

Shangold, M.M., (1994). Role of exercise in nutrition. In R. Lobo (Ed.) Treatment of the postmenopausal women: Basic and clinical aspects. (pp. 289-294). New York: Raven Press.

Sheehy, G. (1992). The silent passage. New York: Random House.

Shoupe, D., & Mishell Jr., D.R. (1994). Contraindications to hormone replacement therapy. In R. Lobo (Ed.) Treatment of the postmenopausal women: Basic and clinical aspects. (pp. 415-418). New York: Raven Press.

Skouby, S.O. (1994). Carbohydrate metabolism and cardiovascular risk. In R. Lobo (Ed.) Treatment of the postmenopausal women: Basic and clinical aspects. (pp. 263-270). New York: Raven Press.

Thomas, T. R., Londeree, B. R., Lawson, D. A., Ziogas, G. & Cox, R. H. (1994). Physiological and psychological responses to eccentric exercise. Canadian Journal of Applied Physiology, 19(1). 91-100.

Uphold, C.R., & Graham, M. V. (1994). Clinical guidelines in family practice, (2nd ed.). Gainesville, FL: Barmarrae Books.

U.S. Bureau of the Census. (1975). Historical statistics of the United States, colonial times to 1970, Bicentennial Edition, Part 2. Washington, DC.

U.S. Bureau of the Census. (1994). Statistical abstract of the United States: 1994. (114th edition) Washington, DC.

U.S. Department of Health and Human Services. (1994). Clinician's Handbook of Preventive Services: Put Prevention into Practice. Washington, DC: U.S. Government Printing Office.

U.S. Department of Health and Human Services. (1992). Urinary incontinence in adults: Clinical practice guidelines. AHCPR Pub. No. 92-0038. Rockville, MD: Agency for Health Care Policy and Research, Public Health Services.

U.S. Department of Health and Human Services. (1993). Depression in

primary care: Clinical practice guidelines. Vol. 1. AHCPR Pub. No. 93-0550. Rockville, MD: Agency for Health Care Policy and Research, Public Health Services.

Wallace, J.P., Lovell, S., Talano, C., Webb, M.L., & Hodgson, J.L. (1982). Changes in menstrual function, climacteric syndrome, and serum concentrations of sex hormones in pre- and post-menopausal women following a moderate intensity conditioning program. Med. Sci. Sports Exercise, 14, 154.

Walsh, B.W., & Schiff, I. (1990). Menopause and ovarian hormone therapy. In W.B. Abrams & R. Berkow (Eds.), The Merck Manual of Geriatrics (pp 831-840). New Jersey: Merck Sharp & Dohme Research Laboratories.

Walsh, B.W., & Schiff, I. (1990). Vasomotor flushes. In M. Flint, F. Kronenberg, and W. Utian (Eds.), Annals of the New York Academy of Sciences: Multi disciplinary perspectives on menopause. (pp. 346-356). New York: The New York Academy of Sciences.

Weiss, N.S., Ure, C.L., Ballard, J.H., Williams, A.R. & Daling, J.R. (1980). Decreased risk of fractures of the hip and lower forearm with postmenopausal use of estrogen. The New England Journal of Medicine, 21(303), 1195-1198.

Wilbur, J., Dan, A., Hedricks, C., & Holm, K. (1990). The relationship among menopausal status, menopausal symptoms, and physical activity in midlife women. Family and Community Health, 13, 67-77.

Wilson, R.A. (1966). Feminine forever. New York: J.B. Lippincott Co.

Wren, B.G., (1986). Health needs of climacteric women. In M. Notelovitz & P van Keep (Eds.), The Climacteric in Perspective (pp 51-58). Boston: MTP Press Limited.