This is to certify that the

thesis entitled

The Relationship Between
Exercise and Premenstrual
Symptomatology

presented by

Elizabeth Ann Gale

has been accepted towards fulfillment
of the requirements for

Master degree in Nursing

Rachel Schiffman

Rachel Schiffman

Major professor

Date 11-11-93

THE RELATIONSHIP BETWEEN EXERCISE AND PREMENSTRUAL SYMPTOMATOLOGY

By

Elizabeth Ann Gale

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

MASTER OF SCIENCE IN NURSING

College of Nursing

1993

ABSTRACT

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DEDICATION

This thesis is dedicated to my husband, Geoff, for his support and technical assistance, and to my children Summer and Amber for their patience and understanding during the months in which this thesis was written.

ACKNOWLEDGMENTS

I would like to give thanks to my thesis committee: Rachel Schiffman, Brigid Warren, Jackie Wright, and Carol Rogers for their expertise and guidance for making this dream become a reality. I would also like to thank the thesis committee for their belief in me and their genuine concern and involvement in this project.

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Introduction

Premenstrual syndrome is a constellation of physical, psychological and/or behavioral symptoms arising from an observable pattern related to the menstrual cycle. Women who suffer from PMS symptomatology may experience emotional and physical discomfort during the premenstrual phase of their menstrual cycle. PMS is one of the most common complaints of childbearing women with an estimated 2% to 85% of women having at one time or another experienced at least one of the PMS symptoms (Johnson, McChesney, & Bean, 1988; Wilhelm-Hass, 1984; Woods, Most, & Dery, 1982).

Women may experience PMS symptomatology at any age during their reproductive years. However, there is evidence that PMS symptomatology increases in severity with age and that women over age 30 seek treatment for PMS at higher rates than women under 30 years of age (Hsia & Long, 1990; Johnson, McChesney, & Bean, 1988; Kirkpatrick, Brewer, & Stocks, 1990).

The four most widely accepted theories of PMS are progesterone deficiency, excess of prostaglandins, deficiency of prostaglandins, and excess of estrogen (Hsia & Long, 1990). The etiology of PMS remains an enigma; therefore, clinicians prescribe treatment based on the woman's symptoms of PMS. The emergence of the beta-endorphin

deficiency theory as an etiology for PMS has generated interest in the use of exercise as a treatment modality for PMS symptomatology. Current literature suggests that exercise plays an important role in the management of PMS by reducing stress and increasing beta-endorphin levels in women who suffer from PMS symptomatology (Carr et al., 1981).

There is no literature that examines the pattern of exercise in women and how this pattern might be associated with PMS symptomatology. Clinical Nurse Specialists in the primary care setting will have clients present with PMS symptomatology and will need a basis on which to make therapeutic decisions. The purpose of this study was twofold: (1) to examine PMS symptomatology in a sample of women who exercise, and (2) to determine the relationship between the pattern of exercise in women and the pattern of PMS symptomatology.

Research Questions

The research questions addressed in this study were:

1.) What physical, psychological, or behavioral premenstrual symptoms are most commonly self-reported by a sample of menstruating women, 30 to 46 years of age, who exercise?

2.) Is there a relationship between the pattern of exercise in menstruating women 30 to 46 years of age and the severity of self-reported premenstrual symptoms?

Definition of Concepts

Premenstrual Syndrome Symptomatology

Dalton (1984) succinctly describes premenstrual syndrome as "the recurrence of symptoms in the premenstruum with absence of symptoms in the postmenstruum" (p.7). She further elaborates that recurrence of symptoms means a repetition of symptoms for a minimum of three consecutive cycles and that the severity of the symptoms may vary from cycle to cycle. For example, one premenstrual cycle may be characterized by a headache relieved with analgesics. The next cycle may be characterized by an excruciating migraine with visual disturbances that causes loss of functioning (Dalton, 1984). Dalton (1984) explains that the absence of symptoms in the postmenstruum requires a phase of a minimum of seven days free from all symptoms.

Premenstrual syndrome has been defined by Magos and Studd (1986) as the distressing physical, psychologic, and behavioral symptoms, not caused by organic disease, which regularly occur during some phase of the menstrual/ovarian cycle and which disappear or significantly regress during the remainder of the cycle. Rubinow and Roy-Byrne (1984) define PMS as "the cyclic occurrence of symptoms that are of sufficient severity to interfere with some aspects of life and appear with a consistent and predictable relationship to menses" (p. 114).

The American Psychiatric Association labels PMS as Periluteal Phase Dysphoric Disorder. Periluteal Phase

Dysphoric Disorder is described as a pattern of clinically significant emotional and behavioral symptoms that occur during the last week of the luteal phase and remit within a few days after the onset of the follicular phase (DMS-III, 1987). Diagnostic criteria include the following: (a) symptoms that correspond to the two phases of the menstrual cycle, (b) a disturbance that seriously interferes with work or with social activities and relationships, and (c) a disturbance that is not merely an exacerbation of the symptoms of another disorder, such as Major Depression, Panic Disorder, or Personality Disorder (DMS-III, 1987).

It is very clear that the above definitions all share a common theme of PMS symptoms occurring in a cycle with a pattern. The above definitions of PMS stress that there is a symptom period as well as a distinct symptom-free period related to the menstrual cycle. Sveinsdotter and Reame (1991) examined the symptom characteristics and patterns of menstrual cycles in seven healthy women who suffered from PMS. The PMS group in their study displayed a pattern type of increasing severity across the menstrual cycle.

According to Burkhart (1991), symptoms associated with premenstrual syndrome can be categorized into physical symptoms and psychological/behavioral symptoms. The common physical symptoms associated with PMS are: abdominal bloating, headaches, breast enlargement and tenderness, constipation, edema of extremities, acne, and craving for sweets or salty foods. The psychological/behavioral

symptoms associated with PMS are: anxiety, mood swings, depression, irritability, lethargy, crying spells, hostility, low morale, and sleep disorders (Burkhart, 1991). Woods, Most, and Dery (1982) found that symptoms with a prevalence greater than 30 per cent included: weight gain, headache, skin disorders, cramps, anxiety, backache, fatigue, painful breast, irritability, mood swings, depression, and tension. For the purpose of this study PMS symptomatology was defined as a cluster of symptoms related to the menses which is manifested by a pattern of physical, psychological, and/or behavioral symptoms.

Exercise

Exercise is defined as physical activity that is planned, structured, repetitive, and purposeful (McArdel, Katch, & Katch, 1991). Physical activity is defined as any body movement produced by muscles that results in increased energy expenditure (McArdel et al., 1991). The terms "exercise" and "physical activity" have been used interchangeably in the literature. There is a distinct difference between the two. According to Caspersen, Powell, and Christenson (1985) exercise is a subcategory of physical activity. They concede that exercise contains the following components: (a) bodily movement via skeletal muscles, (b) results in energy expenditure, (c) energy expenditure (kilo-calories) varies continuously from low to high, (d) very positively correlated with physical fitness, (e) is planned, structured, and repetitive, and (f) an objective is to

improve or maintain physical fitness. Physical activity contains only the first four components of exercise (Casperen et al., 1985).

Fair, Rosenaur, & Thurston (1979) define physical exercise as an action or an activity involving either physical and/or mental exertion. Fair et al. (1979) define aerobic or endurance exercise as exercise which promotes cardiac conditioning such as running, jogging, biking, swimming and walking. Allan (1985) also describes aerobic exercise as exercise that promotes cardiopulmonary endurance or fitness. She further elaborates by stating they are rhythmic, repetitive exercises that create a demand for increasingly larger amounts of oxygen by using large muscle groups.

The three components to an exercise program are: (a) frequency, (b) intensity, and (c) duration. Frequency refers to how many days per week the exercise is performed (Allan, 1985). Studies have shown that fitness can be attained and maintained on a frequency of three times per week (Pollack, 1971; Fox, Naughton, & Gorman, 1972; Merriman, 1978).

Intensity refers to target heart rate. Target heart rate is exercising at a level of 70 to 85 per cent of maximal heart rate (Allan, 1985). Duration is considered the specific length of time an individual exercises for each exercise session (Allan, 1985).

Consistency is another component of exercise that was addressed in this study. Consistency was defined in this study as the regularity, constancy, and uniformity of the exercise program one is engaged in. Consistency is the unaltered state of an exercise program. In other words, the exercise program is not altered or changed due to normal life circumstances such as time constraints.

The American College of Sports Medicine (1990) recommends the following guidelines for developing and maintaining cardiorespiratory fitness, body composition, and muscular strength and endurance in the healthy adult: (a) frequency of training: 3-5 days per week, (b) intensity of training: 60%-90% of maximum heart rate, (c) duration of training: 20-60 minutes of continuous aerobic activity. The benefits of aerobic training include prevention of heart disease, weight control, higher tolerance to fatigue, and a reduction in tension, depression, and mood changes (Canty, 1984).

The above definitions imply that exercise contains an element of planned activity that is repetitious and ongoing. An exercise pattern is developed from this rhythmic, repetitive activity. For the purpose of this study exercise pattern was defined as the frequency, duration, and consistency of a planned, rhythmic, repetitive activity involving large muscle groups.

Review of the Literature

There is a paucity of literature on studies on PMS and exercise. Timonen and Procope' (1971) analyzed the effect of physical exercise on PMS by sending out questionnaires to 1,000 female students. Of a thousand questionnaires distributed 748 were returned. Timomen and Procope' (1971) concluded that girls who exercised regularly showed fewer PMS symptoms than their less active counterparts. This was a poorly written, retrospective study with confusing tables and lacking in a clear definition of PMS, with no validity and reliability of instruments.

Israel, Sutton, and O'Brien (1985) studied the effects of aerobic training on primary dysmenorrhea in 36 college-aged females suffering from primary dysmenorrhea. Eighteen subjects were randomly assigned to a training program consisting of a 30-minute continuous walk/jog program three days a week at an intensity of 70-85% of heart rate range for twelve weeks. Eighteen subjects were randomly selected as a control and were asked not to exercise during the twelve week period. Primary dysmenorrhea symptomatology was measured using the Moos Menstrual Distress Questionnaire (MDQ). The results of this study showed that the training group had lower mean MDQ scores than the control group. The direct cause for the decline in the MDQ scores in the training group was not established in this study. The authors speculate that the release and rise in beta-endorphin in the training group could explain the perception

of less discomfort in dysmenorrhea (Israel et al., 1985). This was a prospective, controlled study investigating the effects of a training program on subjects who suffered from primary dysmenorrhea. It is unclear if the variable being studied was dysmenorrhea or premenstrual syndrome.

Prior, Vigna, Sciarretta, Alojado, and Schulzer (1987) found an association between exercise and PMS symptomatology. Prior et al. (1987) studied twenty-one women with a mean age of 33.4 years. Eight sedentary women volunteered to begin a 6-month training program. Seven women runners who were training for a marathon (26.2 mile road race) volunteered to record training and menstrual cycle data over six months. Six nontraining women served as the control group. All subjects monitored body temperature, weight, and their exercise program. There was no change in body weight, body mass or menstrual cycle interval in the subjects. The training and marathon groups experienced significant decrease in several premenstrual symptoms at six months. The control group experienced no change in premenstrual symptoms. This was a prospective, controlled study in which PMS was clearly the outcome variable. The major flaw in this study is the small sample size and one must use caution when interpreting results.

Stanley (1985) conducted a survey on the relationship between exercise and PMS for a thesis project on 116 women, ranging in age from 18 to 53 years. The subjects were recruited from three different sources: (a) a PMS clinic,

(b) a lecture on PMS, and (c) a PMS conference. All subjects believed that they had PMS and were seeking treatment for PMS or information on PMS. The survey instrument included an exercise questionnaire and a health questionnaire, which contained a modified version of the Moos Menstrual Distress Questionnaire. Stanley (1985) found that there was a significant inverse relationship between exercise and PMS. Stanley showed that women who exercise report few PMS symptoms. Limitations of this study were: (a) it was unclear whether the exercise questionnaire was tested for validity and reliability, (b) all subjects were volunteers, (c) there was no control group, and (d) the sample was comprised of women from one of the highest socioeconomic areas in the United States (Stanley, 1985).

A homogeneous group of college aged women was used in both the Timonen and Procope' study (1971) and the Israel et al. (1985) study. Prior et al. (1987) and Stanley (1985) used a more heterogenous group for their sample. Prior et al. (1987) used a sample of women with a mean age of 33.4 while Stanley used a sample of women between the ages of 18 to 53 years old.

The Israel et al. (1985) and Prior et al. (1987) studies were similar in that each was a prospective, controlled study in which exercise was the independent variable. A retrospective survey questionnaire was used in both the Timonen and Procope' study (1971) and the Stanley (1985) study. However, Stanley's study was much better

documented than Timonen and Procope's with the variables being clearly defined.

Although, the literature fails to address the antithesis that exercise increases PMS symptomatology, considerable attention has been given to exercise induced menstrual disorders. Researchers have found that menstrual dysfunction does exist in distance runners. The most common exercise induced menstrual disorders are oligomenorrhea and amenorrhea (Boyden, Pamenter, Stanforth, Rotkins, & Wilmore, 1983; Bullen, Skrinar, Beitins, VonMering, Turnbull, & McArthur, 1985; Dale, Gerlach, & Wilhite, 1979). If exercise can have such a profound effect on the menstrual cycle one needs to wonder what effect it has on PMS symptomatology.

Evaluation of the literature

Of the three studies found in the literature on exercise and its effects on PMS only Prior et al. (1987) clearly define PMS. Timonen and Procope' (1971) make no attempt to define PMS in their study and Israel et al. (1985) label PMS as dysmenorrhea. Researchers need to critically define PMS and remain consistent with the definition and diagnostic criteria for PMS (Logue & Moos, 1986) in future studies.

Timonen and Procope' (1971) conducted a cross-sectional study on exercise and PMS that was poorly documented (Prior et al., 1987). Israel et al. (1985) were the first to attempt a controlled trial of exercise and PMS,

but failed to clearly discern PMS as the outcome variable. Prior et al. (1987) successfully completed a controlled study of the relationship of exercise and PMS showing that women who exercise report less PMS symptoms than women who do not exercise. Although, Prior et al. (1987) conducted a well documented, controlled study more research is indicated to make a definitive statement that exercise decreases PMS symptomatology. To date there are no studies that disprove that exercise alleviates PMS (Prior et al., 1987).

The studies cited do not distinguish women who experience mild symptoms of PMS to women who suffer severe, incapacitating symptoms of PMS. Researchers need to delineate mild symptoms of PMS from severe symptoms and show how exercise pattern affects the various degrees of PMS symptomatology. Researchers should also question whether strenuous exercise exacerbates or mitigates severe PMS symptomatology.

Theoretical Framework

The theoretical foundation used for this study is Rogers' Science of Unitary Human Beings. Rogers (1986) defined unitary human beings as "irreducible, four-dimensional energy fields identified by pattern and manifesting characteristics that are different from those of the parts and cannot be predicted from knowledge of the parts" (p.5). Unitary human beings are open systems. Unitary human beings are exemplified as energy fields in open process with environmental energy fields (Smith, 1986).

Energy fields have pattern (Fawcett, 1989). This continuous, changing human and environmental fields is depicted as a wave pattern (Smith, 1986). Pattern distinguishes human energy fields from their environmental energy fields. Patterns are abstractions that are observable through nonrepeating rhythms that are constantly changing. Manifestations of patterns are analogous to the wave pattern of the Great Lakes. The waves of the great body of waters are rhythmic and continuous but the wave pattern is constantly changing. There is continuous variation in the waves due to shift in the winds, interruption by water craft and change in the tide. Human energy field patterns are observable through manifestations of pattern such as amount of exercise and perceptions of PMS symptomatology.

The practice of nursing mainly involves assessment and identification of the manifestations of patterns that emerge from the mutual person and environmental energy field process and deliberative patterning through a nurse and person mutual process (Lutjens, 1990). The nurse and client participate in deliberative mutual patterning; the nurse facilitates the client's actualization of potentials for health and well being (Cowling, 1989). Pattern manifestation appraisal enables the nurse to assess recurring life themes and issues through sensory information, thoughts, feelings, perceptions, experiences, imagination, memory, and expressions of her/his clients

(Cowling, 1989). Pattern manifestation appraisal centers on "identifying manifestations of human and environmental fields that relate to current health events" (Barrett, 1988, p. 50).

Roger's unitary pattern-based practice model was used in this study for identifying manifesting patterns of PMS symptoms such as pain, bloating, breast enlargement, anxiety, and irritability in a sample of women who exercise. A pattern profile of PMS symptoms in exercising women was developed incorporating properties, features, and qualities derived from the pattern information. These properties include an assessment of the exercise pattern of these women. The author also investigated how exercise pattern affects PMS pattern symptomatology.

Three distinct exercise patterns were identified through pattern manifestation appraisal. These patterns demonstrated the rhythmicity and continuum of human energy fields. Pattern group A consisted of infrequent, and/or inconsistent exercise behavior, of short duration depicted in Figure 1 as a very sporadic wave pattern with much variation in the shape and size of the peaks. Pattern group B consisted of exercise behavior that is of moderate frequency, consistency and duration depicted in Figure 1 as an irregular wave pattern with some variation in the shape and size of the peaks. Pattern group C consisted of exercise behavior that was frequent, consistent and of extended duration depicted in Figure 1 as a very constant

wave pattern with uniformity in the shape and size of the peaks.

The model shown in Figure 1 shows the pattern of the three different groups and how exercise pattern is related to perceived amount of PMS symptoms (PMS symptom profile). The more consistent the exercise pattern the less PMS symptomatology. The nurse fits in this model by assessing and identifying exercise pattern manifestation and perceived PMS symptomatology manifestation in menstruating women.

Methods

Study Design

A retrospective, survey questionnaire was used to address the research questions. In a retrospective study, the sample is questioned or interviewed after the fact. A retrospective study is a practical and efficient method of collecting data in a relatively short period and is used often in nursing research (Polit & Hungler, 1991).

This was a non-experimental, ex post facto, correlational study. The researcher did not control for the independent variable, pattern of exercise. The researcher did not manipulate the pattern of exercise in the study sample. The researcher did not randomly assign individuals to different exercise pattern groups. The dependent variable in this study was the perceived amount of PMS symptoms.

Sample

A nonprobability convenience sample of 37 women between the age of 30 and 46 was used for this study. The criteria

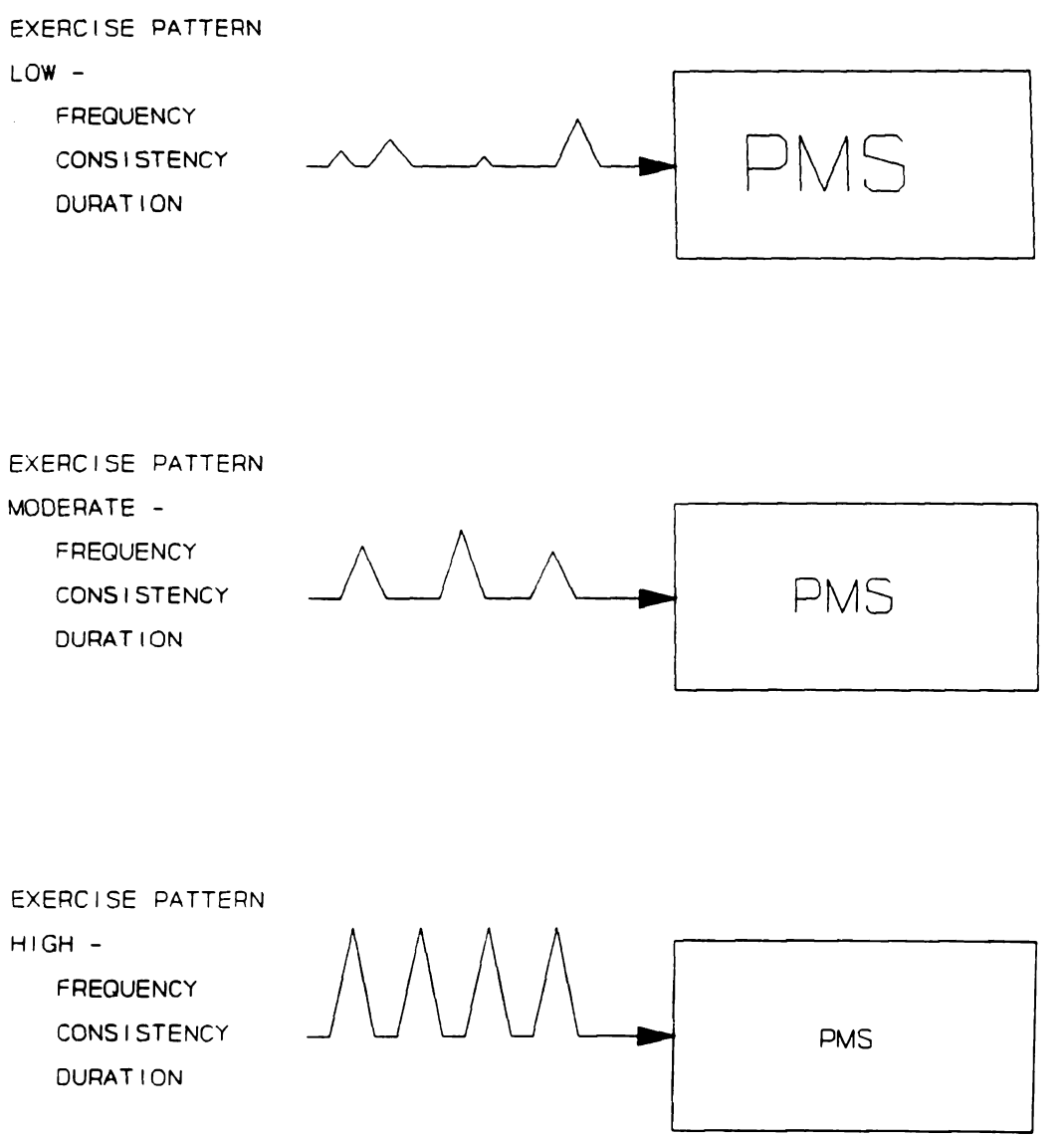

Figure 1

EXERCISE AND PMS PATTERN MANIFESTATION APPRAISAL MODEL

for inclusion in this study were women: (a) between the ages of 30 to 46, (b) currently not on progesterone therapy, oral contraceptives or psychotropic agents, (c) who had two consecutive menstrual periods 20 to 40 days apart at the time of completing the questionnaires, and (d) who currently reported exercising.

Women on progesterone therapy, oral contraceptives or psychotropic agents were excluded from this study because these agents may be used for the treatment of PMS symptomatology. Oral contraceptives and progesterone also alter the menstrual cycle and may confound premenstrual symptomatology. The normal menstrual cycle is 28 days in duration, but cycles may range from 20 to 40 days and still be considered normal (Ensign, Rowe, & Kowalski, 1988). Women who reported any deviation from the average normal cycle were excluded from this study because abnormally long or short periods may confound premenstrual symptomatology.

The sample was obtained from two different sources: (a) the 1992 "Women's Only" Race register list, and (b) a large obstetric/gynecology group practice in Lansing, Michigan. "Women's Only" is a two day annual event held in Flint, Michigan which includes a women's health fair, fashion show and dinner, and an 8 kilometer run, 8 kilometer competitive walk, 5 kilometer run, and 5 kilometer fitness walk. The researcher selected 100 names from the "Women's Only" 1992 register list for the sample. This was done by selecting every fourth label from the computerized printout until 25

labels were selected from each of the four race categories totalling 100 names. Of the 100 questionnaires sent, 46 were returned for a 46% response rate. Of the 46 returned questionnaires, 8 were excluded due to current birth control use; 4 were excluded due to improper completion of the MDQ questionnaire; and 2 were excluded because the subjects reported that they did not exercise. This resulted in 32 usable questionnaires from the "Women's Only" register list.

The researcher obtained 8 completed questionnaires from the office site. Of the 8 questionnaires obtained from this site, 2 were excluded due to current birth control use and 1 because she reported she did not exercise. This resulted in 5 usable questionnaires from the office site.

Field Procedures

The questionnaires were mailed with instructions to the "Women's Only" participants selected for the study. A stamped, return envelope was included to facilitate response. The researcher mailed the questionnaires with written instruction (Appendix A).

Subjects from the private office site were selected on a voluntary basis. The office nurse distributed the questionnaires during a one month period to women from 30 to 46 years of age as they came into the clinic for their health care needs. Those wishing to fill out the questionnaire did so while waiting for their appointment. There was a deposit box available in the waiting area forthe completed questionnaires. The response rate was low for this sample.

Protection of Human Subjects

Protection of human subjects in regard to confidentiality was insured by anonymity. No one including the investigator was able to associate responses from the questionnaire with individual subjects. This was done by instructing subjects not to write their name on the questionnaires. No attempt was made to identify returned questionnaires with names on the "Women's Only" register list. Subjects were instructed that by returning the completed questionnaire they were giving consent.

The private office clients were also assured anonymity by instructing subjects not to write their name on the questionnaire. The deposit box was placed in a safe area free from intrusion. Office personnel did not tamper with the box. The box contained one envelope size slot and was tightly secured with packaging tape. Subjects were instructed that by completing the questionnaire and depositing it in the box they were giving consent. This project was approved by the University Committee on Research Involving Human Subjects (Appendix B).

Operational Definitions

Exercise pattern was operationalized according to self-reported frequency, duration, and consistency of exercise. The subjects were divided into three groups according to their pattern of exercise. Exercise pattern was determined by responses to questions 1, 2, 5, 6, 7, and 8 of the Exercise Questionnaire (refer to questionnaire in Appendix

C). Question 1 of the Exercise Questionnaire addressees the frequency of exercise. Question 2 of the Exercise Questionnaire addresses the duration of exercise. Questions 5, 6, 7, and 8 address the consistency of exercise.

Questions 1 and 2 were scored using the following rules. In question 1 answer (a) received a score of 0, answer (b) received a score of 1, answer (c) received a score of 2, and answer (d) received a score of 3. Question one of the Exercise Questionnaire measured the frequency of exercise.

In question 2 answer (a) received a score of 1, answer (b) received a score of 2, and answer (c) received a score of 3. Question 2 of the Exercise Questionnaire measured the duration of exercise.

In questions 5 through 8 answer (a), (c), and (d) received a 0 and answer (b) received a 1. The scores from questions 5 through 8 were totalled. The total score of questions 5 through 8 measured consistency of exercise.

Each respondent had three scores, one representing their exercise frequency, the second representing their exercise duration, and a third representing their exercise consistency. These scores were then combined for a final score. A final score of 2-5 represented Pattern group A consisting of low frequency, low duration, and inconsistent exercise. A final score of 6-7 represented Pattern group B consisting of moderate frequency, moderate duration and moderately consistent exercise. A final score of 8-10

represented Pattern group C consisting of high frequency, long duration and very consistent exercise.

The physical, psychological, and behavioral components of premenstrual syndrome symptomatology was operationalized by using six of the eight subscales of the Moos' Menstrual Distress Questionnaire as presented in Table 1. The subscales of Pain, Water Retention, and Autonomic Reactions reflected the physical or somatic symptoms. The subscale of Negative Affect reflected the psychological symptoms. Impaired Concentration and Behavior Change reflected the behavioral symptoms. The subscales of Arousal and Control were eliminated from this study because neither reflects the physical, psychological, or behavioral symptoms generally associated with premenstrual symptoms. The Arousal subscale taps the positive reactions that some investigators have linked with the menstrual cycle (Moos, 1985). The Control subscale is composed of items that are rarely reported as being related to the menstrual cycle (Moos, 1985).

The complete MDQ contains 47 items that are individually scored on a Lickert scale ranging from 0 to 4, with 0 being no experience of symptoms; with 1 meaning symptoms are present, mild; with 2 meaning symptoms are present, moderate; with 3 meaning symptoms are present, strong; and with 4 meaning symptoms are present, severe. The items were then added for a total score for each subscale. For example, the water retention scale included the items weight gain, skin blemish or disorder, painful or

Table 1

MDQ Scales Derived from Menstrual, Premenstrual, Intermenstrual, and Worst Menstrual Cycle Factor Analysis

1 Pain	5 Impaired Concentration
Muscle Stiffness	Insomnia
Headache	Forgetfulness
Cramps	Confusion
Backache	Poor judgement
Fatigue	Difficulty concentration
General aches and pains	Distractible
	Minor motor coordination
2 Water Retention	
Weight gain	6 Behavior Change
Skin blemish/disorder	Poor school or work performance
Painful or tender breasts	Take naps, stay in bed
	Stay at home
3 Autonomic Reactions	Avoid social activities
Dizziness, faintness	Deceased efficiency
Cold sweats	
Nausea, vomiting	
Hot flashes	
4 Negative Affect	
Loneliness	
Anxiety	
Mood swings	
Crying	
Irritability	
Tension	
Feeling sad or blue	
Restlessness	

Note. From Menstrual Distress Questionnaire Manual (p.3) by R. H. Moos, 1991, Los Angeles: Western Psychological Services.

tender breasts, and swelling. A raw score for water retention was tabulated by adding the scores of the 4 items defining the scale for each cycle phase. The raw score was then divided by the number of items to arrive at a mean score. The same method of scoring was done on the other 5 subscales of the MDQ.

For this study prevalence was defined as symptoms reported by over half of the women. Severity was determined by the raw score of each of the 47 items of the MDQ reported during the four days before the menstrual cycle. A score of 1 or 2 received a value of 1 meaning mild to moderate severity. A score of 3 or 4 received a value of 2 meaning severe to disabling. These values were then entered into SPSS which then calculated the frequency for each value and the percent for each value for all 47 items.

Instrumentation

The investigator used two instruments to measure the concepts: one was an adaptation of Carol Stanley's Exercise Questionnaire to determine exercise pattern and the other was Moos' Menstrual Distress Questionnaire to determine premenstrual symptomatology. The Exercise Questionnaire (Appendix C) is an eight item forced answer questionnaire adapted from Carol Stanley (1985) to measure frequency, duration, and consistency of exercise. The original questionnaire contained 11 items. Four items were deleted because they were dealing with past exercise pattern and

intention to exercise. The remaining item responses were altered semantically to enable a more accurate measurement of exercise pattern and consistency. Question 8 regarding exercise habits during menses was added to give a more accurate measurement of exercise pattern and consistency over the entire menstrual cycle.

The Moos' Menstrual Distress Questionnaire (MDQ) Form C (Appendix D) was used to measure PMS symptomatology. The MDQ was developed over 20 years ago and has been used extensively in the area of PMS research (Facchinetti, Martignoni, Petraglia, Sances, Nappi, & Genazzani, 1987; Shelley, & Anderson, 1986; & Woods et al., 1982).

Moos (1985) tested the MDQ on a sample of 839 women to arrive at the present factor structure with eight subscales. All of the eight subscales of the MDQ are positively correlated. Negative Affect and Impaired Concentration were the most highly correlated at 0.68. Pain and Negative Affect, Pain and Behavior Change, and Pain and Impaired Concentration were the next most highly correlated pairs at 0.59, 0.58, and 0.57 respectively. Negative Affect and Arousal were among the least correlated at .18. The factor analysis performed by Moos suggested a moderate to high degree of construct validity of the instrument.

Factor analysis performed on subsets of the MDQ scales provided further support of moderate to high construct validity of the MDQ. Woods, Most, and Dery (1982) in their sample of 179 women found internal consistencies, as

estimated by Cronbach's Alpha, to be between 0.64 and 0.88for these four scales: Pain, Water Retention, Negative Affect, and Impaired Concentration.

The questionnaire was examined for reliability of the eight subscales for the initial sample of 839 subjects (Moos, 1985). In the initial sample the sub-scale internal consistencies, as measured by Kuder-Richardson Formula 20, varied between 0.89 for the Negative Affect scale, and 0.53 for the Control scale. Piccolo (1982) obtained similar results for reliability in a sample of 156 college students.

Internal consistency reliabilities for the present study's sample of 37 women between the ages of 30 and 46 as estimated by Cronbach's Alpha were: Pain 0.65, Water Retention 0.75, Autonomic Reactions 0.32, Negative Affect 0.87, Impaired Concentration 0.67, and Behavior Change 0.53. The internal consistencies for the subscales Pain, Water Retention, Negative Affect, and Impaired Concentration were moderate suggesting that the items on the scale are measuring the same characteristic for this sample of women. The subscale Autonomic Reactions had a very low alpha coefficient which indicated that the items on this scale were not measuring the same characteristic for this sample of women. The alpha was increased moderately to 0.58 by deleting item 16 (hot flashes) from the questionnaire. The subscale Behavior Change had a moderately low alpha coefficient which was not significantly increased by deleting any of the items suggesting moderately low

reliability. The alpha coefficient for Impaired Concentration was increased from 0.67 to 0.78 by deleting item 23 (insomnia) giving a moderate to high alpha. There is no standard for what an acceptable reliability coefficient should be (Polit & Hungler, 1991). However, coefficients in the vicinity of 0.70 is considered sufficient when making group-level comparisons (Polit & Hungler, 1991). The alpha's derived from the sample in the present study have an overall lower reliability coefficient score than those obtained from previous studies.

There is evidence of moderate to high inter-cycle stability (reliability) of women's menstrual cycle symptom reports (Moos, 1985). That is, women tend to report similar symptoms from one menstrual cycle to another (Moos, 1985). Moos (1985) also found that a "woman's retrospective reports of her symptoms are not affected by the menstrual cycle phase she is in when completing the MDQ" (p. 9). Rapkin, Chang, & Reading (1988) compared a retrospective PMS questionnaire to a daily PMS diary in 17 women by having the women complete the daily diary, as well as the retrospective study. Their study suggest that women reliably report cyclical variation in PMS symptomatology when assessed by retrospective report.

Data Analysis

A. Means and standard deviations were calculated for the demographic variable of age. Frequencies and percents

were calculated for the variables of marital status and educational level to describe the sample.

B. The first research question (What physical, psychological, or behavioral premenstrual symptoms are most commonly self-reported by a sample of menstruating women, 30 to 46 years of age, who exercise?) was addressed by obtaining frequencies and percentages of 35 items representing the physical, psychological, and/or behavioral symptoms of premenstrual symptomatology to determine the prevalence of premenstrual symptoms.

C. The second research question (Is there a relationship between exercise pattern in menstruating women 30 to 46 years of age and the severity of self-reported premenstrual syndrome symptoms?) was addressed by using one-way ANOVA's to test the significant differences among the three different exercise groups with the 6 MDQ subscales. Mean scores and standard deviations for each of the 6 subscales of the MDQ was obtained to determine the self-reported severity of the physical, psychological, an/or behavioral cluster of PMS symptoms.

Assumptions

A. People are basically honest and therefore, the women answered the questionnaire honestly.

B. Women were able to accurately recall their premenstrual symptomatology.

Limitations of Study

A. The researcher was unable to control for factors which may influence PMS symptomatology such as the following: (a) women who exercise may also practice other self-care behaviors such as maintaining a diet low in caffeine, refined sugar, salt, red meat, and fat, (b) women who exercise may maintain lower body fat composition than their nonexercising counterparts, and (c) the psychosocial make-up of women who exercise may be different than the psychosocial make-up of women who do not exercise (different personality types).

B. All subjects were volunteers. Women who experience frequent, moderate to severe premenstrual symptoms may have been more likely to participate in this study because of their personal interest in the subject. Therefore, the prevalence rates and self-reported severity rates may be high.

C. Since this was a convenience sample of women, results may not be generalizable to other women.

Results

Descriptive Findings of the Study Sample

The mean age of participants was 38.92 (s.d. 3.70) years. Most participants were married, well educated, and all 37 were white (Table 2).

Findings Related to Research Questions

The following describes the findings for the research questions addressed by the study.

Research Question 1:

What physical, psychological, and/or behavioral premenstrual symptoms are most commonly self-reported by a sample of menstruating women, 30 to 46 years of age, who exercise?

Table 2

Demographic Characteristics (N = 37)

Characteristic	Frequency	Per cent
Marital status		
Single	4	10.8
Married	29	78.4
Divorced	1	2.7
Widowed	0	0.0
Living with partner	2	5.4
Missing	1	2.7
Educational level		
Some high school	0	0.0
High school graduate	7	18.9
Trade or business school	1	2.7
Some college	8	21.6
College graduate	8	21.6
Post-graduate	13	35.1

The first research question was addressed by obtaining frequencies and percentages of 35 selected items from the MDQ that measures the presence of the physical, psychological, and behavioral symptoms associated with premenstrual symptomatology.

Prevalence of Premenstrual Symptomatology

The percentage of women reporting the 35 selected premenstrual symptoms is given in Table 3. The 35 selected items assess for the presence of the physical, psychological, and behavioral symptoms associated with premenstrual symptomatology. The six most prevalent premenstrual symptoms, reported by more than half the women for this sample, included weight gain, swelling, mood swings, irritability, fatigue, and painful breasts.

Severity of Premenstrual Symptoms

Of these symptoms, most women reported their symptoms to be mild to moderate in severity (Table 4). Three of the six most prevalent premenstrual symptoms for this sample fell into the Water Retention subscale (weight gain, swelling, and painful breasts). One (fatigue) was in the Pain subscale. Two were in the Negative Affect subscale (mood swings and irritability). Symptoms that fall into the Autonomic Reactions, Impaired Concentration, and Behavioral Change subscales had a low prevalence rate with low severity. Overall, most women reported mild to moderate symptoms of PMS symptomatology.

Research Question 2:

Is there a relationship between the pattern of exercise in menstruating women 30 to 46 years of age and the severity of self-reported premenstrual symptoms?

Table 3

Per Cent Of Premenstrual Symptomatology Reported (N = 37)

Symptom	Per cent
Weight gain	73.0
Swelling	64.9
Mood swings	62.2
Irritability	62.2
Fatigue	59.5
Painful or tender breasts	59.5
Tension	48.6
Skin blemish	45.9
Anxiety	40.5
Feeling sad or blue	37.8
Backache	29.7
Headache	27.0
General aches and pains	27.0
Cramps	24.3
Take naps, or stay in bed	24.3
Crying	18.9
Restlessness	18.9
Loneliness	18.9
Muscle stiffness	13.5
Forgetfulness	13.5
Decrease efficiency	13.5
Poor work or school performance	10.8
Insomnia	10.8
Stay at home	10.8
Distractible	10.8
Poor judgment	08.1
Dizziness	08.1
Poor motor coordination	05.4
Difficulty concentrating	05.4
Confusion	05.4
Avoid social activities	05.4
Cold sweats	05.4
Hot flashes	02.7
Nausea\vomiting	02.7
Minor accidents	02.7

Table 4

Per Cent Of Severity Of Most Prevalent Premenstrual Symptoms

Symptom	N	Per cent M/M	Per cent S/D
Weight gain	27	74.1	25.9
Swelling	24	83.3	16.7
Mood swings	23	65.2	34.8
Irritability	23	69.6	30.4
Fatigue	22	72.7	27.3
Painful breasts	22	68.2	31.8

N = Number of women who reported symptom
M/M = Mild, moderate
S/D = Severe, disabling

Exercise Characteristics

As can be seen in Table 5 most women from this sample exercised at least 3 times a week for a duration of 40 minutes or longer. The two most common types of exercises reported were running and walking. Most women reported exercising for more than 4 years. These findings suggest that the women from this sample exercise on a regular basis and have established a moderate to high level exercise pattern.

Exercise Consistency

Most women from this sample reported changing their exercise schedule if their life became cluttered with unexpected events or if they felt poorly physically. Most did not change their exercise schedule if they felt poorly

emotionally or during their menses. Exercise consistency is described in Table 6.

Table 5

Exercise Characteristics (N = 37)

Characteristic	Frequency	Per cent
Exercise Frequency		
Once a month to twice a week	7	18.9
3 to 4 times a week	15	40.5
5 or more times a week	15	40.5
Exercise Duration		
Less than 20 minutes	0	0.0
20 to 40 minutes	13	35.1
40 minutes or more	24	64.9
Type of Exercise		
Walking	12	32.4
Running	17	45.9
Swimming	0	0.0
Aerobics	8	21.6
Cycling	0	0.0
Other	0	0.0
Exercise History		
Less than 1 month	0	0.0
Less than 6 months	2	5.4
Less than 1 year	2	5.4
1 to 2 years	5	13.5
2 to 3 years	4	10.5
3 to 4 years	1	2.7
More than 4 years	23	62.2

The sample was divided into three groups according to their exercise pattern as described in the operational definition section. The low level group consisted of 6

women, the moderate level exercise group consisted of 15 women, and the high level exercise group consisted of 16 women.

Table 6

Exercise Consistency (N = 37)

Characteristic	Frequency	Per cent
Life Becomes Cluttered with unexpected events		
Change schedule	22	59.5
No schedule change	15	40.5
Feel poorly physically		
Change schedule	28	75.7
No schedule change	9	24.3
Feel poorly emotionally		
Change schedule	13	35.1
No schedule change	24	64.9
During menses		
Change schedule	4	10.8
No schedule change	33	89.2

The means, standard deviations, and ranges were calculated for the total scores of each of the six MDQ subscales for the three different phases of the menstrual cycle to measure the spread or variability of self-reported premenstrual symptoms. The means for each subscale was much lower in the intermenstrual phase than the premenstrual and menstrual phases. This means that women from this sample experience few, if any, symptoms during the intermenstrual

phase which was consistent with the definition of premenstrual symptomatology.

The standard deviations shown in Table 7 point to considerable interindividual variation in reports of menstrual cycle symptoms for this sample. For example, a woman who was 2 standard deviations above the mean would obtain a score of 10.95 on the Pain scale in the premenstrual phase. This score represents an average report of "present, moderate" on all six Pain items or, more likely, a report of "present, strong" or "present, severe" on two or three items and little or no experience of the other symptoms (Moos, 1985). The ranges also showed considerable variation in reports of menstrual cycle symptoms.

Histograms of the data showed that the sample was grossly skewed. Histograms of the Pain, Autonomic Reactions, Negative Affect, Impaired Concentration, and Behavior Change subscales showed the data to have an asymmetrical shape with positive skewness and outliers. A histogram of the Water Retention subscale showed a symmetrical shape without outliers. The histograms reveal that this data is not tightly clustered around the means. There is variation in the data sets with the exception of the Water Retention subscale. Interpretation of the means, standard deviations, and ranges of the subscales was done with caution because of the wide distribution of the data sets.

Table 7

Means, Standard Deviations, and Range for Each Phase of the Most Recent Cycle (n = 37)

	Premenstrual			Menstrual			Intermenstrual		
Sub Scale	Total Mean	SD	Range	Total Mean	SD	Range	Total Mean	SD	Range
Pain	3.51	3.72	0-14	3.95	3.73	0-16	0.89	1.37	0-06
WR	4.65	3.55	0-11	3.27	3.26	0-11	0.43	0.80	0-03
Auto	0.38	0.98	0-24	0.30	0.85	0-03	0.16	0.60	0-03
NA	4.86	5.13	0-18	4.68	5.13	0-18	1.73	3.78	0-17
IC	0.78	1.75	0-09	0.78	1.53	0-07	0.38	0.85	0-04
BC	0.86	1.25	0-05	1.05	2.58	0-15	0.24	0.55	0-02

Subscale	Possible range for each subscale
Pain = Pain	Pain = 0 - 24
WR = Water Retention	WR = 0 - 16
Auto = Autonomic Reactions	Auto = 0 - 16
NA = Negative	NA = 0 - 32
IC = Impaired Concentration	IC = 0 - 32
BC = Behavioral Change	BC = 0 - 20

Hypothesis Testing

One-way analysis of variance was used to compare the three different exercise groups and mean total scores on the six subscales of the MDQ: Pain, Water Retention, Autonomic Reactions, Negative Affect, Impaired Concentration, and Behavioral Change. On the basis of this analysis (see table 8), there was a difference in the mean scores of the Pain subscale among the different exercise groups. The Tukey method of post hoc comparisons was used to test which groups differed in perceived amount of pain in the premenstrual phase of the menstrual cycle. The low exercise group showed

higher mean total scores than the moderate and high exercise groups in the Pain subscale.

Table 8

Analysis Of Variance For Differences In Mean Total Score them or giving them praise for their exercise efforts. Of The MDQ Subscales And The Different Exercise Groups

Scale	N	M	SD	F-ratio	df	F Prob
Pain						
Low exercise	6	8.67	4.50	10.50	2,36	0 .0003
Moderate exercise	15	2.00	1.90			
High exercise	16	3.19	3.30			
Water Retention						
Low exercise	6	6.00	3.90	1.14	2,36	0.3303
Moderate exercise	15	3.67	3.60			
High exercise	16	5.13	3.40			
Autonomic Reactions						
Low exercise	6	0.00	0.00	1.03	2,36	0.3668
Moderate exercise	15	0.13	0.51			
High exercise	16	0.50	1.21			
Negative Affect						
Low exercise	6	6.33	6.71	0.06	2,36	0.9358
Moderate exercise	15	6.33	7.20			
High exercise	16	5.36	5.34			
Impaired concentration						
Low exercise	6	0.83	1.32	0.61	2,36	0.4463
Moderate exercise	15	0.20	0.41			
High exercise	16	0.90	2.15			
Behavior change						
Low exercise	6	1.00	2.00	0.61	2,36	0.5468
Moderate exercise	15	0.53	0.83			
High exercise	16	1.00	1.26			

There were no differences in the mean total scores of the Water Retention, Autonomic Reactions, Negative Affect, Impaired Concentration, and Behavioral Change subscales among the different exercise groups. The null hypothesis

that there is no relationship between exercise pattern and PMS symptomatology cannot be rejected based on this analysis. Exercise pattern of women between the ages of 30 and 46 had no effect on the perceived amount of premenstrual symptomatology. Table 8 shows that women who are in the low exercise group have higher mean scores in the Pain scale than women who are in the moderate and high exercise groups. Women in the moderate exercise group have lower mean scores in the Water Retention and Behavior Change scale than the women in the low and high exercise groups, but this finding was not statistically significant. There were no differences in the total mean scores among the three groups in the Autonomic Reactions, Negative Affect, or Impaired Concentration scales. These women essentially reported very few symptoms in the Autonomic Reactions, Negative Affect, and Impaired Concentration subscales regardless of their exercise pattern.

Cochran's C was used to test for homogeneity of variance between the groups. There was no difference in variation between groups in the Pain, Negative Affect, and Water Retention subscales. However, Cochran's C was significant between groups in the Autonomic Reactions, Impaired Concentration, and Behavior Change. Even though ANOVA is a robust test results of this study must be interpreted with caution because the assumption that the variances in all groups must be equal was not met and the population did not have a normal distribution.

Interpretation

The sample in the present study was composed of white, highly educated, married women. Most of the sample (32) was from taken from the " Womens' Only" register list. Women who participate in the "Womens' Only" road race were white, educated, and married. This phenomenon could be a result of many factors. Married women may have more social support than single women such as spouse running or walking with Married women may experience fewer barriers and have better access to exercise. Married women may have husbands that accept child care duties while the wife exercises. Married women may have husbands who contribute to household duties providing more time for exercise. Married women may enjoy a higher socioeconomic status providing more opportunities for exercise. Women who are educated may be more cognizant of the benefits of exercise than women who are not educated. Running and walking may be considered activities for educated whites and blacks or less educated women may feel uncomfortable participating in such activities.

The most prevalent self-reported premenstrual symptoms of women 30 to 46 years of age who exercise were weight gain, fatigue, swelling, tender breasts, mood swings, and irritability. The literature shows that the symptoms most commonly associated with premenstrual syndrome in the general population are fatigue, swelling, breast tenderness, skin disorders, mood swings, anxiety, depression, irritability, lethargy, crying spells, low

morale, and sleep disorders (Johnson, McChesney, & Bean, 1988; Wilhelm-Hass, 1984; Woods, Most, & Dery, 1982). The prevalence of premenstrual symptomatology in this sample of women 30 to 46 years of age who exercise is similar but not identical to that of other populations studied to date. Woods et al. (1982) found, in their sample of 179 women between the ages of 18 and 35, a prevalence of weight gain to be 48 per cent, headache to be 38 per cent, swelling to be 46 per cent, and tension to be 43 per cent. Lee and Rittenhouse (1991) found in their sample of 594 women between the ages of 21 to 50 symptoms to have a prevalence rate of greater than 30 per cent were cramps, weight gain, swelling, headache, anxiety, irritability, tension, backache, fatigue, painful breasts, and mood swings. This sample of women reported little premenstrual symptomatology of pain such as cramps, headaches, and backaches. They also reported little premenstrual symptomatology of negative affect, impaired concentration, and behavior change such as depression, insomnia, and decreased efficiency, respectfully. It is of interest that this sample of women reported a higher prevalence rate of symptoms in the Water Retention scale than other study samples. One could speculate that women who exercise are concerned with their weight and are very sensitive to water retention symptoms.

Most of the previous studies were done on younger women. This is the first study done on a sample of

exclusively older women (30 to 46 years of age) who exercise. Other studies did not exclude women who were on birth control pills, hormone therapy, diuretics, antidepressants, or sedatives. Women who were on birth control pills, hormone therapy, diuretics, antidepressants, and sedatives were excluded from this study. Taking into consideration that older women generally report more premenstrual symptoms than younger women and that certain medications positively affect PMS symptoms, this sample of women show low to moderate PMS symptomatology.

The women of this sample clearly showed a pattern of exercise and this pattern was rhythmic and continuous but constantly changing. Women from this study showed a moderate amount of consistency in their exercise habits. Women tended to change their exercise pattern when unexpected life events occurred and when they were feeling poorly physically. It stands to reason that one would not exercise when feeling poorly physically. In this sample of women their exercise schedule changed in response to unexpected life events. It can be extrapolated that exercise is important to this sample of women but does not take absolute priority in their lives. This sample of women did not change their exercise schedule when feeling poorly emotionally. Perhaps this sample of women use exercise as a form of mental health therapy. Most women of this sample reported not changing their exercise behavior during their

menses. This sample of women may experience low menstrual discomfort or exercise may take precedence over comfort.

This study showed that women who exercise report low severity of premenstrual symptoms. The women of this study reported mild to moderate premenstrual symptoms of fatigue, weight gain, swelling, tender breasts, mood swings, and irritability. There was no difference in premenstrual symptomatology among the different exercise pattern groups. This finding suggests that exercise in general can have a positive effect on the perceived amount of premenstrual symptomatology in women.

The low exercise group showed significantly higher mean scores on the Pain subscale than the moderate and high exercise groups. This could be explained by the beta-endorphin theory. Increased blood levels of beta-endorphins have been found after exercise (Hsia & Long, 1990). Increased circulating beta-endorphins has been associated with analgesia and euphoria (Hsia & Long, 1990). Women who exercise at a moderate to high exercise level may have more circulating beta-endorphins than their low exercise cohorts and have natural analgesia decreasing their pain symptoms.

The human energy field pattern of this sample of women is observable through manifestations of exercise pattern such as frequency, duration, and consistency of exercise and through manifestations of premenstrual symptomatology. The original model presented earlier was not supported by the

results of this study. However, Rogers' unitary pattern-based practice model was used to develop a PMS symptomatology profile for women over 30 who exercise. Weight gain, fatigue, painful breasts, swelling, mood swings, irritability, and tension in the largest box depict the most frequently self-reported premenstrual symptoms in this sample of women. Skin disorders, anxiety, and feeling sad in the medium-size box depict the second most frequently self-reported premenstrual symptoms. Backache, cramps, taking naps, and headaches in the small box depict the third most frequently self-reported premenstrual symptoms. The revised model in Figure 2 depicts the premenstrual symptomatology pattern profile of women who exercise.

The results of this study show that exercise pattern has little effect on how women report premenstrual symptoms. However, women in the moderate exercise group reported less symptoms in the Behavior Change and Water Retention subscales of the MDQ. The majority of the women (80%) inthis study had a fairly consistent exercise pattern. The results of this study also show that women between the age of 30 to 46 years of age, who exercise experience low severity of premenstrual symptoms.

Methodological problems for this study include a small sample size, lack of a control group, data collection was done through a mailed questionnaire, and the researcher needed to rely on retrospective recall for reports of PMS symptomatology. A larger sample size may have reduced the

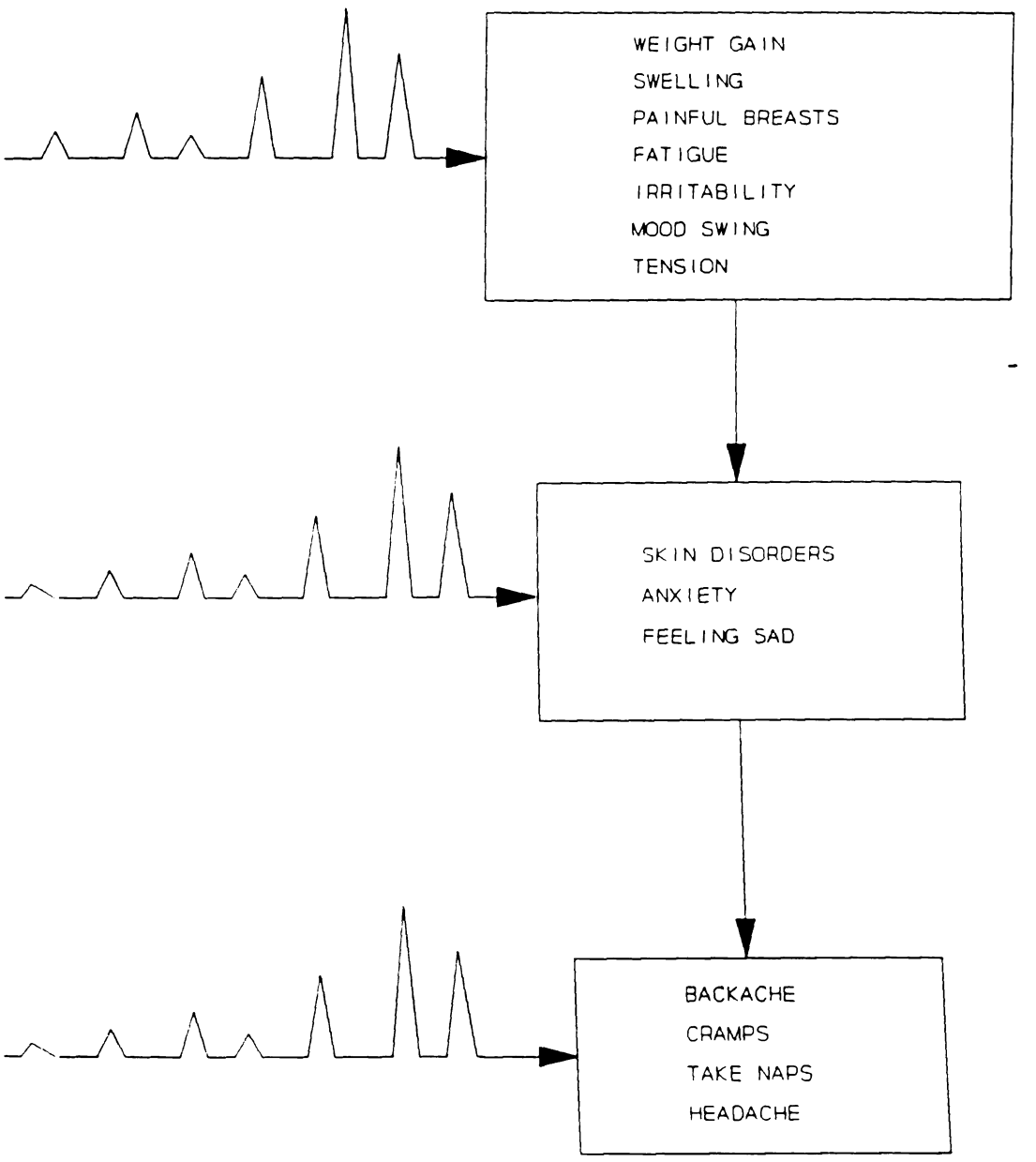

Figure 2

PMS SYMPTOM PROFILE OF WOMEN WHO EXERCISE

effect of extreme scores in the subscales and eliminated outliers giving the sample a more symmetrical shape. A control group of "no exercisers" could have been used to compare the effect exercise has on premenstrual symptomatology.

Another disadvantage of this study is that the researcher had to rely on mailed questionnaires for data collection. Mailed questionnaires commonly have a poor response rate. Although, the response rate for this study was high with 46% of the women returning the questionnaire. However, some of the questionnaires could not be used due to the respondents failure to complete the questionnaire accurately. A major shortcoming of a mailed questionnaire is the inability to provide clarification of questions when needed. Having to rely on retrospective recall may have had a limited effect on the recollection of the presence or absence of premenstrual symptoms and may have resulted in an overestimation of symptom severity.

A data analysis problem for this study is that the assumptions of analysis of variance were not met. The first assumption that the groups must be a random sample from a normal population was violated. The data was grossly skewed not meeting the criteria of normalcy. The assumption that in the population, the variances in all groups must be equal was also violated for one-way analysis.

Implications For Nursing

Nursing implications derived from the findings of this study are in the areas of nursing practice and future nursing research using Rogers' unitary pattern-based practice model as the conceptual framework.

Implications for Nursing Practice

The Family Clinical Nurse Specialist (FCNS) provides primary health care to individuals and families on the continuum of the life span. It is common knowledge that women are the most likely age and gender group to enter the health care delivery system. Women usually enter the health care system seeking contraception upon becoming sexually active. It is very typical for women to stay in the health delivery system for health maintenance visits related to contraception and prenatal care.

One of the primary roles of the FCNS in clinical practice is to provide a health maintenance history and physical promoting health and wellness for individuals. The FCNS provides these services to women in a variety of settings including family practice offices, family planning centers, OB/GYN offices, college campuses, and women's clinics.

This study of a sample of women 30 to 46 years of age who exercise showed a prevalence rate of premenstrual symptomatology of up to 70% but with low severity. The most commonly reported premenstrual symptoms were weight gain, fatigue, swelling, tender breasts, mood swings, and

irritability. The FCNS may provide anticipatory guidance for women who are approaching 30 by talking to them about the common symptoms related to the premenstruum or counsel women who are suffering from premenstrual symptoms. The FCNS can provide PMS counseling, education, and treatment focusing on the most prevalent premenstrual symptoms. Most women reported symptoms from the Water Retention and Pain subscales. The FCNS needs to be knowledgeable in the use of diuretics and prostaglandin inhibitors in the treatment of premenstrual symptoms.

Many women will not seek help for their premenstrual symptoms with the belief that it is "normal" to have these cyclic episodes of pain and discomfort. The first step the FCNS takes in the management of premenstrual symptomatology is to recognize that a premenstrual related problem exists. If the FCNS determines that a premenstrual problem exists he/she than needs to assess for the severity of symptoms. This could be done by administering the MDQ or another reliable instrument that measures premenstrual symptomatology and severity. The FCNS functions as an assessor by systematically collecting subjective and objective data and formulating premenstrual symptomatology diagnoses or problems related to premenstrual syndrome.

It is very likely that FCNS's will provide health services in a variety of settings to women who present with premenstrual symptomatology. These settings could include family planning and health services to low-income and

minority women in low cost clinics. The FCNS can be creative in the development and prescription of an exercise program for this population group by networking with area churches and neighborhood clubs. The FCNS could act as a facilitator and help organize church and neighborhood walking or aerobic programs for this population group.

Based on the prevalence rate of women experiencing premenstrual symptoms it is imperative that the nurse in advanced practice assess for premenstrual symptomatology in women. Rogers' unitary pattern-based model is a useful tool for the assessment of premenstrual symptoms. Rogers' pattern manifestation appraisal model provides a systematic approach in the identification of premenstrual symptomatology pattern. The nurse in advanced practice can develop a pattern profile of clients who present with PMS symptomatology.

The etiology of premenstrual symptomatology remains unclear. The clinician managing premenstrual symptomatology has many treatment options available such as hormone therapy, diuretics, psychotropic therapy and stress management techniques. Based on this study the nurse in advanced practice may prescribe a moderate exercise program as part of the treatment plan of clients who present with premenstrual symptoms of pain. The results of this study show that women who exercise experience the common symptoms of PMS, but report low severity of symptoms. This study also shows that exercise does not worsen or exacerbate

premenstrual symptoms and may even reduce symptom severity in the Pain subscale. Exercise is a self-care behavior that has many benefits such as cardiovascular fitness, weight control, and stress management and should be included in the PMS treatment plan if not otherwise contraindicated.

Recommendations for Future Research

The sample in the present study consisted mainly of women who participated in the "Women's Only" race who were from the ages of 30 to 46 years old. These women were white, well-educated, and married. A study including a variety of subjects from different racial and ethnic backgrounds, lower educational levels, a wider age range and cultural differences would produce conclusions applicable to a broader population. More experimental studies that include a control group and groups assigned to specific exercise levels are needed to support the hypothesis that there is an inverse relationship between PMS and exercise. Most of the studies done on PMS and exercise used retrospective recall questionnaires; more studies need to be done using prospective questionnaires or asking women to keep daily diaries of symptoms related to their menses.

This study raises more questions than answers in regard to the relationship between exercise pattern and PMS symptomatology. Further research is needed to explore why women who exercise report most of their PMS symptoms in the Water Retention subscale. Further research

investigatingthis relationship is necessary in order to draw any definitive conclusions.

The data from this study suggest that women who exercise report mild to moderate premenstrual symptoms. These data are limited to women from southeast Michigan, who participated in the Women's Only race who are between the ages of 30 to 46 years. Further study is necessary to ascertain whether these symptoms are characteristic of childbearing women of all ages and women who participate in other forms of exercise.

APPENDICES

Appendix A

Sample letters to potential study participants.

To: Lansing OB/GYN Clients

From: Elizabeth Gale RN

Date: February 16, 1993

I am a Registered Nurse pursuing a Master's Degree in Nursing at Michigan State University. I am doing research on exercise pattern and the menstrual cycle for my thesis project. The results of the study will be helpful to nurses providing care to childbearing women. Will you please take time to complete the enclosed questionnaire while you are waiting for your appointment? The questionnaire takes about ten minutes to complete. No attempt will be made to identify you in any way. Please do not write your name on the questionnaire or envelope. Participation in this study is voluntary and you are under no obligation to participate. If you do not wish to participate in this study your care at Lansing OB/GYN Associates will not be affected in any way. You indicate your voluntary agreement to participate by completing and depositing the questionnaire into the box labelled "Study". A written summary of the results of this study will be available in this office in the Fall of 1993. If you have any questions concerning your health as a result of completing this questionnaire please consult your health care provider. Thank you very much for your assistance.

To: "Women's Only" Participants

From: Elizabeth Gale RN

Date: February 16, 1993

I am a Registered Nurse pursuing a Master's Degree in Nursing at Michigan State University. I am doing research on exercise pattern and the menstrual cycle for my thesis project. The results of the study will be helpful to nurses providing care to childbearing women. Will you please take time to complete the enclosed questionnaire and return it in the stamped, self-addressed envelope by March 1, 1993. The questionnaire takes about ten minutes to complete. No attempt will be made to identify you in any way. Please do not write your name on the questionnaire or envelope. Participation in this study is voluntary and you are under no obligation to participate. You indicate your voluntary agreement to participate by completing and returning this questionnaire. A written summary of the results of the study will be available at the 1993 "Women's Only" race at one of the information tables. If you have any questions concerning your health as a result of completing this questionnaire please consult your health care provider. Thank you very much for your assistance.

Appendix B

University Committee on Research Involving Human Subjects (UCRIHS) approval.

MICHIGAN STATE UNIVERSITY

OFFICE OF VICE PRESIDENT FOR RESEARCH
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February 10, 1993

TO: Ms. Elizabeth Gale
1225 Clearview Drive
Flushing, MI 48433

RE:

IRB #:	93-027
TITLE:	THE RELATIONSHIP BETWEEN EXERCISE PATTERN AND PREMENSTRUAL SYMPTOMATOLOGY
REVISION REQUESTED:	N/A
CATEGORY:	1-C
APPROVAL DATE:	02/09/1993

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 including any revision listed above.

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 seek updated certification. Request for renewed approval must be accompanied by all four of the following mandatory assurances.

1. The human subjects protocol is the same as in previous studies.
2. There have been no ill effects suffered by the subjects due to their participation in the study.
3. There have been no complaints by the subjects or their representatives related to their participation in the study.
4. There has not been a change in the research environment nor new information which would indicate greater risk to human subjects than that assumed when the protocol was initially reviewed and approved.

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.

UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. Investigators must notify UCRIHS promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

If we can be of any future help, please do not hesitate to contact us at (517) 355-2180 or FAX (517) 336-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:pjm

cc: Dr. Rachel Schiffman

Appendix C

Instruments

Exercise Questionnaire

Today's date:_____

Age:____

Race:___White
___Black
___Asian or Pacific Islander
___Hispanic
___Other, specify_____

Marital Status: (circle one) a. single b. married c. divorced d. widowed e. living with partner

Educational level:
a. some high school
b. high school graduate
c. trade school or business school
d. some college
e. college graduate
f. post-graduate work at a college or university

Have you taken any of the following medications within the last 6 months? (You may indicate more than one answer).
a. sedative
b. antidepressant
c. water pill (diuretic)
d. birth control pill
e. progesterone
f. Norplant
g. estrogen

The following questionnaire is designed to determine the amount of exercise that you do. Please answer each question only once. Please circle your response or, where appropriate, write your response in the space provided.

1. On the average, how often do you exercise?
   a. never (if you answer never please go to the **Menstrual Distress Questionnaire**)
   b. once a month to twice a week
   c. 3 to 4 times a week
   d. 5 or more times a week

2. When you do your exercise how much time on the average do you spend at each session?
   a. less than 20 minutes
   b. 20 to 40 minutes
   c. 40 minutes or more

3. What type of exercise do you participate in most frequently? ONE ANSWER ONLY.
   a. walking
   b. running
   c. swimming
   d. aerobics
   e. cycling
   f. other_____

4. How long have you been exercising?
   a. less than 3 months
   b. less than 6 months
   c. less than 1 year
   d. 1 to 2 years
   e. 2 to 3 years
   f. 3 to 4 years
   g. more than 4 years

5. If your life becomes cluttered with unexpected events, do you...
   a. exercise more than normal
   b. do not change your exercise schedule
   c. exercise less than you normally would
   d. not exercise at all

6. If you are feeling poorly physically, do you...
   a. exercise more than normal
   b. do not change your exercise schedule
   c. exercise less than you normally would
   d. not exercise at all

7. If you are feeling poorly emotionally, do you...
   a. exercise more than normal
   b. do not change your exercise schedule
   c. exercise less than you normally would
   d. not exercise at all

8. When you are on your "period" do you...
   a. exercise more than normal
   b. do not change your exercise schedule
   c. exercise less than you normally would
   d. not exercise at all

		1 Most recent flow (A)	2 Four days before (B)	3 Remainder of cycle (C)
45.	Blind spots, fuzzy vision.....	____	____	____
46.	Poor motor coordination.....	____	____	____
47.	Increased appetite.....	____	____	____

		1 Most recent flow (A)	2 Four days before (B)	3 Remainder of cycle (C)
22.	Restlessness.....	____	____	____
23.	Insomnia.....	____	____	____
24.	Poor school or work performance.....	____	____	____
25.	Affectionate.....	____	____	____
26.	Feelings of suffocation.....	____	____	____
27.	Forgetfulness.....	____	____	____
28.	Take naps, stay in bed.....	____	____	____
29.	Orderliness.....	____	____	____
30.	Chest pains.....	____	____	____
31.	Confusion.....	____	____	____
32.	Poor judgment.....	____	____	____
33.	Stay at home.....	____	____	____
34.	Excitement.....	____	____	____
35.	Ringing in the ears.....	____	____	____
36.	Difficulty concentrating.....	____	____	____
37.	Avoid social activities.....	____	____	____
38.	Feelings of well-being.....	____	____	____
39.	Heart pounding.....	____	____	____
40.	Distractible.....	____	____	____
41.	Decreased efficiency....	____	____	____
42.	Bursts of energy, activity.....	____	____	____
43.	Numbness, tingling.....			
44.	Minor accidents.....	____	____	____

Descriptive Categories:

0 - No experience of symptom
1 - Present, mild
2 - Present, moderate
3 - Present, strong
4 - Present, severe

		1 Most recent flow (A)	2 Four days before (B)	3 Remainder of cycle (C)
1.	Muscle stiffness.....	____	____	____
2.	Weight gain.....	____	____	____
3.	Dizziness, faintness....	____	____	____
4.	Loneliness.....	____	____	____
5.	Headache.....	____	____	____
6.	Skin blemish or disorder.....	____	____	____
7.	Cold sweats.....	____	____	____
8.	Anxiety.....	____	____	____
9.	Mood swings.....	____	____	____
10.	Cramps.....	____	____	____
11.	Painful or tender breast.....	____	____	____
12.	Nausea, vomiting.....	____	____	____
13.	Crying.....	____	____	____
14.	Backache.....	____	____	____
15.	Swelling (breast, abdomen.....	____	____	____
16.	Hot flashes.....	____	____	____
17.	Irritability.....	____	____	____
18.	Tension.....	____	____	____
19.	Fatigue.....	____	____	____
20.	Feeling sad or blue.....	____	____	____
21.	General aches and pains.....	____	____	____

Menstrual Distress Questionnaire

Form C

Write the approximate dates of your most recent menstrual period (flow) in the space marked "A" below. Then write the dates of the menstrual period which preceded the most recent one in the space marked "D".

previous menstrual flow from_____ to_____	other times during most recent cycle	four days before most recent flow	most recent flow from_____ to_____
D	C	B	A

On the next two pages is a list of symptoms that women sometimes experience. Please describe your experience of each of these symptoms during the three time periods listed below:

Column 1 during your <u>most recent</u> menstrual flow (the dates shown in area A on the diagram above).

Column 2 during the four days before your <u>most recent</u> menstrual flow (area B on the diagram).

Column 3 during the remainder of your <u>most recent</u> menstrual cycle (area C).

<u>Note</u>: The answers you put in columns 1, 2, and 3 should be accurate for your experience during your most recent menstrual cycle. Please do not report your general experience. Also, please report <u>any</u> experience of these symptoms whether or not they seem to be related to your menstrual cycle.

For each answer choose the category that best describes your experience of that symptom during that time. Write the number of that category in the space provided. Even if none of the categories is exactly correct, choose the one that best describes your experience. Do not leave any blank spaces.

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