INFORMATION TO USERS

The most advanced technology has been used to photograph and reproduce this manuscript from the microfilm master. UMI films the text directly from the original or copy submitted. Thus, some thesis and dissertation copies are in typewriter face, while others may be from any type of computer printer.

The quality of this reproduction is dependent upon the quality of the copy submitted. Broken or indistinct print, colored or poor quality illustrations and photographs, print bleedthrough, substandard margins, and improper alignment can adversely affect reproduction.

In the unlikely event that the author did not send UMI a complete manuscript and there are missing pages, these will be noted. Also, if unauthorized copyright material had to be removed, a note will indicate the deletion.

Oversize materials (e.g., maps, drawings, charts) are reproduced by sectioning the original, beginning at the upper left-hand corner and continuing from left to right in equal sections with small overlaps. Each original is also photographed in one exposure and is included in reduced form at the back of the book.

Photographs included in the original manuscript have been reproduced xerographically in this copy. Higher quality 6" x 9" black and white photographic prints are available for any photographs or illustrations appearing in this copy for an additional charge. Contact UMI directly to order.

U·M·I

University Microfilms International
A Bell & Howell Information Company
300 North Zeeb Road, Ann Arbor, MI 48106-1346 USA
313/761-4700 800/521-0600

Order Number 1342672

Relationships among perimenstrual symptoms, stressful life events, anxiety and cortisol levels

Richards-Barna, Anne, M.S.

The University of Arizona, 1990

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

RELATIONSHIPS AMONG PERIMENSTRUAL SYMPTOMS, STRESSFUL LIFE EVENTS, ANXIETY AND CORTISOL LEVELS

by

Anne Richards-Barna

A Thesis Submitted to the Faculty of the

COLLEGE OF NURSING

In Partial Fulfillment of the Requirements
For the Degree of

MASTER OF SCIENCE

In the Graduate College

THE UNIVERSITY OF ARIZONA

1 9 9 0

STATEMENT BY AUTHOR

This thesis has been submitted in partial fulfillment of requirements for an advanced degree at The University of Arizona and is deposited in the University Library to be made available to borrowers under rules of the Library.

Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of source is made. Requests for permission for extended quotation from or reproduction of this manuscript in whole or in part may be granted by the head of the major department or the Dean of the Graduate College when in his or her judgment the proposed use of the material is in the interests of scholarship. In all other instances, however, permission must be obtained from the author.

SIGNED: Anne M Richards-Barna

APPROVAL BY THESIS DIRECTOR

This thesis has been approved on the date shown below:

Cheryl A. Cahill
Professor of Nursing

11/21/90
Date

ACKNOWLEDGEMENTS

I would like to thank my chairperson, Dr. Cheryl Cahill, for her assistance in bringing this thesis to completion. I would also like to recognize and thank Dr. Rose Gerber and Dr. Terry Badger for the time and effort they put into editing this thesis.

I would like to express my appreciation to the assistants in the data lab for their collective efforts in obtaining statistical results from the data. In addition, I am grateful for the warm advice and support given to me by fellow students and colleagues at the College of Nursing.

Most importantly, I would like to acknowledge my husband, Richard, for his support and encouragement during the most trying times. I would like to recognize our children, Dustin, Jenny and Joni, for the sacrifices they made when my time and attention was primarily focused on this thesis. Lastly, I would like to thank my parents, Noel and Bobbie Richards, for their long distance love and support throughout the masters program.

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF ILLUSTRATIONS

LIST OF TABLES

ABSTRACT

The purpose of this study was to examine the relationship between stress and perimenstrual symptoms. Stress was studied in terms of major life events, self-reported anxiety, and blood cortisol levels. Fifteen women who demonstrated negative affect perimenstrual symptoms and seventeen women who were identified as asymptomatic charted their symptoms daily for three menstrual cycles. During this time, state anxiety and blood cortisol levels were measured twice a week.

The results of this study support a positive relationship between stressful life events, trait anxiety, state anxiety, and perimenstrual symptoms. However, cortisol levels were not correlated with either perimenstrual symptoms or state anxiety.

There was a difference between the symptomatic and the asymptomatic groups in terms of stressful life events and trait anxiety. There was also a significant difference in state anxiety between the two groups when measured during the perimenstrual phase, however, not during the postmenstrual phase. There were no significant changes in cortisol levels between groups or cycle phases.

CHAPTER I

INTRODUCTION

Perimenstrual symptoms (PS) are defined as physical, emotional and/or behavioral symptoms that recur cyclically prior to menses and are drastically reduced in the postmenstruum (Chakmakjian, 1983; O'Brien, 1985; Peterson, 1985; Sanders, Warner, Backstrom & Bancroft, 1983; Woods, 1986). For some women, the experience of PS is a monthly irritation. For others, PS drastically disrupt their lives, as well as the lives of those around them (Brown & Zimmer, 1986a; Steiner, Haskett & Carroll, 1980). In order to manage PS most effectively, it is important to gain a clear understanding of the factors associated with these symptoms. The goal of this study is to clarify the relationship between stress and PS.

Statement of the Problem

An estimated 40-90% of females at childbearing age are affected by PS (Boyle, Burkowitz & Kelsy, 1987; Peterson, 1985; Van Tyle & Sagraves, 1988). Of these, 5-10% describe their symptoms as severe enough to disrupt their lifestyle (Van Tyle & Sagraves, 1988). Estimates of the incidence of PS reflect a wide variance that may be due in part to the lack of congruency in definition. For example, some authors define PS as any symptoms occurring prior to menses, regardless of the severity or number of symptoms (Chakmakjian, 1983; Frank, 1931; O'Brien & Shaugn, 1985; Peterson, 1985; True, Goodner & Burns, 1985). Others limit the diagnosis of PS to those symptoms described as

incapacitating (Sanders et al., 1983; Van Tyle & Sagraves, 1988). Despite the broad range of incidence reported, it is clear that PS affects a significant portion of women.

Significance of the Problem

PS have been linked to employee absenteeism, suicide, criminal violence, family abuse, divorce and psychiatric emergencies (Brown & Zimmer, 1986a; Carnine, 1986; Chakmakjian, 1983; Dalton, 1960; Dalton, 1975; Dalton, 1980; Glass, Heninger & Lansky & Talan, 1971; Peterson, 1985). Due to the large number of women effected by PS and the devastating impact PS may have on one's life, these symptoms are the focus of many research studies. However, there is little agreement among researchers in terms of the cause and treatment for PS (Woods, 1986).

Most of the research done in the area supports a positive relationship between PS and stress (Peterson, 1985; Siegal, Johnson & Sarason, 1979; Taylor & Bledsoe, 1986; Van Tyle & Sagrages, 1988; Wilcoxin, Schrader & Sherif, 1976; Woods, 1985; Woods, Dery & Most, 1982). However, there are many questions left unanswered as to the nature of this relationship.

Original Study

Data for this study was collected as a component of an ongoing research project entitled "Psychobiological Correlates of Perimenstrual Symptoms" (Cahill, 1987). The purpose of Cahill's study is to compare and contrast patterns of self-reported

perimenstrual symptoms and selected hormones in women with PS and asymptomatic women. More specifically, Cahill is examining the patterns of hormones secreted by the hypothalamic, pituitary, adrenal and ovarian glands in relation to perimenstrual symptoms. Due to the interrelatedness of these glands, the term Hypothalamic/Pituitary/Adrenal/Ovarian (H/P/A/O) axis is utilized.

The following hormones are being measured as indicators of H/P/A/O functioning: 1) prolactin levels serve as indicators of anterior pituitary functioning, 2) progesterone levels serve as indicators of ovarian function, 3) cortisol levels serve as indicators of adrenal cortex activity, and 4) beta-endorphin levels indicate anterior pituitary function (Cahill, 1987). The interrelationships between the hormones secreted from the H/P/A/O axis are illustrated in Figure 1 (Cahill, 1987). A difference in the hormone secretion between the PS group and the control group supports the hypothesis that there may be a problem in the normal regulatory mechanisms associated with the H/P/A/O axis.

The literature suggests that PS consist of several unique, yet interrelated symptom clusters (Chakmakjian, 1983). Based on a factor analysis of 839 women, Moos (1968) found that the 47 symptoms in the Menstrual Distress Questionnaire (MDQ) were grouped into eight categories. The general categories identified by Moos (1968) are: 1) pain, 2) concentration, 3) behavior change, 4) autonomic reactions, 5) water retention, 6) negative affect, 7) arousal, and 8) control. Woods, Most and Dery (1982b) analyzed the data from 193 subjects to identify the dimentions of perimenstrual distress. Using factor

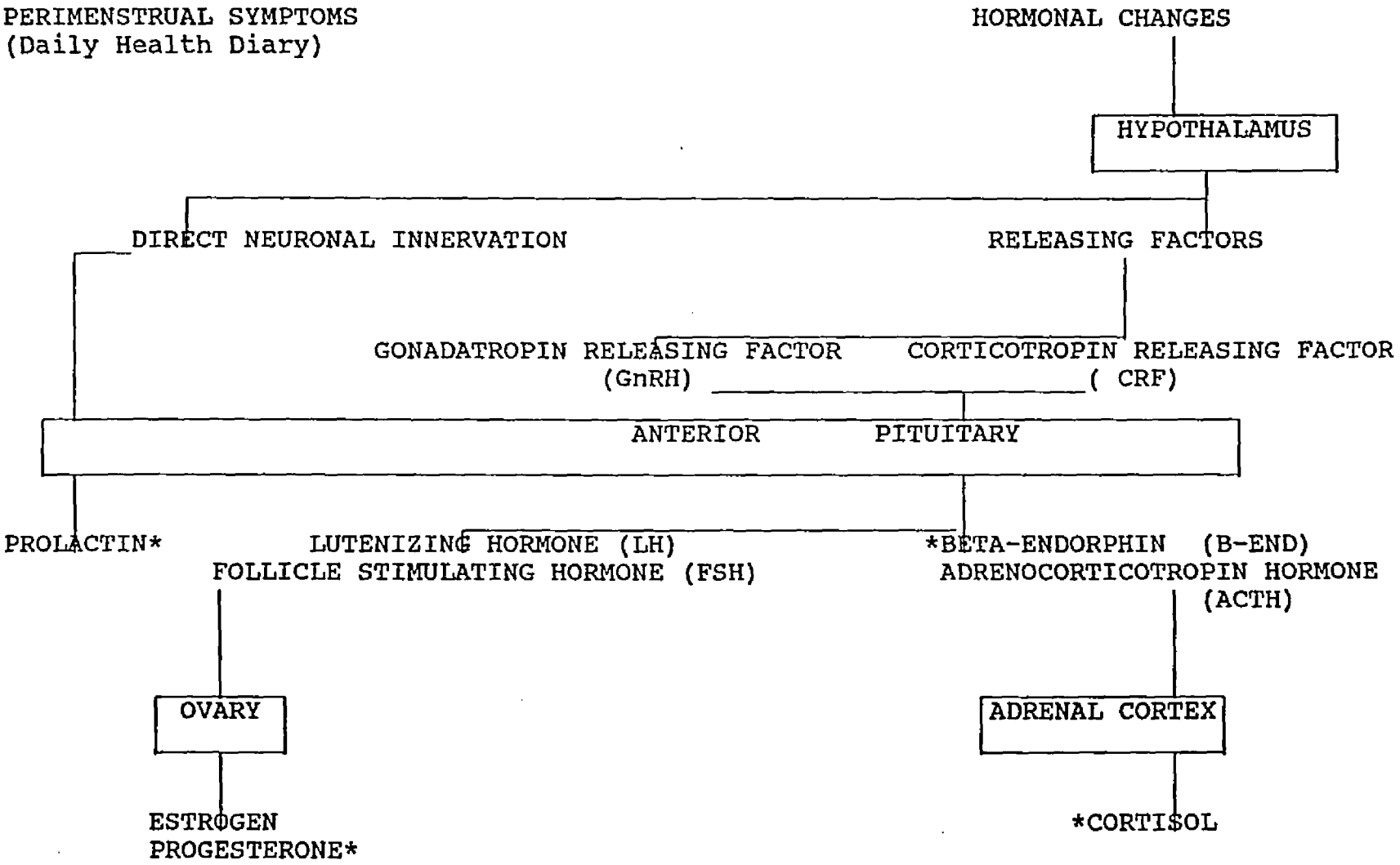


Figure 1. Interrlationships Among Hormones on the A/P/O/H Axis

analysis, they limited the number of categories to 1) negative affect, 2) pain, 3) water retention and 4) performance impairment.

Several researchers who have studied the relationship between stress and PS, have found that the correlations vary significantly between symptom categories (Gannon, Luchetta, Pardie & Rhodes, 1989; Stephenson, Denny & Arberger, 1983; Woods, 1986; Woods, Most & Longenecker, 1985). Therefore, rather than studying PS as a whole, it may be beneficial to study populations that are similar in terms of the types of symptoms they are experiencing. Cahill has limited her study to focus on symptoms associated with the category negative affect. The symptoms in the negative affect category include crying, loneliness, anxiety, restlessness, irritability, mood swings, depression, and tension (Moos, 1968).

The study reported here was limited to the data from Cahill's research associated with psychological stress in relation to the menstrual cycle. Additionally, blood cortisol was used as a physiological indicator of the stress response.

Purpose

There were three overall goals of this study. The first was to identify any differences in life stress, anxiety and cortisol measures between those women who suffer with PS and those women who are asymptomatic. The second goal was to describe the relationship between the experience of PS, one's perception of stressful life events, levels of state and trait anxiety, and blood cortisol measures. These relationships were described for the sample as a whole, as well as

between groups to identify correlational differences in these variables based on the experience of symptoms. The third goal was to identify differences in state anxiety and blood cortisol levels between the perimenstrual phase and the postmenstrual phase. These differences were analyzed to compare phase differences between the symptomatic and asymptomatic groups.

PS Verses PMS

The term premenstrual syndrome (PMS) is used most commonly in the literature. Identification of the subtle difference between PMS and PS is important. PMS is defined as those symptoms occurring prior to menstruation and regressing after the onset of menses. PS include those changes experienced prior to menstruation as well as those symptoms experienced during menstruation (Woods, 1986).

Woods, Most and Dery (1982b) found a high correlation between symptoms reported prior to menstruation and those reported during menstruation. Due to the relatively small difference between premenstrual and menstrual symptoms, these researchers support the utilization of the term, perimenstrual, referring to both phases of the menstrual cycle (Woods, 1986).

Significance for Nursing

Nurses are in an ideal role and are uniquely qualified to manage a client with PS (Coyne, Woods & Mitchell, 1985; Frank, 1986). First, nurses have the educational background to understand the physiological mechanisms associated with PS as well as the psychosocial aspects of

these symptoms. Secondly, many of the techniques presently used to treat PS are within the domain of nursing. For example, providing nutritional counseling, teaching stress management, and facilitating peer support groups are all part of the nursing role (Coyne, Woods & Mitchell, 1985). In addition, regardless of the particular setting, nurses are often the primary contact person for these clients (Frank, 1986). This places them in a potentially supportive role.

Brown and Zimmer (1986b) explored the experiences of 83 clients receiving treatment for PS. These researchers found that nutrition and life style management, specifically exercise and stress reduction, were the most popular interventions for PS. Brown and Zimmer also found that out of 11 categories of people, including friends and family, nurse practitioners, as a group, were most frequently sought for treatment. In addition, the subjects described their encounter with nurse practitioners as a positive experience more frequently than with any other health care providers.

Summary

A relatively large percentage of reproductive aged women suffer with perimenstrual symptoms, and the impact of these symptoms may be devastating. The purpose of this study was to examine the nature of the relationship between stress and PS.

One of the goals of clinical nursing research is to improve the quality of nursing and health care. Improvement of care occurs in part through enhanced knowledge and understanding of the problem. This

study will provide some insight into the relationship between stress and PS, allowing nurses to manage these clients more effectively.

CHAPTER II

CONCEPTUAL FRAMEWORK AND LITERATURE REVIEW

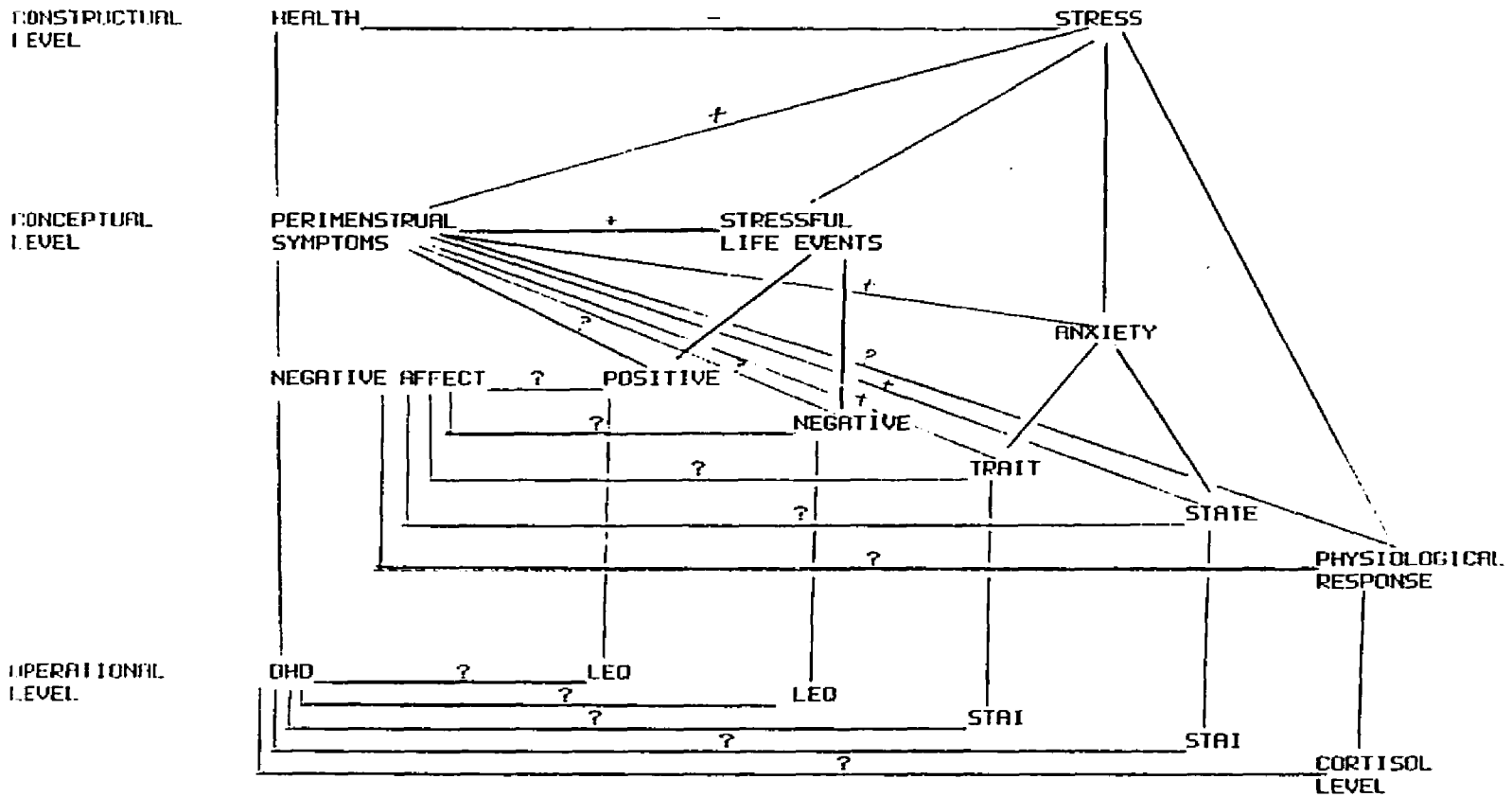
The focus of this chapter is to present the conceptual framework guiding this research and to discuss the literature relevant to stress and perimenstrual symptoms (PS). The constructs and concepts will be defined and the relationships between them will be supported by the literature. The literature will also be reviewed to identify the current status of knowledge related to the etiology of PS.

Conceptual Framework

The conceptual model illustrates the primary concepts under investigation. According to the diagrammatic presentation (Figure 2), the concepts have been categorized into three levels based on the degree of abstraction. The conceptual level identifies the variables that are being studied. The constructual level represents a higher level of abstraction to which the concepts can be generalized. The operational level consists of instruments that will be utilized to measure the concepts of interest.

Health and stress have been identified as the overall constructs. Health was studied in terms of perimenstrual symptoms (PS), with negative affect (NA) symptoms identified as a subgroup of particular interest. The Daily Health Diary (DHD) (Woods, 1981) will be used to measure PS and NA.

Stress was conceptualized in terms of stressful life events, self-reported anxiety and the body's endocrinological response to stress.



DHD: DAILY HEALTH DIARY
LEQ: LIFE EVENTS QUESTIONNAIRE
STAI: STATE-TRAIT ANXIETY INVENTORY

FIGURE 2. CONCEPTUAL MODEL: LINKING PERIMENSTRUAL SYMPTOMS, STRESSFUL LIFE EVENTS, ANXIETY AND CORTISOL LEVELS

Stressful life events have been further divided based on the subjects perceptions of the event. Positive life events are those events which influenced one's life in a desirable manner, and negative life events are those which have an undesirable affect on one's life. These were measured by the Life Events Questionnaire (LEQ) (Norbeck, 1984).

Anxiety has been broken down into trait and state anxiety. These were measured by Speilberger's (1983) State-Trait Anxiety Inventory. Lastly, the body's endocrinological response has been measured by blood cortisol levels. The following discussion, based on Figure 2, describes the conceptual links and supporting literature to substantiate the model.

Health and Stress

The construct of health is recognized as a dynamic process encompassing illness, as well as wellness (Hadley, 1974). Optimum health is defined holistically as the experience of physical, emotional, social and spiritual well-being enabling one to function appropriately at the given growth and developmental level (Hadley, 1974). The monthly experience of PS can negatively affect one's sense of well-being in all areas of health.

Stress can be viewed from many perspectives. From a physiological framework, stress is defined as the body's response to any internal or external demand encountered (Selye, 1982). Lazarus' (1974) view of stress accounts for one's cognitive appraisal of the event and recognizes the interactive nature between person and environment. According to Lazarus and Folkman (1984), "psychological

stress is a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being" (p. 19).

For the purpose of this research, stress was recognized as both a physiological response and cognitive experience. Stress was defined as a "state of imbalance a) elicited by an actual or perceived disparity between environmental demands and the organism's capacity to cope with these demands and b) manifested through a variety of physiological, emotional and behavioral responses" (Stokols, 1985, p. 35).

On a conceptual level, stress was studied from three different aspects. One way to study stress was through the major life events one has experienced and the amount of impact these events have had on his/her life. Another measurement of stress was self-reported anxiety levels. Stress was also investigated through the body's physiological response, indicated by blood cortisol concentrations (Abplanalp, Livingston, Rose & Sandwisch, 1977; Marinari, Leshner & Doyle, 1976).

The relationship between health and stress, can be conceptualized as an interactive process. In this sense, poor health may either be the primary source of stress, or it may diminish one's coping abilities, thereby predisposing him/her to other sources of stress (Cox, 1988; Mechanic, 1978). In turn, the experience of stress may negatively influence one's sense of well-being (Cox, 1988). Therefore, one's health may be the source of stress or a response to the experience of stress. Regardless of the starting point, one can see how the vicious cycle is perpetuated through the interaction between health and stress.

Perimenstrual Symptoms and Stress

Perimenstrual symptoms (PS) were defined as physical, emotional and/or behavioral symptoms that recur cyclically prior to menses and are drastically reduced in the postmenstruum (Chakmakjian, 1983; O'Brien, 1985; Peterson, 1985; Sanders, Warner, Backstrom & Bancroft, 1983; Woods, 1986). There are two important components to this definition, the relation of symptoms to the menstrual cycle and the cyclical nature of these symptoms. Due to the extremely large number and variety of symptoms associated with PS, the repetitive pattern of symptoms reported specifically in the perimenstrual phase becomes paramount to the definition of PS.

For the purpose of this study, the perimenstrual phase was specified to begin five days prior to menses and to continue through the second day of menses. The severity of PS was measured prospectively using the Daily Health Diary (DHD) modified by Woods (1981).

Several researchers have examined the relationship between PS and stress (Gannon, Luchetta, Pardie and Rhodes, 1989; Woods, 1986). Overall, earlier findings support the contention that there is a positive relationship between one's perception of stress and the report of PS.

Woods (1986) examined the effects of a stressful milieu on a women's report of PS and disability related to PS. Results of the path analysis, based on 179 women between the ages of 18 and 35, showed that the influence of a stressful milieu was a factor in predicting monthly symptoms. Women exposed to a highly stressful milieu reported the most

severe negative affect symptoms. However, stress did not significantly explain perimenstrual pain or water retention. The study by Woods supports the idea that stress influences some perimenstrual symptoms, but does not seem to impact on all perimenstrual symptoms.

Gannon, Luchetta, Pardie and Rhodes (1989) also found a positive relationship between chronic stress and some types of perimenstrual symptoms. Based on the retrospective reports of 211 women, chronic stress was correlated with all PS categories, except arousal. Of all the contextual factors studied, chronic stress, exercise, alcohol, nicotine and caffeine intake, stress was the best predictor of PS and accounted for 3-15% of the variance in PS.

Stressful Life Events and PS

Stressful life events are defined as any experiences that disrupt an individual's pattern of behavior, cognitions and/or emotions (Brown, 1988; Oatley, 1988), thereby placing demands on the person's adaptive functioning (Zegans, 1982). Recognizing that the amount of disruption caused by an event is mediated by one's perception of the event is important. One of the problems with life events research done in the past, was the assumption that psychosocial demands affect all individuals in the same way (Jordan & Meckler, 1982).

Stress cannot be measured by the situation, because the individual's characteristics and the context of the situation influence one's reaction to it (Cassel, 1976; Lazarus, 1966). For example, the event of pregnancy may be experienced very differently by a couple who has been trying to start a family for several years and by a young teenage girl who has no immediate intentions of raising a

child. Although pregnancy is typically considered to be a stressful event, the people involved and the context of their situation have a great impact on their experience of stress. Therefore, in order to understand the impact of a major event, one must account for the individual's perception of the situation.

Several researchers have investigated the relationship between major life stress and problems associated with menstruation (Jordon & Meckler, 1982; Siegal, Johnson & Sarason, 1979; Stephenson, Denny & Arberger, 1983; Wilcoxon, Schrader & Sherif, 1976; Woods, Most & Longenecker, 1985). For the most part, the results support a positive relationship between these two factors.

Siegal, Johnson and Sarason (1979) studied the relationship between life changes during the past year and menstrual problems. A total of 244 college students completed the Life Experiences Survey and a menstruation questionnaire. Correlational statistics showed that life changes, having both desirable and undesirable effects on one's life, were positively related to the number of symptoms reported retrospectively.

However, when correlations were calculated separately for oral contraceptive users and nonusers, life stress and the number of menstrual symptoms were significantly correlated for nonusers only. Regression analysis, comparing the influence of oral contraceptive use, positive life changes and negative life changes, indicated that negative life changes were the strongest predictor of menstrual problems. These findings suggest that one's perception of an event and

the use of oral contraceptives are significant factors in the experience of menstrual symptoms.

Stephenson, Denny and Aberger (1983) also analyzed the subjects' perceptions of life events and their relation to PS. One of the purposes of their study was to investigate the relationship between stressful life change and various clusters of menstrual symptoms. Four hundred twenty three college females completed a modified version of the Menstrual Symptom Questionnaire and the Life Experiences Survey. A factor analysis indicated that negative life change was significantly correlated with four of six symptom clusters. The types of symptoms correlated with negative life change were, menstrual pain, premenstrual pain, premenstrual water retention, and menstrual backache. Negative life change was not correlated with premenstrual negative affect or menstrual gastrointestinal symptoms. Positive life change was not related to any of the factors.

The study by Woods, Most and Longenecker (1985) also supports the idea that major life events may only be associated with specific types of symptoms. They studied 74 women of child-bearing age to determine the relationship of major life events and daily stressors to PS. Although the results showed that there was a positive correlation between life change scores and some types of perimenstrual symptoms reported on a retrospective questionnaire, the types of symptoms that were positively correlated with life stress directly opposed those reported by Stephenson et al., 1983). Life change was correlated with negative affect, performance impairment and water retention. However, life change was not correlated with pain symptoms.

Although life events were correlated with the subjects' recollection of symptoms, there were no significant correlations between life events and symptoms reported on a daily basis. In addition, correlations between daily stressors and PS were stronger than the relationship between life events and PS. This suggests that retrospective reports of stress correlate with retrospective reports of PS and prospective reports of stress correlate with prospective reports of PS.

Jordan and Meckler (1982) surveyed 156 undergraduate nursing students to study the relationship between life change events and the experience of dysmenorrheic symptoms. Multiple regression analysis identified life change as the best predictor of menstrual distress, accounting for 12% of the variance.

Wilcoxon, Schrader and Sherif (1976) investigated the relationship between daily activities, life events, moods, and somatic changes during the menstrual cycle. They studied 33 undergraduate students categorized into three equal groups. One group of males, assigned "pseudo" cycles, one group of females using oral contraceptives, and one group of females not taking oral contraceptives. Results showed that prospective reports of impaired concentration and stressful events increased for both female groups during premenstruum. One interesting difference between oral contraceptive users and nonusers, was the timing of negative affect symptoms. Oral contraceptive users reported the highest negative affect during the premenstrual phase, while nonusers reported the highest negative affect during the menstrual phase. Stressful life

events accounted for more of the variance in negative mood than did cycle phase, however, this was not the case for water retention and pain type symptoms.

Anxiety and PS

Anxiety levels are another indicator of the amount of stress one is experiencing. Anxiety has been divided into two forms, state and trait anxiety (Spielberger, 1983). State anxiety (S-anxiety) refers to a transitory condition characterized by "subjective feelings of tension, apprehension, nervousness, and worry" (Spielberger, 1983, p. 1). According to Endler (cited in Endler and Edwards, 1982) S-anxiety is mediated by one's perception of stress.

Trait anxiety (T-anxiety) can be defined as "relatively stable individual differences in anxiety-proneness" (p.1), which affect one's perception and response to stress (Spielberger, 1983). Therefore, according to Spielberger, those individual's with high T-anxiety exhibit increased S-anxiety more often than those with low T-anxiety.

Golub (1976) studied 50 parous women between the ages of 30 and 45 who were not using oral contraceptives or any other type of hormone. The purpose of the study was to compare measures of trait anxiety, state anxiety and depression between the premenstrual and intermenstrual phase of their menstrual cycle. The sample was randomly divided into two groups. One group was studied four days prior to menstruation and again two weeks later during intermenstrual phase. A second group was tested during the first four days of menstruation and again two weeks later. Results demonstrate that both depression and state anxiety were significantly higher in the premenstrual phase of

their menstrual cycle as opposed to the intermenstrual phase of their cycle. This study provides increasing support that fluctuations in mood are directly related to the menstrual cycle.

In 1979, Golub and Harrington replicated the study described above, using a sample of 158 adolescents. The results showed that feelings of anxiety and depression were not significantly different for the premenstrual phase, the menstrual phase or the intermenstrual phase of the cycle. These two studies by Golub et al. suggest that there is a difference between adolescents and adults in terms of PS. PS usually appear when a female reaches 20 - 30 years of age and gradually become more severe as she gets older, until she reaches menopause.

Christensen and Oei (1989) examined 43 women between the ages of 25 and 45 to assess the relationship between premenstrual dysphoria and levels of anxiety and depression. These women were classified into three groups, one group (n = 13) had confirmed premenstrual dysphoria, one group (n = 17) had unconfirmed premenstrual dysphoria, and the third group (n = 13) did not have a 30% change in symptoms from the premenstrual to the postmenstrual phase. These subjects were given a book of questionnaires and were not informed of the premenstrual nature of the study. Post-hoc analysis indicated that the confirmed PMS group had significantly higher levels of depression, state anxiety and trait anxiety than the unconfirmed PMS group or the control group.

Mira, Vizzard and Abraham (1985) studied 124 women to compare a PMS group with an asymptomatic group on measures of minor psychiatric illness, state and trait anxiety, and neuroticism. The researchers were also interested in examining the differences in test scores

between the luteal phase and the follicular phase of the menstrual cycle. Based on scores from 91 PMS sufferers and 33 control subjects, they found that the PMS group scored significantly higher than the control group in terms of psychiatric illness, state and trait anxiety and neuroticism. They also found that only the PMS group demonstrated significantly higher scores in state anxiety and trait anxiety in the premenstrual phase as opposed to the follicular phase.

Giannini, Price, Louiselle & Giannini (1985) analyzed pseudocholinesterase levels and trait anxiety (STAI) among three equal groups of women. Based on the Peck-Abraham Questionnaire, one group of 14 was identified as having mild PMS, another group was found to have moderate PMS and the third group had severe PMS. Elevated levels of the enzyme pseudocholinesterase have been associated with anxiety. Results demonstrated that none of the subjects in the mild group showed trait anxiety, 25% of the in the moderate group showed trait anxiety and 75% of those in the severe group showed trait anxiety. In terms of pseudocholinesterase, these levels were elevated in 43% of the severe group, 14% of the moderate group and in none of the mild group.

Watts, Dennerstein and Horne (1980) compared a PS group and a control group to analyze differences in neuroticism, anxiety and negative attitudes toward themselves. The results were based on a PS group of 25 and a control group of 23. Findings suggested there were significant differences between the two groups in terms of trait anxiety and neuroticism, however, there were no significant differences in state anxiety scores. A couple speculations can be made related to the lack of difference between the PS and the control group

in state anxiety scores. The primary limitation, was the time that the tests were administered in relation to the menstrual cycle. There was no mention that this was taken into consideration in the design. Another potentially confounding variable, is the effect of mefenamic acid. The subjects in the PS group were also participating in a drug trial.

Physiological Stress and PS

Another way to examine stress, is to use physiological measures of stress. The endocrine responses to stress are worthy of discussion. In general, the endocrine system functions by secreting hormones into the blood which are then circulated to various organs and tissues (Asterita, 1985). It is important to note that the body attempts to maintain a constant internal environment. Any demand which may disrupt this homeostasis will lead to physiological changes to maintain stability of the system (Asterita, 1985).

The endocrine response is initiated when a demand is placed on the system. This stimulates the hypothalamus, which then secretes corticotropin-releasing factor (CRF). CRF activates the anterior pituitary-adrenocortical mechanism which releases a variety of hormones such as, growth hormone (GH), adrenocorticotropic hormone (ACTH), thyroid-stimulating hormone (TSH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), and prolactin (P) (Chaffee & Lytle, 1980). ACTH stimulates the adrenal cortex to secrete glucocorticoid. Cortisol accounts for approximately 95% of glucocorticoid activity. Therefore, cortisol is often used as a physiological indicator of stress.

During periods of stress, the body responds by secreting larger amount of aldosterone, antidiuretic hormone, ACTH, glucocorticoid and epinephrine. Both aldosterone and antidiuretic hormone cause water retention. This may be associated with the following perimenstrual symptoms, breast swelling and tenderness, abdominal bloating, headache and peripheral edema. An increase of glucocorticoid may be related to depression. The symptoms of hostility, irritability, anxiety and aggression may result from excess epinephrine (Taylor & Bledsoe, 1986).

Several researchers have investigated physiological measures of stress in relation to the menstrual cycle. Marinari, Leshner and Doyle (1976) studied 60 undergraduate females to investigate the relationship between reactions to psychologically stressful situations and the menstrual cycle. Blood cortisol levels were used as an indicator of the hypothalmic/pituitary/adrenal response to a stressor. Psychological stress was measured by subjective reports on an adjective rating scale. Subjects were divided into two groups, those taking oral contraceptives and those not using oral contraceptives. Results showed that cortisol levels were significantly higher during the premenstrual phase than during midcycle for those subjects not using oral contraceptives. There was no significant difference between phases for those subjects taking oral contraceptives. Self-evaluation of psychological stress did not fluctuate with respect to the menstrual cycle or oral contraceptive use. These researchers suggested that women not using oral contraceptives exhibit an increased physiological response to psychological stress premenstrually as opposed to their response in midcycle.

Abplanalp, Livingston, Rose and Sandwisch (1979) studied 21 women between the ages 21 to 38 for one menstrual cycle to examine the relationship between the menstrual cycle and endocrine responsitivity to psychological stress. Blood was drawn at the same time approximately three times a week to measure levels of human growth hormone (HGH), cortisol and estrogen. Subjects were exposed to a stressful interview during both the menstrual and intermenstrual phase of their cycle. Results of this study show that cortisol and HGH responsivity vary independently of the menstrual cycle. In addition, subjective reports of anxiety did not differ between the menstrual and intermenstrual phase of the cycle. Lastly, there was a significant relationship between cortisol and HGH responsivity to psychological stress and the level of anxiety reported following the stressful interview. This research suggests that cortisol, HGH and anxiety reports may be valid indicators of stress, however, they are not mediated by one's menstrual cycle as suggested in the study by Marinari et al. (1976).

Haskett, Steiner & Carroll (1984) studied 42 subjects with severe PMS to compare their subjective reports of PMS with a 24 hour urinary free cortisol estimation. The women were examined during the luteal and follicular phases of their menstrual cycle for 2 - 4 cycles. Although there was a marked increase in state anxiety and in symptoms reported during the premenstrual phase compared to the postmenstrual phase, the urinary cortisol levels were not significantly different.

Dennerstein, Morse and Varnavides (1988) studied 79 women to explore the relationship between PMS and the history of emotional

changes at other times of hormonal fluctuations. Based on a prospective charting for two months, 57 women were placed in the PMS group and 22 women were utilized as a control group. A comparison of the two groups showed that the PMS subjects reported post-partum depression over 20% more than the control group, however, this difference was not statistically significant. The PMS group reported significantly more experience with oral contraception side effects, obstetric difficulties, gynecological problems and psychiatric history in the family. This data indicates that those women vulnerable to mood changes during the premenstrual phase appear to be more vulnerable to emotional changes at other times of hormonal fluctuations. The researchers also noted that the trait anxiety of both groups was relatively high with no difference between the PMS and the control groups.

Factors Related to Inconsistent Research Findings

Definitional Inconsistency

There are several reasons for the inconsistencies in research findings. One of the primary reasons is related to the lack of congruence in definitions of PS. The primary areas of disagreement are related to the timing of the symptoms and the severity of the symptoms. Often times researchers fail to operationally define the perimenstrual phase and the luteal phase of the cycle. There may be a large discrepancy between symptoms reported two weeks prior to menses and those reported only a few days before menses. Some believe that

symptoms abruptly end with the onset of menses, yet others include the experience of symptoms during menses in their definition (Woods, 1986; Woods, Most and Dery, 1982b).

The other source of conflict is related to the severity of symptoms. Some researchers recognize all symptoms occurring during the premenstrual phase as PS (Chakmakjian, 1983; Frank, 1931; O'Brien & Shaugn, 1985; Peterson, 1985; True, Goodner & Burns, 1985), while others only include those symptoms that are severe enough to cause "deterioration of their interpersonal relationships and/or interference with normal activities" (Reid, 1985, p. 4). The problem with defining PS by the degree of incapacity reported, is that it is extremely difficult to quantify. For example, one person's experience of PS may render her unable to attend work, while someone else with more severe symptoms may be able to continue working. Therefore, the diagnosis may be based more on the robustness of the individual rather than on the severity of symptoms.

Another potential reason for the inconsistencies in PS research is related to the wide variety of symptoms associated with PS. In the past, all of the 200 plus symptoms have been analyzed collectively, however, there is increasing evidence to support the contention that different types of symptoms are influenced by different factors (Stephenson, Denny & Aberger, 1983; Wilcoxon, Schrader & Sherif, 1976; Woods, 1986; Woods, Most & Longenecker, 1985). According to Chakmakjian (1983), there is no consistently effective treatment for PS, because treatments "have been applied indiscriminantly to a heterogeneous collection of symptoms despite the growing evidence that

the syndrome is not uniform but composed of a number of distinct though related symptoms, clusters or complexes" (p. 532). Therefore, when studying the treatment efficacies, it may be beneficial to study more homogenous populations or to analyze the different types of symptoms separately.

Methodological Flaws

The measurement of symptoms has also been a factor in studying PS. Research reveals that there is a large discrepancy between symptoms reported on a daily basis and those recalled from memory (Woods, 1986).

The timing of data collection in relation to the menstrual cycle may also be a factor leading to inconsistent conclusions. Subjects' perceptions may change in relation to the menstrual cycle. Sanders, Warner and Backstrom (1983) compared subjective reports and hormonal changes during the menstrual cycle. Based on a study of 55 women, they found that the most positive experiences were reported during the mid and late follicular phase and the most negative experiences were reported in the late luteal phase for both symptomatic and asymptomatic subjects. However, the difference was significant only for the symptomatic group. Therefore, it is important to collect data at a consistent point during the menstrual cycle.

Controlling factors that may influence PS such as, oral contraceptives is also important to consider when researching PS. Several researchers have found that oral contraceptive users report significantly fewer and less severe symptoms than nonusers (Jordan and

Meckler, 1982; Siegal, Johnson & Sarason, 1979; Stephenson, Denny & Aberger, 1983; Wilcoxon, Schrader & Sherif, 1976). The majority of oral contraceptives maintain high levels of progesterone and estrogen throughout the menstrual cycle. Since the imbalance of these hormones may be a factor associated with PS, it is logical that oral contraceptive use may minimize the experience of PS (Wilcoxin, Schrader & Sherif, 1976). Another possible explanation for the differences in PS between oral contraceptive users and nonusers, is due to the fact that the two groups are self-selected. Those women who experience some relief in symptoms with oral contraceptive use will often continue usage, while those women who experience an exacerbation of symptoms when trying oral contraceptives will often discontinue their use (Coyne et al., 1985).

Summary

The conceptual framework guiding this research was based on the interactive relationship between health and stress. Stress was studied in terms of stressful life events, self-reported anxiety and the body's endocrinological response to stress. The subjective experience of perimenstrual symptoms was the aspect of health that was studied. The literature was reviewed to support the links between the concepts under investigation. In addition, the factors related to inconsistent findings was discussed.

CHAPTER III

METHODOLOGY

This chapter will present the methodological plan of this study. The research design, the population studied and the procedure for data collection will be specified. In addition, the instruments utilized and the plan for data analysis will be discussed.

Research Design in Original Study

Data for this research was collected as a component of an ongoing study, conducted by Cheryl A. Cahill, R.N., Ph.D. The purpose of Dr. Cahill's research was to examine the relationship between perimenstrual symptoms and selected hormones secreted by the hypothalamus, pituitary, adrenal and ovarian glands (Cahill, 1987). The research reported here was conducted using a descriptive, correlational design.

The data for this study was collected in three consecutive parts. The first part was the prescreening interview in which callers were asked several brief questions over the phone to ensure that they met the criteria for inclusion in the study. The next part of the study, Phase I, involved prospective charting of symptoms for two consecutive menstrual cycles to identify the type, pattern and severity of symptoms experienced throughout the menstrual cycle. This data was analyzed to identify two groups of subjects, symptomatic and asymptomatic, who continued into the second phase of the design.

The final step of data collection, Phase II, involves daily, prospective charting of symptoms and biweekly blood collection

throughout three complete menstrual cycles. This data provides information about self-reported perimenstrual symptoms in relation to hormone levels.

The sample for this study consisted of women who responded to newspaper advertisements and flyers targeted at two large university communities. One community is in the eastern United States, and the other is in the southwestern part of the country.

In order to qualify for participation in the study, the subjects must be between 18 and 40 years of age. In addition, they must be menstruating on a regular basis. This eliminates women who are pregnant, women who have had a hysterectomy, or those with a history of amenorrhea. To accurately measure PS, it is important to have an established point of reference related to the menstrual cycle, such as the onset of menses. This criteria also helps to control hormonal variables that may influence PS. Women using medication during the course of the study (including birth control pills) and those with a history of depressive illness, endocrine disease, blood dyscrasia or anemia were excluded from this study. These conditions may influence PS or confound the hormone levels under study. Lastly, drawing blood from a subject with blood disease or anemia may be potentially harmful to the subject or the researcher.

An estimated 350 women called for the prescreening interview in response to flyers and newspaper advertisements. Of these, 220 women entered Phase I, and 150 subjects (68%) completed this phase. Data obtained from Phase I was analyzed to identify 40 subjects to enter

into Phase II of the study, 20 subjects with emotional PS and 20 subjects who were asymptomatic.

Sample and Setting

The sample population for this study consisted of the first 32 women to complete data collection, 15 in the symptomatic group and 17 in the asymptomatic group. Data was collected at the university in the laboratory space provided to Dr. Cahill.

Human Subjects

Human subjects approval was obtained by Dr. C. Cahill, the Principal Investigator (Appendix A). Each subject signed a consent form explaining the purpose of the study, the procedures to be followed and the risks and benefits of participating. There were separate consent forms for Phase I (Appendix B) and Phase II (Appendix C). Confidentiality was respected for all subjects by coding their data with an identification number and by keeping all files in a locked file cabinet. Only those people directly related to the research had access to the data.

Instruments

Several instruments were used to collect the data. These instruments included the following: 1) Spielberger State/Trait Anxiety Inventory (STAI) (Spielbrger, 1983), 2) Life Events Questionnaire (LEQ) (Norbeck, 1984), and 3) Daily Health Diary (DHD) (Woods, 1981).

Spielberger State-Trait Anxiety Inventory Form Y (STAI-Y): The STAI is a self-report questionnaire to measure anxiety, developed in the mid 1960's by Spielberger in collaboration with Gorsuch, Lushene, Vagg and Jacobs (Spielberger, 1983). This scale was revised in 1979 to create Form Y. This instrument consists of a total of 40 items, 20 items measure state anxiety (S-anxiety), the subject's feelings of anxiety at that particular time. The remaining 20 items measure trait anxiety (T-anxiety), which refers to "relatively stable individual differences in anxiety-proneness" (Spielberger, 1983, p. 1). Response choices range from 1-4, indicating the extent to which the statement describes the subject's feelings. Possible scores range from 20-80 for both the state and the trait measurement. The answers are coded so that a score of 20 represents minimal anxiety and a score of 80 represents extreme anxiety. The STAI has been used extensively to measure anxiety in women with PS (Christensen & Oei, 1988; Giannini et al., 1985; Haskett et al., 1984; Mira et al., 1985; Watts et al., 1980).

The STAI has undergone many tests in the process of development, standardization and validation. The populations used for testing include 6,000 high school students, 600 neuropsychiatric and medical/surgical patients, and 200 prison inmates. Test-retest reliability was based on two groups of high school students and three groups of college students. After a baseline test was done, the subjects were retested one hour later after exposure to one of the following: 1) relaxation training, 2) taking a difficult IQ test, 3) viewing a film of car accidents resulting a serious injury to the

victims. Test-retest correlations ranged from .73 - .86. Cronbach's alpha was greater than .90 (Spielberger, 1983).

Construct validity was based on two studies in which subjects were asked to fill out questionnaires in high and low stress conditions. The studies were based on 900 high school students and 197 college students. In both cases, the S-anxiety scores were substantially higher during the exam condition than during their normal condition or relaxation training condition. The Cronbach's alphas range from .89-.94 (Spielberger, 1983).

Life Events Questionnaire (LEQ): Norbeck (1984) developed the LEQ to provide a measure of stressful life events that was relevant for females of childbearing age. This tool was constructed by modifying three existing instruments to measure life stress, 1) a revised version of the original life change questionnaire (Holmes & Rahe, 1967; Rahe, 1975), 2) the Psychiatric Epidemiology Research Interview Life Events Scale (Dohrenwend, Krasnoff, Askensky & Dohrenwend, 1978), and 3) the Life Events Survey (Sarason, Johnson, and Siegel, 1978). The researchers interviewed women with young children related to major events that had occurred during the past year and during the first year of the child's life. Based on these interviews, researchers found that 40% of the responses were not consistent with items from existing measures of life stress. Therefore, items were modified and added to reflect stressful events relevant to women of childbearing age.

The LEQ consists of 79 situations that are commonly considered to be stressful. These situations have been organized into the following 10 categories: 1) health, 2) work, 3) school, 4) residence 5) love

and marriage, 6) family and close friends, 7) personal and social life, 8) financial matters, 9) crime and legal matters, and 10) parenting.

The LEQ can be utilized as a self-report tool, however, in this study, the instrument was used as an interview tool. Once the category has been identified, the respondent was asked whether a particular event had occurred during the past year. For example, "With respect to health, have you had a major personal illness or injury in the past year?" If the subject answers negatively, the researcher continues to the next event. If the subject affirms that a particular situation has been experienced in the past year, further information is sought. The subject is asked to identify whether the event, overall, has had a good or bad effect on her life. The subject is also asked to describe how much effect the event has had on her life. The four responses range from no effect (0) to a great effect (3).

The tool was scored by adding the responses for each item. The score for negative life events was derived by adding only those items that were identified by the respondent to have an overall negative effect on her life. Likewise, the score for positive life events was derived by adding only those items that were reported to have an overall positive effect. The total score is obtained by summing the positive and negative scores.

The LEQ was given to 60 graduate nursing students, 50 of whom were retested one week later. Based on the results, the LEQ was judged to have high test-retest reliability (.78 - .83). Lastly, the validity of the instrument was determined by correlating the LEQ score with

scores from three tools used to measure psychological and psychiatric symptoms. The testing results of two groups, 60 graduate nursing students and 69 mothers, provided evidence for validity of the negative events score (Norbeck, 1984).

Daily Health Diary (DHD): The DHD, developed to measure perimenstrual symptoms, was formed by Woods through the integration of items from three commonly used instruments to measure PMS (Woods, Most & Dery, 1982c). These tools are the Menstrual Distress Questionnaire (MDQ) Form T by Moos (1968), the Premenstrual Tension Syndrome (PMTS) Scale by Steiner, Haskett and Carroll (1980), and the Premenstrual Assessment Form (PAF) by Halbreich, Endicott, Schacht and Nee (1982).

This self-report tool was designed as a prospective instrument to be completed on a daily basis throughout the menstrual cycle. The DHD consists of 57 items, each one describing a feeling or behavior. Response choices range from 0 (not present) to 4 (extreme), indicating the extent to which the respondent is currently experiencing each symptom. The severity of PS for any given day is measured by summing the responses of those items identified as perimenstrual symptoms. Feelings and behaviors unrelated to PS are included in the tool to serve as distractors. The scores can range from 0 to 228, the more symptoms reported and/or the more severely the symptoms were experienced, the higher the DHD score will be.

The perimenstrual phase score was obtained by averaging the 7 DHD scores reported 5 days prior to menses through the second day of menses. Similarly, the midcycle score was calculated by averaging the 7 DHD scores between the forth and the tenth day of the menstrual

cycle. The midcycle mean was subtracted from the perimenstrual phase mean to obtain the cycle phase difference. Those subjects with a cycle phase difference of 12 or higher were labeled symptomatic, if their negative affect score was at least 4. Those subjects with a cycle phase difference of 4 or less were considered asymptomatic. The negative affect score was calculated in the same manner. However, only the negative affect symptoms were averaged.

The DHD also has a qualitative component which encourages the subject to identify any factors that may be related to the responses. The qualitative component is useful in determining changes in behavior and feelings that are independent of the menstrual cycle.

Data Collection Protocol

The procedure for data collection began when a prospective subject called in response to the advertisements. At that time, the woman was asked several brief questions from the Prescreening Questionnaire (Appendix D) to ensure she met the identified criteria for inclusion in the study and was interested in completing the longitudinal study. She was also given information about the study, and any questions were answered at that time. If the woman was interested and if she met the criteria, an interview was scheduled during the week prior to her menses. As stated previously, an estimated 350 subjects inquired about the study.

The interview took approximately one hour. During that time, the subject signed a consent form (Appendix B), completed a Spielberger

State/Trait Anxiety Inventory (Spielberger, 1983), and the Life Events Questionnaire (Norbeck, 1984).

At the conclusion of the interview, the subject was given a packet that included Daily Health Diaries (DHD) (Woods, 1981), S-anxiety forms (Spielberger, 1983) and written instructions about completing the study (Appendix E). Each subject was directed to complete one DHD everyday through two full menstrual cycles and five days into the third cycle, beginning with the first day of her next menstrual cycle. S-anxiety forms were attached to the DHD's every Monday and Thursday. The subject was asked to complete all questionnaires at a consistent time at the end of each day.

In order to minimize attrition rates, the subjects received follow-up phone calls approximately every two weeks during their participation in the study. The purpose of these calls was to maintain contact with the subjects, to make sure the DHD's were being completed consistently, and to answer any questions the subjects may have had about the questionnaires. These follow-up calls were recorded on the subjects' telephone contact sheet (Appendix F).

At the conclusion of the specified time period, the subject was asked to return the packets via mail in the self-addressed envelope provided. Once the information was received, the subject was mailed a check for $20.00 and a thank you letter along with the graphed results of her DHD's and S-anxiety levels. This Phase I information was analyzed to determine the type, pattern and severity of symptoms. Based on the results of Phase I, subjects were categorized into two groups, symptomatic and asymptomatic. The symptomatic group consisted

of women who reported high PS, specifically negative affect type symptoms, during the perimenstrual phase of their cycle and low symptoms during the rest of their menstrual cycle. The asymptomatic group consisted of women who reported low symptoms throughout their cycle.

Both symptomatic and asymptomatic subjects were invited by phone to enter Phase II of the study, once information was provided and questions were answered. Those subjects who agreed to further participation were scheduled to come to Dr. Cahill's laboratory space around the first day of their next menstrual cycle. These subjects did not have access to the results of their Phase I data until the completion of Phase II to avoid any bias in symptom reporting during the remainder of the study.

When the subjects came into the physiology lab they were asked to sign another consent form (Appendix C) and were given another packet of DHD's that were to be completed on a daily basis, as in Phase I. In addition, they had their blood drawn twice a week by a registered nurse. Each subject scheduled a regular time between seven o'clock and ten o'clock in the morning on Mondays and Thursdays or Tuesdays and Fridays. The appointments for blood collection were scheduled at a consistent time each day to control for circadian changes in cortisol levels.

When the subjects came in to have their blood drawn, they completed an S-anxiety form and approximately 31 ml of blood were extracted. Hematocrit levels were obtained after each venipuncture, to ensure that levels remained above 33.

Phase II lasted for three full menstrual cycles and a few days into the forth cycle. Subjects returned their DHD's upon completion of Phase II. Following the return of the DHD's, the subjects were sent a check for $100, a thank you letter and the results of their data.

The blood for the cortisol assay was collected in a heparinized tube, then spun in a centrifuge for 10 minutes at 3 degrees. Once the plasma was separated, it was stored in an aliquot at -80 degrees Fahrenheit until the radioimmunoassay was done by a biochemist. This procedure required 25 microliters of plasma to be buffered with 1.0 milliliter of Iodine 125. After the plasma had incubated for 45 minutes in a 37 degree waterbath, it was decanted and counted for 1 minute on a gamma counter. Normal cortisol levels range from 5-25 micrograms/milliliter in the mornings and are reduced by approximately 50% in the afternoon. Cortisol levels are usually 3-5 times greater as a result of ACTH stimulation.

Data Analysis Plan

The demographic data was analyzed using descriptive statistics. The frequencies, means and standard deviations were obtained for all demographic subgroups. t-tests were computed on interval level data to identify potentially significant differences between the symptomatic and asymptomatic groups and between data collection sites.

Correlational statistics were used to analyze the relationship between stressful life events, anxiety levels, cortisol levels, and perimenstrual symptoms. Pearson product-moment correlation coefficients were computed to answer the following research questions.

1) What were the relationships between a) stressful life events, b) state anxiety, c) trait anxiety, and d) blood cortisol levels and the severity of PS reported?

2) What was the relationship between stressful life events and trait anxiety?

3) What was the relationship between state anxiety and blood cortisol levels?

A t-test was calculated to answer the following research question.

4) Were there significant differences in stressful life events and trait anxiety between women with PS and women who are asymptomatic?

Mixed design analysis of variance was calculated to identify differences between women with PS and the control group of asymptomatic women. This type of statistics was also used to identify differences between the perimenstrual and postmenstrual phases of the cycle. The following research question was answered.

5) Were there significant differences between measures of state anxiety and cortisol levels obtained during the perimenstrual phase and average measures of state anxiety and cortisol levels obtained during the postmenstrual phase? How do the symptomatic and asymptomatic groups compare?

The decision for determining statistical significance was established at $p < .05$. The statistics were calculated using a computer software program SPSSPC.

Summary

This study was a component of an ongoing study conducted by Dr. Cahill. The research was conducted using a descriptive, correlational design. The subjects were recruited through newspaper adverisements and flyers. Eligibility criteria was related to age, menstrual pattern, medication use, and health history.

Several instruments were used to measure the variables under study. The Spielberger State-Trait Anxiety inventory was used to measure anxiety, the Life Events Questionnaire was used to measure the subjects' perceptions of stressful life events, and the Daily Health Diary was used to measure perimenstrual symptoms. Blood cortisol levels were used as a physiological indicator of stress.

Data was collected in three distinct phases. The prescreening interview identified those subjects that met the eligibility criteria. The next phase, focused on the type, pattern and severity of symptoms experienced throughout the cycle. The final step in data collection provided information about self-reported perimenstrual symptoms in relation to the subjects' hormone levels. Descriptive statistics, correlational statistics and multiple analyses of variance were used to analyze the data.

CHAPTER IV

DATA ANALYSIS AND RESULTS

The results of data analysis are presented in this chapter. The characteristics of the sample are described and the relationships between measures of stress and perimenstrual symptoms are identified using correlational statistics. The results of t-tests and multiple analyses of variance will describe the differences between the two groups and between phases of the menstrual cycle.

Characteristics of the Sample

The sample consisted of 32 women classified into two groups, symptomatic and asymptomatic. This classification was based on self-reported symptoms over two consecutive menstrual cycles. Fifteen of the women were identified as symptomatic, due to the significant increase in symptoms reported during the perimenstrual phase of their cycle. The asymptomatic group was comprised of seventeen women who reported relatively few symptoms consistently throughout their menstrual cycle.

The demographic variables of age, education, marital status and employment are displayed in Table 1. The sample as a whole will be discussed, and then the sample will be divided by group and by data collection site to identify potential differences in their demographic make-up.

Table 1. Characteristics of Sample (N = 32)

	Number	Percent
Age		
18 - 25	3	9.4
26 - 30	9	28.1
31 - 35	9	28.1
36 - 40	11	34.4
Education		
High School Diploma	5	15.6
Non-degree Certificate	3	9.4
Associate Degree	1	3.1
Baccalaureate Degree	18	56.3
Master's Degree	5	15.6
Marital Status		
Single	9	28.1
Married	17	53.1
Divorced	5	15.6
Widowed	1	3.1
Employment Status		
Student	3	9.4
Employee	19	59.4
Both Student & Employee	10	31.3

Age

The age of the subjects ranged between 23 and 40 years. The majority of the subjects (34.4%) were in their late thirties. The mean age for the entire sample was 32.6 with a standard deviation of 5.1. The mean age for the symptomatic group was 33.67 (SD = 4.45) and the mean age for the asymptomatic group was 31.71 (SD = 5.62) (Table 2). Based on a t-test, there were no significant differences between these two groups. Table 3 illustrates the difference in age between data collected in the eastern U.S. and data collected in the southwestern U.S. Again, there were no significant differences noted between these two groups.

Education

Overall, the sample was very well-educated. The range began with the completion of high school and continued through graduate school. The highest level of education completed for the majority of subjects (56.3%) was a baccalaureate degree. Five subjects (15.6%) had earned a Master's Degree. The educational level between groups was distributed fairly evenly when separated by symptom report (Table 4), as well as when separated by data collection site (Table 5).

Marital Status

Slightly more than 53% (n = 17) of the subjects were married or living with a partner. Twenty-eight percent (n = 9) were single, 15.6% (n = 5) were divorced, and 3.1% (n = 1) were widowed. In both the symptomatic and asymptomatic groups, the majority of subjects were

Table 2. Comparison of Groups by Age

Age	Symptomatic (n = 15)	Asymptomatic (n = 17)
Range	26 - 40	23 - 39
Mean	33.67	31.71
S.D.	4.45	5.62

Table 3. Comparing Age Between Data Collection Sites

Age	Eastern United States (n = 10)	Southwestern United States (n = 22)
Range	23 - 40	23 - 38
Mean	33.10	32.41
S.D.	5.88	4.88

Table 4. Comparison of Groups by Educational Background

Educational Background	Symptomatic (n = 15)	Asymptomatic (n = 17)
High School Diploma	3 (20%)	2 (12%)
Non-degree Certificate	1 (7%)	2 (12%)
Associate Degree	1 (7%)	0 (0%)
Baccalaureate Degree	7 (47%)	11 (65%)
Master's Degree	3 (20%)	2 (12%)

Table 5. Comparing Educational Background Between Data Collection Sites

Educational Background	Eastern United States (n = 10)	Southwestern United States (n = 22)
High School Diploma	2 (20%)	3 (14%)
Non-degree Certificate	1 (10%)	2 (9%)
Associate Degree	0 (0%)	1 (5%)
Baccalaureate Degree	4 (40%)	14 (64%)
Master's Degree	3 (30%)	2 (9%)

married, followed by single women (Table 6). This pattern was consistent when the subjects were divided by the geographic location of data collection (Table 7).

Employment

The majority of the subjects (90.7%) were employed. The types of employment represented a wide variety of jobs. Thirty-one percent (n = 10) of these were also taking university classes at the time of the study. The remaining 9.4% (n = 3) were college students. The employment status looked similar between groups (Table 8) and between data collection sites (Table 9).

Findings Related to the Research Questions

The first research question was "What are the relationships between 1) stressful life events, 2) state anxiety, 3) trait anxiety, and 4) blood cortisol levels and the severity of PS reported?" The strength of these correlation coefficients was described using the following categories: little, if any (0.00 -0.25), low (0.26 - 0.49), moderate (0.50 - 0.69), high (0.70 - 0.89), and very high (0.90 - 1.00) (Munro, Vistainer, and Page, 1986).

Pearson Product Moment Correlations were calculated for the entire sample to examine how the Life Events Questionnaire (LEQ), Trait Anxiety (T-anxiety), State Anxiety (S-anxiety) and cortisol levels were related to perimenstrual symptoms (PS) and negative affect symptoms (NA) (Table 10). The results show moderately positive relationships between LEQ and PS (r = .59), LEQ and NA (r = .53), T-

Table 6. Comparison of Groups by Marital Status

Marital Status	Symptomatic (n = 15)	Asymptomatic (n = 17)
Single	4 (27%)	5 (29%)
Married	7 (47%)	10 (59%)
Divorced	3 (20%)	2 (12%)
Widowed	1 (7%)	0 (0%)

Table 7. Comparing Marital Status Between Data Collection Sites

Marital Status	Eastern United States (n = 10)	Southwestern United States (n = 22)
Single	3 (30%)	6 (27%)
Married	4 (40%)	13 (59%)
Divorced	2 (20%)	3 (14%)
Widowed	1 (10%)	0 (0%)

Table 8. Comparison of Groups by Employment Status

Employment Status	Symptomatic (n = 15)	Asymptomatic (n = 17)
Student	1 (7%)	2 (12%)
Employee	10 (67%)	9 (53%)
Both Student & Employee	4 (27%)	6 (35%)

Table 9. Comparing Employment Status Between Data Collection Sites

Employment Status	Eastern United States (n = 10)	Southwestern United States (n = 22)
Student	2 (20%)	1 (5%)
Employee	5 (50%)	14 (64%)
Both Student & Employee	3 (30%)	7 (32%)

Table 10. Correlations Between Stressful Life Events, State Anxiety, Trait Anxiety and Blood Cortisol Levels and the Experience of Perimenstrual Symptoms and Negative Affect Symptoms (N = 32)

	Perimenstrual Symptoms	Negative Affect Symptoms
Stressful Life Events	.59** (p = .000)	.53** (p = .010)
Negative Life Events	.41* (p = .037)	.36 (p = .093)
Positive Life Events	.43* (p = .023)	.41* (p = .033)
Trait Anxiety	.68** (p = .000)	.67** (p = .000)
State Anxiety		
Perimenstrual	.66** (p = .000)	.64** (p = .000)
Postmenstrual	.35 (p = .156)	.29 (p = .266)
Cortisol Levels		
Perimenstrual	.04 (p = .407)	.12 (p = .573)
Postmenstrual	.-30 (p = .532)	.04 (p = .543)

* $p < .05$
** $p < .01$

anxiety and PS (r = .68), T-anxiety and NA (r = .67), Perimenstrual S-anxiety and PS (r = .66), and Perimenstrual S-anxiety and NA (r = .64). All of these correlations were statistically significant at the .01 level. There was no significant relationship between measures of cortisol and either PS or NA.

Stressful Life Events were divided into positive and negative categories, based on the subjects' perceptions of how these events have affected their lives. Both negative and positive life events were slightly correlated with PS with coefficients of .41 and .43 respectively. These results were statistically significant at the .05 level. Negative life events were not significantly correlated with negative affect symptoms, however, there was a low correlation (r = .41) between positive life events and negative affect which was significant at the .05 level.

When the above correlations were computed separately for the symptomatic group and the asymptomatic group, there were no significant relationships between variables of stress and perimenstrual symptoms for the asymptomatic group (Table 11). The results for the symptomatic group were fairly consistent with the results calculated on the entire sample. Most of the correlations fell within the moderate range, with coefficients extending between .52 and .66 (Table 12). However, there was not a significant relationship between negative life events and PS or between negative life events and NA. Again, there was no significant relationship between the symptoms reported and cortisol levels.

Table 11. Correlation Coefficients Between Stressful Life Events, State Anxiety, Trait Anxiety and Blood Cortisol Levels and the Experience of Perimenstrual Symptoms and Negative Affect Symptoms for the Asymptomatic Group (n = 17)

	Perimenstrual Symptoms	Negative Affect Symptoms
Stressful Life Events	-.03 (p = .899)	.02 (p = .948)
Negative Life Events	.19 (p = .465)	.25 (p = .339)
Positive Life Events	-.12 (p = .647)	-.09 (p = .739)
Trait Anxiety	.38 (p = .128)	.40 (p = .116)
State Anxiety		
Perimenstrual	.12 (p = .650)	.02 (p = .935)
Postmenstrual	.16 (p = .540)	.07 (p = .803)
Cortisol Levels		
Perimenstrual	.37 (p = .146)	.38 (p = .134)
Postmenstrual	.28 (p = .279)	.31 (p = .229)

* $p < .05$
** $p < .01$

Table 12. Correlation Coefficients Between Stressful Life Events, State Anxiety, Trait Anxiety and Blood Cortisol Levels and the Experience of Perimenstrual Symptoms and Negative Affect Symptoms for the Symptomatic Group (n = 15)

	Perimenstrual Symptoms	Negative Affect Symptoms
Stressful Life Events	.67** (p = .006)	.61* (p = .016)
Negative Life Events	.28 (p = .320)	.10 (p = .718)
Positive Life Events	.52* (p = .045)	.54* (p = .038)
Trait Anxiety	.60* (p = .030)	.61* (p = .025)
State Anxiety		
Perimenstrual	.63* (p = .012)	.66** (p = .007)
Postmenstrual	.48 (p = .069)	.44 (p = .105)
Cortisol Levels		
Perimenstrual	-.30 (p = .31)	-.24 (p = .401)
Postmenstrual	-.45 (p = .110)	-.36 (p = .202)

* $p < .05$
** $p < .01$

The second research question was, "What is the relationship between stressful life events and trait anxiety?" Pearson Product Moment Correlations for the symptomatic group reveal a moderate relationship between LEQ and trait anxiety with a coefficient of .68 ($p = .010$). However, there was no significant relationship found between these two variables in the asymptomatic group.

The third research question was, "What is the relationship between state anxiety and blood cortisol levels?" Pearson's r demonstrated that there were no significant relationships between state anxiety and measures of blood cortisol for either the symptomatic or the asymptomatic group.

The forth research question was, "Are there significant differences in stressful life events and trait anxiety between women with PS and women who are asymptomatic?" T-tests were used to compare the two groups in terms of stressful life events and trait anxiety (Table 13). The mean LEQ for the symptomatic group was 35.07 (SD = 18.59), compared to a mean of 23.12 (SD = 10.87) for the control group. The t value was computed to be 2.25 ($p < .032$).

The mean score for negative life events was 10.20 for the symptomatic group (SD = 8.39) and 4.53 (SD = 1.00) for the asymptomatic group. The t statistic for these two means was 2.38 ($p < .028$). However, there is no significant difference in positive life stress between the two groups.

The mean trait anxiety score for the symptomatic group was 41.00 (SD = 9.43), and the mean trait anxiety score for the control group was

Table 13. t-tests Comparing Stressful Life Events and Trait Anxiety Between Symptomatic and Asymptomatic Groups

	Symptomatic Group Mean (SD) (n = 15)	Asymptomatic Group Mean (SD) (n = 17)	t	p
Stressful Life Events	35.07 (18.59)	23.12 (10.87)	2.25*	.032
Negative Life Events	10.20 (8.39)	4.53 (4.14)	2.38*	.028
Positive Life Events	24.87 (19.30)	18.59 (9.60)	1.14	.267
Trait Anxiety	41.00 (9.43)	30.65 (6.15)	3.64**	.001

* $p < .05$
** $p < .01$

30.65 (SD = 6.15). The difference between the PS group and the control group was significant at .001 (t = 3.64).

The fifth research question was, "Are there significant differences between measures of state anxiety and cortisol levels obtained during the perimenstrual phase and measures of state anxiety and cortisol levels obtained during the postmenstrual phase? How do the symptomatic and asymptomatic groups compare?"

The perimenstrual and postmenstrual scores were attained by computing means for the specified times. For example, all of the data obtained 5 days prior to the onset of menses (Day -5) until 2 days after the onset of menses (Day 2) was averaged to derive the perimenstrual score for that particular variable. Likewise, the mean scores taken from Day 4 to Day 10 of the cycle were calculated to derive the postmenstrual scores.

Mixed design analyses of variance were computed to identify differences between the two phases of the menstrual cycle, as well as between the two groups. As illustrated in Table 14, there was a significant difference (p = .011) in state anxiety between the symptomatic and asymptomatic groups. There was also a significant difference (p = .004) between the perimenstrual phase and the postmenstrual phase.

Comparing the means of perimenstrual state anxiety between the symptomatic group and the asymptomatic group, it is clear that the symptomatic group has higher state anxiety during the perimenstrual phase than the asymptomatic group (Table 15). During the postmenstrual phase, however, this difference is greatly reduced (Table 16).

Table 14. Summary of Mixed Design Analysis of Variance for State Anxiety

Source of Variance	SS	df	MS	F	p
Group	2187	1	2187	7.36	.011**
Error (Group)	8910	30	297		
Phase	499	1	499	9.97	.004**
Group x Phase	712	1	712	14.22	.001**
Error (Group x Phase)	1500	30	50		

* $p < .05$
** $p < .01$

Table 15. Means of Perimenstrual State Anxiety Levels Between Groups Across Three Menstrual Cycles

Menstrual Cycle	Symptomatic Group	Asymptomatic Group
#1	42.5 (SD = 11.2)	30.6 (SD = 7.2)
#2	40.5 (SD = 10.7)	29.8 (SD = 6.3)
#3	38.3 (SD = 8.9)	29.1 (SD = 6.5)

Table 16. Means of Postmenstrual State Anxiety Levels Between Groups Across Three Menstrual Cycles

Menstrual Cycle	Symptomatic Group	Asymptomatic Group
#1	33.1 (SD = 8.4)	31.9 (SD = 8.1)
#2	34.5 (SD = 12.1)	30.0 (SD = 7.7)
#3	32.5 (SD = 9.8)	29.4 (SD = 5.8)

In terms of the cortisol values, there were no significant differences noted between the symptomatic group and the asymptomatic group or between the perimenstrual phase and the postmenstrual phase of the menstrual cycle (Table 17).

Summary

The results of data analysis were presented in this chapter. The outcome supports a positive relationship between stressful life events, trait anxiety, state anxiety, perimenstrual symptoms and negative affect symptoms. However, neither perimenstrual symptoms or anxiety levels were significantly correlated with cortisol levels.

As expected, there were significant differences in stressful life events, trait anxiety, state anxiety between the symptomatic and asymptomatic groups when examined during the perimenstrual phase. However, these differences were not significant during the postmenstrual phase. There were no significant changes in cortisol levels between groups or cycle phases.

Table 17. Summary of Mixed Design Analysis of Variance for Cortisol Levels

Source of Variance	SS	df	MS	F	p
Group	4	1	4	.05	.822
Error (Group)	2180	29	75		
Phase	6	1	6	1.34	.256
Group x Phase	16	1	16	3.43	.074
Error (Group x Phase)	137	29	5		

* $p < .05$
** $p < .01$

CHAPTER V

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Interpretations of the research findings are presented in this chapter. In addition, limitations of the study, implications for nursing practice and recommendations for further research are addressed.

Relationships Among Variables in the Conceptual Framework

The purpose of this study was to examine the relationships between stressful life events, trait anxiety (T-anxiety), state anxiety (S-anxiety), cortisol levels and perimenstrual symptoms (PS), specifically negative affect symptoms (NA). The following section will discuss the findings from this study and compare these findings with other research in the area.

Stressful Life Events and PS

Findings from this study showed a moderately positive relationship between stressful life events and PS ($r = .59$, $p = .000$), which is consistent with the results from previous studies (Jordan & Meckler, 1982; Siegal, Johnson & Sarason, 1979; Stephenson, Denny & Aberger, 1983; Woods, Most & Longenecker, 1985). However, there were also differences noted between the results of this study and other research findings (Siegal, et. al., 1979; and Stephenson, et. al., 1983) when life events, perceived to have a desirable or positive effect on one's life, were analyzed independently from those events which were interpreted as having an undesirable or negative effect on

one's life. The literature supports the relationship between negative life events and PS, but not the relationship between positive life events and PS (Siegal, et. al.; 1979, and Stephenson, et. al., 1983).

In this study, however, the correlations between negative life events and PS ($r = .41$, $p = .037$) and positive life events and PS ($r = .43$, $p = .023$) were almost equal. When these correlations were calculated for the symptomatic group only, negative life events were not significantly correlated with PS, while positive life events and PS remained moderately correlated ($r = .52$, $p = .045$).

There are several speculations one can make about the differences in this study's findings compared to the results reported by Stephenson et al. (1983) and Siegal et al. (1979). First of all, samples differed in terms of age and confirmed symptoms. Both Stephenson and Siegal studied a general population of relatively young females with no identified history of PS. Whereas this study selected a sample of women with confirmed negative affect symptoms, the majority of whom were in their thirties.

Secondly, although the instruments utilized to measure stress were similar, the tools to measure PS were very different. This study utilized a prospective tool to measure symptoms for three menstrual cycles. In contrast, the other two researchers used an instrument that measured symptoms based on the subjects' retrospective accounts of their most recent menstrual cycle.

This study, in conjunction with other related studies, lends support for a positive relationship between stressful life events and PS. More research needs to be done, however, before one can make

conclusive statements about the relationship between PS and stressful life events based on the desirability of the events.

Stressful Life Events and NA

Focusing on the symptom clusters, results of this study support a positive correlation ($r = .53$, $p = .010$) between stressful life events and NA symptoms which is congruent with the findings by Woods et al. (1985). However, these findings are not consistent with Stephenson et al. (1983) who found that although stressful life events were correlated with many types of symptoms, they were not correlated with NA.

These inconsistent findings may be related to differences in sample characteristics. The mean age of Woods' et al. (1985) sample (27, SD = 4.5) was similar to the mean age for the sample in this study (32.6, SD = 5.1). In contrast, the mean age of the subjects in Stephenson's et al. (1983) study was 19, with 90% of the sample being under 22 years of age. Accounting for the increased severity of symptoms with age, it is likely that a study using a younger sample would not find significant correlations with PS, (Golub & Harrington, 1979).

Another significant difference among these studies is related to the difference in symptoms between oral contraceptive users and nonusers. In contrast to Stephenson et al. (1983) who included oral contraceptive users in their analysis, Woods (1985) analyzed oral contraceptives users and nonusers separately. Woods found the correlation between life stress and negative affect to be significant for nonusers only. In this study, only nonusers were included in the

analysis which, provides a rational for the similarity in findings between this study and Woods', and the differences between this study and the research conducted by Stephenson. Again, due to differences in findings, it is difficult to make a conclusive statement about the relationship between stressful life events and NA.

Anxiety and PS

Consistent with results of previous studies (Golub, 1976; Mira et al., 1985; and Giannini et al., 1980), this study's findings that perimenstrual S-anxiety was positively correlated with PS ($r = .66$, $p = .000$), suggests that S-anxiety is high in relation to symptoms during the perimenstrual phase. This result was expected since the sample was chosen based on the experience of increased negative affect symptoms during the perimenstruum, and anxiety is a negative affect symptom.

The results of this study are not consistent, however, with those reported by Golub & Harrington (1979). These researchers were unable to identify a significant difference between perimenstrual S-anxiety and intermenstrual state anxiety. One possible explanation for the incongruity between the two findings is related to a difference in the sample. First of all, Golub and Harrington tested adolescents. Research shows that symptomatology increases with age, thereby suggesting that the sample of adolescents is incomparable to a sample of middle aged women. Secondly, the researchers made no mention of attempting to select a symptomatic group of females, therefore, their sample may have been largely comprised of asymptomatic females.

Watts et al. (1980) was also unable to support the relationship between perimenstrual state anxiety and PS. The primary speculation for the lack of a correlation between these variables was Watts et al. did not account for the time that questionnaires were administered in relation to the menstrual cycle. Although some women may have been tested during their perimenstrual phase, chances are that the majority of subjects were tested at various other times in their cycle. Therefore, due to the fluctuations in anxiety levels, characteristic of S-anxiety, it is not unusual that Watts did not find a significant correlation between S-anxiety and PS. Overall, the findings lend support for the relationship between S-anxiety during the perimenstruum and PS for women of childbearing age.

Anxiety and NA

T-anxiety and NA were moderately correlated ($r = .67$, $p = .000$) which is consistent with previous results (Giannini et al., 1980; Golub, 1976; Mira et al., 1985; Watts et al., 1980). This finding may suggest that women who generally tend to be more anxious are more reactive and experience symptoms more severely than women with low T-anxiety. The finding that T-anxiety was also positively correlated ($r = .68$, $p = .010$) with stressful life events lends further support to the suggestion that women with high T-anxiety may be more reactive and experience situations more intensely than women with low T-anxiety. Therefore, one would expect them to score higher on self-report scales than women who report low T-anxiety. The results of this study in combination with previous studies suggest that there is a relationship between T-anxiety and PS.

Cortisol Levels and State Anxiety

In this study, there were no significant relationships between biweekly measures of S-anxiety and cortisol levels. This indicates that although women were subjectively reporting that they felt more anxious, their bodies were either not responding to stress through cortisol secretion, or the timing of the blood draws was not detecting increases in cortisol activity. Increases in anxiety levels during the premenstruum may occur gradually, thereby, either failing to elicit the secretion of cortisol or allowing the body time to return to physiological homeostasis, as in a chronic state of anxiety.

In an acute state of stress, cortisol will be excreted into the blood stream within 10 to 30 minutes after exposure to a stimulus. The level of cortisol in the blood gradually decreases after that point. In order to measure the physiological response, one must be able to identify the specific stimulus eliciting the endocrinological response and measure blood cortisol shortly thereafter.

The findings from this study were not consistent with the findings reported by Abplanalp et al. (1977), who found that cortisol levels were significantly related to the anxiety reported on Spielberger's State Anxiety Inventory (STAI). One possible explanation for these inconsistencies is related to the differences in design. Abplanalp et al. (1977) obtained measures of cortisol and anxiety, then exposed the subjects to a psychologically stressful interview. Cortisol levels were measured again, approximately 15 - 30 minutes after the interview, in attempt to measure cortisol at its peak level in the blood stream. In this study, anxiety and cortisol levels were

measured once a day, twice a week, without exposure to stressful stimuli. Therefore, in the absence of an identified stimulus, one may not detect an acute rise in cortisol.

Another possible explanation for the discrepancy in research findings is related to how individuals respond to stressful situations. Abplanalp et al. (1977) measured cortisol and human growth hormone (HGH) as indicators of endocrine responsivity to stress. She found that some women responded to stress with an increase in the amount of cortisol secreted while others responded with an increase in the amount of HGH in their blood. Out of 21 women who demonstrated a physiological response to stress, 11 were considered to be "cortisol responders", 8 were identified as "HGH responders", and 6 demonstrated significant responsivity to both cortisol and HGH.

Lastly, Abplanalp et al. (1977) used a sample of undergraduate females with no confirmed history of PS, whereas, this study examined middle aged women with confirmed perimenstrual NA. The women in Abplanalp's study were also tested during menses, as opposed to the premenstruum, as in this study.

The research by Haskett et al. (1984) and Marinari et al. (1976) was also unable to support a positive correlation between anxiety and cortisol. However, it is difficult to make comparisons between the present study and those studies by Haskett and Marinari due to the differences in measurement and design.

For example, Haskett et al. (1984) measured a 24 hour cortisol level, whereas this study and Marinari's study measured blood cortisol. Comparisons can not be made between 24 hour urine cortisol and blood

cortisol, because the urine cortisol measures the total amount of cortisol excreted in the urine during a 24 hour period to ascertain the mean cortisol level for that day. Cortisol levels fluctuate in response to the circadian rhythm. Therefore, with the 24 hour urine cortisol, the peaks and troughs that occur throughout the day are averaged to obtain a single value. This could vary considerably with a measure of blood cortisol obtained at one particular time during the day. This study was designed to minimize variation in cortisol levels secondary to the time of day by drawing the blood between seven and ten o'clock in the morning.

In summary, further research is needed before conclusive statements can be made about the relationships between subjective measures of anxiety and cortisol levels. A study utilizing Abplanalp's et al. (1977) design, yet testing a homogenous sample of women during their perimenstrual phase may provide further information about the relationship between subjective and physiological measures of anxiety.

Cortisol Levels and PS

The findings in this study demonstrated that although subjective measures of anxiety were correlated with PS, cortisol did not appear to fluctuate in relation to the menstrual cycle. Haskett et al. (1984), analyzed 24 hour urinary cortisol and found that cortisol varied independently of the menstrual cycle. As previously discussed, the differences in the cortisol measurement between this study and Haskett's et al. make it difficult to draw conclusions.

Abplanalp et al. (1977), also found no relation between blood cortisol and the menstrual cycle, however, these researchers tested the women during menses, as opposed to premenstruum. Again, as elaborated on in the previous section, the differences in design and sample between the present study and the research by Abplanalp make them incomparable.

The findings from this study are not consistent with the previous research findings of Marinari et al. (1976). These researchers found that cortisol results were significantly higher during the premenstrual phase as opposed to midcycle. Again, further research is needed before any conclusions can be make about the relationship between PS and cortisol levels.

Differences Between Symptomatic and Asymptomatic Women

The results from data analysis suggest that there is a significant difference between symptomatic and asymptomatic women in terms of stressful life events, state anxiety and trait anxiety. This may suggest that women with PS have more stress in their lives, thereby predisposing them to emotional fluctuations in relation to changes associated with their menstrual cycle. It is also possible that those women who suffer from PS may perceive events more negatively or more intensely than those women who are asymptomatic. As suggested by Koeske (cited in Coyne et al., 1984), some women may experience an increase in "emotional arousal" during premenstruum; the type of emotion experienced is based on the situation. This concept is supported by the finding that the symptomatic group scored higher on

all of the self- report scales administered during their perimenstrual phase.

Insight into perceptual changes associated with the menstrual cycle may be gained by administering stable instruments at different points during the menstrual cycle. In this study, stressful life events and T-anxiety were measured one time, during the perimenstrual phase. Since these instruments were intended to remain stable over time, repeating these measures during the postmenstruum would provide information related to alterations in perceptions during the perimenstrual phase.

As expected, symptomatic women reported significantly higher levels of S-anxiety during the perimenstrual phase, however, anxiety levels did not significantly differ between groups during the postmenstrual phase. This suggests that these feelings of anxiety are associated with the menstrual cycle.

Limitations of the Study

These study was conducted using a sample of women specifically identified as having perimenstrual negative affect symptoms. Those women were between the ages of 18 and 40, had regular menstrual cycles, and were not taking any medications. These findings are limited to populations with similar characteristics; they cannot be generalized to women under 18 or over 40 years of age, women using medication, or women presenting with other types of perimenstrual symptoms.

Implications for Nursing Practice

These findings have practical implications for nurses, who have been identified as the primary contact person for women suffering with PS (Brown & Zimmer, 1986; Frank, 1986). The identification of psychological stress as a factor associated with the severity of PS suggests that stress management techniques may be beneficial in minimizing these symptoms. Relaxation training, exercise, and cognitive techniques may also be helpful in reducing stress and anxiety.

In addition, keeping daily records of their symptoms and stressors may help women to become more aware of situations associated with increased symptoms. This may enable them to avoid these situations at times when they seem more vulnerable to stress. Documenting their symptoms may also be beneficial in providing these women with a sense of control over their symptoms.

These techniques can be independently implemented by nurses in a wide variety of settings. Although further research needs to be done to document the effectiveness of stress management with clients suffering with PS, these techniques can be employed without risk.

Findings from this study also have implications for assessment and education. The added stress of seeking health care may be associated with an exacerbation in symptoms. Assessing women's menstrual patterns, and educating them about the relationship between symptoms and stress may be comforting.

Recommendations for Further Research

This study has elicited several suggestions for further research as identified within the body of this chapter. First, this study could be replicated on a sample of women presenting with different types of PS to identify if other clusters of symptoms, such as pain, concentration, behavior change, autonomic reactions, water retention, arousal or control are related to stressful life events, anxiety or cortisol secretion. Similar findings with other samples could increase the generalizability of these findings to a wider population of women who suffer with PS. A contrast in findings could help differentiate these clusters of symptoms in terms of contributing factors.

Secondly, although women in this study reported feeling anxious, physiological responses were not effected, suggesting they may have been in homeostasis. A study could be done to expose women to some kind of stressful stimuli in order to examine changes in cortisol during the perimenstrual phase. In addition to measuring cortisol, it would also be interesting to measure levels of HGH as another potential indicator of physiological stress.

Third, multivariate analysis suggest that there may be a difference in the variation of cortisol levels between the symptomatic and the asymptomatic groups. Post hoc analysis could be performed on this data to gain insight into these differences.

Forth, replication of this study controlling for potentially influential factors such as, diet, caffeine intake, and exercise might provide further information related to the understanding of PS.

Summary

The purpose of the present study was to examine the relationships between stressful life events, anxiety, cortisol and perimenstrual symptoms. Significant correlations were found between stressful life events and PS, stressful life events and T-anxiety, T-anxiety and PS, and S-anxiety and PS. There were no significant findings related to cortisol levels.

Anxiety levels obtained during the perimenstrual phase were significantly different between the symptomatic group and the asymptomatic group. However, there were no significant differences between the two groups during the postmenstrual phase.

Limitations of the study relate to the generalizability of the findings. These findings are limited to women between the ages of 18 and 40 complaining of negative affect symptoms, who have regular menstrual cycles and are not using medication.

Nursing implications include the use of stress management techniques such as relaxation training, exercise and cognitive techniques to reduce anxiety. Findings may also be utilized to enhance assessment and education of women experiencing PS.

Recommendations for further research included replicating this study with a sample that presents with other types of perimenstrual symptoms, modifying the design to expose subjects to stressful stimuli, testing HGH as another physiological measure of stress, and controlling for factors that may influence the severity of PS.

APPENDIX A

HUMAN SUBJECTS APPROVAL

The University of Arizona
Human Subjects Committee
1690 N. Warren - Bldg. 526B
Tucson, Arizona 85724
(602) 626-6721 or 626-7575

2 November 1988

Cheryl A. Cahill, Ph.D., R.N.
College of Nursing
Arizona Health Sciences Center

RE: A88.134 PSYCHOBIOLOGICAL CORRELATES OF PERIMENSTRUAL SYMPTOMS

Dear Dr. Cahill:

We have received the revised consent forms for your above cited project. The procedures to be followed in this study pose no more than minimal risk to participating subjects. Regulations issued by the U.S. Department of Health and Human Services [45 CFR Part 46.110(b)] authorize approval of this type project through the expedited review procedures, with the condition(s) that subjects' anonymity be maintained. Although full Committee review is not required, a brief summary of the project procedures is submitted to the Committee for their endorsement and/or comment, if any, after administrative approval is granted. This project is approved effective 2 November 1988.

The Human Subjects Committee (Institutional Review Board) of the University of Arizona has a current assurance of compliance, number M-1233, which is on file with the Department of Health and Human Services and covers this activity.

Approval is granted with the understanding that no changes or additions will be made either to the procedures followed or to the consent form(s) used (copies of which we have on file) without the knowledge and approval of the Human Subjects Committee and your College or Departmental Review Committee. Any research related physical or psychological harm to any subject must also be reported to each committee.

A university policy requires that all signed subject consent forms be kept in a permanent file in an area designated for that purpose by the Department Head or comparable authority. This will assure their accessibility in the event that university officials require the information and the principal investigator is unavailable for some reason.

Sincerely yours,

Milan Novak

Milan Novak, M.D., Ph.D.
Chairman
Human Subjects Committee

MN/ms

cc: Departmental/College Review Committee

APPENDIX B

PHASE I CONSENT FORM

THE UNIVERSITY OF ARIZONA
COLLEGE OF NURSING

Women's Health Study
Phase I

YOU ARE ASKED TO READ THE FOLLOWING MATERIAL TO INSURE THAT YOU ARE INFORMED OF THE NATURE OF THIS RESEARCH STUDY AND OF HOW YOU WILL PARTICIPATE IN IT, IF YOU CONSENT TO DO SO. SIGNING THIS FORM WILL INDICATE THAT YOU GIVE YOUR CONSENT. FEDERAL REGULATIONS REQUIRE WRITTEN CONSENT PRIOR TO PARTICIPATION IN THIS RESEARCH STUDY SO THAT YOU CAN KNOW THE NATURE AND THE RISKS OF YOUR PARTICIPATION AND CAN DECIDE TO PARTICIPATE OR NOT PARTICIPATE IN A FREE AND INFORMED MANNER.

PURPOSE

I am being invited to participate in the above-titled project. The purpose of this study is to better understand why some women report daily changes in feeling healthy or ill.

SELECTION CRITERIA

I have been asked to participate in this study because I have responded to advertisements in campus publications and/or fliers available on campus. I have reported that I am in excellent health and do not knowingly have a heart condition, high blood pressure, anemia, diabetes or any other chronic illness. I am not currently taking any medications or drugs. I have not been hospitalized for a major illness, including a psychiatric disorder nor have I had major surgery in the last two years. A total of 200 women will participate in this study.

PROCEDURE

If I agree to participate, I will be asked to agree to the following : in order to understand women's health patterns better, my responses to questions about my general health, gynecological health history, general health attitudes, my usual sense of happiness or depression, feeling of wellness and anxiety will be recorded at the beginning of the study. Then, for a total of two months, I will complete a checklist of adjectives which will describe how well I am feeling each day. On selected days, I will complete a questionnaire about how anxious I might be feeling that day. At the end of two months, I will send the completed questionnaire and checklists to Cheryl A. Cahill, RN, PhD in the addressed and stamped envelope provided.

I also understand that the answers I provide in this study may make me eligible for participation in other studies conducted by Cheryl A. Cahill, RN, PhD. Some of these may include continued reports of my health patterns, as described above, as well as collection of blood samples. Should I meet criteria for inclusion in these other studies, I agree to give full consideration to participation. I

understand, however, that I am under no obligation to agree to further participation. Should I agree to participate, another consent form will be required after I receive a full and complete explanation of the new study.

BENEFITS

In return for this I will receive a check for $20.00. I understand that if I choose not to complete the study, I will not be entitled to the $20.00.

CONFIDENTIALITY

All of my records will be coded with a special identification number and stored in a locked file cabinet. Only Cheryl A. Cahill, RN, PhD, the Principal Investigator on this project, and the Research Assistants employed on the project will have access to my name and data. I will meet the Research Assistants who will have access to my data during my participation in the study.

PARTICIPATION COSTS

There is no charge for participation in this study.

AUTHORIZATION

BEFORE GIVING MY CONSENT BY SIGNING THIS FORM, THE METHODS, INCONVENIENCES, RISKS, AND BENEFITS HAVE BEEN EXPLAINED TO ME AND MY QUESTIONS HAVE BEEN ANSWERED. I UNDERSTAND THAT I MAY ASK QUESTIONS AT ANY TIME AND THAT I AM FREE TO WITHDRAW FROM THE PROJECT AT ANY TIME WITHOUT CAUSING BAD FEELINGS OR AFFECTING MY MEDICAL CARE. I UNDERSTAND THAT THIS CONSENT FORM WILL BE FILED IN AN AREA DESIGNATED BY THE HUMAN SUBJECTS COMMITTEE WITH ACCESS RESTRICTED TO THE PRINCIPAL INVESTIGATOR, CHERYL A. CAHILL, RN, PHD, OR AUTHORIZED REPRESENTATIVES OF THE DEPARTMENT. I UNDERSTAND THAT I DO NOT GIVE UP ANY OF MY LEGAL RIGHTS BY SIGNING THIS FORM. A COPY OF THIS FORM WILL BE GIVEN TO ME.

_____ _____

Subject's Signature Date

_____ _____

Parent/Guardian (If necessary) Date

INVESTIGATOR'S ENDORSEMENT

I have carefully explained to the subject the nature of the above project. I hereby certify that to the best of my knowledge the person who is signing this consent form understands clearly the nature, demands, benefits and risks involved in his/her participation. A medical problem or language or educational barrier has not precluded this understanding.

_____ _____

Signature of Investigator Date

APPENDIX C

PHASE II CONSENT FORM

THE UNIVERSITY OF ARIZONA
COLLEGE OF NURSING

Women's Health Study
Phase II

YOU ARE ASKED TO READ THE FOLLOWING MATERIAL TO INSURE THAT YOU ARE INFORMED OF THE NATURE OF THIS RESEARCH STUDY AND OF HOW YOU WILL PARTICIPATE IN IT, IF YOU CONSENT TO DO SO. SIGNING THIS FORM WILL INDICATE THAT YOU GIVE YOUR CONSENT. FEDERAL REGULATIONS REQUIRE WRITTEN CONSENT PRIOR TO PARTICIPATION IN THIS RESEARCH STUDY SO THAT YOU CAN KNOW THE NATURE AND THE RISKS OF YOUR PARTICIPATION AND CAN DECIDE TO PARTICIPATE OR NOT PARTICIPATE IN A FREE AND INFORMED MANNER.

PURPOSE

I am being invited to participate in the above-titled project. The purpose of this study is to better understand why some women report daily changes in feeling healthy or ill. In this study, blood levels of some hormones will be compared to reports of how I feel.

SELECTION CRITERIA

I have been asked to participate in this study because I have responded to advertisements in campus publications and/or fliers available on campus. I have reported that I am in excellent health and do not knowingly have a heart condition, high blood pressure, anemia, diabetes or any other chronic illness. I am not currently taking any medications or drugs. I have not been hospitalized for a major illness, including a psychiatric disorder nor have I had major surgery in the last two years.

I was a participant in another study conducted by Dr. Cahill. During that study, my reports of how well or ill I was feeling were similar to those reported by other women who experience daily changes in these feelings or by women who do not experience any daily changes in how they are feeling. At the conclusion of this study, Dr. Cahill will advise me as to which group I was most similar. A total of 40 women will be asked to participate in this study.

PROCEDURE

If I agree to participate, I will be asked to agree to the following : in order to understand women's health patterns better, my responses to questions about my general health, gynecological health history, general health attitudes, my usual sense of happiness or depression, feeling of wellness and anxiety will be recorded at the beginning of the study. Then, for a total of three months, I will complete a checklist of adjectives which will describe how well I am feeling each day. On selected days, I will complete a questionnaire about how anxious I might be feeling that day. I will report to the laboratory located in Room 224 of the College of Nursing two mornings each week before 10 AM. At that time approximately forty milliliters (about 10 tablespoons) of blood will be collected. This amount of

blood is considered safe for those in good health. At the end of three months, I will return the completed questionnaire and checklists to Cheryl A. Cahill, RN, PhD or her Research Assistant.

BENEFITS

In return for this I will receive a check for $100.00. I understand that if I choose not to complete the study, I will not be entitled to the $100.00.

CONFIDENTIALITY

All of my records will be coded with a special identification number and stored in a locked file cabinet. Only Cheryl A. Cahill, RN, PhD, the Principal Investigator on this project, and the Research Assistants employed on the project will have access to my name and data. I will meet the Research Assistants who will have access to my data during my participation in the study.

PARTICIPATION COSTS

There is no charge for participation in this study.

AUTHORIZATION

BEFORE GIVING MY CONSENT BY SIGNING THIS FORM, THE METHODS, INCONVENIENCES, RISKS, AND BENEFITS HAVE BEEN EXPLAINED TO ME AND MY QUESTIONS HAVE BEEN ANSWERED. I UNDERSTAND THAT I MAY ASK QUESTIONS AT ANY TIME AND THAT I AM FREE TO WITHDRAW FROM THE PROJECT AT ANY TIME WITHOUT CAUSING BAD FEELINGS OR AFFECTING MY MEDICAL CARE. I UNDERSTAND THAT THIS CONSENT FORM WILL BE FILED IN AN AREA DESIGNATED BY THE HUMAN SUBJECTS COMMITTEE WITH ACCESS RESTRICTED TO THE PRINCIPAL INVESTIGATOR, CHERYL A. CAHILL, RN, PHD, OR AUTHORIZED REPRESENTATIVES OF THE DEPARTMENT. I UNDERSTAND THAT I DO NOT GIVE UP ANY OF MY LEGAL RIGHTS BY SIGNING THIS FORM. A COPY OF THIS FORM WILL BE GIVEN TO ME.

_____ _____

Subject's Signature Date

_____ _____

Parent/Guardian (If necessary) Date

INVESTIGATOR'S ENDORSEMENT

I have carefully explained to the subject the nature of the above project. I hereby certify that to the best of my knowledge the person who is signing this consent form understands clearly the nature, demands, benefits and risks involved in his/her participation. A medical problem or language or educational barrier has not precluded this understanding.

_____ _____

Signature of Investigator Date

APPENDIX D

PRESCREENING QUESTIONNAIRE

Women's Health Study

Initial Screening Interview

Name:_____ Date of Interview:_____

Age:_____

Address:_____

Phone Number: Home:_____Work:_____

Social Security Number:_____

Date of First Day of Last Menstrual Cycle:_____

How Long is Your Cycle?_____

Are You Currently Taking Any Medications?_____
If so, Please List:_____

_____

Do you have a history of any of the following diseases:

Anemia?_____

Endocrine Disease?_____

Heart Disease?_____

Reproductive Disease?_____

Have you noticed any changes in your menstrual cycle recently? Please explain:

_____

Have you had any major surgery recently?_____

Have You ever had hepatitis?_____

What are good times to contact you for follow-up?

_____

_____

_____

Interview date: _____ time: _____

APPENDIX E

INSTRUCTIONS

1. Begin filling out the daily health diaries on the first day of your next menstrual period.

2. Continue to fill out a diary each day until five days past the start of your third menstrual period from now.

   period 1 ----------period 2 ----------period 3
   (start day 1) (finish day 5)

3. Do not skip any days or leave any items blank.

4. Return the packets to us as soon as you are finished.

5. PLEASE NOTE: Incomplete packets constitute data that is not usable in this study. We are not able to compensate volunteers that do not provide complete data per the above instructions.

Questions or problems, call 626-6652

APPENDIX F

TELEPHONE CONTACT SHEET

TELEPHONE CONTACT SHEET

SUBJECT NAME:_____ I.D.#:_____

TELEPHONE #: WORK:_____ HOME:_____

GOOD TIMES TO CALL:_____

_____

DATE DIARY GIVEN:_____

DATE DIARY DUE :_____

DATE DIARY RETURNED:_____

DATE OF PHONE CALLS AND INITIALS:

1) _____
2) _____
3) _____
4) _____
5) _____
6) _____
7) _____
8) _____

PAYMENT REQUESTED:_____

PAYMENT SENT:_____

INTERVIEWER SIGNATURE:_____

REFERENCES

Abplanalp, J., Livingston, L., Rose, R. & Sandwisch, D. (1977). Cortisol and growth hormone responses to psychological stress during the menstrual cycle. Psychosomatic Medicine, 39(3), 158-177.

Asterita, M. (1985). The Physiology of Stress: With Special Reference to the Neuroscience System. New York: Human Sciences Press.

Boyle, C., Berkowitz, G. & Kelsey, J. (1987). Epidemiology of premenstrual symptoms. American Journal of Public Health, 77(3), 349-350.

Brown, J. (1988). Environmental and nuclear threats. In Handbook of Life Stress, Cognition and Health (pp. 115-134) by Fisher, S. & Reason, J. (eds). New York: John Wiley & Sons.

Brown, M. & Zimmer, P. (1986a). Personal and family impact of premenstrual symptoms. Journal of Obstetrics, Gynecologic and Neonatal Nursing, 15(1), 31-38.

Brown, M. & Zimmer, P. (1986b). Help-seeking for premenstrual symptomatology: a description of women's experiences. Health Care for Women International, 7(1/2), 173-184.

Cahill, C. (1987). Psychobiological Correlates of Perimenstrual Symptoms. NIH Funded Research Grant, University of Arizona, Tucson.

Carnine, M. (ed). (1986). Premenstrual syndrome: a puzzle of the 80's. American Association of Occupational Health Nurses, 34(2), 88-89.

Cassel, J. (1976). The contribution of the social environment to host resistance. American Journal of Epidemiology, 194, 107-123.

Chaffee, E. & Lytle, I. (1980). The endocrine system. Basic Physiology and Anatomy (4th ed), (pp. 518-543). Philadelphia: J.B. Lippincott Company.

Chakmakjian, Z. (1983). A critical Assessment of therapy for the premenstrual tension syndrome. The Journal of Reproductive Medicine, 28(8), 532-538.

Christensen, A. & Oei, T. (1989). Correlates of confirmed premenstrual dysphoria. Journal of Psychosomatic Research, 33(3), 307-313.

Cox, T. (1988). Psychobiological factors in health and stress. In Handbook of Life Stress, Cognition and Health (pp. 543-557) by Fisher, S. & Reason, J. (eds). New York: John Wiley & Sons.

Coyne, C., Woods, N. & Mitchell, E. (1985). Premenstrual tension syndrome. Journal of Obstetric, Gynecologic and Neonatal Nursing, 14(6), 446-454.

Dalton, K. (1980). Cyclical criminal acts in premenstrual syndrome. Lancet, 2(8203), 1070-1071.

Dalton, K. (1975). Paramenstrual baby battering. British Medical Journal, 2, 279.

Dalton, K. (1960). Menstruation and accidents. British Medical Journal, 2, 1425.

Dennerstien, L., Morse, C. & Varnavides, K. (1988). Premenstrual tension and depression - is there a relationship? Journal of Psychosomatic Obstetrics and Gynaecology, 8, 45-52.

Dohrenwend, B., Krasnoff, L., Askenasy, A. & Dohrenwend, B. (1978). Exemplification of a method for scaling life events: The PERI life events scale. Journal of Health and Social Behavior, 19(2), 205-229.

Endler, N. & Edwards, J. (1982). Stress and Personality. In Handbook of Stress (pp. 36-48) by Goldberger, L. & Breznitz, S. (eds). New York: The Free Press.

Frank, E. (1986). What are nurses doing to help PMS patients? American Journal of Nursing, 86(2), 136-140.

Frank, R. (1931). The hormonal causes of premenstrual tension. Archives of Neurological Psychiatry, 26, 1053-1057.

Gannon, L., Luchetta, T., Pardie, L. & Rhodes, K. (1989). Perimenstrual symptoms: relationships with chronic stress and selected lifestyle variables. Behavioral Medicine, 15(4), 149-159.

Giannini, A., Price, W., Louiselle, R. and Gianni, M. (1985). Pseudocholinesterase and trait anxiety in premenstrual tension syndrome. Journal of Clinical Psychiatry, 46(4), 139 - 140.

Glass, G., Heninger, G., Lansky, M. & Talan, K. (1971). Psychiatric emergency related to the menstrual cycle. American Journal of Psychiatry, 128, 705.

Golub, S. & Harrington, D. (1981). Premenstrual and menstrual mood changes in adolescent women. Journal of Personality and Social Psychology, 41(5), 961-965.

Golub, S. (1976). The magnitude of premenstrual anxiety and depression. Psychosomatic Medicine, 38(1), 4 - 12.

Hadley, B. (1974). Current concepts of wellness and illness: their relevance for nursing. Image, 6(2), 21 - 27.

Halbreich, U., Endicott, J., Schacht, S. & Nee, J. (1982). The diversity of premenstrual changes as reflected in the Premenstrual Assessment Form. ACTA Psychiatrica Scandinavica, 65, 46-65.

Haskett, R., Steiner M., and Carroll, (1984). A psychoendocrine study of premenstrual tension syndrome. Journal of Affective Disorders, 6 (2), 191 - 199.

Holmes, T. & Rahe, R. (1967). The social readjustment rating scale. Journal of Psychosomatic Research, 11, 213-218.

Jordan, J. & Meckler, J. (1982). The relationship between life change events, social supports, and dysmenorrhea. Research in Nursing and Health, 5, 73-79.

Lazarus, R. (1974). Psychological stress and coping in adaptation and illness. International Journal of Psychiatric Medicine, 5, 321-333.

Lazarus, R. (1966). Psychological stress and the coping process. New York: McGraw-Hill.

Lazarus, R. & Folkman, S. (1984). Stress, Appraisal and Coping. New York: Springer Publishing Company.

Marinari, K., Leshner, A & Doyle, M. (1976). Menstrual cycle status and adrenocortical reactivity to psychological stress. Psychoneuroendocrinology, 1, 213-218.

Mechanic, D. (1978). Effects of psychological distress on perceptions of physical health and use of medical and psychiatric facilities. Journal of Human Stress, 4(4), 26-32.

Mira, M., Vizzard, J. & Abraham, S. (1985). Personality characteristics in the menstrual cycle. Journal of Psychosomatic Obstetrics and Gynaecology, 4(4), 329 - 334.

Moos, R. (1968). The development of a menstrual distress questionnaire. Psychosomatic Medicine, 30(6), 853-867.

Munro, B., Visintainer, M. & Page, E. (1986). Statistical Methods for Health Care Research. Philadelphia: Lippincott.

Norbeck, J. (1984). Modification of life event questionnaires for use with female respondents. Research in Nursing and Health, 7, 61-71.

Oatley, K. (1988). Life events, social cognition and depression. In Handbook of Life Stress, Cognition and Health (pp. 543-557) by Fisher, S. & Reason, J. (eds). New York: John Wiley & Sons.

O'Brien, P. (1985). The premenstrual syndrome: a review. The Journal of Reproductive Medicine, 30(2), 113-126.

O'Brien, P. & Shaugn, M. (1985). The premenstrual syndrome: a review. The Journal of Reproductive Medicine, 30, 113-126.

Peterson, L. (1985). PMS: the premenstrual syndrome. Phoenix: Oryx Press.

Rahe, R. (1975). Epidemiological studies of life change and illness. International Journal of Psychiatry in Medicine, 6(1-2), 133-146.

Ried, R. (1985). Premenstrual syndrome. Current Problems in Obstetrics, Gynecology and Fertility, 8(1), 5-57.

Sanders, D., Warner, P., Backstrom, T. & Bancroft, J. (1983). Mood, sexuality, hormones and the menstrual cycle. I. Changes in mood and physical state: description of subjects and method. Psychosomatic Medicine, 45(6), 487-500.

Selye, H. (1982). History and present status of the stress concept. In Handbook of Stress (pp. 7-17) by Goldberger, L. & Breznitz, S. (eds). New York: The Free Press.

Siegel, J., Johnson, , J. & Sarason, I. (1979). Life changes and menstrual discomfort. Journal of Human Stress, 5, 41-46.

Speilberger, C. (1983). Manual for the State-Trait Anxiety Inventory. Palo Alto: Consulting Psychologists Press, Inc.

Speilberger, C., Gorsuch, R. & Lushene, R. (1970). STAI for the State-Trait Anxiety Inventory. Palo Alto: Consulting Psychologists Press, Inc.

Steiner, M., Haskett, R. & Carrol, B. (1980). Premenstrual tension syndrome: the development of research diagnostic criteria and new rating scales. ACTA Psychiatrica Scandinavica, 62, 177-190.

Stephenson, L., Denney, D. & Aberger, E. (1983). Factor structure of the menstrual symptom questionnaire: relationship to oral contraceptives, neuroticism and life stress. Behaviour Research Therapy, 21(2), 129-135.

Stokols, D. (1985). A congruence analysis of human stress. Issues in Mental Health Nursing, 7(1/4), 35-64.

Taylor, D. & Bledsoe, L. (1986). Peer support, PMS, and stress: a pilot study. Health Care Women International, 7(1&2), 159-171.

True, B., Goodner, S. & Burns, E. (1985). Review of the etiology and treatment of premenstrual syndrome. Drug Intelligence and Clinical Pharmacy, 19, 714-721.

Van Tyle, J.H. & Sagraves, R. (1988). Premenstrual syndrome: diagnosis, etiologies, therapy. The Journal of Practical Nursing, 38(4), 19-27.

Watts, S., Dennerstein, L. and Horne, D. (1980). The premenstrual syndrome: a psychological evaluation. Journal of Affective Disorders, 2(4), 257 - 266.

Wilcoxin, L., Schrader, S. & Sherif, C. (1976). Daily self reports on activities, life events, moods, and somatic changes during the menstrual cycle. Psychosomatic Medicine, 38, 399-417.

Woods, N. (1986). Socialization and social context: influence on perimenstrual symptoms, disability, and menstrual attitudes. Health Care for Women International, 7(1/2), 115-129.

Woods, N. (1985). Relationship of socialization and stress to perimenstrual symptoms, disability, and menstrual attitudes. Nursing Research, 34, 145-149.

Woods, N. (1985). Employment and family roles, and mental ill health among young married women. Nursing Research, 34, 4-10.

Woods, N. (1981). The health diary as an instrument for nursing research: problems and promise. Western Journal of Nursing Research, 3, 76-92.

Woods, N., Dery, G.K. & Most, A. (1982). Stressful life events and perimenstrual symptoms. Journal of Human Stress, 8, 23-31.

Woods, N., Most, A. & Dery, G.K. (1982a). Prevalence of perimenstrual symptoms. American Journal of Public Health, 72, 1257-1264.

Woods, N., Most, A. & Dery, G.K. (1982b). Toward a construct of perimenstrual distress. Research in Nursing and Health, 5, 123-126.

Woods, N., Most, A. & Dery, G. (1982c). Estimating perimenstrual distress: a comparison of two methods. Research in Nursing and Health, 5, 81-91.

Woods, N., Most, A. and Longenecker, G. (1985). Major life events, daily stressors, and perimenstrual symptoms. Nursing Research, 34(5), 263-267.

Zegans, L. (1982). Stress and the development of somatic disorders. In Handbook of Stress: Theoretical and Clinical Aspects by Goldberger, L. and Breznitz, S. (eds) (pp. 134-152). New York: A Division of Macmillan Publishing Company, Inc.