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THE EFFECTS PHYSICAL ACTIVITY HAS ON THE
MENSTRUAL CYCLE CHARACTERISTICS BETWEEN
TWO GROUPS OF HIGH SCHOOL ATHLETES
AND ONE GROUP OF HIGH SCHOOL NON-ATHLETES

A Thesis

by

YOLANDA D. ROBINSON

Submitted to the Graduate School of the
University of Texas Pan-American
In partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2005

Major Subject: Kinesiology

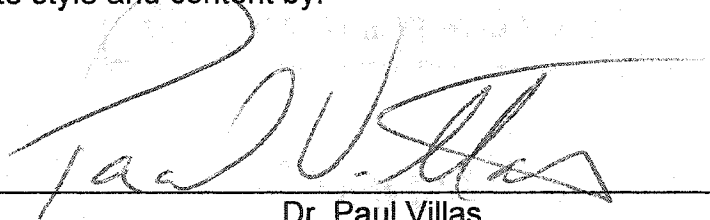
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TWO GROUPS OF HIGH SCHOOL ATHLETES
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A Thesis
By
YOLANDA ROBINSON

Approved as to style and content by:



Dr. Paul Villas
Chair of Committee



Dr. Tom Semper
Committee Member



Dr. Francisco Guajardo
Committee Member

May 2005

ABSTRACT

Robinson, Yolanda D., The Effects Physical Activity has on the Menstrual Cycle Characteristics Between Two Groups of High School Athlete's and One Group of High School Non-Athletes. Master of Science (MS), May, 2005, 104 pp., 14 tables, 34 references.

The purpose of this study was to assess and compare the menstrual cycle characteristics between two groups of high school athletes and one group of high school non-athletes. The study consisted of 30 high school females from Donna High School. The participants consisted of ten female basketball athletes from the Donna High School Basketball Team (14.5 ± 4.5 years), ten female volleyball athletes from the Donna High School Volleyball Team (14.5 ± 4.5 years) and ten females (14.5 ± 4.5 years) that were randomly picked out of the general female population of the Donna High School that do not participate in any type of school sponsored sports and are considered non-athletes (14.5 ± 4.5 years). Each participant completed a questionnaire on their menstrual cycle status and history, training regiments, lifestyles, and any health conditions they may have, as well as, a personal information sheet. All the participants were given a notebook that contained: 1) the informal consent form and minors consent form, 2) monthly menstrual cycle diary sheets with the instructions, and 3) a monthly calendar to indicate start and stop dates of their menstrual cycle.

DEDICATION

This thesis is dedicated to those who have inspired me to never give up on what I believe in, to continue my education until I have reached my final goal, and who have given me the opportunity to grow in knowledge and in love. I dedicate this Thesis to the following people:

Guadalupe De Leon †

Concepción Chaccon

Gonzalo De León

Ofelia Garza

Michael James Robinson

Carmen Rodgers

I love you all for giving me the strength and the push to go forth into a world of great opportunity and to give everything I have heart and soul into believing that I can achieve greatness and go beyond what I know I can do. For this I thank you.

ACKNOWLEDGEMENTS

The researcher would like to extend her sincere gratitude to Dr. Paul Villas for his guidance, expertise, patience, and time that he devoted to the completion of this study. He has been the inspiration and the driving force behind the researcher. Appreciative and indebted acknowledgement is made to Dr. Tom Semper and Dr. Francisco Guajardo for their helpful recommendations and comments. The researcher was very proud and delighted to have worked on this study with them.

Special acknowledgements go to Joe D. Gonzalez, Superintendent of the Donna C.I.S.D. for allowing me to conduct my study with the students in his school district. Special acknowledgments also go out to Fernando Castillo, Donna High School Principal and David Evans, Athletic Director for allowing me to use the female students and the athletes for the study. A very special recognition goes to the Donna High School female athletes and students who took part in this study, because without them this study would not have been possible.

Finally, the researcher wishes to express her sincere appreciation to her family, friends and colleagues who provided the encouragement, support and help that were needed to finalize this study.

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CHAPTER I

INTRODUCTION

Background

A major event endured by every female is menarche. As a female reaches the era in her life where menarche begins, she crosses the boundaries from childhood to adulthood. When the female navigates from childhood into pre-teen the female may or may not experience the first change. It is a bit harsh to state that a female will go from being a child to a woman but that is exactly what happens when a female begins her menstrual cycle. The menstrual cycle is "the result of complex hormonal interactions" (Kagan, 1998). It has been documented in the Gale Encyclopedia of Childhood and Adolescence that "even after **adolescence**, a number of physical and emotional factors can throw off the timing of menstruation." Factors can include relationships, school, tests, peer pressure, fitting in, new friends, and home problems.

Previous studies have shown that some females have early menstruation called "precocious puberty" which occurs between the ages of eleven and thirteen, and some have late menstruation called "primary amenorrhea" which occurs between the ages of sixteen or seventeen. Through this study there will be research available to help adolescents understand the reasons for

painful/non-painful menses, late menses, Premenstrual Syndrome (PMS), and how physical activity, no physical activity, and lifestyle relate to the menstrual cycle characteristics.

Physical activity is greatly underappreciated in the high school setting. A large percentage of high school females would rather substitute another course for one that involves physical activity. Unremarkably, obesity and sedentary lifestyles have become an overwhelming problem associated with such substituted courses for those involving physical activity. Prior et al. (1987) found that "severity of premenstrual symptoms among sedentary women was decreased after they had participated in a 6-month physical training program." Israel et al., (1985) found that "12 weeks of an aerobic exercise program reduced symptoms of dysmenorrhea" and Johnson et al., (1995) reported "that frequent exercise was related to lower severity ratings of some menstrual symptoms, but the intensity of exercise was unrelated to symptoms." What females need to understand is how important the effects of physical activity or inactivity are on menstrual cycles and how the two can affect females.

It is considered that female athletes will experience a variety of menstrual disturbances when they are actively engaged in physical activity, such as "longer and more variable cycles than...sedentary women" (Sternfeld, 2000), and other research has indicated that excessive exercise can result in a "delay menarche, lack of ovulation, and the absence of menstrual periods" (Kritz-Silverstein et al., 1999).

Adolescent females are educated about their menstrual cycle and menstrual disorders via mothers, health clinics/seminars, and schools. The information provided is not enough; therefore, studies completed on adolescent female menstrual cycles will be of use to help adolescent females with concerns about the consequences of being inactive, eating junk foods, and living unhealthy lifestyles. A high school population of females should not be lacking physical activity, yet there are many cases where other forms of extracurricular credit such as homemaking are substituted for physical activity.

Every female is different and every area of concern will be different. Menstrual cycle abnormalities, "from a few skipped periods to a complete absence of menses, are extremely common in both athletic and non-athletic adolescents" (Harmon, 2002). Adolescent menstrual cycles need to be studied in order to inform young females of the reasons for disorders that may occur later in their lives. For athletes, "irregular menses have been reported to range from 1% to 66%...compared with 2% to 5% of the general population."

After all consent forms were signed and approved by the administrators, parents, participants, and the IRB Board Human Subject Research from the University of Texas Pan American, the study began. The evaluation process included ten athletes who participated in more than two sports (Group A), ten athletes who participated in two or fewer sports (Group B), and ten females who were randomly selected (Group C), using the Table of Random Numbers, from the Donna High School general female population who did not participate in school sponsored sports. Data evaluation also included the use of a menstrual

cycle diary ©, provided by the Centre for Menstrual Cycle and Ovulation Research, notating of start and stop dates on a monthly calendar, and a questionnaire.

Purpose of the Study

The purpose of this study was to compare the menstrual cycle characteristics between two groups of high school female athletes who participated in school-sponsored sports and one group of high school females who did not participate in school-sponsored sports. The study characteristics are:

1. Three groups of high school females, one athletic group participated in more than two sports, the second athletic group participated in two or fewer sports, and one group who did not participate in any type of school-sponsored sports.
2. The age range is fourteen through seventeen.
3. All three groups attend the same high school.

Statement of the Problem

The problem of this study is to establish if physical activity and lifestyles had any effects on menstrual cycle characteristics in the high school population. A hypothesis of the difference between means of the three study groups was tested for the 10 variables selected. The hypothesis is stated in the null form:

H_0 : There is no difference between means for the
10 variables tested of the three study groups.

A 95% confidence interval will be used to determine whether the three study groups differ sufficiently to allow the researcher to reject the null hypothesis.

Need for the Study

There is adequate research on the effect of physical activity and menstrual cycle characteristics in women eighteen years and older. There are also numerous research articles that have been published on menopause and the effects that physical activity had on it, as well as, the effects and relationship between physical activity and breast cancer in females, as indicated in the related literature section of this thesis. Yet, an area that has not been researched is on adolescent menstrual cycle characteristics and the effects being an adolescent athlete or a sedentary adolescent may have on those characteristics. Since obesity and exercise are controllable and modifiable characteristics, adolescent females need to be educated about the how behavioral problems and lifestyle problems are associated with menstrual cycle disorders. Thus, this field of study must be investigated and pursued.

Delimitations

This study was designed to conclude what effects physical activity and lifestyle had on the menstrual cycle characteristics such as: cycle length, bleed flow, bleed length, cramps, fluid retention, constipation, frustration, depression, anxiety, headaches and sleep problems in high school females. The following delimitations were imposed upon this study:

1. Thirty 14 to 17 year-old high school participants were selected from the Donna High School population.
2. The participants of the study were female.

3. The participants agreed to participate in the three-month study faithfully and granted consent.

Limitations

There were a few limitations imposed upon the study based on the selection criteria of the participants. The following limitations were noted:

1. Participants were selected from one high school and may not represent an entire high school female population.
2. Due to the length of the study participants will go from on-season practices to off-season practices due to changing of athletic seasons.

Basic Assumptions

The basic assumptions made were necessary in order to complete the study.

The basic assumptions for this study were:

1. All participants were honest about the physical activity.
2. That all participants logged their physical activity correctly in their journal on a daily basis.
3. That all participants filled in their Daily Menstrual Cycle Diary as completely and honestly as possible.

Definition of Terms

The terms defined below were needed in order to facilitate the understanding and the literature.

1. **Amenorrhea:** the absence of menstrual bleeding for three months or longer. This is normal before menarche, during pregnancy and for the first year or two of lactation as well as in late perimenopause and after menopause.
2. **Anorexia:** a condition in which a person does not eat normally. This severe eating disorder is associated with a need for control and severe weight loss, amenorrhea, high cortisol levels, bone loss and the metabolic effects of undernutrition.
3. **Anovulatory Androgen Excess (AAE):** a more accurate term for what is often called "Polycystic Ovary Syndrome" (PCOS). AAE is diagnosed when a woman has clinical evidence of androgen excess (usually hirsutism or acne) and evidence of past or present ovulation disturbances (anovulatory or short luteal phase cycles). AAE is associated with both infertility and risk for insulin resistance and Diabetes Mellitus Type 2.
4. **Bulimia:** a kind of eating disorder with binge eating followed by guilt and often by self-induced vomiting or diarrhea.
5. **Dysmenorrhea:** this is a medical term for menstrual cramps.
6. **Eating disorders:** a general term for conditions in which concern about becoming overweight is associated with cognitive dietary

restraint but normal weight, anorexia characterized by amenorrhea and undernutrition, or bulimia in which binge eating and vomiting occur.

7. **Estrogen:** an important group of hormones essential for normal women's maturation and the healthy functioning of reproductive and other tissues. During the reproductive years in women estrogens are primarily made in the ovaries. Estrogen is also normally made in children, men and menopausal women by conversion of androgens in fat and muscle tissue. There are three kinds of estrogens—estradiol is the ovarian hormone of the premenopausal years, estrone is the hormone of the menopausal years and estriol, a weak estrogen is present in high levels during pregnancy. High levels are associated with nausea, breast tenderness, insulin resistance and fluid retention.
8. **Female Athletic Triad:** three interrelated disorders—disordered eating, menstrual dysfunction, and bone mineral disorders—to which some female athletes are prone.
9. **Hormones:** naturally occurring substances produced by endocrine glands that have effects throughout the body. They travel in the blood stream and act through receptors in multiple tissues.
10. **Menstrual cramps:** these are a discomfort or pain caused by the uterus muscle contracting. They often occur just before and during the first days of menstruation. The muscle contractions are caused by high levels of prostaglandins that relates to both hormone levels and to the tightness of the cervix.

11. **Menstruation:** vaginal bleeding resulting from the process of periodic shedding of the endometrium. The first day of menstrual flow marks the beginning of a new menstrual cycle.
12. **Molimina:** the set of normal experiences that tells a woman that her period is coming and that she has ovulated. Most specific of these is the development of breast tenderness under the armpit when the rest of the breast is not sore. Other experiences include some increase in fluid retention, perhaps an increase in appetite and possibly increase sensitivity to the emotion in everyday experiences. It is different from premenstrual symptoms because it is less intense and indicates ovulation.
13. **Oligomenorrhea:** means menstrual cycles farther apart than 36 days but shorter than 180 days. This may normally occur during early adolescence and in perimenopause. It is commonly a protective form of hypothalamic suppression in association with weight loss, inappropriately intense exercise training, emotional stress or under-nutrition. It appears to precede the development of anovulatory androgen excess. When oligomenorrhea is related to hypothalamic suppression, estrogen levels are low; but when related to anovulatory androgen excess, estrogen levels are high or normal.
14. **Ovaries:** twinned organs found on either side of the uterus. The ovaries produce important estrogen and progesterone hormones cyclically during about 35-40 years of women's lives.

15. **Progesterone:** an important ovarian hormone produced by the ovaries following ovulation during the menstrual cycle. Progesterone rises 1400 percent over a week from the mid-cycle to its peak during the luteal phase. It acts on specific receptors in every tissue in the body in which estrogen acts. Its primary job is to cause differentiation (maturation) and to stop the proliferation (growth) caused by estrogen. Progesterone causes the endometrium to become secretory and able to accept and nurture a fertilized egg. If fertilization does not occur estrogen and progesterone levels decrease and a period results.
16. **Puberty:** the normal process of change from a child into a reproductive adult. For women it involves development of breasts and pubic hair as well as enlargement of the uterus, widening of the hips and an increase in body fat.
17. **Quantitative basal temperature (QBT):** a scientific way of determining from a series of first morning temperature readings across
18. **Short luteal phase:** a type of ovulatory disturbance in which the luteal phase is shorter than normal and progesterone production is less than optimal. Shortening of the luteal phase is a common hypothalamic protective response to weight loss, stress, exercise training that is too intense or cognitive dietary restraint, the worry that what you eat will make you gain weight. Short luteal phase cycles are associated with infertility, bone loss and osteopenia.

19. **Uterus:** a hollow muscular organ, commonly known as the womb that is lined with endometrium. It changes during the normal menstrual cycle and is the place in which the embryo and fetus develop. The lower narrow part opens into the vagina at the cervix and the upper part into the fallopian tubes.
20. **Vagina:** the passage extending from the uterus to the outside. The vagina is very rich in estrogen and progesterone receptors. It takes very low levels of estrogen, such as are found after the menopause in normal weight women, to maintain elasticity and moisture.

Summary

The beginning of puberty, the development of breasts buds and then breasts, the first menstrual cycle and the many cycles that will follow, and the birth of a child are circumstances that females experience in their lifetime. The Center for Menstrual Cycle and Ovulation Research and independent researchers devoted their time to study the menstrual cycle of women twenty years old and above, yet, have not provided important data needed on adolescent females between the ages of fourteen and seventeen. It is imperative to research how physical activity and no physical activity affect the menstrual cycle characteristics of teenage females.

The study was done with participants ranging from 14 to 17 years of age. A Kruskal-Wallis ANOVA was used to obtain the results of the information collected. The instruments used to collect the data consisted of a questionnaire, a monthly calendar, and a menstrual cycle diary. Included in this chapter were

the delimitations, limitations, basic assumptions, and the definitions of specific terms used to understand information in the study.

Organization for the Remainder of the Study

In Chapter II Related Literature, which was significant to this study is presented. Chapter II gives explanation to the reader with some past research that was done on the effects of physical activity on the menstrual cycle characteristics. There is also vita background on the adolescent females and their physical activity and dietary habits, as well as stresses they encountered that may have altered any aspect of the information that was gathered. In the subsequent chapters the researcher gives explanation of the methodology that was followed in the study, the analysis of the data and the conclusion.

CHAPTER II

REVIEW OF LITERATURE

Introduction

All females go through the process of menses. Menses, also known as menstruation prepares females leaving childhood for the journey into adulthood. There are many valuable lessons that can be taught to the adolescent female population and older generations about how physical activity affects the menstrual cycle characteristics and what type of disorders may or may not occur with no, little, moderate or intense physical activity. It is known that the brain controls what happens within all the systems in our bodies and the area of the brain called the hypothalamus is the master control which regulates and detects the amount of estrogen, progesterone and testosterone that is in the blood stream during a female's menstrual cycle. Women have been living in a man's world and most of the idiosyncrasies had been defined through the bases of comparisons to men. Gerard M. DiLeo (2003) states, "most men won't understand is that it's hard to feel great when you're miserable with the discomfort of cramps or inconvenienced with the soiling of menstrual blood, and what they can't understand is the power of hormonal changes. The fact that all of this makes possible reproduction goes unappreciated for the miracle that it is."

Therefore, the menstrual cycle is a bit difficult to understand for some, but very interesting and informative.

It is also indicated that medical concerns need to be considered by the coaches of young children and adolescents. These females are likely to develop many different types of disorders due to the fact that they are involved in sports at an early age.

Definition of Menstruation

It has been affirmed that menstruation is the process where the "layers of the endometrium are shed at the end of the cycle" (Chevins, 2001) and that menarche transpires between the ages of 12 and 13, but some studies have shown that "by age eight, 48% of African-American girls and 15% of Caucasians were showing pubic hair and developing breast buds" and starting their menses. Early menstruation can be influenced by being overweight and late menstruation can be influenced by being underweight or an elite athlete.

A menstrual cycle affects the reproductive organs (system) of a young female. When a female begins menses her body is preparing itself for childbirth. The reproductive organs that are affected are the uterus, the fallopian tubes and the ovaries. The ovaries are the egg producing organs which can hold "between 200,000 and 400,000 follicles...these are cellular sacks contain the materials needed to produce ripened eggs, or ova" (Kling, 2001). The female body also produces estrogen, progesterone, and testosterone, which are needed for reproduction during this time.

The menstrual cycle is divided into three stages: Follicular (Proliferative) Phase, Ovulation and Luteal (Secretory) Phase or the Premenstrual Phase. The follicular phase is from day one, the beginning of menstruation, through day six, which is usually the end of blood flow. The hormones estrogen and progesterone are working at this particular time at the lowest levels. The hypothalamus produces a hormone called gonadotropin-releasing hormone (GnRH) that stimulates the pituitary gland, which in turn produces the follicle-stimulating hormone (FSH). Through this process the FSH is the hormone that stimulates and matures the follicles. In days seven through thirteen the endometrium begins to thicken for the implantation of the egg that will soon be released. Ovulation begins on day fourteen of the menstrual cycle and the surge of luteinising hormone (LH) begins. The largest follicle then bursts and releases the matured egg into the fallopian tube. Luteal (Secretory) phase, also known as the premenstrual phase, lasts from day 15 until day 28. Here the "ruptured follicle develops into corpus luteum, which produces progesterone" (Kling, 2001). The progesterone together with the estrogen that is being produced fuel a blanket of blood vessels, which prepares the egg for embedment. If fertilization does occur the egg attaches itself to the blanket of blood vessels that will supply the developing egg with the nutrients that it needs and the corpus luteum will continue to produce the estrogen and progesterone. If fertilization does not occur the corpus luteum will deteriorate, the estrogen and progesterone levels will drop and the blood vessel lining will shed off and menstruation will begin.

Understanding the phases will help a young female understand what process her body goes through in order for menstruation or pregnancy to occur.

Normal Menstruation

Menstruation will not be the same for every female; it will vary from woman to woman. It is very common for an adolescent to have an irregular menstrual cycle for the first few years because it is the time the body's hormones are maturing. During this time "the ovaries may not release an egg once every month" therefore, "cycles may be irregular, occurring as close together as 2 weeks or as far apart as 3 months" (Mammel, 2001). Typically the menstrual cycle will run once a month which is every 28 days, yet "can be as short as 21 days or as long as 35 days and still be considered normal." Any woman of childbearing years, which could possibly be from eleven years \pm depending on the age of menstruation, will cycle between three to seven days. It is characterized that if a female is five or more days late from the original date of menstruation then there is a possibility of a disorder. There are circumstances to consider when looking at a menstrual disorder, such as being overweight, underweight, athletic, having an eating disorder or possibly stresses one may occur on a daily, weekly, or monthly basis.

Menstrual disorders

A menstrual disorder is defined as "anything that interferes with the normal menstrual cycle, causing pain, unusually heavy or light bleeding, or missed periods" (Gordon, 2001). Many women have symptoms that are associated with menstrual disorders that are brutal enough to "cause a disruption in their daily

activity. These symptoms are responsible for more lost work and school hours among women than any disease entity" (Kritz-Silverstein, et al., 1999). It is known that "5%-10% of all women (almost 3.5-7 million American women) are incapacitated for 1-2 days each month because of their symptoms" (Kritz-Silverstein, et al., 1999). There are many factors that will affect a female's menstrual cycle causing them to have a menstrual disorder or just irregularities. A female's menstrual cycle can be late, missed, or interrupted by many things, one being pregnancy. In adolescent females this is the most common cause for missed periods. It is known that an alarming rate of adolescent females are becoming sexually active and pregnant younger and younger within the last decade. Irregular periods and amenorrhea have been associated with weight loss; on the other hand, obesity "has also been associated with amenorrhea as well as hypermenorrhea, oligomenorrhea, anovulation, infertility, and premature menopause." Tolino et al., (1994) reports, alterations of sex hormone levels...could affect the menstrual cycle and its characteristics" and is known to happen in obese women.

Stress is encountered everyday and is another reason as to a menstrual cycle being late, missed or interrupted. Stress is considered the second most common reason for an adolescent female to be late or miss her menses.

Kathleen A. Mammel (2001) concedes, "It may be emotional stress...breakup with a boyfriend or final exams or depression. Or...physical stress to the body, such as a severe illness, a sexually transmitted infection, rapid weight loss or gain, or strenuous exercise." Adolescent females are very sensitive about how

they look and some may develop eating disorders such as dieting too much or not eating at all (anorexia) or bingeing and purging (bulimia) and these will interrupt the menstrual cycle. Even taking a vacation could disrupt the cycle. In adolescent females a hormonal imbalance is rarely the cause for an irregular or missed menstrual cycle. The most common hormonal imbalance for an adolescent would be polycystic ovary syndrome. Polycystic ovary syndrome may cause "irregular cycles, increased body hair, acne, and weight gain" in adolescent females. There are two reasons why an adolescent will take birth control pills, 1) if a young female is sexually active or 2) regulating their menstrual cycle. In either case, when the female ceases to take the pills it may cause the loss of a period.

Adolescents are more capable of sustaining the more serious menstrual disorders such as, premenstrual syndrome, oligomenorrhea, primary amenorrhea and secondary amenorrhea, primary dysmenorrhea and secondary dysmenorrhea, menorrhagia and metrorrhagia.

Premenstrual syndrome

Premenstrual syndrome (PMS) has traditionally reflected a stereotypical negative bias that does not encompass the complexity of the phenomena. The effects of PMS for most women are negative, but there are a few who do experience positive changes with PMS such as having an increase in energy and well-being, having a heightened level of creativity, an increase in their libido (sex drive) and feeling they are on top of the world. The positive affects of PMS have been known for some time but their existence has practically been ignored

possibly as the result of how a biomedical approach to premenstrual syndromes reflects the intellectual tradition where the linear, causal model of research dominates over the positive findings. Premenstrual syndrome is defined as “a set of physical, emotional, and behavioral symptoms that occur during the last week of the luteal phase (a week before menstruation) in most cycles” (Kling, 2001). David W. Sifton (2001), reports that “Between 70 to 90 percent of menstruating women experience some degree of physical and mental changes before their periods, but only 10 to 20 percent suffer from Premenstrual Syndrome (PMS).” Severe symptoms of PMS are “mood swings, irritability, and bursts of temper” and begin anywhere from four to five days before a female begins her menstrual cycle. Other symptoms of PMS include, “bloating, sore breasts, weight gain, extreme depression, confusion and insomnia.”

Oligomenorrhea

Oligomenorrhea is a disorder where “the menstrual cycle is light or infrequent” (DiLeo, 2001). Polycystic Ovarian Syndrome or PCOS is a collection of symptoms related to infrequent ovulation. DiLeo, (2003) defines oligomenorrhea as “less than 8 periods a year or cycles coming less frequent than every 35 days, which can be a sign of PCOS.” PCOS actually has very little to do with ovarian cysts, instead, women with this syndrome have many symptoms that include: irregular menstrual cycles, weight gain, and abnormal hair growth on the face or body. It is very common for adolescents to have very light or infrequent menstruation when they first encounter puberty. In fact, women should be concerned if their menstruation occurs “less than 21 days or

more than 2 to 3 months apart, or if they last more than eight to ten days” (Kling, 2001).

Amenorrhea

Amenorrhea defined is “when a woman does not have her periods” (McKesson Health Solutions, LLC, 2001). Amenorrhea occurs if the hypothalamus and pituitary glands fail to provide the appropriate gonadotropin stimulation to the ovary, which results in a failure to ovulate and progesterone production. Amenorrhea can also occur if the ovaries fail to produce adequate amounts of estradiol despite normal and appropriate gonadotropin stimulation by the hypothalamus and pituitary. In some cases, the hypothalamus, pituitary, and ovaries all may be functioning normally, yet amenorrhea occurs because of adhesions in the endometrium.

Amenorrhea is separated into two forms, primary amenorrhea and secondary amenorrhea. There are times when a female will just have a pubertal delay. There are other causes of amenorrhea, such as starvation, excessive exercise, depression, psychological stress, diabetes, anorexia nervosa, and even obesity, but there is also the possibility that there may be something wrong with the “uterus, vagina, ovaries, or certain glands in your body.” Therefore, a check-up is suggested. Since females and their menstrual cycle differ, it explains why “two athletes of similar body composition may have different menstrual responses to the same training volume and diet, or why athletes of “normal” weight may still experience menstrual dysfunction” (Harmon, 2002). Harmon does state that most athletes do not have eating disorders.

Primary Amenorrhea

Primary amenorrhea is either an absence of menses by age 14 with the absence of growth or the development of secondary sex characteristics or as defined by Harmon, (2002) as, "the absence of menstruation by age 16 in a girl with secondary sex characteristics."

Secondary Amenorrhea

Secondary amenorrhea is "the absence of three or more consecutive menstrual cycles after menarche." Secondary amenorrhea is when a female has had her menstrual cycle but has stopped having it for three months or more consecutively.

Dysmenorrhea

Dysmenorrhea is termed "painful periods" (DiLeo, 2001). Dysmenorrhea is one of the most common menstrual disorders among adolescent girls and is also the "leading cause of recurrent short-term school or work absenteeism among female adolescents" (Harel, 2002). It has been estimated that "50%-80% of the 15 million menstruating women in the United States" suffers to one degree or another from dysmenorrhea. Dysmenorrhea is broken down into two sections, primary dysmenorrhea and secondary dysmenorrhea. Primary dysmenorrhea is connected with "powerful chemicals known as prostaglandins and arachidonic acid, which induce uterine muscles (myometrium) contractions" (Kling, 2001). It has also been suggested through research that some women may have overly sensitive autonomic nervous systems that are affected through the menstrual cycle changes. A women's autonomic nervous system regulates the "heart rate,

blood pressure, and it contains the pain receptors in nerve fibers in the uterus and pelvic area," which in turn causes the abnormalities of having more intense pain than other women. Harel (2002) calls attention to the fact that in approximately "10% of adolescents with severe dysmenorrhea, pelvic abnormalities such as endometriosis or uterine anomalies may be found". Within the 10% not many of them will seek the treatment necessary to relieve the discomfort they are experiencing.

Frequently exercise has been described or recommended for the treatment of dysmenorrhea and "several studies have reported a beneficial effect of exercise interventions on the premenstrual syndrome (PMS) and dysmenorrhea" (Kritz-Silverstein et al., 1999). Exercise is becoming as common a prescription as any medication that is given for the common cold.

Primary Dysmenorrhea

Primary Dysmenorrhea is also known as functional dysmenorrhea and is the type that most adolescents will experience with a normal menstrual cycle. Many of the symptoms associated with primary dysmenorrhea are as follows: "cramps, nausea, vomiting, loss of appetite, headaches, backaches, leg aches, weakness, dizziness, diarrhea, facial blemishes, abdominal pain, flushing, sleeplessness, general aching, depression, irritability and nervousness" (Harel, 2002).

Secondary Dysmenorrhea

Secondary dysmenorrhea is associated with other medical conditions, principally endometriosis. Yet, this can be associated with "pelvic abnormalities,

which may be seen in approximately 10% of adolescents with dysmenorrhea. Secondary dysmenorrhea can also be associated with “chronic pelvic pain, cyclic and/or acyclic, that does not respond to conventional therapy.”

Endometriosis

Kling (2001) reports “endometriosis was the most common cause of menstrual pain that did not respond to over-the-counter painkillers” in adolescents. Harel (2002) reports that endometriosis “is the most common cause of secondary dysmenorrhea in adolescents.” The percentage of endometriosis among female adolescents is very high. It is approximately between “45% and 70%.” If the adolescent’s first-degree female family members have had endometriosis, it is highly suspected that the adolescent may acquire the disorder herself.

Metrorrhagia

Metrorrhagia is “irregular timing of the menstrual periods (usually more frequent)” (DiLeo, 2001). Metrorrhagia is classified as “bleeding from the uterus between menstrual periods” (Angello, 2001). Metrorrhagia causes include such things as hormonal imbalance, polyps (growths on the cervix), an infection or inflammation of the cervix or the uterus, or endometriosis.

Menorrhagia

Menorrhagia is “heavy bleeding during a menstrual period; also, prolonged menstrual bleeding (>8 days)” (DiLeo, 2001). Menorrhagia usually occurs “in the years just before menopause or just after women start menstruating. It occurs in 9 to 14 percent of all women” (Longe, 2001). A female who is

diagnosed with menorrhagia will have also been diagnosed with iron deficiency and will experience 80 ml of blood loss per menstrual period. Menorrhagia is regularly found in perimenopausal women and adolescents. These two types of females are targeted for menorrhagia because they "are times of the lifecycle in which estrogen exposure exceeds and is out of balance with progesterone" (Prior, 2003). Prior indicates that menorrhagia can be treated, but one must take the measures to assess and take care of anemia and to maintain the treatment or therapy for menorrhagia.

Athletic Amenorrhea

An athlete can encounter what is called athletic amenorrhea or exercise-associated amenorrhea. There is no single cause for the onset of athletic amenorrhea, but the potential factors include low body fat, low weight, a rapid weight loss occurrence, starting a vigorous exercise program, and disordered eating which will lead to nutritional deprivation, an energy imbalance, as well as the psychological and physical stress of everyday life. Athletic amenorrhea is defined "when a woman does not have periods because she exercises very intensely and is very lean. Some women with athletic amenorrhea stop having periods. Others will never get their first period until years after the age at which most girls start menstruating" (Rouser, 2001). It has been stated by Rouzier that some of these women will not get their first menstrual cycle until they are in their twenties.

The Medical Reporter (2000) indicates, "genetic predisposition may also be important." It also indicates "Higher intensity exercise and increased

frequency of training are associated with a greater incidence of menstrual disorders." It has been suggested that "metabolic alterations and changes in body composition such as weight loss and decreased percent body fat are coincidental rather than causative" and must be investigated further. Not only must someone look into the weight loss and lowered body fat but if the person is consuming the number of calories needed for the exercise they are performing and if they are lacking important nutrients. All factors must be considered before labeling someone with athletic amenorrhea.

Athletic amenorrhea occurs when a woman is very thin and exercises intensely. An increase in exercise and low body fat that leads to thinness will decrease the levels of hormones that the body produces to regulate a female's menstrual cycle. The hormones that regulate the female's menstrual cycles are estrogen and progesterone. Most females that have athletic amenorrhea will be those who compete in sports or activities that stress thinness, such as gymnastics, figure skating, swimming, and long distance running. With sports that emphasize extreme thinness, these athletes are in danger of incurring eating disorders, for instance, bulimia and anorexia nervosa.

Disordered eating

Disordered eating has been connected with the Female Athlete Triad. Reported by Roberts, et al., there have been studies done on adolescent and adult female athletes and they have both demonstrated a high rate of disordered eating and menstrual dysfunctions. Yet, they are uncertain about the effects of those non-elite adolescent female athletes who participated in school-sponsored

sports. Roberts (2003) also prepared two questions and gave them to a group of adolescent athletes that did partake in school-sponsored sports. The questions presented to these females were, "Is participation in school-sponsored sports a risk factor for disordered eating and menstrual dysfunction?" and the second one was, "Can any physical and behavioral characteristics be used to predict menstrual dysfunction among these athletes."

The questions were distributed to seventh through twelfth grade girls. The group of athletes that were surveyed reported that they engaged in these types of behaviors (anorexia nervosa or bulimia) at least once a month. The athletes either increased exercise (67%), skipped meals (50%), engaged in some type of fasting (11%), decided to pick up smoking (10%), which curbs the appetite, and others vomited after they were finished eating (4%). Eating disorders "has one of the highest mortality rates of all mental disorders" (Trover Foundation, 2004) and is related to personality traits such as; low self esteem, feelings of helplessness and fear of becoming fat.

Anorexia

Anorexia or "anorexia nervosa is self-imposed starvation, with an obsessive desire to be thin" (Trover Foundation, 2004). Females who are anorexic will have an image of their bodies that is much distorted. Such distortion could have been brought on by a coach, family member or friend. Anorexics will continue to diet and exercise even after their weight has dropped below the norm for the age and height. The warning signs to look for, for anorexics are:

- dramatic weight loss
- efforts to hide the weight loss from friends or family
- preoccupation with food in spite of the anorexic's refusal to eat
- excessive exercise to burn calories
- irregular or stopped menstrual periods
- mood swings

It is not known why anorexia develops, but excessive thinness is dangerous in more than one aspect (Trover Foundation, 2004).

Bulimia

Bulimia "or bulimia nervosa refers to binge eating that is followed by attempts to rid the body of the excess calories." A bulimic person will rid the body of its excess calories by fasting, attempting excessive/strenuous exercising, or purging by either vomiting or using laxatives. Bulimic behavior signs can include:

- the disappearance of large amounts of food in short periods of time or the existence of wrappers and containers indicating the consumption of large amounts of food
- frequent trips to the bathroom after meals
- excessive, rigid exercise regimen
- calluses on the back of the hands and knuckles from self-induced vomiting
- withdrawal from friends and activities

Bulimic's as anorexics have a poor self-image and believe that they are fat and need to be thin. Both disorders are associated with the adolescent population (Trover Foundation, 2004).

Binge Eating

Binge eating is probably the most popular or common among all the eating disorders, according to the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). Binge eating affects "as many as 4 million Americans" and most of these Americans are either overweight or obese. Binge eating not only affects the overweight or obese Americans, but also those of normal weight. Since binge eating ultimately results in extreme weight gains, the stresses place upon the body can eventually result in many health problems, such as, menstrual disorders.

Cohort study

Some epidemiologic studies suggest, "women participating in moderate recreational activity have longer and more variable cycles than do sedentary women" (Sternfeld, 2001). Therefore, the knowledge gained through the use of this and many other similar studies help others reveal and grasp a better perspective of "the effects on the menstrual cycle of moderate levels of physical activity" and how it "is more relevant because few women engage in high-level, vigorous exercise, but as many as 20 percent regularly participate in moderate-intensity activity."

In many cases, such as the cohort study by Sternfeld, reported most studies that were done on hormonal effects of physical activity were done on athletes who had a higher prevalence of amenorrhea or oligomenorrhea. Many valuable lessons can be taught to the adolescent population and older generations about how physical activity affects the menstrual cycle

characteristics and what type of disorders may occur with no, little, moderate or intense physical activity. Therefore, the function of this study was to find out what influences physical activity has on the menstrual cycle characteristics between two groups of athletes (one group participating in two or more sports and one group participating in two or fewer sports) and one group of adolescents who do not participate in any school or privately sponsored sports (they may or may not participate in some type of physical activity).

Menstrual cycle data were collected from each participant containing, the dates their cycles began, their cycle lengths, bleed length, disorders, and pain reception. This study examined the affects physical activity intensity had on the menstrual cycle characteristics. It also looked at if changing the intensity of the physical activity changes the variables of normal cycle start date, cycle length, bleed length, disorders, and pain reception as well.

CHAPTER III

METHODOLOGY

The relationship between an adolescent athlete and her menstrual cycle is an area not well understood. Warren and Perlroth (2001) reported that, "Women have become increasingly physically active in recent decades. While exercise provides substantial health benefits, intensive exercise is also associated with a unique set of risks for the female athlete." Sternfeld et al. (2002) also reported that, a few epidemiologic studies had suggested that some women who participated in moderate recreational activity have had longer and more variable cycles than sedentary women, and that amenorrhea had become induced when the previously sedentary women began to exercise. There is ample literature to prompt an investigation on the association between degrees of physical activity in female adolescents and their menstrual cycles. This study intends to determine if differences exist between three different groups of females. The participants, parents, administrators and physical education educators will be informed of the affects that intense, moderate, and no physical activity has on the adolescent's menstrual cycle.

The Committee on Sports Medicine and Fitness (2000) reported "Female children and adolescents who participate regularly in sports may develop certain medical conditions, including disordered eating, menstrual dysfunction, and

decreased bone mineral density.” When working with adolescent athletes, coaches must take special care in making sure that their athletes do not suffer any of these conditions. Yet at the initial meeting, the researcher observed the participants slouching when sitting and leaning forward when walking—conditions that are common among athletes resulting from the effect of bone mineral disorders or osteoporosis. The observation is not a medical analysis, but such characteristics are conditions associated with the ‘Female Athletic Triad’. The Committee (2000) states,

“Special medical concerns should be considered, when caring for young female athletes. Athletes can develop abnormal eating patterns (termed disordered eating), which can be associated with menstrual dysfunction (amenorrhea or oligomenorrhea) and subsequently decreased bone mineral density (BMD), or osteoporosis. These 3 conditions—disordered eating, amenorrhea, and osteoporosis—often occur together and have been termed the female athletic triad.”

It was discussed with the athletes that the obsession with “thinness” opened themselves up to a triad of disorders that are likely interconnected which possibly could lead to the ‘Female Athletic Triad’.

Participants for the study

The study was based on monitoring two groups of adolescent females that participate in high school sports and one group that did not participate in any type of high school sports. The research participants were 30 high school students; 10 athletes who participated in more than two sports throughout the school year,

10 athletes who participated in two or fewer sports throughout the school year, and 10 students who were non-athletes and did not participate in any classes that required physical activity. The 30 students' ages ranged from 14-17 and attended a South Texas High School. The participants were divided into three groups by the number of sports they participated in. One group of 10 students was selected from the high school freshman and junior varsity volleyball teams after a process of elimination and interviews; the second group of 10 students was selected from the high school freshman and junior varsity basketball teams after a process of elimination and interviews and the final group of 10 students was assigned as the control group and was randomly selected by the administration after a process of eliminating those females who participated in physical education classes, Reserve Officer Training Corps (ROTC), and Band. Only participants who obtained parental consent participated in the study. Each participant was provided a notebook containing a three-month calendar for the documentation of their menstrual cycle start and end dates, a menstrual cycle diary© for the three-months. The instructions were provided on how to fill in the menstrual cycle diary©, a copy of the child assent form, informed consent form, and the parental consent form.

Instrumentation

Prior (2003), of the Center for Menstrual Cycle and Ovulation Research provided the menstrual cycle diary© for use by the participants in this study. This facility and its employees have done extensive studies on the female menstrual cycle and ovulation with populations that are 20 years old and older. Since the

study population of previous studies was older (Prior, 1996), it makes this study more relevant. The researcher hopes to provide some insight into the female athlete adolescent's menstrual cycle.

The data collection instrument was a twenty-five-item Likert type scale questionnaire (Appendix H) with 10 menstrual cycle related variables. The instrument has been tested for validity and reliability (Prior, 1996) and permission for its use has been granted (Appendix D). Five additional items on the questionnaire were included for the athletes only. Questions were designed to address menstrual history, disordered eating practices, and medical disorders.

Each participant completed a personal information page with information such as height, weight, menarche age, current age and last menstrual cycle. They also completed a questionnaire, three monthly menstrual cycle diaries®, and a three-month calendar to indicated their menstrual cycle start and stop dates.

Procedures in the study

A list of terms, used in the study's' participant manual, was distributed to the participants and their mothers so they could become familiar with the research vocabulary. The Donna I.S.D. Superintendent and the I.R.B. Board at the University of Texas-Pan American granted permission to proceed with the study. The participants selected were ten athletes that were involved in two or more sports, ten athletes involved in two or fewer sports and the remaining ten were selected using the Table of Random Numbers after their schedules were separated from those who participated in physical activity courses that included

physical education, Reserve Officer Training Corps (ROTC), and band. All study participants and the parents/guardians read and signed a child assent form, an informed consent form, and a parental consent form prior to answering any questions on the questionnaire. Two envelopes were distributed to each of the participants, one envelope was marked "Personal information" and the other was marked "Questionnaire." The participants were instructed to complete the personal information page and the questionnaire, place them in the appropriate envelope, and seal them. The participants were instructed to put no personal information on the questionnaire. The participants then placed the sealed envelopes into an 8X11 inter-office memo size envelope that was collected by the investigator.

Materials

The research project used several data collection instruments, including a 25 item questionnaire (Appendix H) for all 30 participants and an additional five items on the questionnaire for the athletes only. A previous study distributed a questionnaire similar to the one given to the participants of this study (van Hooff, 1998). The questionnaire contained the following indicators, "birth date, age at menarche, general health, sports, stress and strain, weight loss, subjective impression of overweight, abnormal body hair or acne, nipple discharge, menstrual cycle pattern during the last year and menstruation characteristics." The questionnaire given to the participants in this study asked about issues such as age of puberty, current age, current height, current weight, age at menarche, disordered eating practices, medical disorders, sports, menstrual disorders, and

physical activity intensity, and number of years competing. Permission was obtained for the use of the menstrual cycle diary® data entry sheet as a guide in collecting the information needed for the study (Appendix D). The participants filled in the monthly menstrual cycle diary® for three-months and a three-month calendar with menstrual cycle start and stop dates. The participants were recruited through direct contact with the Donna High School Principal, the Athletic Director, and the Athletic Coaches. The participants were not paid. The participants were between 14 and 17 years of age. Each participant was free to withdraw from the project at any time without any penalties from the coaches or the parent/guardian. Results from the questionnaire were confidential and no names were used that could identify any of the participants. Permission from the respective administrators, coaches and parents was attained (Appendix B, Appendix E, Appendix F, and Appendix G).

Project Design

This study was designed to investigate the effects physical activity had on the menstrual cycle characteristics such as: cycle length, bleed flow, bleed length, cramps, fluid retention, constipation, frustration, depression, anxiety, headaches and sleep problems in high school females. Said characteristics that could result from all types of physical activity in the lives of two groups of female athletes and one group of female non-athletes were studied.

Approximately 30 female participants between the ages of 14 and 17; 10 athletes who participated in two or more sports, 10 athletes who participated in

two or fewer sport, and 10 females randomly selected who did not participate in any school sponsored sport were involved in this study.

Summary

Discussions with university professors, physical education teachers and coaches, as well as, parents about the consequences of menstrual cycle disorders, eating disorders and obstacles that could affect a young female's menstrual cycle helped in keeping in contact with the participants and making sure that there was a personal line between the participants and the researcher. This study was to determine if differences existed between three different groups of females. The participants, parents, administrators and physical education educators will be informed of the affects that intense, moderate, and no physical activity has on the adolescent's menstrual cycle.

Data from this study will be used to supplement the instruction given to females when they enter into puberty and as they experience the growth that their bodies go through as they mature into adults. By involving students from within a school district enabled the researcher to give them more individualized attention and create an encouraging environment for the participants. This facilitated them to feel less intimidated about discussing their menstrual cycle with their mothers, coaches, and female teachers.

CHAPTER IV

ANALYSIS OF DATA

Introduction

This chapter presents the results of the investigation in four sections. The first section discusses a pilot qualitative investigation on a group of females similar in age and activity involvement to the study participants. The second section presents the distribution of eligible participants. The third section presents the results of the investigation and the fourth section presents a summary of the analysis.

Pilot Qualitative Investigation

A convenient sample of 10 females was obtained to test two assumptions. It was assumed that adolescent females were not familiar with how physical activity affects menstrual cycle characteristics and types of disorders associated with physical activity intensity. Additionally, the researcher decided to also test the assumption that adolescent females were not familiar with menstrual cycle record keeping and diaries. Through a series of questions, the researcher learned that the convenient sample of females were not familiar with menstrual cycle disorders associated with either low or high intense physical activity nor were they familiar with menstrual cycle record keeping.

The convenient sample were introduced to the menstrual cycle diary © that had been selected for use in the study. Inquiry by the researcher revealed that tracking the menstrual cycle by adolescents required age-appropriate and cultural adjustments. It was assumed adolescent athletes were not ovulating normally and whatever association may be found with exercise may be related to the immaturity of their reproductive systems. Adjustments were made for each adolescent and the researcher kept in constant contact with each participant. It was concluded that the adjustments made by constant contact with the participants determined success in keeping records utilizing the menstrual cycle diary ©.

Distribution of Eligible Participants

A convenient sample of 54 adolescent females was selected to take part in the study. 24 were eliminated because they either were very irregular in their menstrual cycles, were pregnant or who had not even begun their menstrual cycles. This left the researcher with 30 study participants who were divided into three groups of 10 each (Group A; Group B; Group C).

It was determined that all potential participants from Group A had to have been athletes involved in more than two sports. The participants from Group B were athletes involved in two or fewer sports. The participants from Group C were selected from the general population who were not involved in any classes that involved physical education or other forms of exercise.

Results of the Investigation

It was reported by the Committee on Sports Medicine and Fitness (2000) that young female athletes develop medical conditions such as disordered eating, menstrual dysfunction, and decreased bone mineral density, qualities of the female athletic triad. The committee also stated that these three areas are common among those females who start playing sports at an early age. During the initial meeting, the researcher, observed some participants slouching when sitting and leaning forward when walking. The data obtained from the questionnaire and the menstrual cycle diary®, revealed a pattern of eating disorders and menstrual cycle dysfunctions among the participants. While the researcher cannot make a medical diagnosis, extrapolation from the literature leads the researcher to believe that the study participants might be demonstrating symptoms associated with the female athletic triad. The athletes in the study have been playing sports since their elementary years and have continued on through high school.

Data obtained through the interview process with the participants through a pre-test demographic questionnaire provided the researcher with an understanding of the study participants. Data were obtained from comparing and questioning the three groups consisting of 10 females each. The groups were labeled Group A (athletes who participated in more than two sports), Group B (athletes who participated in two or fewer sports), and Group C (females who did not participate in sports).

The researcher learned the following about all three groups following a questionnaire interview process:

Group A:

- All 10 were on a diet
- They experienced most of the same menstrual disorders
- Nine reported that they were anemic
- Nine experienced menstrual cramps
- Three experienced night sweats
- Six experienced Urinary Tract Infections (UTI)
- Five experienced vaginal dryness
- Six were not eating at all, taking laxatives, skipping meals, throwing their food away when others were not looking, eating very little and not eating every day
- Nine were bingeing and purging (bulimic)
- Four reported they knew that they were malnourished
- Three reported experiencing amenorrhea early in their athletic career

Group B

- All 10 were on a diet
- They experienced most of the same menstrual disorders
- Seven reported that they were anemic

- Nine experienced menstrual cramps
- Seven experience night sweats
- Three experienced Urinary Track Infections (UTI) and
- One experienced vaginal dryness
- Five were not eating complete meals and were, taking laxatives, skipping meals, throwing their food away when others were not looking, eating very little and not eating every day
- Five reported bingeing and purging (bulimic)

Group C

- Nine were on a diet
- One was showing the signs of anorexia and bulimia by eating very little or nothing at all and when being watched eating extensively and then purging
- Four reported that they considered themselves obese because of their weight when compared to the height/weight ratio chart hanging in the nurses office

Data for all three combined groups were summarized by ranges, averages, mean values, and standard deviations (Appendix 1, Table 1, Table 2 and Table 3). The average age for Group A was 16.3; with an average age for beginning puberty at 11.9 and the average menarche age was 13.8. Group A had a pre-weight average of 96 pounds and a post-weight average of 91.2

pounds. They averaged 64.7 inches in height. The average age for Group B was 15.6; with an average age for beginning puberty at 11.6 and an average menarche age of 13.6. Group B had a pre-weight average of 98.7 pounds and post-weight average of 94.1 pounds. They averaged 63.9 inches in height. The average age of Group C was 16.4; with an average age for beginning puberty at 10.9 and the average menarche age of 12.7. Group C had a pre-weight average of 127.8 pounds and post-weight average of 128.3 pounds and they averaged 63.4 inches in height.

Table 4 presents summary averages data by variables for all three groups for the three month duration of the study. When averages are compared, Group C reported more differences from the other groups with Groups A and B reporting more similarities.

Table 4 All 3 Group Averages—For 3 Months									
	Month 1	Month 1	Month 1	Month 2	Month 2	Month 2	Month 3	Month 3	Month 3
Variable	A	B	C	A	B	C	A	B	C
Tampons/Pads Used	11.5	9	15	11	8.5	14.5	10.75	9	14.25
Amount of Flow	11.5	9.75	17.5	11.75	7	18	12.75	6.5	18.5
Cramps	20	15.25	24.25	18.75	13.5	26.75	22.75	11.75	26.5
Fluid Retention	31.25	26.25	43	38	28	40.75	36.75	25.5	44.25
Constipation	8.75	9	9.5	10	10	13.5	8	10.25	11.5
Headache	19.75	18.75	26	22.65	21.5	18.5	19.75	14.5	18.5
Sleep Problems	27.5	16.75	22.25	32.25	13.25	26.75	27.25	14	27.75
Feeling Frustrated	20	18.75	31.25	24.75	15	30.25	25	15.5	30.5
Feeling Depressed	0.75	0	3	1.5	0.75	4.5	1.25	0.75	1
Feeling Anxious	13	14.75	11.75	16.75	14	7.25	12.5	14	10

Because the data were not normally distributed, statistical comparisons between groups were performed using the Kruskal-Wallis analysis of variance (ANOVA). The Kruskal-Wallis ANOVA was used to compare the differences between the three groups in menstruation variations using the menstruation cycle diary©. Additionally, the small sample size of the study groups was also a consideration in using a nonparametric assessment to determine if group mean differences existed on menstruation related variations. The Kruskal-Wallis test ranks the groups' sum-of-ranks values to obtain the test's calculated value to either accept or reject the null hypothesis. A Chi-Square approximation was used to correct for ties. The computerized Analyze-It program was used to analyze the data sets.

Tables 5 – 14 present data resulting from analyzing 10 variables with the Kruskal-Wallis one-way analysis of variance. Ten analyses of variance tests were performed on the data. The Null Hypothesis formulated for this study stated that:

H_0 – There is no difference in the results between the three groups for bleed length, bleed flow, cramps, fluid retention, constipation, headaches, sleep problems, feelings of frustration, depression, anxiety and energy, appetite and outside stresses.

A 95% confidence interval was used to determine whether the three study groups differ sufficiently to allow the researcher to reject the null hypothesis. The quality of athletic participation served as the independent variable and menstruation fluctuation with associated symptoms were the dependent variables.

Table 5 presents the summary Kruskal-Wallis ANOVA test for mean differences in tampons/pads usage among Groups A, B and C. The test results revealed that the differences between groups was significant (Kruskal-Wallis ANOVA statistic = 8.87, $p < .05$).

Table 5 Test: Kruskal-Wallis ANOVA Tampons/Pads Used Per Day All 3 Months Comparison Number by Month: Groups A, B, C				
n		72		
Number by Month	N	Rank sum	Mean rank	
A	24	878.5	36.60	
B	24	659.5	27.48	
C	24	1090.0	45.42	
Kruskal-Wallis statistic		8.87	$p < .05$	

Table 6 presents the summary Kruskal-Wallis ANOVA test for mean differences in flow comparison intensity among Groups A, B and C. The test results revealed that the differences between groups was significant (Kruskal-Wallis ANOVA statistic = 11.50, $p < .05$).

Table 6 Test Kruskal-Wallis ANOVA Flow Comparison Intensity by Month: A, B, C				
N		36		
Intensity by Month	N	Rank sum	Mean rank	
A	12	217.5	18.13	
B	12	137.0	11.42	
C	12	311.5	25.96	
Kruskal-Wallis statistic		11.50	$p < .05$	

Table 7 presents the summary Kruskal-Wallis ANOVA test for mean differences in cramps comparison intensity among Groups A, B and C. The test results revealed that the differences between groups was significant (Kruskal-Wallis ANOVA statistic = 9.90, $p < .05$).

Table 7 Test Kruskal-Wallis ANOVA Cramps Comparison Intensity by Month: A, B, C				
		N	36	
Intensity by Month		n	Rank sum	Mean rank
A		12	219.0	18.25
B		12	142.5	11.88
C		12	304.5	25.38
Kruskal-Wallis statistic		9.90	$p < .05$	

Table 8 presents the summary Kruskal-Wallis ANOVA test for mean differences in fluid retention among Groups A, B and C. The test results revealed that there was no significant differences between groups (Kruskal-Wallis ANOVA statistic = 2.58 $p > .05$).

Table 8 Test Kruskal-Wallis ANOVA Fluid Retention Comparison Intensity by Month: A, B, C				
		n	36	
Intensity by Month		n	Rank sum	Mean rank
A		12	203.0	16.92
B		12	193.5	16.13
C		12	269.5	22.46
Kruskal-Wallis statistic		2.58	$p > .05$	

Table 9 presents the summary Kruskal-Wallis ANOVA test for mean differences in constipation among Groups A, B and C. The test results revealed that there were no significance differences between groups (Kruskal-Wallis ANOVA statistic = 0.87, $p > .05$).

Table 9 Test Kruskal-Wallis ANOVA Constipation Comparison Intensity by Month: A, B, C			
n		36	
Intensity by Month	N	Rank sum	Mean rank
A	12	198.5	16.54
B	12	221.0	18.42
C	12	246.5	20.54
Kruskal-Wallis statistic		0.87	$p > .05$

Table 10 presents the summary Kruskal-Wallis ANOVA test for mean differences in sleep problems among Groups A, B and C. The test results revealed that there were no significant differences between groups (Kruskal-Wallis ANOVA statistic = 0.58, $p > .05$).

Table 10 Test Kruskal-Wallis ANOVA Sleep Problems Comparison Intensity by Month: A, B, C			
n		36	
Intensity by Month	n	Rank sum	Mean rank
A	12	235.0	19.58
B	12	199.5	16.63
C	12	231.5	19.29
Kruskal-Wallis statistic		0.58	$p > .05$

Table 11 presents the summary Kruskal-Wallis ANOVA test for mean differences in headaches among Groups A, B and C. The test results revealed that there were no significant differences between groups (Kruskal-Wallis ANOVA statistic = 0.89, $p > .05$).

Table 11 Test Kruskal-Wallis ANOVA Headache Comparison Intensity by Month: A, B, C			
	n	36	
Intensity by Month	N	Rank sum	Mean rank
A	12	202.0	16.83
B	12	215.0	17.92
C	12	249.0	20.75
Kruskal-Wallis statistic	0.89	$p > .05$	

Table 12 presents the summary Kruskal-Wallis ANOVA test for mean differences in feeling frustrated among Groups A, B and C. The test results revealed that the differences between groups was significant (Kruskal-Wallis ANOVA statistic = 18.17 $p < .05$).

Table 12 Test Kruskal-Wallis ANOVA Feeling Frustrated Comparison Intensity by Month: A, B, C			
	n	36	
Intensity by Month	n	Rank sum	Mean rank
A	12	229.0	19.08
B	12	109.0	9.08
C	12	328.0	27.33
Kruskal-Wallis statistic	18.17	$p < .05$	

Table 13 presents the summary Kruskal-Wallis ANOVA test for mean differences in feeling depressed among Groups A, B and C. The test results revealed that the differences between groups was significant (Kruskal-Wallis ANOVA statistic = 10.48, $p < .05$).

Table 13 Test Kruskal-Wallis ANOVA Feeling Depressed Comparison Intensity by Month: A, B, C			
n		36	
Intensity by Month	n	Rank sum	Mean rank
A	12	205.0	17.08
B	12	155.0	12.92
C	12	306.0	25.50
Kruskal-Wallis statistic		10.48	$p < .05$

Table 14 presents the summary Kruskal-Wallis ANOVA test for mean differences in feeling anxious among Groups A, B and C. The test results revealed that there was no significant differences between groups (Kruskal-Wallis ANOVA statistic = 2.73, $p > .05$).

Table 14 Test Kruskal-Wallis ANOVA Feeling Anxious Comparison Intensity by Month: A, B, C			
n		36	
Intensity by Month	n	Rank sum	Mean rank
A	12	239.5	19.96
B	12	253.0	21.08
C	12	173.5	14.46
Kruskal-Wallis statistic		2.73	$p > .05$

Summary

This chapter presented an analysis of the data that was obtained from three groups of high school female students (two groups were athletes and one group was non-athletic). Presented here was the convenient sample pilot questionnaire and interview procedure. Participant interview results, rank sums, mean sums measures using 10 variables from a menstrual cycle diary were analyzed. The Kruskal-Wallis ANOVA test for mean differences was used to determine significance.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to determine if physical activity produces changes in the characteristics of high school adolescent females' menstrual cycle. The review of the related literature provided insight into the need for information about how the menstrual cycle is affected by physical activity and no physical activity, particularly the adolescent female population. The research participants were 30 high school students; 10 athletes who participated in more than two sports throughout the school year, 10 athletes who participated in two or fewer sports throughout the school year, and 10 students who were non-athletes and did not participate in any classes that required physical activity. The 30 students' ages ranged from 14 through 17 and attended a South Texas High School. The participants were divided into three groups by the number of sports they participated in. One group of 10 students was selected from the high school freshman and junior varsity volleyball teams after a process of elimination and interviews; the second group of 10 students was selected from the high school freshman and junior varsity basketball teams after a process of elimination and interviews and the final group of 10 students was assigned as the control group.

and was randomly selected by the administration after a process of eliminating those females who participated in physical education classes, ROTC and Band. Only participants who obtained consent from their parents participated in the study. The researcher received permission to use the CeMCOR's Menstrual Cycle Diary©.

The investigation lasted for three months and through cooperation with the Center for Menstrual Cycle and Ovulation Research (CeMCOR) facility, the variables listed in the Menstrual Cycle Diary© served as the dependent variables for the study. Ten Kruskal-Wallis ANOVA tests were performed on the data variables obtained from the Menstrual Cycle Diary©. The Null Hypothesis stated that there would be no difference in results between the three groups in the Menstrual Cycle Diary© variables ---- number of tampons/pads used, amount of flow, cramps, fluid retention, constipation, headache, sleep problems, feeling of frustration, feeling of depression and feelings of anxiety. All 10 measurements produced positive differences as determined by the Kruskal-Wallis ANOVA analysis. The null hypothesis was rejected at the 95% level of significance for the following variables; number of tampons/pads used, amount of flow, cramps, feeling of frustration and feeling of depression. Statistical significance was not determined for fluid retention, headache, constipation, sleep problems and feelings of anxiety.

The study was able to supplement the instruction that was given to every female when entering puberty and as they experienced the growth that their bodies go through as they mature into adults. Van Hooff et al. (1998) stated that,

"During puberty, menstrual cycle abnormalities may also be associated with all kind of causes for menstrual irregularity known in adults such as strenuous physical exercise, psychosocial stresses, low body weight and endocrine disturbances." Since the participants were from the same school district, it was easier for the researcher to provide individualized consultations and meet regularly with the participants as the study progressed. Familiarity with the participants and giving them more individualized attention created additional encouragement and respectability for the participants by making them feel less intimidated about discussing their menstrual cycle with their mothers, coaches, and female teachers. The participants and their mothers became more accustomed with their menstrual cycles and the affects physical activity and eating habits have on their cycles. They were better able to understand why certain things happen during their cycle and the effects of participating in physical activity, sound nutrition or living sedentary lifestyles.

The participants were able to take an active roll in the determinants of their menstrual cycles and menstrual cycle disorders that may occur if their lifestyles change in any way. Knowing factors that affect their menstrual cycles the participants became aware of how to prevent disorders from occurring and living the type of lifestyle they know will keep them fit and healthy for a very long time.

Findings

1. The Null Hypothesis was rejected for the following variables; tampons/pads used, flow, cramps, feeling frustrated and feeling depressed.

2. The Null Hypothesis was not rejected for the following variables; fluid retention, headache, constipation, feeling anxious and sleep problems.
3. The Averages for Groups A and B did not vary significantly around the mean.
4. The averages for Group C varied around the mean of both Groups A and B.
5. Qualitative comments revealed a pattern of obsession with "thinness" among members of Groups A and B.
6. Qualitative comments revealed that Groups A and B were employing a Vegetarian and Zone diet respectfully. The reasons for such diet were to lose or maintain weight.
7. The average pre-study weight for Group A was 96, Group B was 98.7, and Group C was 127.8. The average post weight for Group A was 91.2, Group B was 94.1 and Group C was 128.3.
8. The participants and their mothers, in reaction to the study, presented the following comments:
 - "It was a good idea to have this study done. It allows us as parents to understand and help our daughters through a time in life that is very difficult for them. I did not realize that these disorders were happening to her."

- “Understanding how physical activity affects my menstrual cycle helps me understand and give me more knowledge on how to keep myself from getting sick.”
- “At first I was skeptical about the study and unsure of how it would help my daughter, but I now realize the great importance this study showed and how it opened my eyes to areas of concern with athletes. I did not know that my daughter was experiencing disorders such as not eating at all and dropping weight to a very serious level. I am very glad that she participated in this study. We have become closer than ever now.”
- “I now have a clearer picture on why my cycles are so irregular.”
- “I didn’t realize how important it was to know about your periods, but now I am glad to have information given to me by participating in this study.”
- “My mother thought I was pregnant, but now understands that it was due to the intensity of my exercise regiment and diet. We have both learned that since I do not have a lot of body fat, that my leanness may be cause of the irregular and absence of menses.
- “I didn’t know that cramps and a heavy flow were menstrual disorders until I participated in this study.”
- “This study provided other mothers and daughters with helpful information. I believe mothers will now become more involved with

their daughters as they begin to grow into young women and become involved or not in high school sports.”

- “I understand now that I was only hurting myself by exercising too much and eating less and less everyday. I am thankful for all the useful information given to me through participating in this study.”
- “I have learned that if I want to live a long healthy life, I need to change; begin exercising and stop eating too much.”
- “I learned that everything I do affects everything that is happening inside my body. I know now that the reactions that my body gives me are a direct result of what I have done.”

Conclusion

The analysis of the findings indicated the following conclusions:

1. There were many health risks associated with high school female students, especially those competing in sports, however, the risks may not be with athlete participation but with other factors.
2. Athletes believe that thinness will make them better athletes.
3. Coaches and administrators are possibly unaware of the conditions that their athletes are placing themselves in by dieting and excessively exercising.
4. Athletes are displaying how competition has become secondary to thinness.

5. Athletes are exhibiting at an early stage symptoms associated with the female athletic triad.
6. The myth that was very popular in the 1970's and 1980's of "thin is in" still exists among high school females, especially among the athletes.
7. Females are unaware of the dangers they are placing themselves in by being too thin or too fat and weighing too little or too much.
8. The athletes are unaware of the muscle mass that is lost by dieting, not eating or bingeing and purging.

Recommendations

The recommendations that resulted from this investigation, centered on the findings from utilizing the menstrual cycle diary©, interviews and information reported in the questionnaire. The tracking system utilized over 12 weeks is also used to assist students identify the areas that may be affecting their menstrual cycles or delaying menarche are as follows:

1. It is recommended that the study be continued for a longer period of time.
2. It is recommended that further investigations of this type be conducted.

Particularly requiring the participants to record in a journal all aspects of changes during the day—such as in a diary, reducing the athletes exercise intensity or the number of days that they work out, and including mothers and coaches with every aspect of the research project can facilitate better improvements of the study.

3. It is recommended that non-athletes participate for 6 months in a “no exercise” program and then in a 6 month exercise program using pedometers, and walking a required number of steps to see if any different results can be facilitated in this study.
4. It is recommended that the coaching staff evaluate the athletes on a regular basis for weight losses and weight gains.
5. It is recommended that the coaching staff and administrators be evaluated on their knowledge of eating disorders such as anorexia and bulimia.
6. It is recommended that some type of policy for the coaching staff be developed and implemented about implications resulting from dieting.
7. It is recommended that the coaching staff visually monitor and report any unusual and unforeseeable conditions that are occurring with their athletes, and recommended that they be tested for bone mineral density disorders, if needed.
8. Allow parents to have a copy of the physical for athlete participation with an explanation of results attached to it. The explanation should include the BMI (body mass index) for percent of body fat that is necessary to maintain a healthy lifestyle for the athletes' weight to height.
9. It is recommended that a strong effective health education effort be undertaken to provide workshops and seminars for the coaching staff and administration.

10. It is recommended that the coaches and administration conduct a required parent and athlete meeting to familiarize them with the health risks associated with diet, eating disorders and intense exercise.
11. It is recommended that these workshops and seminars seek to promote and organize support groups concerned about the athlete population's health and well being.
12. It is recommended that the researcher keep in close contact with the coaches, administration, and parents throughout the study in order to keep them informed of any changes encountered.
13. It is recommended that the parents, coaches, and administration become more involved in educating the female population of health risks associated with dieting, extreme weight loss, extreme weight gains, and how to create a good exercise program and diet.
14. It is recommended that females not involved in exercise programs or classes that promote physical activity be informed of the health benefits and/or risks attached to such classes.

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APPENDIX A

Table 1
Questionnaire Results—Group A

Subject	Current	Age began		Weight		Current	Days PMS begins before M.C.
	Age	puberty	M.C.	Before	After	Height	
A-1	15	13	14	96	92	66	3
A-2	15	11	14	82	79	62	5
A-3	16	11	13	99	94	64	6
A-4	16	12	14	96	87	65	1
A-5	16	12	13	101	96	66	0
A-6	17	12	14	94	90	62	3
A-7	17	11	14	102	96	65	4
A-8	17	13	14	93	88	65	4
A-9	17	13	14	96	94	66	3
A-10	17	11	14	101	96	66	4
Range	15-17	11-13	13-14	82-102	79-96	62-66	0-6
Average	16.3	11.9	13.8	96	91.2	64.7	3.3
Median	16.5	12	14	96	93	65	3.5
SD	0.823273	0.875595	0.421637	5.811865	5.411921	1.567021	1.766981

Table 2
Questionnaire Results—Group B

Subject	Current	Age began		Weight		Current	Days PMS begins
		Age	Puberty	M.C.	Before	After	Height Before M.C.
B-1	14	11	13	89	87	64	4
B-2	15	12	15	86	81	65	1
B-3	15	13	15	83	74	64	2
B-4	15	10	11	102	96	62	2
B-5	16	9	11	122	118	63	3
B-6	16	11	13	102	99	65	3
B-7	16	12	15	87	83	66	3
B-8	16	12	14	98	96	62	2
B-9	16	12	14	130	122	66	5
B-10	17	13	15	88	85	62	2
Range	14-17	9-13	11-15	83-130	74-122	62-66	1-5
Average	15.6	11.5	13.6	98.7	94.1	63.9	2.7
Median	16	12	14	93.5	91.5	64	2.5
SD	0.843274	1.269296	1.577621	15.9795	15.68049	1.595131	1.159502

Table 3
Questionnaire Results—Group C

Subject	Current	Age began		Weight		Current	Days PMS begins
	Age	Puberty	M.C.	Before	After	Height	Before M.C.
C-1	15	10	13	102	102	63	6
C-2	15	11	13	98	101	63	7
C-3	16	11	13	98	100	62	7
C-4	16	13	14	156	154	65	8
C-5	17	10	12	129	130	64	6
C-6	17	11	12	168	168	64	14
C-7	17	10	11	145	145	63	5
C-8	17	11	13	142	142	63	5
C-9	17	10	12	110	110	63	0
C-10	17	12	14	130	131	64	7
Range	15-17	10-13	11-14	98-168	100-168	62-65	0-14
Average	16.4	10.9	12.7	127.8	128.3	63.4	6.5
Median	17	11	13	129.5	130.5	63	6.5
SD	0.843274	0.994429	0.948683	25.10777	24.23519	0.843274	3.439961

APPENDIX B

Yolanda Robinson
Graduate Student of the University of Texas-Pan American
534 N. Travis San Benito, Texas 78586
(956) 399-2391

Dear Mr. Gonzalez,

My name is Yolanda Robinson and I am a Physical Education Teacher with Palmer-Laakso Elementary. I am a graduate student of the University of Texas—Pan American in the School of Education of the Kinesiology Program and beginning my Thesis. My thesis will be a longitudinal study of High School females titled "The Effects Physical Activity has on the Menstrual Cycle Characteristics between Two Groups of High School Athletes and One Group of High School Non-Athletes."

The study is designed to investigate the relationship that physical activity has on the menstrual cycle characteristics—cycle length, bleed length, bleed flow and menstrual cycle disorders—that may occur with no, low, mild, moderate, high and intense physical activity in the lives of two groups of female athletes and one group of non-athletes. At this time I am asking for your permission to include students from Donna High School in this study. Each female will be given a formal consent form and an informed consent form so that their participation may be documented accordingly. The study will be three months long to get an accurate record of occurrences and the students will be provided with a notebook that will contain a monthly menstrual cycle diary and the instructions on how to fill the diary in—the participants will need to fill it in every day of their menstrual cycle, a three month calendar—which will have to be filled in on the days that she is on her menstrual cycle so that I can count the number of days of her cycle and document the date she starts, and a journal—this is where she will document the physical or non-physical activity that she participated in on a daily basis and any problems that occur during her menstrual cycle.

The participants will not be in any harm from the experiment or any names of the participants revealed in any form—there will be absolute anonymity and you will be informed of any changes that I make as they come about. I thank you for the opportunity to work with the female population at Donna High School and having them make their impact on the way that the adolescent menstrual cycle can be affected by living a healthier lifestyle.

Thank You,

Yolanda Robinson
Coach/Physical Education Teacher
University of Texas-Pan American Graduate Student
Cc: Mr. Castillo



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October 20, 2004

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UTPA
 1201 W. University Drive
 Edinburg, Texas 78539

Dear Sirs,

Ms. Yolanda Robinson, a graduate student at UTPA, is working on her thesis titled, "The Effects Physical Activity has on the Menstrual Cycle Characteristics between Two Groups of High School Athletes and One Group of High School Non-Athletes". To assist in completion of her thesis, Ms. Robinson has requested permission to conduct a study at Donna High School during the fall semester of 2004.

We are pleased to grant that permission and state our willingness to cooperate with the University. Ms. Robinson will conduct her study in cooperation with Donna High School Principal Fernando Castillo and Athletic Director David Evans.

If you require further information please do not hesitate to call our offices at (956) 464-1642.

Respectfully,

Nereida G. Cantú
 Assistant Superintendent for Curriculum and Instruction

NGC/ec

Home of the Mighty Fighting Redskins and Bravettes

APPENDIX C



INSTITUTIONAL REVIEW BOARD FOR HUMAN SUBJECTS IN RESEARCH

THE UNIVERSITY OF TEXAS - PAN AMERICAN

1201 West University Drive • Edinburg, Texas 78541-2999 • (956) 384-5004 Office • Fax (956) 381-2940

MEMORANDUM

TO: Yolanda Robinson
Kinesiology Department

FROM: *MF*
Dr. Mark Granberry
Chair, Institutional Review Board for Human Subjects in Research

DATE: December 17, 2004

SUBJECT: Protocol for "The Effects Physical Activity has on the Menstrual Cycle Characteristics Between Two Groups of High School Athletes and One Group of High School Non-athletes" IRB #399

The above referenced protocol has been:

- ☐ Approved (committee review)
- ☒ Approved (expedited review)
- ☐ Approved (continuing review)
- ☐ Conditionally approved (see remarks below)
- ☐ Closed (completed in a satisfactory manner)
- ☐ Exempt from IRB review
- ☐ Tabled for future consideration – re-submit with corrections
(submit 2 copies of your protocol)
- ☐ Disapproved (see remarks below)

by the Institutional Review Board Federal Wide Assurance Number (FWA 00000805).

As stipulated in the guidelines of the IRB, this protocol will be subject to annual review by the IRB and any deviations from the protocol or change in the title must be resubmitted to the board.

For additional information you can contact the IRB University website at <http://www.panam.edu/dept/sponpro/Policies/Policies.html>

cc: Dr. Wendy A. Lawrence-Fowler, AVPR.
Dr. Paul Villas

Federal Assurance Number # FWA 00000805UTPA IRB# 399Reviewed by: Dr. Mark Granberry, Chair

CONTINUING REVIEW FOR INSTITUTIONAL REVIEW BOARD HUMAN SUBJECTS IN RESEARCH

At the end of one year, federal regulations require final reports/continuing review reports for all research projects that deal with human subjects. A copy of this report **MUST** be filed with the Institutional Review Board-Human Subjects in Research, at The University of Texas-Pan American, where unless specified by the Board. Our records indicate that your proposal for research dealing with human subjects was reviewed by a member of the Board on 12 / 17 / 04.

Principal Investigator: Yolanda Robinson, Kinesiology Department

Title: "The Effects Physical Activity Has On the Menstrual Cycle Characteristics Between Two Groups of High School Athletes and One Group of High School Non-Athletes" IRB #399

1. Dates of Study 12 / 17 / 04 through 12 / 17 / 05.
2. If the study was not initiated, please indicate here and return the form.
3. Please check the following items as they may apply to your project during the period following IRB review.
 - a. ☐ Renewal of protocol/proposal with no changes.
 - b. ☐ In regard to human subjects, the research protocol was unchanged from the approved protocol and was completed in a satisfactory manner.
 - c. ☐ The research protocol was modified during the projects including, for example, changes in the informed consent form or any other modifications to the study. (Any changes to the protocol must be reviewed and approved by the IRB).
 - d. ☐ The research protocol was changed significantly in regard to human subjects. Please explain on an attached page, or if the research has been completed, please submit copies of the final report sections which describe these changes.
 - e. ☐ The research is in progress and no changes in protocol have been made regarding human subjects.
4. Indicate the number of subjects proposed _____ actually utilized as of this date / / .

Signature of Individual Completing This Form

Date

**Please return this form and any attachments to Dr. Mark Granberry, Chair,
Institutional Review Board for Human Subjects in Research, Office of Research
and Sponsored Projects, MAGC 2.316 – The University of Texas-Pan American.**

APPENDIX D

THE UNIVERSITY OF BRITISH COLUMBIA



Medicine

Endocrinology and Metabolism

Suite 380 – 575 W. 8th Ave

Vancouver, BC, Canada V5Z 1C6

Tel: (604) 875-5927

Fax: (604) 875-5915

February 11, 2005

Yolanda Robinson
 534 N. Travis
 San Benito, Texas 78586
 (956) 399-2391

Dear Yolanda Robinson:

Re: Permission to use the daily Menstrual Cycle Diary© in research

I've enjoyed learning more about your proposed study of menstrual cycles in teen-aged athletes. As I understand it, it is a prospective study in high school athletes with a non-athletic control group.

We developed the Menstrual Cycle Diary to be able to show within-woman changes from a sedentary state with increasing exercise training (1). Over the years, we have refined it, with the current version being posted on the Centre for Menstrual Cycle and Ovulation Research website www.cemcor.ubc.ca. Explanations about how to score each of the items on this Diary are explained in an article on the website. I'd suggest that you start keeping this Diary yourself. That way, any questions you have can be answered before you begin using it in your study.

Please use reference (2) below when citing this instrument in any academic publication.

You understand that this instrument requires non-parametric analysis methods because the scales are ordinal. Neither the 0-4 nor the alphabetical scale centered around U give interval data.

I am pleased to give you permission to use the daily Menstrual Cycle Diary in your proposed research.

Sincerely,

Jerilynn C. Prior, BA, MD, FRCPC
 Professor of Medicine/Endocrinology

Reference List

- (1) Prior JC, Vigna YM, Alojado N, Sciarretta D, Schulzer M. Conditioning exercise decreases premenstrual symptoms: a prospective controlled six month trial. *Fertil Steril* 1987; 47:402-408.
- (2) Prior JC. Exercise-associated menstrual disturbances. In: Adashi EY, Rock JA, Rosenwaks Z, editors. *Reproductive Endocrinology, Surgery and Technology*. New York: Raven Press, 1996: 1077-1091.

APPENDIX E

The University of Texas Pan American
Study Title: "The Effects Physical Activity Has On The Menstrual Cycle
Characteristics Between Two Groups of High School Athletes and One
Group of High School Non-Athletes"

INFORMED CONSENT FORM

Background

This is a survey intended to look into the general understanding and attitudes of female athletes and non-athletes regarding how physical activity affects the menstrual cycle characteristics between two groups of high school athletes and one group of high school non-athletes. Roughly 30 students will be asked to volunteer for this research project.

Procedures and Duration

If your child decides to play a part in this research your child will be asked to answer a twenty-five-question questionnaire if your child is not an athlete and a thirty-question questionnaire if your child is an athlete. The questions your child will be answering will be about when your child started their menstrual cycle, how your child feels about missing a period, the food your child eats, any health problems your child may have, any diseases that may run in your family, and your child's risk for developing osteoporosis (a disease of brittle bones). If your child does decide to play a part in this research your child will be given a blank envelope with the questionnaire, complete the questionnaire, place it in the blank envelope, seal it and give it back to the researcher. Your child will be told not put their name on the questionnaire. By not putting your child's name on the questionnaire no one will know how your child answers the questions or who answered what questionnaire. Answering this questionnaire should take about 30 minutes to answer. Other methods of data collection included a personal information page, which included your child's years competing, height, weight, menarche age, and use of birth control pills. Your child will also fill in a monthly menstrual cycle diary for three-months, a three-month calendar, and make journal entries for each day of the research study where your child documents the physical activity participated in or did not participate in on a daily basis. The

data entry into the menstrual cycle diary, the calendar, and the journal will take approximately one hour per day for the duration of the research study.

Risks/Benefits

There are no foreseeable risks associated with your child's participation in this research study. There are no direct benefits to your child but indirect benefits may result as better education programs may be developed that address the Effects Physical Activity has on the Menstrual Cycle Characteristics of Athletic Females and Non-Athletic Females.

Confidentiality Statement

The information gathered from this research will be kept confidential. The data will securely stored in a locked file cabinet in Dr. Paul Villas' office at the University of Texas Pan American, 1201 W. University Drive, Edinburg, Texas, Room HPI 1.112 and access will not be given to anyone who is not actively participating in the execution of this research study without the expressed written consent of the principal investigator.

Compensation

Neither you nor your child will receive no money or other compensation for your child's participation in this study.

Contact Information

For questions or comments about the procedures, positive or adverse incidents due to participation in this study or any other attribute of this study, contact the researcher, Yolanda Robinson, Graduate Students, at 534 N. Travis, San Benito, Texas 78586, or Faculty Advisor Dr. Paul Villas, at Room 1.112 Health and Kinesiology Building, University of Texas Pan American, or at the Office number (956) 383-2115. The Institutional Review Board-Human Subject's In Research has reviewed this research for the protection of human subjects. For research related problems or questions regarding subject's rights, the Human Subject's Committee may be contacted through Dr. Mark Granberry, Chair, at 318-5255.

Voluntary Participation

Participation in this research is voluntary and you may withdraw your child or your child may withdraw at any time without penalty. Your child's refusal to participate or desire to discontinue participation at any time will involve no penalty or loss of benefits your child is otherwise entitled.

Consent

I have read the explanations provided to me and voluntarily agree to allow my child to participate in this study. I have been given a copy of this informed consent form.

Subject's name (print) _____

Signature of Subject _____ Date ____ / ____ / ____

Signature of Witness _____ Date ____ / ____ / ____

University of Texas Pan American
del Estudio: "Los Efectos la Actividad Física Tiene En Las Características
Menstruales del Ciclo Entre Dos Grupos de Atletas de Preparatoria y Un
Grupo de No-Atletas" de Preparatoria

FORMA INFORMADA de CONSENTIMIENTO

EL FONDO

Esto es una inspección pensó mirar en el general que entiende y las actitudes de atletas y no-atletas femeninos con respecto a la actividad cuán física afectan las características menstruales del ciclo entre dos grupos de atletas de preparatoria y un grupo de no-atletas de preparatoria. Aproximadamente 30 estudiantes serán pedidos ofrecerse para este proyecto de investigación.

LOS PROCEDIMIENTOS Y LA DURACIÓN

Si usted decide jugar una parte en esta investigación que usted se pedirá para se contestar un veinte cuestionario de cinco preguntas si usted no es un atleta y un cuestionario de la treinta-pregunta si usted es un atleta. Las preguntas que usted estará contestando estarán acerca de cuando usted empezó su ciclo menstrual, cómo usted se siente acerca de perder un período, el alimento que usted come, cualquier problemas de la salud que usted puede tener, cualquier enfermedad que puede correr en su familia, y en su riesgo para desarrollar osteoporosis (una enfermedad de huesos quebradizos). Si usted decide jugar una parte en esta investigación usted completará el cuestionario, lo coloca en el sobre en blanco, lo sella y da lo apoya al investigador. Usted no pondrá su nombre en el cuestionario y nadie sabrá cómo que usted contestó las preguntas o que contestó qué cuestionario. Contestar este cuestionario debe tomar acerca de 30 minutos. Otra información que pediremos incluye el número de años que compiten en el atletismo, la altura, el peso, la edad del período primero menstrual, y del uso de píldoras anticonceptivas. Usted llenará también un diario menstrual mensual del ciclo por tres-meses, para un calendario de tres-mes, y para las entradas de diario de marca para cada día del estudio de investigación donde usted registra su actividad física en una base diaria. Todo

esto debe tomar aproximadamente una hora por día durante el estudio de investigación.

LOS RIESGOS/BENEFICIOS

No hay los riesgos previsibles asociados con su participación en este estudio de investigación. No hay le dirige los beneficios a usted pero los beneficios indirectos pueden resultar los programas como mejores de la educación se pueden desarrollar que dirigen los efectos la actividad física tiene en el ciclo menstrual de hembras atléticas y hembras no-atléticos. La Declaración de la confidencialidad que La información reunió de esta investigación se mantendrá confidencial. Los datos hacen seguramente almacenado en un archivador cerrado en la oficina de Dr. Paúl' Villas, University of Texas Pan American, 1201 W. University Drive, Edinburg, Texas, el Espacio HPI 1.112 y el acceso no serán dados a nadie que no toma parte en activamente la ejecución de este estudio de investigación sin el consentimiento escrito expresado del investigador principal.

LA COMPENSACIÓN

Usted no recibirá dinero ni otra compensación para su participación en este estudio. Contacte Información Para preguntas o comentarios acerca de los procedimientos, los incidentes positivos o adversos debido a la participación en este estudio o cualquier otro atributo de este estudio, contactan al investigador, Yolanda Robinsón, Estudiantes Graduados, en 534 N. Travis, San Benito, Texas 78586, o Consejero de Facultad Dr. Paúl Villas, en el Espacio 1.112 Salud y Edificio de Kinesiología, University of Texas Pan American, o en el número de la Oficina (956) 383-2115. La Revisión Institucional el Sujeto Tabla-Humano's En la Investigación ha revisado esta investigación para la protección de sujetos humanos. Para la investigación relacionó los problemas o las preguntas con respecto al sujeto'los derechos de s, el Sujeto Humano'el Comité des puede ser contactado por Dr. Mark Granberry, la Silla, en (956) 318-5255.

LA PARTICIPACIÓN VOLUNTARIA

De la Participación en esta investigación es voluntaria y usted puede retirar en tiempo sin pena. Su negativa para participar o desear de discontinuar

la participación en tiempo no implicará pena o pérdida de los beneficios que usted de otro modo se permite. Consienta he leído las explicaciones proporcionada a mí y concuerdo voluntariamente tomar parte en este estudio. He sido dado una copia de esta forma informada del consentimiento.

La nombre del Sujeta _____ Fecha ____/____/____

La firma del Sujeta _____ Fecha ____/____/____

La firma de Testigo _____ Fecha ____/____/____

APPENDIX F

Child Assent Form
For the Research Project

The Effects Physical Activity Has On The Menstrual Cycle Characteristics Between Two
 Groups of High School Athletes and One Group of High School Non-Athletes

Principal Investigator: Yolanda Robinson
 Telephone Number: (956) 399-2391
 Faculty Sponsor: Dr. Paul Villas
 Telephone Number: (956) 383-2115
 Department: Department of Kinesiology
 Institutional Review Board Telephone Number: (956) 292-7309

In this study we want to find the best way to help young females like you learn more about your menstrual cycle and what happens to the menstrual cycle when you are an athlete or a non-athlete.

We will work with you to learn how to fill in the menstrual cycle diary, how to fill in the journal entries, and what to place in the calendar. Then you will spend approximately three-months filling in the menstrual cycle diary, journal entries, and calendar. You will spend approximately one hour per day filling in all the information in your booklet.

No one other than the persons conducting this study will know what you have written on the questionnaire or the diary.

- 1) We will then meet with you and your parents to explain that there are no risks or benefits from participating in this study. You and your parents will come to one meeting a month until the end of three-months.
- 2) I will meet with you once a month to see the progress that you have made on filling in your notebooks and to speak with you, answer any questions and see how you're doing.
- 3) Finally, at the end of three-months after you have finished filling in all the paperwork in your notebooks, we will talk to you, see if you have any questions, and to see how you're doing. A committee member or I will explain or answer any questions you may have. Please understand that you may leave the program at any time you wish. No one else will know any of your answers to any of the questions, because your name will not be used.

If you agree with statement above and wish to take part, please sign your name below. Your name below means that it is "OK" with you to be in the program.

Child's Signature: _____ Date: ____/____/____

Witness's Signature: _____ Date: ____/____/____

Reprendió Forma de Asentimiento
Para el Proyecto de Investigación
Los Efectos la Actividad Física Tiene en las Características Menstruales del Ciclo
Entre Dos Grupos de Atletas de Preparatoria y un Grupo de No-Atletas de
Preparatoria

El Investigador principal:	Yolanda Robinsón
el Número de teléfono:	(956) 399-2391
Patrocinador de Facultad:	Dr. Paúl Villas
el Número de teléfono:	(956) 383-2115
el Departamento	Departamento de Kinesiología
La Tabla Institucional de la Revisión:	el Número de teléfono: (956) 292-7309

En este estudio que queremos encontrar la mejor manera de ayudar hembras jóvenes como usted aprenden más acerca de su ciclo menstrual y lo que sucede al ciclo del menstrual cuando usted es un atleta o un no-atleta.

Trabajaremos con usted aprender a cómo llenar el diario menstrual del ciclo, cómo llenar las entradas de diario, y lo que colocar en el calendario. Usted gastará aproximadamente una hora por día llenando todo el informaiton en su folleto.

Nadie de otra manera que las personas que realiza este estudio sabrá lo que usted ha escrito en el cuestionario o el diario.

- 1) Nosotros entonces encontraremos con usted y sus padres para explicar que no hay los riesgos ni los beneficios de tomar parte en este estudio. Usted y sus padres vendrá a una reunión un mes hasta el fin de tres-meses.
- 2) Encontraré con usted ver una vez al mes el progreso que usted ha hecho a llenando sus cuadernos y para hablar con usted, contesta que cualquiera pregunta y ve cómo usted're haciendo.
- 3) Finalmente, a finales de tres meses después que usted ha terminado llenando todo el papeleo en sus cuadernos, nosotros hablaremos con usted, vemos si usted tiene cualquiera pregunta, y para ver cómo usted're haciendo. Un miembro del comité o explicarán o contestarán que cualquiera le pregunta puede tener. Entienda por favor que usted puede salir el programa en tiempo que usted desea. Nadie sabrá más cualquiera de sus respuestas a cualquiera de las preguntas, porque su nombre no se utilizará.

Si usted concuerda con la declaración encima de y el deseo para tomar la parte, tiene por favor el signo su nombre abajo.

Su nombre debajo de medios que está bien con usted estar en el programa.

La Firma de la niña: _____ la Fecha de ____/____/____

Firma de Testigo: _____ la Fecha de ____/____/____

APPENDIX G

The University of Texas Pan American
Study Title: "The Effects Physical Activity Has On The Menstrual Cycle
Characteristics Between Two Groups of High School Athletes and One Group of
High School Non-Athletes"

PARENTAL CONSENT FORM

Background

This is a survey intended to look into the general understanding and attitudes of female athletes and non-athletes regarding how physical activity affects the menstrual cycle characteristics between two groups of high school athletes and one group of high school non-athletes. Roughly 30 students will be asked to participate for this research project.

Procedures and Duration

If your child decides to play a part in this research your child will be asked to answer a twenty-five-question questionnaire if your child is not an athlete and a thirty-question questionnaire if your child is an athlete. The questions your child will be answering will be about when your child started their menstrual cycle, how your child feels about missing a period, the food your child eats, any health problems your child may have, any diseases that may run in your family, and your child's risk for developing osteoporosis (a disease of brittle bones). If your child does decide to play a part in this research your child will be given a blank envelope with the questionnaire, complete the questionnaire, place it in the blank envelope, seal it and give it back to the researcher. Your child will be told not put their name on the questionnaire. By not putting your child's name on the questionnaire no one will know how your child answered the questions or who answered what questionnaire. Answering this questionnaire should take about 30 minutes to answer. Other methods of data collection included a personal information page, which included your child's years competing, height, weight, menarche age, and use of birth control pills. Your child will also fill in a monthly menstrual cycle

diary for three-months, a three-month calendar, and make journal entries for each day of the research study where your child documents the physical activity participated in or did not participate in on a daily basis. The data entry into the menstrual cycle diary, the calendar, and the journal will take approximately one hour per day for the duration of the research study.

Risks/Benefits

There are no foreseeable risks associated with your child's participation in this research study. There are no direct benefits to your child but indirect benefits may result as better education programs may be developed that address the Effects Physical Activity has on the Menstrual Cycle Characteristics of Athletic Females and Non-Athletic Females.

Confidentiality Statement

The information gathered from this research will be kept confidential. The data will securely stored in a locked file cabinet in Dr. Paul Villas' office at the University of Texas Pan American, 1201 W. University Drive, Edinburg, Texas, Room HPI 1.112 and access will not be given to anyone who is not actively participating in the execution of this research study without the expressed written consent of the principal investigator.

Compensation

Neither you nor your child will receive no money or other compensation for your child's participation in this study.

Contact Information

For questions or comments about the procedures, positive or adverse incidents due to participation in this study or any other attribute of this study, contact the researcher, Yolanda Robinson, Graduate Students, at 534 N. Travis, San Benito, Texas 78586, or Faculty Advisor Dr. Paul Villas, at Room 1.112 Health and Kinesiology Building, University of Texas Pan American, or at the Office number (956) 383-2115.

The Institutional Review Board-Human Subject's In Research has reviewed this research for the protection of human subjects. For research related problems or questions regarding subject's rights, the Human Subject's Committee may be contacted through Dr. Mark Granberry, Chair, at 318-5255.

Voluntary Participation

Participation in this research is voluntary and you may withdraw your child or your child may withdraw at any time without penalty. Your child's refusal to participate or desire to discontinue participation at any time will involve no penalty or loss of benefits your child is otherwise entitled.

Consent

I have read the explanations provided to me and voluntarily agree to allow my child to participate in this study. I have been given a copy of this informed consent form.

Subject's name (print) _____

Signature of Subject _____ Date ____/____/____

Signature of Witness _____ Date ____/____/____

University of Texas Pan American
Estudie el Título: "Los Efectos la Actividad Física Tiene En Las Características Menstruales del Ciclo Entre Dos Grupos de Atletas de Preparatoria y Un Grupo de No-Atletas de Preparatoria"

FORMA PATERNAL de CONSENTIMIENTO

EL FONDO

Esto es una inspección pensó mirar en el general que entiende y las actitudes de atletas y no-atletas femeninos con respecto a la actividad cuán física afectan las características menstruales del ciclo entre dos grupos de atletas de preparatoria y un grupo de no-atletas de preparatoria. Aproximadamente 30 estudiantes serán pedidos ofrecerse para este proyecto de investigación.

LOS PROCEDIMIENTOS Y LA DURACIÓN

Si su niña decide jugar una parte en esta investigación que su niña se pedirá para se contestar un veinte cuestionario de cinco preguntas si su niña no es un atleta y un cuestionario de la treinta-pregunta si su niña es un atleta. Las preguntas que su niña estará contestando estarán acerca de cuando su niña empezó su ciclo menstrual, cómo su niña se siente acerca de perder un período, el alimento que su niña come, cualquier problemas de la salud que su niña puede tener, cualquier enfermedad que puede correr en su familia, y en su niña el riesgo de s para desarrollar osteoporosis (una enfermedad de huesos quebradizos). Si su niña decide jugar una parte en esta investigación que su niña se dará un sobre en blanco con el cuestionario, completa el cuestionario, lo coloca en el sobre en blanco, lo sella y da lo apoya al investigador. Su niña será dicho no puso su nombre en el cuestionario. Por no poner a su niña el nombre de s en el cuestionario que nadie sabrá cómo que su niña contesta las preguntas o que contestó qué cuestionario. Contestar este cuestionario debe tomar acerca de 30 minutos de contestar. Otros métodos de la recogida de datos incluyeron una página personal de información, que incluyó a su niña años de s que compiten, la altura, el peso, la edad de

menarche, y el uso de píldoras anticonceptivas. Su niña llenará también un diario menstrual mensual del ciclo por tres-meses, para un calendario de tres-mes, y para las entradas de diario de marca para cada día del estudio de investigación donde su niña documenta la actividad física tomó parte en o no tomó parte en una base diaria. La entrada de datos en el diario menstrual del ciclo, el calendario, y el diario tomarán aproximadamente una hora por día durante el estudio de investigación.

LOS RIESGOS/BENEFICIOS

No hay los riesgos previsibles asociados con su niña'la participación de s en este estudio de investigación. No hay le dirige los beneficios a su niña pero los beneficios indirectos pueden resultar los programas como mejores de la educación se pueden desarrollar que dirigen los Efectos la Actividad Física tiene en las Características Menstruales del Ciclo de Hembras Atléticoas y Hembras No-Atléticoas.

LA DECLARACIÓN DE LA CONFIDENCIALIDAD

Que La información reunió de esta investigación se mantendrá confidencial. Los datos hacen seguramente almacenado en un archivador cerrado en Dr. Paúl' Villas en la oficina en University of Texas Pan American, 1201 W. University Drive, Edinburg, Texas, el Espacio HPI 1.112 y el acceso no serán dados a nadie que no toma parte en activamente la ejecución de este estudio de investigación sin el consentimiento escrito expresado del investigador principal.

LA COMPENSACIÓN

Ni usted ni su niña no recibirá dinero ni otra compensación para su niña'la participación de sen este estudio.

CONTACTE INFORMACIÓN

Para preguntas o comentarios acerca de los procedimientos, los incidentes positivos o adversos debido a la participación en este estudio o cualquier otro atributo de este estudio, contactan al investigador, Yolanda Robinsón, Estudiantes Graduados,

en 534 N. Travis, San Benito, Texas 78586, o Consejero de Facultad. Dr. Paúl Villas, en el Espacio 1.112 Salud y Edificio de Kinesiología, University of Texas Pan American, o en el número de la Oficina (956) 383-2115. La Revisión Institucional el Sujeto Tabla-Humano's En la Investigación ha revisado esta investigación para la protección de sujetos humanos. Para la investigación relacionó los problemas o las preguntas con respecto al sujeto'los derechos de s, el Sujeto Humano'el Comité de s puede ser contactado por Dr. Mark Granberry, la Silla, en (956) 318-5255.

LA PARTICIPACIÓN VOLUNTARIA

Participación en esta investigación es voluntaria y usted puede retirar a su niña o su niña puede retirar en tiempo sin pena. Su niña'la negativa de s para participar o desear de discontinuar la participación en tiempo no implicará pena o pérdida de los beneficios que su niña de otro modo se permiten. Consienta he leído las explicaciones proporcionada a mí y concuerdo voluntariamente permitir mi niña para tomar parte en este estudio. He sido dado una copia de esta forma informada del consentimiento.

Los sujetos denominan (impresión) _____ Fecha ____/____/____

La firma del Sujeto _____ Fecha ____/____/____

La firma de Padre: _____ Fecha ____/____/____

La firma de Testigo _____ Fecha ____/____/____

APPENDIX H

QUESTIONNAIRE

1. At what age did you begin puberty? _____
2. At what age did you begin your menstrual cycle? _____
3. What is your current age? _____
4. What is your current weight? _____
5. What is your current height? _____
6. When was your last menstrual cycle? _____
7. What was the length of your last menstrual cycle? _____
8. Do you think that you use an unusual amount of sanitary pads or tampons?
 - ☐ Yes
 - ☐ No
9. What is the normal length of your menstrual cycle?

<input type="checkbox"/> 3 days	<input type="checkbox"/> 7 days
<input type="checkbox"/> 4 days	<input type="checkbox"/> other
<input type="checkbox"/> 5 days	(specify) _____
<input type="checkbox"/> 6 days	—
10. What is the rate of occurrence?

<input type="checkbox"/> Every 21 days	<input type="checkbox"/> other
<input type="checkbox"/> Every 28 days	(specify) _____
<input type="checkbox"/> Every 34 days	_____
<input type="checkbox"/> Every 36 days	
11. What is your heaviest flow day?
 - ☐ 1st day
 - ☐ 2nd day
 - ☐ other (specify) _____
12. How often do you experience PMS?

<input type="checkbox"/> Every month	<input type="checkbox"/> Other _____
<input type="checkbox"/> Every other month	

13. If yes, approximately when do the PMS symptoms begin before your menstrual cycle begins?

- | | |
|----------------------------------|---------------------------------------|
| <input type="checkbox"/> 2 weeks | <input type="checkbox"/> 3 days |
| <input type="checkbox"/> 1 week | <input type="checkbox"/> 2 days |
| <input type="checkbox"/> 6 days | <input type="checkbox"/> 1 day |
| <input type="checkbox"/> 5 days | <input type="checkbox"/> Other: _____ |
| <input type="checkbox"/> 4 days | |

14. What grade are you in?

- ☐ 9
☐ 10
☐ 11
☐ 12

15. Are you in any athletic sports in high school? (Please mark all that apply or none if none apply)

- | | |
|---|--|
| <input type="checkbox"/> Swimming | <input type="checkbox"/> volleyball |
| <input type="checkbox"/> track & field | <input type="checkbox"/> cheerleading |
| <input type="checkbox"/> tennis | <input type="checkbox"/> other (specify) |
| <input type="checkbox"/> cross country | _____ |
| <input type="checkbox"/> weight lifting | _____ |
| <input type="checkbox"/> basketball | _____ |

16. How long have you been competing in sports?

- | | |
|--------------------------------------|-------------------------------------|
| <input type="checkbox"/> One year | <input type="checkbox"/> Five years |
| <input type="checkbox"/> Two years | <input type="checkbox"/> Six years |
| <input type="checkbox"/> Three years | <input type="checkbox"/> Other |
| <input type="checkbox"/> Four years | |

17. How much physical activity do you engage in daily?

- | | |
|-----------------------------------|--|
| <input type="checkbox"/> 10 mins | <input type="checkbox"/> 1 hour |
| <input type="checkbox"/> 15 mins. | <input type="checkbox"/> 2 hours |
| <input type="checkbox"/> 20 mins. | <input type="checkbox"/> more than 2 hours a day |
| <input type="checkbox"/> 30 mins. | |
| <input type="checkbox"/> 45 mins. | |

18. How much physical activity do you participate in on a:
- | | Hours: | Quantity |
|----------------|--------|----------|
| Daily basis: | _____ | _____ |
| Weekly basis: | _____ | _____ |
| Monthly basis: | _____ | _____ |
19. Have you ever been diagnosed with either anorexia nervosa, bulimia or other eating disorders?
- ☐ Yes
- ☐ No
20. If yes, please check which ones.
- ☐ Anorexia Nervosa
- ☐ Bulimia
- ☐ Malnutrition
- ☐ Obesity
- ☐ Extreme obesity
- ☐ Other: _____
21. Are you on any type of diet?
- ☐ Yes
- ☐ No
22. Are any of the following the diets that you are following?
- ☐ Adkins Diet
- ☐ Swimmers Diet
- ☐ Zone Diet
- ☐ Vegetarian Diet
- ☐ Other: _____
23. Do you take prescription medication for your menstrual cycle cramps?
- ☐ Yes
- ☐ No
24. Do you think it is important to know how and why your menstrual cycles act as they do?
- ☐ Yes
- ☐ No

25. Have you ever experience any of the following:

- | | |
|---|---|
| <input type="checkbox"/> Emotional stress | <input type="checkbox"/> Anxiety distress |
| <input type="checkbox"/> Peer pressure | <input type="checkbox"/> Family stresses |
| <input type="checkbox"/> Chronic illness | <input type="checkbox"/> Emotional distress |

FOR ATHLETE'S ONLY

1. How would you rate the intensity of your training?

- ☐ low
- ☐ mild
- ☐ moderate
- ☐ intense

2. How often do you train?

- ☐ every day
- ☐ every other day
- ☐ once a week
- ☐ other
(specify)_____

3. Will you be training off-season?

- ☐ yes
- ☐ no

4. If yes, how often will you train?

- ☐ every day
- ☐ every other day
- ☐ once a week
- ☐ other (specify)

5. Will you train as often as during season?

- ☐ yes
- ☐ no

APPENDIX I

UNDERSTANDING YOUR MENSTRUAL CYCLE

Instructions for the Menstrual Cycle Diary

The menstrual cycle is created by over a dozen hormones changing in a complex and coordinated manner. Hormones of the ovary, pituitary, and uterus work together to create cyclic symptoms and signs during your cycle. Completing this form every day will help you to learn from and to notice important features about your own menstrual cycle.

At the top, write the month of the first day of flow (day 1). Please start filling in the form on the evening of the first day of your period.

Be sure to write something in every box. A blank tells you nothing about that day but a 0 is good evidence you didn't experience it! If you forget, skip that day. Don't try to remember later. Use a new chart for each cycle.

If no period occurs, continue recording on another sheet after day 30 and just re-number 1 to "31" for subsequent days until flow starts. If you have had no flow for several months, start using a new Diary sheet for each month.

The scale at the top of this Diary is from 0 to 4; zero represents something you did not experience and four represents the worst it has ever been for you. The scale at the bottom uses letters to indicate as factors go up or down from your usual 'U' or normal state. Although the form is mostly self-explanatory, a few explanations and samples are provided.

Flow:

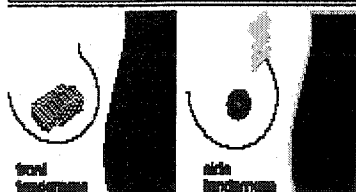
Because flow is important, you are requested to provide two indicators for it. The first is the number of regular sized, soaked pads and/or tampons you use each day of flow. If you use a combination of pads and tampons, enter the combined total for that day (4 tampons/3 pads = 7). The second is your assessment of flow. The score goes from 0 = none, 1 = spotting, to 4 which means clots or a change every hour.

Name: _____ Month: March Year: 2003

Cycle Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	
Date	12	13	14	15	16	Continued														
Tampons/pads/day	4	4	3	2	0															

Record 0 = none, 1 = minimal, 2 = moderate, 3 = moderately intense, 4 = very intense

Amount Flow	3	4	2	2	1														
-------------	---	---	---	---	---	--	--	--	--	--	--	--	--	--	--	--	--	--	--



Breast Tenderness:

Breasts can tell us a lot about estrogen and progesterone levels and how they are acting. You are being asked to note both front and/or side breast tenderness. In the diagram there is shading in the general areas of your breast that you should touch firmly with the palm of your hand to determine if you have any breast soreness or sensitivity there. There may be very little soreness (a "1") but that pressure will feel different from the way the same pressure feels on your leg, for example.

Fluid Retention:

This means feeling bloated or puffy or water weight gain and getting up to urinate at night.

Mucous Secretions:

The mouth of the uterus (cervix) makes a clear stretchy fluid when estrogen levels are high. Progesterone levels stop the production of stretchy mucous. A "4" means you can stretch the mucous out for 6-8 cm (3-4 inches).

Record 0 = none, 1 = minimal, 2 = moderate, 3 = moderately intense, 4 = very intense

Amount Flow	3	4	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cramps	4	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Breast Tenderness: Front	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	0	0	0
Breast Tenderness: Side	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Fluid Retention	0	0	0	1	0	0	0	0	0	0	0	2	3	3	2	1	2	1	1
Mucous Secretion	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	0	0	0	0

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Headache:

The score in this box is for any old ordinary kind of headache. However, if it was a migraine, put a small star or dot in the box as well as the score.

Feelings and Outside Stresses:

You are asked to record how you feel each day using a 0-4 scale on the top section of the form. In addition, we would like you to evaluate the amount of outside stress in your life (Stress - work, home, etc). These two things are sometimes different - your day may have been awful but you can still feel good about yourself and not depressed or anxious.

Please write your comments at the bottom of the column. This may include any particular event that influenced how you felt that day (eg illness, a job promotion, winning a lottery, argument with partner).

Record M = much less, L = a little less, U = usual, Y = a little increased, Z = much increased

[illegible]

Quantitative Basal Temperature (QBT) Monitoring: (called this because we use statistics to decide where the temperature increase occurs—Prior, Clinical Invest. Med., 1980). Progesterone makes the first morning temperature increase a small but reliable amount.

The following recommendations will assist you to accurately take and record your oral temperature.

1. Day 1 is the first day of your flow (and you should be starting on a new sheet).
2. Take your temperature in the morning, when you first wake.
3. Activity will raise your basal (resting) temperature. Although you may start your thermometer and head to the washroom, if you can, postpone this or getting out of bed until your temperature taking is finished.
4. Under 'Comments', please record any events that may affect your morning temperature (the time if you slept in or got up early, felt like you were getting the flu or had a very late night).

Using the digital thermometer:

1. Press the ON/OFF button and a beep will sound (88.88 will display when the thermometer is used for the first time).
2. After a few seconds the display will go blank.
3. Place the thermometer under your tongue.
4. When the peak temperature is reached (in about 1 minute), a beep will sound 3 times. The reading will not change while the power remains on.
5. Turn the thermometer off by pressing the green ON/OFF button. The reading will be stored in memory for 3 seconds the next time you switch the thermometer on. After 3 seconds, the display will go blank and the temperature will be permanently erased from memory.

Analyzing your temperature data:

If you would like to figure out whether you have ovulated and the length of your luteal phase (the time following ovulation) you can do that. First, compute the average of all the temperatures in your record, by adding them up and dividing by the number of days for which you have temperature readings. The average temperature you get can then be compared with the actual readings. If your temperature went above and stayed above that average until the day before the next flow you have ovulated. The higher temperatures should last 10-16 days. When there are between 3 and 9 days of higher temperatures, you have what is called a short luteal phase. This means that you have ovulated but the time of progesterone elevation is too short.

Enjoy the keeping of this daily Menstrual Cycle Diary and quantitative basal temperature record. You will learn new things about yourself!

Version date: August 29, 2003.

Dr JC Prior© 1991, 2002

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APPENDIX J

Menstrual Cycle Diary

Name: _____

Month: _____

Year: _____

Cycle Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Date																															
Tampons/pads/day																															

Record 0 = none, 1 = minimal, 2 = moderate, 3 = moderately intense, 4 = very intense

Amount Flow																															
Cramps																															
Breast Sore: Front																															
Breast Sore: Side																															
Fluid Retention																															
Mucous secretions																															
Constipation																															
Headache																															
Sleep Problems																															
Feeling Frustrated																															
Feeling Depressed																															
Feeling Anxious																															

Record M = much less, L = a little less, U = usual, Y = a little increased, Z = much increased

Appetite																															
Breast Size																															
Interest in Sex																															
Feeling Of Energy																															
Feeling Of Self-Worth																															
Outside Stresses																															
Basal Temperature																															
Comments (temperature taken late feeling sick, poor sleep, etc)																															

version date: August 29, 2003

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VITA

Yolanda De Leon-Robinson was born in Bowling Green, Ohio on February 26, 1966 to Gonzalo and Guadalupe De Leon. She was raised in Defiance, Ohio and moved to Donna, Texas in 1979. After graduating in 1984 from Donna High School, she attended Hardin Simmons University in Abilene, Texas for 2 years and then returned home. In 1992 she enrolled at the Texas State Technical College in Harlingen, Texas where she received an associate's degree as a Legal Assistant and an associate's degree as an Administrative Assistant. She began working for Atlas & Hall L.L.P. until 1996 when her mother grew ill. In 1997 she enrolled at the University of Texas and Southmost College in Brownsville, Texas. In December 2000 she received her Bachelor's of Science in Kinesiology. In the spring of 1998 she began working for the PHD (Public Education from the Home to the Doctorate) program as a site coordinator at Dr. Cash Elementary in San Benito, Texas. She continued this position until 2003 when she received her teacher certification and accepted a position with the Los Fresnos C.I.S.D. as an elementary physical education teacher at Palmer-Laakso Elementary and a junior high coach at Liberty Memorial where she is still employed. She received her Master of Science in Kinesiology from the University of Texas-Pan American in May 2005.