PERFORMANCE AND GENERAL WELL-BEING PERCEPTIONS BEFORE AND AS RECALLED AFTER MENSES

By

KRISTIN MARIE WOHLRAB

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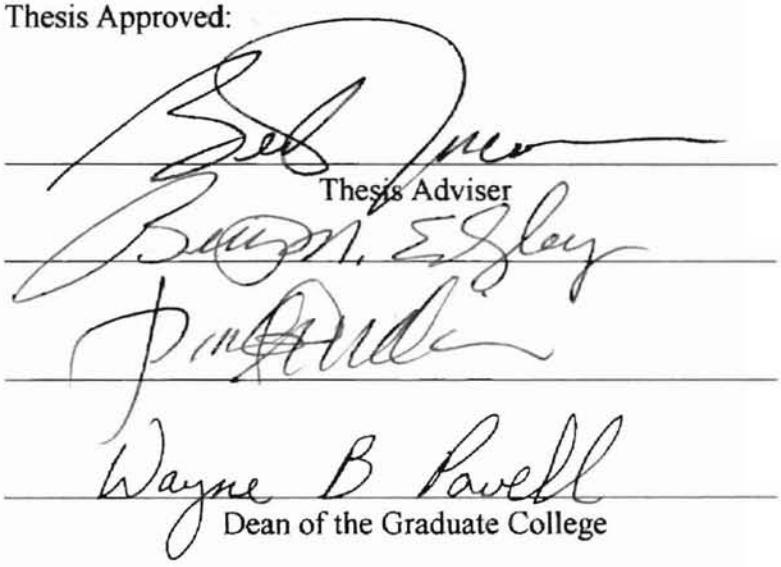

Thesis Adviser

Dean of the Graduate College

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CHAPTER I

INTRODUCTION

Katharina Dalton (1987) introduces premenstrual tension as a gender specific problem succinctly when she says "Once-a-month, with monotonous regularity, chaos is inflicted on American homes as premenstrual tension and other menstrual problems recur time and time again with demoralizing repetition". While a lot is known and even more is being researched about the physiology of premenstrual syndrome (PMS), there are still many myths surrounding the menstrual cycle especially in relation to athletics. Some common myths include: female athletes should avoid athletic participation during menstruation; female athletes should be limited in their choice of contraceptives; and running or jogging may lead to loss of reproductive organ support (Shangold, 1980). To the educated these statements may seem humorous, but unfortunately many regard them as fact. Female athletes, according to Shangold (1980), Doolittle (1972), and De Souza (1990), should not stop or alter their athletic endeavors because of their menstrual cycle.

As the number of women participating in exercise increase, the menstrual cycle and its effects on performance is rapidly becoming a topic of debate. As recently as 1990, it was believed that physical activity had a negative effect on the menstrual cycle (Loucks, 1990). Now, investigators want to know if the menstrual cycle has a true negative effect on athletic performance or if it is only a perceived phenomenon. What has been found is not conclusive, but does show that this topic should be researched further. This study will review the literature regarding premenstrual syndrome and report

on survey results of female athletes and their possible perceived effects on athletic performance.

Statement of the Problem

The problem of this study was to compare perceived athletic performance and general well-being during pre menses with the recall of perceived pre menses performance following menses.

Delimitations

The delimitations of this study were:

1. Thirty-five female intercollegiate athletes participated in this study.

2. Only members of the University of Delaware women's field hockey and volleyball teams and Oklahoma State University women's cross country and softball teams participated in this study.

3. Only medically and scholastically eligible athletes participated, as game performances were included.

Limitations

The limitations of this study were:

1. The subjects were not randomly selected but were members of four pre-existing teams.

2. The instrument contained self-reporting evaluations of attitudes and personal feelings.

3. The survey instrument allowed for individual interpretation of the survey.

Assumptions

The study was based on the following underlying assumptions:

1. The subjects for this study were fully cooperative.

2. The subjects answered the instruments honestly.

3. The subjects for this study accurately represented four different athletic teams.

4. The participants were free of depression or other stress related disorders that could have effected their questionnaire answers.

5. The participants experienced regular menstrual cycles.

Hypothesis

The following hypotheses will be tested at the .05 level:

The perception of athletic performance and general well-being during pre menses will not be statistically different when compared to the recall of pre menses perceptions following menses for the same cohort of college female athletes.

Definitions

For the purpose of this study, the following definitions are provided:

Menses. The monthly flow of blood from the uterus.

Premenstrual Syndrome. Any symptoms or complaints which regularly come just before or during early menstruation but are absent at other times of the cycle.

Normal Menstruation. One cycle every 21 - 35 days.

Follicular Phase. An increase in follicle-stimulating hormone, which results in the production of estrogen during the first half of the menstrual cycle.

Luteal Phase. A surge in luteinizing hormone triggered by rising levels of estrogen. A resultant rise in progesterone stimulates maturation of the follicle and ovulation.

CHAPTER II

REVIEW OF THE LITERATURE

Menses

Menses is defined as the monthly flow of blood from the uterus. A "normal" menstrual cycle occurs between twenty-one and thirty-five days, although some research states normal as nine menstrual cycles per year (Puhl, 1986). To better understand the menstrual cycle it has been divided into seven phases consisting of four days each. The phases are: menstruation, post menstruum, late postmenstruum, ovulation, post-ovulation, early premenstruum and premenstruum (Dalton, 1987). These phases are based on a twenty-eight day cycle. If a female has a cycle that is longer or shorter than every twenty-eight days, the change will occur during the late postmenstruum phase (Dalton, 1987).

During the menstrual cycle, a female has a variety of changes going on in her body. The most important are the varying amounts of hormones that are circulating through her body which help to regulate her body processes. It is also interesting to note that the hormone levels circulating in the blood are never the same within any two phases of the menstrual cycle, unlike the hormone levels of a male which stay constant during a one month time span (Dalton, 1987). These hormone level changes are what may lead to mood swings, performance variation and other premenstrual symptoms which will be discussed later. The following is a review of the literature concerning the relationship

between premenstrual syndrome and athletic performance.

Menstrual Disorders

Female athletes are not immune to menstrual disorders. Some studies have shown that they are more susceptible than non-athletes to certain disorders such as amenorrhea and oligomenorrhea (Pearl, 1993; Loucks and Horvath, 1985; Shangold, 1980). Amenorrhea is defined as absence or cessation of the menses. Oligomenorrhea is scanty or infrequent menstruation (Wells, 1991). These two disorders were found to be more prevalent in sports that required strenuous physical activity, such as tennis, rowing and skiing (Erdelyi, 1976).

The severity of these problems should be understood and discussed with the female athlete. The central issue involving menstrual irregularities is the decrease in the amount of estrogen circulating in the body and its detrimental effects. Women with these problems have to be concerned about two things, infertility and bone degeneration (Pearl, 1993). It is thought that twenty-nine percent of collegiate long distance runners are affected by one of these disorders. Because of demineralization, runners are more at risk to stress fractures during their competitive years and osteoporosis later in life. Guidelines published by the National Collegiate Athletic Association (1992), state that there are no irreversible effects on women with an athletic menstrual disorder. Pearl (1993), concluded that there are no irreversible effects on reproduction with women who have an athletic menstrual dysfunction.

If a female is suspected of having a menstrual disorder she should be seen by a physician for a complete physical. This exam should include nutritional counseling,

review of the training program, routine monitoring of the menstrual cycle and counseling in regards to possible stress factors in the athlete's life (NCAA, 1992).

Another manifestation of menstrual disorders which would have a negative impact on performance is dysmenorrhea or painful menstruation. According to Wells (1991), dysmenorrhea is highest among swimmers and occurs from the consequence of participation in competition during the menstrual period. It is reported that sixty to seventy-five percent of all women report this type of disorder. Prostaglandins that are being released from the endometrium are a major cause of dysmenorrhea (Puhl, 1986). In order to alleviate the symptoms, most physicians will prescribe prostaglandin inhibitors, which have proven to be very effective (Shangold, 1980).

The degree to which an athlete perceives pain has a great impact on her performance. According to Shangold (1980), athletes are thought to have a higher pain tolerance than sedentary females for a number of reasons:

1. the self-discipline and pain tolerance they have developed during their training enables them to tolerate more pain,
2. their innate resistance to pain or diminished perception of it permits them to be more active,
3. the distraction of other activities diminishes their awareness of pain,
4. all of these factors combine to reduce pain or their perception of it.

Individual perception is very important (Moller-Nielsen, 1988; Wells, 1991). An athlete who lets herself be bothered by dysmenorrhea may report having decreased performance as compared to the athlete who is not having any pain at all (Shangold, 1980; Wilson,

1991). A perceived decrease in performance will likely cause the athlete to perform poorly.

Premenstrual Syndrome

Some women regard menstruation as a "curse" due to the severity of symptoms that they experience prior to menses. Premenstrual syndrome, as it was first named in 1931 (Shepard, 1997), is commonly defined as "any symptoms or complaints which regularly come just before or during early menstruation, but are absent at other times of the cycle" (Dalton, 1987). There are a wide variety of factors that are thought to cause premenstrual syndrome, such as water retention, hypoglycemia, Vitamin B6 deficiency, estrogen excess, progesterone deficiency or alterations in the central nervous system neurotransmitters (Cowart, 1989). PMS symptoms may include, tension, depression, irritability, backache, weight gain, headache, acne, appetite craving, painful joints, asthma, and others (Futterman, 1988; Englander-Golden, 1978; Cowart, 1989).

In order to receive appropriate treatment for PMS the doctor must first make a careful diagnosis to ensure that there is not some other accompanying disease or illness, such as depression or stress (Dalton, 1987). Often, the physician may ask the female to keep a diary of her PMS complaints rather than prescribing medication (Gath, 1988; Cowart, 1989). The symptoms will be recorded in a diary from month to month over a period of several months. In order for a female to say she has premenstrual syndrome, she needs to have recorded the same symptoms for a number of months at the same time during her menstrual cycle. By keeping a diary it becomes evident if the symptoms are clustered around the menstrual cycle or if headaches and tension occur scattered

throughout the month. If the symptoms are clustered around the menstrual cycle, the doctor will treat the female for PMS.

Over forty treatments have been proposed, but researchers have not come to a common agreement as to which one is most beneficial (Strausz, 1996). Many women try to alleviate their symptoms without the aid of a trained health care professional. This treatment is acceptable if the female understands that if she were not to succeed, it would be in her best interest to seek effective help from any doctor who understands hormone therapy (Dalton, 1987).

Hormone therapy is a common treatment for PMS. But, in order for the therapy to work, a physician must know which hormone(s) level(s) is (are) unbalanced. Oral contraceptives are the preferred method to bring estrogen and progesterone levels in balance. In 1997, the Journal of the American Medical Association (JAMA) suggests dietary and lifestyle changes as the preferred method of reducing symptoms because medications can have side effects. Eliminating caffeine, sugar and alcohol; reducing stress; eating small, frequent meals and reducing salt intake are all lifestyle changes that can enhance a sense of well-being as well as decrease PMS symptoms (Cowart, 1989; JAMA, 1997). Exercise can be beneficial because it produces relaxation, decreases food cravings, enhances a feeling of self control and increases endorphin levels which are thought to produce a natural high (Wells, 1991). Acupuncture has also been shown to produce positive results because of the idea that it increases endorphin levels (Strausz, 1996). Medications such as lithium and spironolactone are prescribed, but controversy surround their use. In 1995, the *New England Journal of Medicine* published a study that reported Prozac helped women with severe PMS mood type of symptoms. The *Journal*

of the American Medical Association (1997), also reported that the anti-depressant Zoloft has produced similar benefits for patients with severe PMS symptoms. The anti-depressants work by regulating serotonin to the brain which regulates mood. Music therapy and hysterectomies are also prescribed to aid in alleviating premenstrual symptoms (Strausz, 1996). An extreme example of treatment found in the study conducted by Wilson, Abdenour and Keye (1991), consisted of an athlete attempting to eliminate her symptoms by drinking a six-pack of beer.

Dr. William Keye (1988), presented a seven step approach to treatment for PMS symptoms. His program incorporates medical, psychological and social supports including education, elimination of fears regarding the menstrual cycle and possible lifestyle changes.

According to Cowart (1989), studies have been performed to compare the different therapies for PMS and surprisingly there is a significant placebo effect found in PMS patients. It seems that thirty percent of women with PMS will improve regardless of the prescribed treatment.

Athletic Performance and the Menstrual Cycle

The athletic population, as a whole, has attained a variety of advantages and disadvantages secondary to their activity. Female athletes are no exception. Many females complain of PMS symptoms while others claim a decrease in PMS symptoms due to their training regime. Because researchers cannot agree on the cause of PMS, there is little to guide them to agree on an appropriate treatment. Therefore, female

athletes are put in the hands of athletic trainers, physicians and other teammates to give aid in alleviating PMS symptoms.

What about performance? How does the athlete perceive her menstrual cycle? What myths are floating around in her mind? How will she deal with her PMS symptoms before and after the competition starts? These are just a few of the questions that need to be addressed when dealing with a female athlete.

One of the most important factors to be considered is the attitude of the athlete toward menses. Not long ago, menstruation was considered unclean, and females were ostracized from physical education classes and swimming pools. Even today the euphemisms that are used to describe menstruation are less than positive (Wells, 1991). Terms such as "monthlies", "Aunt Flow", "that time of the month", "visit from a friend", "the curse", and "sickness" are all negative connotations that can have a negative impact on a female athlete. In the mid 70's, Erdelyi (1976), acknowledged that performance during menses may well be influenced by psychological factors that are due to attitudes toward menstruation. Wells, in 1991, described the term self-expectancies to mean that a perceived effect regarding behavior will likely produce that behavior. Therefore, if a woman expects to perform a certain way, whether positive or negative, as a result of menstruation, she may indeed do so.

The athlete's personal symptoms are also important. To the average female, bloatedness, backache, headache, painful joints and asthma are symptoms that could be tolerated. But to a competitive athlete, these symptoms could lead to a perceived negative impact on performance. An elite athlete would be the most susceptible to slight changes in her body. She would be so tuned to her body that any changes in weight gain

or dysmenorrhea, would become more noticeable and could effect her. Interestingly, with all the symptoms a female athlete may have, dysmenorrhea included, only one-third used prescription medication for pain relief (Wilson, 1991).

Studies have shown that some athletes missed practices, practiced or performed with less intensity and felt that they were less coachable because of their PMS symptoms (Wilson, 1991). In today's athletic world, if a female chooses to miss practice or a competition because of her menstrual cycle she basically eliminates herself from an athletic career (Wells, 1991). All of these factors can lead to a direct or indirect impact on performance.

Despite the popular belief that exercise helps ameliorate premenstrual symptoms, Wilson (1991), found that competitive female athletes experience PMS symptoms as often and as severe as non-athletes. These same athletes believed that PMS decreased their athletic performance and few utilized effective methods of treatment. Wilson also stated that 50% of the athletes reported PMS hindered their athletic performance. Moller-Nielsen (1988), reported that 39 of 107 female Olympic athletes reported a decrease in performance during menstruation. However, Albohm (1976), reported that 46% of the female athletes surveyed, recorded no deficit in athletic performance during any of the phases of the menstrual cycle.

Actual Deficits in Performance

The research in this area is often contradictory (Albohm, 1976; Agostini, 1994; Shangold, 1980). PMS symptoms have shown a greater impact in athletic performance when endurance effort is required. An example would be sports such as tennis and

rowing, where a woman might be reminded of her symptoms over a prolonged period of time. In contrast, track events like the 100 M dash, the athlete's focus is on her short sprint and not her ongoing symptoms (Erdelyi, 1976).

Lack of stamina and slower reaction time, seen in the premenstruum phase, have been shown to lead to an increase in injuries in that phase (Albohm, 1976). Shangold (1980), found that coordination was decreased during menstruation and then increased immediately after. Another study showed that it took longer to reach exhaustion during the luteal phase which means that performance can be increased in the second half of the cycle (Speroff, 1980). Even with all these reported changes, there are still other studies that show no deficit in skill, speed or accuracy measurements (Shangold, 1980). And De Souza (1990), cited a study by which there was no limits or alterations in exercise performance.

Because perceived and real changes in performance were noted, Albohm (1976), suggested that an individual training schedule may produce positive results. This schedule would allow the female to train at her peak times during her menstrual cycle. Intense training could be accomplished during the follicular (estrogen) phase, which has shown to have an increase in performance. Likewise, training levels should be decreased after the fifteenth day of menses when estrogen levels decrease (Albohm, 1976). For a team sport this scenario would be highly unlikely. It would be hard for a pitcher of a softball team to practice if she and her catcher were not on the same cycle. And how would a basketball team scrimmage if only four girls were on the same cycle? On the other hand, individual sports may benefit from such a plan.

Summary

According to Wells (1991), for many individuals perception may become reality. Therefore, a perceived decrease in performance ability will likely cause an athlete to perform poorly. The competitive athlete is often more aware of the changes that occur in her body during menses. The rigors of training and competition impart a knowledge and understanding of body dynamics.

Lack of stamina, a slower reaction time and a decrease in coordination were performance traits that were found to be changed during one or more of the different phases of the menstrual cycle (Albohm, 1976). On the other hand, an increase in performance was seen during the follicular phase. Other data showed that world and national records have been set during all phases of the menstrual cycle (Strauss, 1984). The female athlete needs a sound, educational understanding of the myths and misconceptions of athletic performance and the menstrual cycle.

Women should not view menstruation as a sickness, curse or a monthly pain in the neck, especially as it relates to sports (Erdelyi, 1976). After an athlete has all the facts, she can make an educated decision regarding her attitude toward menstruation.

CHAPTER III

METHODS AND PROCEDURES

This chapter outlines the operational methods and procedures of the study.

Operational Methods and Procedures

A twenty-seven item survey containing questions on general well-being and athletic performance was developed by the researcher and given to the University of Delaware women's field hockey and volleyball teams and to the Oklahoma State University women's cross country and softball teams (Appendix A). A total of thirty-five female athletes completed both surveys: field hockey (N = 2), volleyball (N = 15), softball (N = 14) and cross country (N = 4). The four sports were chosen based on the researcher's familiarity with the staff.

Following a phone call to the softball coach and cross country athletic trainer, the researcher mailed the forms to Oklahoma State University in September, 1996, with written instructions for the softball coach and cross country athletic trainer (Appendix B). Once they received the surveys, they were distributed by the coach or athletic trainer at their respective team meetings. The staff members agreed to compile the information from their respective teams. The athletes were asked to complete the surveys and return them to their staff members by November 30, 1996. The deadline was to ensure all of the females completed one menstrual cycle and to allow them to have completed the

study before school final exams. Before participation in the study, all subjects completed an informed consent statement (Appendix C).

The researcher attended team meetings with the University of Delaware teams in September, 1996. At that time, the surveys were dispersed with verbal instructions regarding directions and purpose of the study. The same deadline of November 30, 1996, applied to the University of Delaware. Before participation in the study, all subjects completed an informed consent statement (Appendix D).

Each athlete was given two surveys. One was to be completed approximately seven days prior to the beginning of the menstrual cycle. If the athlete was unable to determine the appropriate number of days, she was asked to answer the survey as soon as possible before her cycle began. The other survey was to be completed on the eighth day following the last day of the menstrual cycle. Each athlete was asked to fill out the first survey and not "compare" her answers when it was time to fill out the second survey. All completed forms were anonymous and were labeled with the participants sport code and a number in order to pair the two forms. The researcher asked for questions, left a follow- up phone number and had to trust that the directions were understood and that the athletes would answer the survey honestly.

As the athletes completed the surveys, they returned them to their athletic trainer or coach. Each staff member received one follow-up phone call to assess the progress of the study and to remind them of the deadline. The researcher collected all of the completed surveys before the end of the fall semester. A total of thirty-five female athletes completed both surveys. Four surveys were incomplete and were not included in

the study. The results from the survey were the basis of this study. By rating the questions on a scale from 1 to 5, the researcher was able to compare the pre and post perception of self-reported PMS symptoms.

The Oklahoma State University Institutional Review Board (IRB #ED-96-069) for Human Subjects Research approval was sought prior to having the female athletes partake in the study (Appendix E). Exempt status approval was granted on February 6, 1996. Additionally, the University of Delaware Review Board for Human Subjects Research approval was sought (Appendix F). Exempt status was approved on July 24, 1996.

Research Design and Statistical Analysis

The statistical procedure for this study was a paired t-test. The significance of difference was determined by the frequency of individuals who perceived a difference in athletic performance pre menses versus the athlete's recall of perceived performance following menses. A .05 significance level was used for all statistical tests.

CHAPTER IV

RESULTS AND DISCUSSIONS

This chapter outlines the results obtained from the statistical analysis of the data concerning PMS and the perception of athletic performance and general well-being. The menstrual cycle is a function of the reproductive system that most female athletes experience once a month. Some athletes experience minimal symptoms, while others report embarrassing and bothersome side effects.

The purpose of this survey was to determine the perceived effect of pre menses on athletic performance and general well-being in comparison to recall of how each individual perceived these items following menses. Data was gathered from four collegiate women's athletic teams representing two universities.

Results

Survey one, premenstrual phase data, asks the female athlete what perceived effect PMS has on their athletic performance and general well-being. Post menstrual phase data, survey two, recorded the athlete's recall of their perception of how PMS affected their perceived performance and general well-being.

The data was collected from the surveys (Appendix A) for the two time periods. From these results, the researcher was able to gather information regarding a perceived effect in athletic performance and general well-being pre menses versus the recall of perceived performance and general well-being following menses. General well-being

and athletic performance questions were compared for the thirty-five female athletes using the menstrual cycle as a point of comparison.

Thirty-five female athletes completed both surveys. The athletes included women from four sports and the fall athletic season. A paired t-test was calculated for each question and a .05 level of significance was used.

There was no significant difference reported in the following general well-being questions: appetite 3.20 pre menses and 2.68 post menses; fatigue 3.14 pre menses and 2.57 post menses; vision 1.40 pre menses and 1.42 post menses; and cravings 2.80 pre menses and 2.57 post menses.

The following eight variables were reported as statistically significant ($p < .05$) by the females surveyed: moodiness 3.97 pre menses and 2.68 post menses; depression 3.14 pre menses and 2.31 post menses; bloatedness 4.02 pre menses and 3.02 post menses; cramps 3.40 pre menses and 2.60 post menses; back pain 3.17 pre menses and 2.34 post menses; headaches 2.40 pre menses and 1.91 post menses; breast tenderness 3.60 pre menses and 2.37 post menses and irritability 3.85 pre menses and 2.74 post menses (Table I).

Regarding athletic performance, seven of the eleven variables were reported as not statistically significant: reaction time 2.22 pre menses and 1.97 post menses; endurance 2.60 pre menses and 2.17 post menses; strength 2.22 pre menses and 2.14 post menses; flexibility 2.05 pre menses and 2.00 post menses; coordination 2.11 pre menses and 2.14 post menses; balance 1.74 pre menses and 1.57 post menses; and nervousness 1.85 pre menses and 1.65 post menses. Of those seven variables only coordination had a

TABLE I

MEANS AND p-VALUES

FOR THIRTY-FIVE SUBJECTS

Variable	Mean		p-Value
	Before	After	
General Well-being			
Moodiness	3.97	2.68	.000012*
Depression	3.14	2.31	.001348*
Appetite	3.20	2.68	.065287
Fatigue	3.14	2.57	.052875
Bloatedness	4.02	3.02	.000557*
Cramps	3.40	2.60	.003187*
Back Pain	3.17	2.34	.001550*
Headache	2.40	1.91	.009149*
Vision	1.40	1.42	.744129
Cravings	2.80	2.57	.282667
Breast Tenderness	3.60	2.37	.000032*
Irritability	3.85	2.74	.000393*

p-Value less than .05
*Significant results reported

slight increase in the mean post menses.

Unlike the general well-being questions, only four of the athletic performance questions were reported as significant: concentration 2.65 pre menses and 1.97 post menses; speed 2.48 pre menses and 2.02 post menses; quickness 2.62 pre menses and 2.00 post menses; and attitude 2.85 pre menses and 2.17 post menses (Table II).

Discussion

PMS symptoms can often become bothersome to the female athlete and may potentially affect athletic performance (Wilson, 1991). In this study, all of the female athletes completed a twenty-seven item survey during pre menses and during post menses. Before their menstrual cycle, during the time when PMS symptoms were reported, the females indicated that moodiness, depression, bloatedness, cramps, back pain, headaches, breast tenderness and irritability were significant symptoms as they relate to athletic function. But, after the menstrual cycle, when the women had to answer the same survey via recall, they did not report those symptoms as being an important deficit in performance. Those same eight variables were reported as less severe. The females reported eight of the twelve symptoms as "One of my PMS symptoms is . . ." and agreed with the statement. When answering the second survey, eight days after the menstrual cycle, the athletes answered the questions by disagreeing with the statements.

Unlike the general well-being questions where the females answered ranging from agree (pre menses) to disagree (post menses), the athletic performance questions

TABLE II

MEANS AND p-VALUES

FOR THIRTY-FIVE SUBJECTS

Variable	Mean		p-Value
	Before	After	
Athletic Performance			
Reaction Time	2.22	1.97	.083127
Concentration	2.65	1.97	.003187*
Endurance	2.60	2.17	.053392
Strength	2.22	2.14	.637795
Flexibility	2.05	2.00	.762542
Speed	2.48	2.02	.024206*
Quickness	2.62	2.00	.003045*
Coordination	2.11	2.14	.872190
Balance	1.74	1.57	.205294
Attitude	2.85	2.17	.003187*
Nervousness	1.85	1.65	.069996

p-Value less than .05
*Significant results reported

were answered ranging from disagree (pre menses) to strongly disagree (post menses). Only coordination was answered with a higher mean after menses.

Based on this study a female may report cramps, cravings, bloatedness or attitude changes during PMS but when questions regarding her recall of perception of her performance, she did not report a deficit in performance. One possible explanation for this lack of a perceived deficit after menses may be the attitude a coach has toward the athlete. A coach, whether male or female, may not tolerate the female complaining about her PMS symptoms. In fact, he or she may assure the athlete that she will not have a deficit in performance. This and other positive reinforcements may lead the subjects to answer the way they did. Another reason may be the fact that women begin the menstrual cycle at a young age and as they mature as athletes they have learned to accept the menstrual cycle as a normal female function.

The subjects were not given the opportunity to report "no opinion" as an answer. It was the concern of the researcher that if given that option, the females may have deferred to that response without putting much thought into a more appropriate reply. In addition, when the "no opinion" response was eliminated the numeric scale was not adjusted. It is the opinion of this investigator, that the average mean could have been skewed and could have effected tests of statistical significance. What can be determined from the information gathered is that the athletes recorded no perception of athletic performance decrement secondary to PMS. Likewise, their recall of perceived athletic performance after menses also demonstrated no perceptions of athletic performance reduction.

Hypothesis:

The perception of athletic performance and general well-being during pre menses will not be statistically different when compared to the recall of pre menses perceptions following menses for the same cohort of college female athletes. Based on the statistical analysis, the hypothesis was accepted for eleven of the total twenty-three variables. The general well-being variables were: appetite, fatigue, vision problems and cravings for certain foods. Regarding athletic performance, the variables were: reaction time, muscle strength, flexibility, coordination, balance, nervousness and endurance. These eleven variables were reported as not significant during pre menses and when recalled following menses.

CHAPTER V

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

Summary

This project was designed with the intent to compare the perceived effect of athletic performance and general well-being during menses with the recall of perceived pre menses performance following menses. The subjects were the 1996-1997 University of Delaware women's field hockey and volleyball teams and Oklahoma State University women's softball and cross country teams. The study was completed over a three month time span in order to include the menstrual cycles of all the females involved. Although the literature regarding this topic is contradictory, PMS symptoms have been shown to have a greater performance decrement impact when endurance effort is required. Questions relating to athletic performance and general well-being were analyzed for each athlete prior to and following the menstrual cycle.

Findings

Thirty-five female athletes, from four different athletic teams, were asked to report their feelings through a survey concerning PMS and athletic performance. Paired t-tests at the .05 level of significance were used to analyze the data.

Based on this study, the following findings are presented:

1. There was a statistical significance ($p = .05$) in eight of the twelve general well-being questions regarding the perceived effect of athletic performance pre menses with the recall of perception post menses. The following symptoms were reported as decreased following menses: moodiness, depression, bloatedness, cramps, back pain, headaches, breast tenderness and irritability.

2. There was no reported perception of an athletic performance decrement pre menses. Secondly, recall after menses demonstrated no perception of athletic performance deficit in the following variables: reaction time, endurance, strength, flexibility, coordination, balance and nervousness.

Conclusions

Self-reported perceptions of athletic performance were not markedly affected by premenstrual syndrome. Likewise, eight days post menses, the recall of any decrease of athletic performance secondary to PMS was also not affected. Within the limits of this study, the following conclusion was drawn:

1. Perceptions of PMS symptoms will not be a negative factor in limiting the athlete's ability to perform.

Recommendations

The following recommendations for further research can be made as a result of this study:

1. The study should be continued over a longer period of time to allow for several menstrual cycles.

2. This study should be repeated in a more experimental setting utilizing a performance test to determine actual deficits in performance.

3. This study should be repeated utilizing a variety of sport types - endurance versus sprint type of athletes.

4. More involved statistical tests can be done to compare the different variables and how they relate to each other (i.e. moodiness and depression versus attitude toward coaches and other players).

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APPENDIXES

APPENDIX A

AHTLETIC PERFORMANCE SURVEY

Directions: Carefully read each of the following statements and decide how strongly you agree or disagree with each according to the scale provided. Indicate your response in the space provided beside each statement. For questions 24 - 27 place an "X" in the blank beside your answer.

1	2	4	5
Strongly Disagree	Disagree	Agree	Strongly Agree

GENERAL WELL-BEING QUESTIONS

1. _____One of my PMS symptoms is moodiness.
2. _____One of my PMS symptoms is depression.
3. _____One of my PMS symptoms is an increase in appetite.
4. _____One of my PMS symptoms is fatigue.
5. _____One of my PMS symptoms is a feeling of bloatedness in the abdomen or extremities.
6. _____One of my PMS symptoms is cramps.
7. _____One of my PMS symptoms is back pain.
8. _____One of my PMS symptoms is headaches.
9. _____One of my PMS symptoms is vision problems.
10. _____One of my PMS symptoms is craving for certain foods.
11. _____One of my PMS symptoms is breast tenderness.
12. _____One of my PMS symptoms is irritability.

ATHLETIC PERFORMANCE QUESTIONS

13. _____PMS impairs my reaction time.
14. _____PMS reduces my ability to concentrate.
15. _____PMS reduces my endurance level.
16. _____PMS reduces my muscle strength.
17. _____PMS decreases my flexibility.
18. _____PMS reduces my speed.
19. _____PMS reduces my quickness.
20. _____PMS decreases my coordination.
21. _____PMS impairs my balance.
22. _____PMS negatively effects my attitude toward coaches and/or other players.
23. _____PMS increases my nervousness in competition.

24. Do you notice your PMS symptoms more in practice or games?
    (1) practice_____ (2) games_____

25. What is your age group?
    (1) 17-19_____ (2) 20-22_____
    (2) 23-25_____ (4) 26 and older_____

26. Do you have a regular menstrual cycle?
    (regular = one cycle every 21 - 35 days)
    (1) yes_____ (2) no_____

27 What is the length of your cycle?
    (1) 1-3 days_____ (2) 4-6 days_____
    (2) 7-9 days_____ (4) more than 9 days_____

Thank you very much for your participation in this study.

APPENDIX B

INSTRUCTIONS FOR SURVEYS

Instructions to Hand Out Surveys

Hand out and have the athletes sign the consent form. If the athletes wish to retain a copy with both signatures, please make the appropriate copies.

Each athlete is to be given two surveys, one to fill out one week (approximately seven days) before menses (noted in the top right hand corner as: Before M C), and one to fill out eight days following the last day of menses (noted in the top right hand corner as: After M C). Please stress the importance of answering ALL the questions completely and honestly. (I will not be able to tell who they are because their names are not required on the survey itself).

The surveys are numbered from 1 to 20 and labeled BEFORE MC and AFTER MC. Please keep a list of the athletes and the number of the survey they received in order to follow up with any lack of compliance.

Please allow the girls to return their completed surveys to you as they finish. Please mail all completed surveys and consent forms to me by November 30, 1996.

My home telephone number: (302) 369-3414 and my work number: (302) 731-9100. My address: 108 Cannonball Lane, Newark, DE 19702. Please feel free to call me if you have any questions.

Thank you for your help.

APPENDIX C

INFORMED CONSENT FORM

OKLAHOMA STATE UNIVERSITY

CONSENT FORM

"I, _____, hereby authorize Kristin Wohlrab, or assistants of her choosing, to perform the following procedure."

This is done as part of an investigation entitled *PERFORMANCE AND GENERAL WELL-BEING PERCEPTIONS BEFORE AND AS RECALLED AFTER MENSES.*

The purpose of the procedure is to determine the effect premenstrual syndrome has on athletic performance. The menstrual cycle is a function of the reproductive system that most female athletes experience once a month. Some athletes exhibit minimal symptoms, while others report bothersome, embarrassing side effects.

To achieve an accurate measurement of just how much PMS effects performance, it is important that each athlete answer the survey honestly. You are a valuable asset to the success of this study. Your time and consideration is appreciated.

Each person will be asked to fill out two surveys, one during the time PMS symptoms would be experienced and one eight days following the last day of the menstrual cycle. Each survey will take approximately five minutes to fill out.

The surveys will be confidential. They are marked with a number and sport code in order to pair the two when all the completed surveys have been turned in.

"I understand that participation is voluntary, that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in the project at any time without penalty after notifying the project director."

If I have any pertinent questions concerning the research subject's rights, I may contact Kristin Wohlrab at 302-369-3414. I may also contact University Research Services, 001 Life Sciences East, Oklahoma State University, Stillwater, OK 74078; 405-744-5700.

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date:_____ Time:_____ (a.m./p.m.)

Signed:_____

Signature of Subject

I certify that all elements of this form have been explained to the subjects before requesting the subject to sign it.

Signed:_____

Signature of Project Director

Thank you for your participation in this study.

APPENDIX D

INFORMED CONSENT FORM

UNIVERSITY OF DELAWARE

CONSENT FORM

"I, _____, hereby authorize Kristin Wohlrab, or assistants of her choosing, to perform the following procedure."

This is done as part of an investigation entitled *PERFORMANCE AND GENERAL WELL-BEING PERCEPTIONS BEFORE AND AS RECALLED AFTER MENSES.*

The purpose of the procedure is to determine the effect premenstrual syndrome has on athletic performance. The menstrual cycle is a function of the reproductive system that most female athletes experience once a month. Some athletes exhibit minimal symptoms, while others report bothersome, embarrassing side effects.

To achieve an accurate measurement of just how much PMS effects performance, it is important that each athlete answer the survey honestly. You are a valuable asset to the success of this study. Your time and consideration is appreciated.

Each person will be asked to fill out two surveys, one during the time PMS symptoms would be experienced and one eight days following the last day of the menstrual cycle. Each survey will take approximately five minutes to fill out.

The surveys will be confidential. They are marked with a number and sport code in order to pair the two when all the completed surveys have been turned in.

"I understand that participation is voluntary, that there is no penalty for refusal to participate, and that I am free to withdraw my consent and participation in the project at any time without penalty after notifying the project director."

If I have any pertinent questions concerning the research subject's rights, I may contact Kristin Wohlrab at 302-369-3414. I may also contact Office of the Vice Provost for Research, 210 Hullihen Hall, Newark, DE 19716-1551; 302-831-2136.

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date:_____ Time:_____ (a.m./p.m.)

Signed:_____

Signature of Subject

I certify that all elements of this form have been explained to the subjects before requesting the subject to sign it.

Signed:_____

Signature of Project Director

Thank you for your participation in this study.

APPENDIX E

IRB APPROVAL FORM

OKLAHOMA STATE UNIVERSITY

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
HUMAN SUBJECTS REVIEW

Date: 02-06-96 **IRB#:** ED-96-069

Proposal Title: PREMENSTRUAL SYNDROME AND ITS EFFECT ON ATHLETIC PERFORMANCE

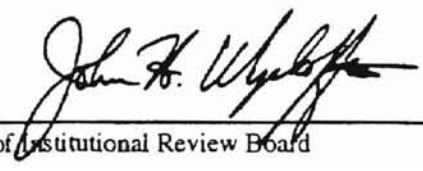
Principal Investigator(s): Bert Jacobsen, Kristin Wohlrab

Reviewed and Processed as: Exempt

Approval Status Recommended by Reviewer(s): Approved

ALL APPROVALS MAY BE SUBJECT TO REVIEW BY FULL INSTITUTIONAL REVIEW BOARD AT NEXT MEETING.
APPROVAL STATUS PERIOD VALID FOR ONE CALENDAR YEAR AFTER WHICH A CONTINUATION OR RENEWAL REQUEST IS REQUIRED TO BE SUBMITTED FOR BOARD APPROVAL.
ANY MODIFICATIONS TO APPROVED PROJECT MUST ALSO BE SUBMITTED FOR APPROVAL.

Comments, Modifications/Conditions for Approval or Reasons for Deferral or Disapproval are as follows:

Signature:  Date: February 9, 1996

Chair of Institutional Review Board

APPENDIX F

IRB APPROVAL FORM

UNIVERSITY OF DELAWARE

UNIVERSITY OF DELAWARE

OFFICE OF THE VICE PROVOST FOR RESEARCH

210 Hullihen Hall
University of Delaware
Newark, Delaware 19716-1551
Ph: 302/831-2136
Fax: 302/831-2828

24 July 1996

Ms. Kristin Finley
108 Cannonball Lane
Newark, DE 19702

Dear Ms. Finley:

Subject: Human subjects approval for "Premenstrual Syndrome and Its Effect on Athletic Performance"

The above-referenced proposal, which you submitted for human subjects approval, will qualify as research exempt from full Human Subjects Review Board review under the following category:

> Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless (1) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects, and (2) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please note that the consent form for students on this campus should be revised to include my name and telephone as a contact for the Human Subjects Review Board. Please also notify the board if you make any changes in this project.

Sincerely,

Costel Denson

Costel D. Denson
Vice Provost for Research
Chair, Human Subjects Review Board

cc: Mary Ann Hitchens

VITA

Kristin Marie Wohlrab

Candidate for the Degree of

Master of Science

Thesis: PERFORMANCE AND GENERAL WELL-BEING PERCEPTIONS BEFORE AND AS RECALLED AFTER MENSES

Major Field: Health, Physical Education and Leisure

Biographical:

Personal Data: Born in Harvey, Illinois, on August 1, 1970, the daughter of Dr. Eric Wohlrab and Suzanne Wohlrab.

Education: Graduated from Eldorado High School, Las Vegas, Nevada, in June 1988; received Bachelor of Science degree in Education from the University of Nevada, Las Vegas, Las Vegas, Nevada in May, 1992. Completed the requirements for the Master of Science degree with a major in Health Promotion at Oklahoma State University in May, 1998.

Professional Experience: Student Athletic Trainer, University of Nevada, Las Vegas, 1990-92; Graduate Assistant Athletic Trainer, Oklahoma State University, 1992-94; Certified Athletic Trainer, Voy's Center for Sportsmedicine and Fitness, Las Vegas, Nevada 1994-95; Certified Athletic Trainer, HEALTHSOUTH Sports Medicine and Rehabilitation Center, Newark, Delaware, 1995-present.

Professional Organizations and Certifications: Certified Athletic Trainer, 1993; Certified Member, National Athletic Trainers Association, 1993; Certified Member, Delaware Athletic Trainers Association, 1995; Licensed Athletic Trainer, State of Delaware, 1995.