

THE EFFECTS OF MENSTRUATION
ON PHYSICAL EFFICIENCY

A Research Paper

Presented to

the Graduate Council of
Austin Peay State University

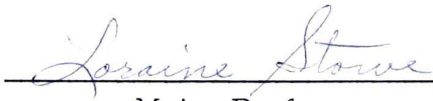
In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in Education

by
Janice Beene Gregory

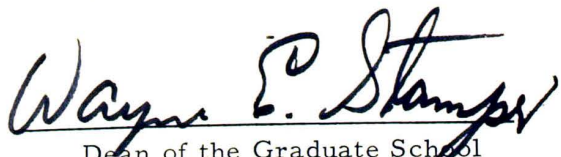
June, 1969

To the Graduate Council:

I am submitting herewith a Research Paper written by Janice Beene Gregory entitled "The Effects of Menstruation on Physical Efficiency." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Arts in Education, with a major in Health and Physical Education.


Major Professor

Accepted for the Council:


Dean of the Graduate School

ACKNOWLEDGEMENTS

The author wishes to express her appreciation to Dr. Loraine Stowe who aided and counseled her during the course of this study; to all the girls who participated and cooperated during the testing periods to make this study possible; and to her husband for the encouragement he gave during the study.

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CHAPTER I

INTRODUCTION

Regular, asymptomatic menstruation is usually considered to be a measure of general good health in the female. However, there is widespread belief, passed on from one generation to another, that the menstrual period affects physical efficiency. Therefore, it is only natural that health and physical educators would study the effect of menstruation on physical efficiency.

I. THE PROBLEM

Statement of the Problem

The purpose of this research was to determine the effect of the menstrual period on physical efficiency in college women eighteen to twenty years of age.

Definition of the Problem

The study was designed to indicate differences between physical efficiency during the menstrual period and physical efficiency fourteen days after the beginning of the flow. The study was not concerned with the effect of exercise on the body during the menstrual period.

The Importance of the Study

The problem is of utmost importance to physical educators because many girls ask to be excused from physical education classes during the menstrual period. The problem may also be important to women's athletic coaches, or the athlete herself, in order to know if certain measures should be taken to avoid athletic competition during the menstrual period. The athlete and her coach need to know if she may become physically inefficient during certain periods of the month.

II. DELIMITATIONS OF THE STUDY

This study involved twelve girls eighteen to twenty years of age enrolled in Austin Peay State University. The subjects chosen were not physical education majors; were not taking more than one physical education activity course; were not participating in any other regular physical activity program; and were instructed not to practice any portion of the test during the experiment.

III. LIMITATIONS OF THE STUDY

The following limitations applied to this study:

1. The subjects used in this study were twelve female

college women which made a small sample.

2. Only one test was applied to measure physical efficiency in this study. Other tests of physical efficiency could have been used for more valid results.

3. The test used to measure physical efficiency only measured certain areas of efficiency.

IV. DEFINITIONS OF TERMS USED

First Day of Menstrual Period

The first day of the menstrual period refers to the onset of the menstrual flow.

Fourteenth Day of Menstrual Period

The fourteenth day of the menstrual period refers to fourteen days after the onset of the menstrual flow.

Physical Efficiency

Physical efficiency, as used in this study did not mean that the subject was actually physically efficient, but that she was as efficient, less efficient, or more efficient at one time as compared to another.

V. REVIEW OF THE LITERATURE

There is very little agreement among investigators who have attacked the problem of the effects of menstruation on physical efficiency. DeVries reported that Pierson, Lockhart, and Sloan found no effect of the menstrual cycle upon motor performance, but that Erdelyi, Klaus, and Noack reported that performance is best in the post-menstrual phase, slightly poorer during menstruation, and at its worst in the two or three days preceding menstruation.¹

Gendel states that, "Participation in all sports activities before, during, or after menstruation, causes no deleterious effect on the normal menstrual cycle."²

In a study by Tuttle and Frey the data obtained indicated that during the pre-menstrual period and the period of the flow, the physical efficiency rating was higher than during the periods of regeneration and rest.³

¹Herbert A. DeVries, Physiology of Exercise, Dubuque, Iowa: William C. Brown Company, 1966, p. 408.

²Evalyn S. Gendel, "Women and the Medical Aspects of Sports," Journal of School Health, 37:431, November, 1967.

³W. W. Tuttle and Henryetta Frey, "The Periodic Fluctuation of Physical Efficiency During the Menstrual Cycle," Research Quarterly, 1:22, December, 1930.

In a later study by Tuttle and Scott the same conclusion was drawn, in that the menstrual cycle does not bring about a cyclic rise and fall in physical efficiency.⁴

Scott and Tuttle also tell of a study made in 1914 by Hollingworth. The extensive experiment, conducted to determine the effect of the menstrual period on motor performance, fatigue, steadiness, perception, typing, and physiological processes showed that there was no periodic mental or motor inefficiency in normal women.⁵

Scott and Tuttle also cited Duntzer's study in which was measured momentary efficiency using jumps and javelin throws. Duntzer concluded that sixty percent of the cases were as great or greater during the menstrual period.⁶

Bilhuber, as cited by Scott and Tuttle found that fluctuations were no greater than those occurring at other times or with men.⁷

⁴Gladys Scott and W. W. Tuttle, "The Periodic Fluctuation of Physical Efficiency During the Menstrual Cycle," Research Quarterly, 3:41, March, 1932.

⁵Gladys Scott and W. W. Tuttle, "The Periodic Fluctuation of Physical Efficiency During the Menstrual Cycle," Research Quarterly, 3:31, March, 1932.

⁶Ibid., p. 32.

⁷Ibid., p. 32.

Karpovich told of a study of 111 athletic women participating in track and field events. The study showed that fifty-five percent suffered no decrease in efficiency, the performance of some of these being even increased on days of the flow. The other forty-five percent showed a decrease in performance either during menstruation or immediately before the onset of the flow.¹¹

VI. HYPOTHESIS

Menstruation does not affect physical efficiency in women eighteen to twenty years of age.

VII. BASIC ASSUMPTIONS OF THE STUDY

The writer assumed that the modified American Association of Health, Physical Education, and Recreation physical fitness test was a valid measure of physical efficiency.

¹¹Peter V. Karpovich, Physiology of Muscular Activity, Philadelphia: W. B. Saunders Company, 1953, p. 27.

CHAPTER II

METHOD OF ATTACK

This study was an endeavor to determine the effect of menstruation on physical efficiency. The subjects consisted of twelve college women, eighteen to twenty years of age, who volunteered to carry out the experiment, during and following their menstrual periods. The subjects selected to participate in the study reported no serious menstrual difficulties, were not health and physical education majors, had only one physical education activity class during the testing period, and did not participate in any other regular physical activity. The mean age of the subjects was nineteen years and one month; the mean height was sixty-four inches; and the mean weight was 122 pounds. The study began with thirty-five subjects, twelve of whom completed the program. Twenty-three subjects did not complete the experiment for various reasons such as: time conflict, menstrual difficulty, or disinterest.

I. THE TEST OF PHYSICAL EFFICIENCY

A modification of the American Association of Health, Physical Education, and Recreation Youth Fitness Test was used as the criterion of physical efficiency. The battery consisted of the flexed-arm hang, for judging arm and shoulder girdle strength; sit-up, for judging efficiency of abdominal and hip flexor muscles; shuttle run, for judging speed and change of direction; standing broad jump, for judging explosive muscle power of leg extensors; forty-yard dash, for judging speed.¹²

Description of Test Items

The following is a description of each test item:

A. Flexed-arm hang. The height of the bar was approximately equal to the subject's standing height. The subject used an overhand grasp and raised her body off the floor to a position where the chin was above the bar with elbows flexed and chest close to the bar. The stop watch was started as soon as the subject took a hanging position. The watch was stopped when the subject's chin touched the bar or when the subject's head fell below the level of the bar.

¹²American Association for Health, Physical Education, and Recreation, Youth Fitness Test Manual, 1961, pp. 15-24.

B. Sit-up. The subject lay on her back, on the floor, with legs extended. Her hands were placed on the back of the neck with the fingers interlaced and elbows retracted. A partner held the ankles down, the heels in contact with the floor at all times. The subject sat up, turning the trunk to the left and touched the left knee with the right elbow, returned to starting position, then sat up turning the trunk to the right and touched the left elbow to the right knee.

C. Shuttle run. Two parallel lines were marked on the floor thirty feet apart. Two wooden blocks were placed behind one of the lines and the subject started from the other line. On signal the subject ran and picked up one block, returned to the starting line and placed the block behind the line. She then ran back and picked up the second block, which she carried across the starting line.

D. Standing broad jump. The subject stood behind a line with feet several inches apart and the toes just behind the take-off line. The jump was measured from the take-off line to the heel or other part of the body that touched the floor nearest the take-off line.

E. Forty-yard dash. The subject ran as fast as she could from behind a line to a finish line forty yards from the

starting point.¹³

The experiment was explained to all of the subjects at the same time to insure that all had the same instruction. The test items were then explained and demonstrated to the group. Because of the physical fitness factor involved, the subjects were instructed not to practice any of the tasks at any time during the experiment. The same test administrator tested each subject. No warm-up period or trials were allowed before the test.

Equipment and Apparatus

A. A Junghans stop watch was used to facilitate accurate timing of the test procedure.

B. A horizontal bar approximately one and one-half inches in diameter was used for the flexed-arm hang.

II. DATA COLLECTION

Each subject reported to the test administrator on the first day or the fourteenth day of her menstrual period, whichever day came first. Those girls starting their period at night reported the following day. When the subjects reported for the test, they dressed in gym clothes. Before the first test trial was administered, the height and weight of each subject was obtained.

¹³Ibid.

The test battery was given and recorded in the following order: sit-ups, recorded one for each completed sit-up; shuttle run, time recorded to the nearest tenth of a second; standing broad jump, recorded the best of two trials in inches to the nearest inch; forty-yard dash, time recorded to the nearest tenth of a second; flexed-arm hang, time recorded to the nearest second the subject held the hanging position.

On the fourteenth day of the menstrual cycle the subjects reported for exactly the same test battery. The test was given for two months which included four testing periods for each subject.

III. RECORD OF DATA

Individual records were kept on every test item the first and fourteenth days of the menstrual cycle. The symbols "T₁" and "T₂" were used to represent the two test trials of the first month ("T₁" for the first day and "T₂" for the fourteenth day). The symbols "T₃" and "T₄" were used to represent the two test trials for the second month ("T₃" for the first day and "T₄" for the fourteenth day).

Individual scores were tabulated and recorded for each test item and the mean was determined for each item. The significance of the differences between the means of the scores of the first and the fourteenth days was also determined for each test item.

The following statistical formulas were used to determine the significance of the difference between the means: ¹⁴

MEAN

$$M = \frac{\sum X}{N}$$

STANDARD DEVIATION

$$\sigma = \sqrt{\frac{\sum X^2}{N} - \left(\frac{\sum X}{N}\right)^2}$$

STANDARD ERROR OF MEAN

$$\sigma_m = \frac{\sigma}{\sqrt{N - 1}}$$

STANDARD ERROR OF DIFFERENCE

$$\sigma_{\text{diff}} = \sqrt{\left(\sigma_{m_1}\right)^2 + \left(\sigma_{m_2}\right)^2}$$

T-VALUE

$$t = \frac{M_1 - M_2}{\sigma_{\text{diff}}}$$

¹⁴Benton J. Underwood, Carl P. Duncan, Janet A. Taylor, and John W. Corton, Elementary Statistics, New York: Appleton-Century-Crofts, Inc., 1954, pp. 36-104.

CHAPTER III

PRESENTATION AND ANALYSIS OF DATA

This study was an endeavor to determine the effect of menstruation on physical efficiency as determined by the results of scores based on five items of a physical fitness test. It was hypothesized that the menstrual period had no effect on physical efficiency.

Subjects Studied

A total of thirty-five college women, eighteen to twenty years of age volunteered to participate at the beginning of the study. Only twelve of the women completed all four trials of the test and the only scores used were those of the twelve subjects who completed the test. The average age of the twelve subjects was nineteen years and one month; the average height was sixty-four inches; and the average weight was 122 pounds.

Explanation of Tables

The tables show the sum of the scores made for the twelve subjects for each of the test items on the first day of the menstrual period for two months ($T_1 + T_3$) and also the sum of the scores made on the fourteenth day of the menstrual cycle for the same

Table V, page 21, shows the mean on the flexed-arm hang for the first day was 9.92 and mean for the fourteenth day was 10.39. The standard error of the difference was 3.75 giving a t-value of .125 which was not significant at the five percent level of confidence.

A comparison of the scores on the five test items showed that there was no significant difference between the scores obtained on the first day of the menstrual period and the scores obtained on the fourteenth day of the menstrual cycle. Although there were differences between the average scores for the group, the differences were probably due only to chance and the assumption may be made that there was no real difference in scores caused by menstruation.

TABLE I
A COMPARISON OF THE SCORES ON SIT-UPS

Subject	$T_1 + T_3$	$T_2 + T_4$
1	54	46
2	32	33
3	31	31
4	74	79
5	34	53
6	53	56
7	70	70
8	50	46
9	39	38
10	50	50
11	44	45
12	<u>33</u>	<u>29</u>
	M = 46.17	M = 48.00

Standard Error of Difference = 5.67

T-value = .32

TABLE II

A COMPARISON OF THE SCORES ON THE SHUTTLE RUN

Subject	$T_1 + T_3$	$T_2 + T_4$
1	23.0	24.3
2	25.1	25.8
3	24.8	24.6
4	22.2	22.8
5	26.8	24.1
6	22.2	22.1
7	24.2	23.9
8	22.3	22.7
9	22.1	21.8
10	24.5	23.5
11	25.5	24.0
12	<u>27.1</u>	<u>25.9</u>
	M = 24.15	M = 23.79

Standard Error of Difference = 1.32

T-value = .27

TABLE III

A COMPARISON OF SCORES ON THE BROAD JUMP

Subject	$T_1 + T_3$	$T_2 + T_4$
1	121	129
2	93	88
3	94	95
4	146	147
5	112	106
6	125	141
7	122	124
8	117	135
9	137	135
10	117	135
11	123	122
12	<u>85</u>	<u>98</u>
	M = 116	M = 118.83

Standard Error of Difference = 7.48

T-value = .38

TABLE IV

A COMPARISON OF SCORES ON THE FORTY-YARD DASH

Subject	$T_1 + T_3$	$T_2 + T_4$
1	12.5	12.3
2	14.8	14.8
3	15.0	14.4
4	12.4	12.7
5	15.3	14.7
6	13.1	13.4
7	14.1	13.9
8	14.1	14.1
9	11.9	11.5
10	14.5	14.0
11	14.5	13.7
12	<u>16.5</u>	<u>15.2</u>
	$M = 14.06$	$M = 13.73$

Standard Error of Difference = .49

T-value = .67

TABLE V

A COMPARISON OF SCORES ON THE FLEXED-ARM HANG

Subject	$T_1 + T_3$	$T_2 + T_4$
1	12.2	10.7
2	00.0	00.0
3	21.5	20.9
4	27.4	37.1
5	6.3	10.5
6	14.9	10.9
7	00.0	00.0
8	12.2	8.1
9	12.5	12.3
10	00.0	00.0
11	00.0	00.0
12	<u>00.0</u>	<u>00.0</u>
	M = 9.92	M = 10.39

Standard Error of Difference = 3.75

T-value = .125

CHAPTER IV

SUMMARY AND CONCLUSIONS

This study was an endeavor to determine the effect of menstruation on physical efficiency as determined by scores on five items of a physical fitness test. It was hypothesized that there would not be any effect of menstruation on physical efficiency.

Only twelve subjects were used in the final analysis of the comparison between the scores made on the test items on the first day of the menstrual period and the scores made on the test items fourteen days following the onset of the menstrual period.

As a result of the analysis of the data obtained during the study, it would seem necessary to accept the null hypothesis that the menstrual period does not affect the physical efficiency of a person. The analysis showed that there was no significant difference in the mean scores made on any of the test items. Since the onset of the menstrual period, according to the results of this study, has no effect on physical efficiency, it may be said that any decrease in physical efficiency during the menstrual period is probably due to some psychological

factor and not to the physical aspect of menstruation.

Further research in this area is needed. The problem needs to be investigated in more depth, using different measures of physical efficiency. Also, there is a need for a larger sample of subjects in order to make the results more reliable.

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