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A CRITICAL ANALYSIS OF THE RESEARCH CONCERNING
THE EFFECTS OF COMPETITIVE ATHLETICS FOR
WOMEN AND GIRLS

—————

HILLYER

1955

DIVISION OF GRADUATE STUDY

PRAIRIE VIEW AGRICULTURAL AND MECHANICAL COLLEGE

FINAL EXAMINATION

of

MATTIE MAE HILLYER

For the Degree of

MASTER OF SCIENCE

Tuesday, August 9, 1955 2:00 P.M. Ed. 106

COMMITTEE IN CHARGE:

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- PE 713 Techniques of Research
- PE 723 Kinesiology

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- Ed 713 School and Community Relations
- Ind Ed 593 Audio Visual Aids
- Psy 593 Pupil Growth and Development

BRIEF OF THESIS

A CRITICAL ANALYSIS OF THE RESEARCH CONCERNING THE EFFECTS OF COMPETITIVE ATHLETICS FOR WOMEN AND GIRLS

It was the purpose of this study:

1. To analyze philosophically the data concerning competitive athletics for women and girls.
2. To determine what anatomical and physiological data concerning women and girls could and should be considered in formulating a program of competitive athletics for women and girls.
3. To analyze all controversial ideas concerning the subject of competitive athletics for women and girls.

The findings were:

1. There was a tendency to draw conclusions which the data hardly appear to warrant.
2. A number of the studies were unquestionably biased.
3. Ideas on educational values were contrasting and controversial in many instances.
4. Some authors changed their philosophies about a question over a period of time.
5. There were three authors who retained or were consistent in their philosophies concerning the topic.

A CRITICAL ANALYSIS OF THE RESEARCH CONCERNING THE EFFECTS
OF COMPETITIVE ATHLETICS FOR WOMEN AND GIRLS

by

Mattie M. Hillyer

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A Thesis Submitted in Partial Fulfillment
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in the

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The writer of this study is especially indebted to Dr. John C. Mitchem, Prairie View Agricultural and Mechanical College, for his guidance and patience which have been unflinching throughout the writing of this thesis.

M.M.H.

DEDICATION

This thesis is dedicated to my mother,
Mrs. Sarah McDonald and to my husband,
Mr. James H. Hillyer who have been an in-
spiration to me throughout this study.

M.M.H.

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Chapter I

INTRODUCTION

It is the opinion of a number of authorities - medical, educational, physical education and the like that participation in competitive sports programs of any sort by women has an injurious or adverse effect on their physiological functional.

Some students take the position, based upon research findings that participation in competitive sports by women is injurious to them physiological. Others are equally insistent that participation in competitive sports has no adverse physiological effects on women.

It appears that the argument against the participation in competitive sports by women has had the greater influence. Hence the opportunities for women to participate in sports have been severely limited. The arguments run (a) that the participation of women in competitive sports is socially undesirable, (b) that women are not emotionally fitted to withstand the tensions incurred in competitive sports, (c) the effects of competitive sports, particularly during the menstrual period, not only effect the woman adverse physiologically possibly for life, but also may danger the natural reason for women's existance - childbirth.

Whether or not these claims are true require critical examination of the research presently available.

Statement of the Problem

Since there have been many divergent ideas expressed as to women and girls participating in competitive sports, the purpose of this treatise is to analyze philosophically the data concerning competitive athletics for women and girls. The data used for this investigation was confined to the writings of authorities in the field of Physical Education and those related anatomical, physiological, sociological writings that have bearing on the topic.

Chapter II

PROCEDURE

The data discussed in this study were taken from the writings of authorities in the field of physical education and those related anatomical, physiological, sociological and psychological writings that have bearing on the topic. The data were arranged, presented and analyzed in separate categories. The categories selected were:

1. Physiological
2. Anatomical
3. Educational
4. Conflicting
5. General

Where ever possible writings of the same author over a period of time were scrutinized to determine any change in attitude and the reason or justification for such change.

Chapter III

ANALYSIS OF DATA AND DISCUSSION

Physiological DataMenstruation

McCurdy and Larson¹ reported:

Some such studies have been made of the 418 Japanese girls who had won championships; 85.9 per cent began their athletic activities before fourteen years of age; 85.7 per cent began before the first menstrual period. Irregularities in menstruation were more common in athletics, 50.6 per cent as compared with 32.6 to 37.9 per cent in the none-athlete. Pain on menstruation was more prevalent in athletes, 56.33 per cent as compared with 38.09 to 49.39 per cent with none-athletes. Complete development of Japanese girls occurs at about eighteen years of age. This author recommends refraining from strenuous athletics until at least one-half year after the establishment of the menses. This would be from about the fifteenth to the seventeenth year, depending on the climate. Girls mature earlier in the hotter climates.

Other authors disagree with the Japanese position regarding the effect of athletics on menstruation. They say athletics, as a rule, have no bad effect on the menstrual process. They lessen menstrual pain. They would avoid athletics competition during the menstrual period. Moderation should

¹ J. H. McCurdy and L. A. Larson, The Physiology of Exercise, Philadelphia: Lea & Febiger, 1939, p. 217.

be the rule in athletic competition and then only under medical supervision. Physical activity during the menopause apparently decreases the climacteric difficulties. Belgium opposes the participation of women in competitive athletics except under the strictest medical supervision. They would allow under regulation participation in tennis, handball, basketball, cricket, swimming, boating, equitation, golf, lacrosse, field hockey, fencing, skiing (without the jump), skating and javeline hurling. They would exclude boxing, wrestling, football, ice hockey, bicycle racing, pole vaulting, foot racing and racing and ski jumping.

Karpovich² reported:

Early dynamometric studies indicated that women's strength suddenly decreases a few days before menstruation begins and continues at a lower level throughout the menstrual period.

The relation between athletic performance and the menstrual cycle presents a more complicated picture. In a study of 111 athletic women participating in field and track events, it was shown that 55 per cent suffered no decrease in performance either during menstruation or immediately before the onset of the flow.

There is no evidence to prove that participation during menstruation is harmful. Some menstruating girls faint during severe exertion but severe exertion causes fainting in some men.

2

Peter Karpovich, Physiology of Muscular Activity, New York: W. B. Saunders Co., 1953, p. 27.

Duntzer and Hellendal³ found:

A majority of the 1500 women who were participants in a gymnastic meet continued their exercises during menstruation, the quality of the gym work of 61 per cent of these women being either the same or better than usual during this time. As to those who reported painful results coming from exercise at this time the majority attributed this to overexertion or outdoor exercise during hot or cold weather.

Morehouse and Miller⁴ stated:

Transitory modifications of menstrual function among athletic women disappear with the cessation of heavy exercise programs. Muscular work has a favorable influence on some. There should be no prohibition of moderate physical activity during the menses. Exercise has no detrimental effect upon fertility and the supposed increase in the strength of the pelvic floor musculature resulting from participation in competitive athletics appears to have no pathological influence on labor.

Tuttle and Frey⁵ found that the physical efficiency

3

Roy B. Moore, (Duntzer and Hellendal reference cited), "An Analytical Study of Sex Differences as They Affect the Program of Physical Education," Research Quarterly, October, 1941, p. 597.

4

Lawrence Morehouse and Augustine Miller, Physiology of Exercise, St. Louis: C. V. Mosby Co., 1953, pp. 309-312.

5

W. W. Tuttle and Henryetta Frey, "A Study of Physical Efficiency of College Women as Shown by the Pulse--Ratio Test," Research Quarterly, 1:4, December, 1930, p. 17.

of women, as shown by the pulse-ratio test, is the highest in the period of endometrium growth and during the menstrual flow and lowest during the regeneration period of rest.

Scott and Tuttle⁶ found no significance fluctuation in pulse rate occurring because of menstruation.

Allen⁷ states that blood pressure lowers the period, but this is not true with all women, especially after the first or second day as shown by studies quoted by Ellis⁸. Painful menstruation is generally caused by poor muscle tone and according to Sturgis⁹ often all that is needed during a period is a little more exercise rather than a little less. She believes that each case of dysmenorrhea should be diagnosed and exercises prescribed to suit each individual.

⁶ Gladys Scott and W. W. Tuttle, "The Periodic Fluctuation of Physical Efficiency During the Menstrual Cycle," Research Quarterly, 3:1, March 1932, pp. 137-144

⁷ Chauncey N. Allen, "Studies in Sex Differences," Psychology Bulletin, 24, May 1927.

⁸ Havelock Ellis, Man and Woman, Boston: Houghton and Mifflin, 1929.

⁹ Margaret C. Sturgis, "Menstruation and Menstrual Hygiene in Relation to Physical Education," Mind and Body, 38, June 1931, p. 531.

Lee¹⁰ said it has been estimated that 45.5 per cent of all women in the United States suffer from dysmenorrhea and that 16.6 per cent or 5.3 million women are actually incapacitated at the time of each menstrual period.

Hammer¹¹ found that a direct relationship between the strength of the abdominal muscles and dysmenorrhea in the women she examined.

Studies by Hubbell¹² and Lundquist¹³ have been completed that have definitely shown exercise to be helpful in the relief of dysmenorrhea.

Summary of Menstruation

The data concerning menstruation and exercise presents a rather complicated picture. Some studies reviewed reported decreased performance at various times, either before, during or after the menses.

Psychological effects may have great bearing on

10 Mable Lee, Fundamentals of Body Mechanics and Conditioning, Philadelphia: W. B. Saunders Co., 1949, p. 14.

11 M. C. Hammer, "Dysmenorrhea and Its Relation to Abdominal Strength," Research Quarterly, 4, March 1933, p. 229.

12 Josephine W. Hubbell, "Relief of Dysmenorrhea by Exercise," Research Quarterly, Vol. XX, December 1949, p. 378.

13 Cordelia Lundquist, "Use of Billig Exercise in Dysmenorrhea," Research Quarterly, Vol. XIIIIV, March 1947, p. 95.

the subject of dysmenorrhea. When the menstrual period is looked upon as "sick" days, naturally one expects to be ill. Mothers who offer suggestions for special or carefully planned programs for their daughters during this time often make the menstrual period a time of illness for the girl's entire life time. The psychological implications involved in this subject are so many and so varied that a truly scientific investigation of the topic is virtually impossible.

Characteristics of the Blood

Man has more red corpuscles per cubic millimeter than has woman. The blood of man has about per cent advantage in hemoglobin content. The specific gravity of the male blood is higher 1.057 in man to 1.054 in women¹⁴.

Ellis¹⁵ points out that a good physique is associated with a high specific gravity of blood in any given individual. He advances the theory that the lower specific gravity of the female blood may be a contributing factor to the relatively small degree of athletic ability in the woman.

14

Bernardo Houssay, Human Physiology, New York: McGraw-Hill, 1951, p. 18.

15

Havelock Ellis, Man and Woman, Boston: Houghton-Mifflin, 1929.

Pulse

Vertical pulse rate comparisons tabulated by Lincoln¹⁶ show only a slight sex difference in ages 2 to 12 years, but in the horizontal position the girls pulses were consistently faster. Faber and James¹⁷ found similar results. The best explanation seems to be that since the female heart is relatively smaller and the blood of the female has less corpuscles, the increased pulse rate is a compensation for these weaknesses.

Blood Pressure

Lincoln¹⁸ found little sex differences in blood pressure up to 13 years. Faber and James¹⁹ insisted that any sex differences up to 15 years were insignificant. Richey²⁰ however found:

The curve formed by the
average systolic pressure at each

¹⁶ E. M. Lincoln, "Hearts of Normal Children: Clinical Studies," Am. J. Dis. Child., 35, June 1928, pp. 398-410.

¹⁷ H. K. Faber and C. A. James, "The Range and Distribution of Blood Pressure in Normal Children," Am. J. Dis. Child., 21, June 1921, p. 28.

¹⁸ Lincoln, op. cit.

¹⁹ Faber and James, op. cit.

²⁰ N. G. Richey, "The Blood Pressure in Boys and Girls Before and After Puberty," Am. J. Dis. Child., 42, December 1931, p. 1281.

age differed widely after the age of 8 years. From 10 to 14 years the girl has the higher systolic pressure, at 12 years having the maximum advantage of 4.15 mm. The diastolic pressures also increased from 10 to 16 years. His suggestion that the sedentary life of the girl might tend to make the diastolic pressure higher should be of interest to the physical educator.

In adults the systolic pressure has been found to be higher in the male.

Pulse Ratio as an Indication of Physical Fitness

Boulware²¹ compared her study with that of Tuttle and Skein and found that the female heart rate increases more rapidly with exercise and requires a longer time to return to normal. This sex difference can be accounted for by (1) the relatively smaller heart in female, (2) the smaller number of red corpuscles and less hemoglobin, (3) the relatively shorter legs of women and girls resulting in a relatively greater amount of work in performing the prescribed exercise, and (4) poorer physical endurance in general.

Respiration

Relative to height the female has a smaller breathing capacity than has the male.

21

Lois Boulware, "Survey of the Physical Efficiency of Freshmen Women as Shown by the Pulse-Ratio Test," Unpublished M. A. Thesis, State University of Iowa, 1932.

Kelley²² found that:

Using the ratio of the cube of the height with the breathing capacity gave the best device for comparing the sexes. He also found that during the twelfth to fifteenth years when the girl has superiority in other physical respects she still lags behind the boy in breathing capacity. This smaller capacity is partly but not entirely accounted for by the fact that the lower rate of metabolism in the female calls for less oxygen. But women have more respiration per minute than men which proves that the lower female metabolic rate doesn't entirely balance the smaller lung capacity.

Calcium Metabolism

The calcium metabolic rate is more rapid in the growing girl than it is in the boy as indicated by the earlier ossification of the bones and by the comparative freedom from rickets and tetany.

The male rate of calcium metabolism seems to be more slow and sure.²³

22

Helen G. Kelley, "Individual Differences in Breathing Capacity," Iowa City: State University of Iowa Studies in Child Welfare, Vol. VII, No. 5, 1933.

23

R. F. Matters, "Calcium Metabolism in the Human Female," Austrian J. of Exp. Biol. and Med., Science, 6, June 1929.

General

Riedman,²⁴ Morehouse and Miller,²⁵ and Karpovich's²⁶ writing were in agreement that differences in strength and endurance between the two sexes is not apparent until after puberty. Beginning at puberty, boys begin to excel in strength and endurance. Maximum endurance declines rapidly in girls after 14 years of age.

McCurdy and Larson²⁷ reported differences between sexes for consideration in determining activities suitable for girls. The various aspects discussed rather generally in this quotation were discussed more fully in specific subheadings.

McCurdy and Larson²⁸ said the following:

Directors of physical education should bear in mind the physiological differences between men and women, and between boys and girls. At birth, boys as a rule, are taller and heavier than girls. From the eleventh to the sixteenth year, the girls are the taller,

²⁴ Sarah Riedman, The Physiology of Work and Play, New York: Dryden Press, 1950, pp. 488-489.

²⁵ Morehouse and Miller, Physiology of Exercise, Philadelphia: W. B. Saunders Co., 1953, p. 209.

²⁶ Peter Karpovich, Physiology of Muscular Activity, Philadelphia: W. B. Saunders Co., 1953, p. 28.

²⁷ J. H. McCurdy and L. A. Larson, The Physiology of Exercise, Philadelphia: Lea & Febiger, 1939, pp. 215-216.

²⁸ Ibid.

and from the twelfth to the seventeenth year they are the heavier. From the seventeenth year to maturity the boys forge ahead in weight, height and strength. In comparison with the boy the girl has a larger trunk, shorter, less muscular legs, more adipose tissue on the hips, and thighs, a smaller heart and smaller lung capacity. Her shoulders are narrower, and arms, shoulders and chest less muscular.

The lower physical efficiency of women may be due more to less muscularity, smaller heart, smaller lungs and relatively fewer red corpuscles, rather than to a greatly lower center of gravity as is some times thought.

Her shorter, heavier legs and smaller lung capacity interfere with the greatest success in all games and other athletics where speed or jumping are involved. In exercises of speed, women become breathless more rapidly than men; their oxygen-carrying capacity is less, due to their relatively smaller surface measurement and to the smaller amount of hemoglobin in the individual corpuscle. Metabolism is less rapid in girls than in boys, the ratio begins as 100 to 141. This is true age and bulk for bulk, from the beginning of the adolescent period to maturity. If we compare the bodily surface for each age we find that girls and women have less active metabolism than boys and men.

Summary of Physiological Data

The information concerning physiological data presents facts and functions that require serious critical analysis. The data showed the female to mature earlier but to be inferior to males in a number of capacities such as strength and endurance.

Some of these factors may be real while others are probably due to psychological implications of our cultural considerations of the place of women in our American society. The one thing that stands out is the absence of research concerning the effects of strenuous exercise upon the female. The studies merely show the physiologic status of males and females. Comparisons of the functional efficiency between the two sexes can not be used as a basis for selection of activities for girls and women as the consideration under question is not competition between men and women but among women.

Therefore, until research substantiates the physiologic effects of strenuous exercise on the female, this criterion can not be used as a basis for decision of whether women should participate in competitive athletics.

Anatomical Data

Roy Moore²⁹ included a section on anatomic differences in his study "An Analytical Study of Sex Differences as They Affect the Program of Physical Education". The following passages are quoted from this study. Credit is given the original authors in the bibliography.

General Growth

The growing girl at any age is farther advanced toward maturity than is the boy. X-ray studies of the bones of the hand and wrist show that these bones ossify sooner in the female than in the male. At any age from a few months to twelve or thirteen years this sex difference in ossification can be seen. For instance, at nine to ten years of age the pisiform bone of the girl is completely ossified, but not until the twelfth or thirteenth year does this take place in the boy. And again, the union of the epiphyses of the metacarpal bones and the phalanges is generally completed at sixteen years of age in the female hand but not until nineteen years in the male hand.

In comparing the growth curve of the boy and the girl these differences can be noted: (1) the boy's prepubertal growth starts two or three years after the girl's, (2) the boy's greatest acceleration in growth occurs in his fourteenth or fifteenth year, the girl's in the twelfth, (3) unlike the girl his growth is not suddenly slowed down as a result of sexual maturity but extends over a longer period of years, (4) the

29

Roy B. Moore, "An Analytical Study of Sex Differences as They Affect the Program of Physical Education," Research Quarterly, October, 1941, p. 587-604.

boy does not reach his ultimate size until the age of 20-21 three after the age the girl reaches maturity.

Skeletal Framework

The male is more rugged in appearance than the female for two reasons: (1) excessive amount of subcutaneous fat in the female and (2) size and massiveness of the bones of the male. The adult male has the advantage in absolute length of bone. In proportion to height, however, the knee joint width of the girl of fifteen to seventeen has the advantage over the boy. No such advantage shows in elbow width of the girl.

Height

From birth the male child has a slight advantage in height which he maintains throughout the early growing period. Burk's tables show that from the eleventh to the fourteenth year the girl's acceleration of growth gives her a height advantage of as much as two inches.

At fifteen years the boy surpasses the girl again in height because of the differences in their acceleration of growth. Growing in height in the female ceases between the ages of eighteen and twenty and in the male about three years later. The mean height of the adult male is from five to six inches more than that of the adult female.

Iowa Child Welfare Station Measurements show that the girl's sitting height relative to her total height is the lowest at eleven years when it is 52.2 per cent and the boy's at thirteen years when it is 51.4 per cent. The adult standards are 53.7 per cent for women and 53.0 per cent for men.

Weight

There is very little difference in the absolute weight of the two sexes up to the period of prepubertal growth, the advantage though small always going to the male. Sometime between the ages of ten - twelve years the accelerated growth of the average girl makes her heavier than the average boy. This advantage may reach as much as four or five pounds at twelve or thirteen years. At fifteen years the boy again takes the lead which is never relinquished.

Fatty Deposits

The relative greater weight of the female can be explained to a greater extent by her excessive accumulation of fat. Measurements at the Iowa Child Welfare Station show that as early as four years of age the girl has a larger amount of subcutaneous fat than has the boy. This difference increases until maturity is reached. The average adult female has about seven more pounds of this subcutaneous fat than the average man. In addition to this layer women also have an extra thick pad of fat over the hips and thighs.

Center of Gravity

Cotton found that the mean center of gravity in man is located at a point 56.7 per cent of his height above the ground. Woman's relatively smaller upper trunk and her relatively heavier lower trunk and thighs are enough to overbalance her shorter legs. No mean center of gravity is located at 56.1 per cent of her height.

Shoulder Width

Measurements taken by Iowa Child Welfare Station show that from eleven to fifteen years of age the girl has relatively wider shoulders than the boy. Her greatest advantage comes during the thirteenth year when, relative to height, her shoulder width is 20.75, while the boy's is 20.40. After the fifteenth year the boy's becomes much wider until at nineteen years of age it is 22.0 while the relative width of the female is 21.46.

Chest Measurements

In absolute chest circumference the boy is superior at every age with the possible exception of ages twelve and thirteen. This superiority varies from 1 to 2 cm. at the different ages before puberty and increases to 11.4 cm. at seventeen years. Measurements at the Iowa Child Welfare Station show that relative to height the chest girth in the male is the smallest in the twelfth year when it is .450. The females lowest being at seventeen years of age when it was .441.

Heart Size

Roentgen-ray studies by Lincoln, Spillman, and Nicolson show that the male heart in absolute size is greater except for the twelfth and thirteenth year. In relation to height the transverse width of the boy's heart is larger at every age up to the thirteenth year. Bainton's X-ray studies found the average transverse diameter of the heart in men and women were 12.13 cm. and 10.67 cm. respectively. He found that when members of each sex are of the same height, weight, and age the transverse diameter of the heart of the male is 0.8

cm. greater than that of the female.

Abdomen

While man seems to have a relatively larger thoracic region, women, according to Ellis has abdominal dominance. Cunningham made measurements of a small number of cases before the turn of the century and came to this conclusion.

This relatively larger abdominal segment is filled with relatively larger visceral organs and with the extra organs of generation of the female.

Pelvis

The belief that the trunk of the male is more wedged shaped than that of the female is based upon the assumption that his shoulders are relatively broader and his hips relatively narrower. Tables from Martin show that the female pelvis is relatively broader and more shallow than the male. These measurements were of the bony pelvis itself.

From a study of measurements made at the Iowa Child Welfare Station came the surprising discovery that, starting at the age of eighteen, the relative width at the crests showed practically no sex difference. Their pelvic measurements showed the same curve as other parts of the body except that the female retained her advantage for a longer period.

Straus states that the marked overlapping of pelvic characters of males and females makes it impossible to definitely sex and unknown pelvis. He writes: There are no distinct sexual types. The type is only an extreme form, expressed by the mean for any character and is in no sense the rule

An unpublished x-ray study made by McCloy, of a small number of young women, show clearly that individuals pelvises in the same sex may differ enormously.

Whether sex differences in pelvises are innate or environmental has been a controversial problem. Thomson's study of foetal pelvises showed sex differences even before birth.

Lower Extremities

Men's legs are relatively longer than are those of women. Moore found that Weissenberg's study showed the leg length of men was 52 per cent of their height and that of women 51.2 per cent. All studies found this to be true except Bach.

Bach reported absolute calf girth of men and women to be quite comparable 33.6 cm. for men and 33.3 cm. for women. The thigh girth, on the other hand, is much greater in women.

Boys and men have relative longer feet than girls and women. At the age of ten the girls' feet are at their longest proportion, 15.6, and at thirteen years the boys' feet are 16.1 per cent of their height.

Upper Extremities

The arm length of girls from seven to twelve years never surpasses that of the boys. At thirteen and one-half years the girl does have a relative advantage of 0.2 per cent, but this advantage is short-lived.

Hordlicka's measurements of thousands of humeri resulted in the following comparisons: (1) the upper arm is

absolutely and relatively shorter than in the female, (2) the humerus is smaller in diameter in the female; (3) the forearm of the female is relatively more shortened than is the upper arm; (4) the upper arm of the female is relatively shorter than is the thigh when compared to the male.

Bach found that in men and women of the same height the upper arm of the man is longer by 0.4 to 0.5 of the body height.

Potter found that the angle of obliquity of the forearm with the upper arm is 173.17 degrees in men and 167.35 degrees in women, thus showing that the extended arm is 5.84 degrees nearer to being straight in the adult male.

Body Build and Somatotype

The general body build of girls requires a special type of program which recognizes the relatively under developed upper portion of her body.

Buche-Geis believes that the sedentary, conventional behavior into which the girl falls during and after puberty because of the dictates of society is responsible for much of her inferior thoracic development. Therefore she advocates strong and vigorous activities such as running, swimming, and apparatus work to foster the natural broadening effect of the ovarian secretions at puberty.

Most authors suggest the use of running and swimming for developing the chest muscles, but there is a great deal of controversy concerning the use of apparatus by girls. It must be remembered that girls are not physically as well equipped to perform vaulting and hanging stunts on pieces of apparatus as are boys, but there is a drastic need

for the development of the muscles used in such stunts. Apparatus work may be taught to girls keeping their peculiar body build in mind. There should be no attempt to follow strictly the stunt routine prescribed for boys. Running games and all games which require the use of shoulder girdle muscles, such as volleyball, baseball, and basketball, serve to develop the upper body. It must always be remembered that the relatively small heart and lungs of the girl handicap her endurance.

A great deal of research concerning body built and somatotyping physical performance has been done on men. However, the picture is not the same relative to women. A study concerning somatotyping women is now in progress. The author Dr. William Sheldon³⁰ has this to say about his incomplete work:

Somatotypically, women are more conservative than men. They are most closely massed about the center of their own distribution, are rarer at the extreme edges of their distribution, and they altogether avoid the "no woman's land" of the extreme Northeast. Men are more evenly distributed throughout the whole range of the somatotypes, and are thinly scattered even in the extreme South and Southwest which is a female stronghold and for consistency ought to be an inviolate no man's land. But these men of the South and Southwest tend toward gynandromorphy and also toward

 30

William H. Sheldon, Atlas of Men, New York: Harper & Bros., Publishing Co., 1954, p. 14.

gynandry of behavior. They are in quite a real, structural sense women-men (although they are by no means ladies' men).

It has often been observed in the endocrine clinics that the male gynandromorph seems to be commoner than the female gynandromorph. There has been a controversial question whether this was merely because the male genitals are external and the condition therefore more overt and obvious in men while more covert in women, or whether males are in fact more gynec than women are andric. The evidence of the somatotype distributions would seem to support the second alternative. In the human species nature appears to cloister the female. The male seems to be more expendable, more experimental, more widely variable, and his variation takes him frequently into female territory. Judging from somatotype photographs alone. It would appear that there must be many times as many males who successfully impersonate the typical or average female as there are females so closely resembling the average male. Somatotypically there are perhaps ten times as many men who reach 5 in endomorphy as women who reach 5 in mesomorphy.

Summary of Anatomical Data

The facts concerning the anatomy of the women disclose that the female matures faster, has excessive amount of subcutaneous tissue and is smaller and less ruggedly built in all respects than the male.

In some of the anatomical considerations the female is different enough to be considered under entirely different criteria from those used to evaluate men. However, many of the qualities in the evaluation of female and male differ-

ences is a matter of degree. How these considerations should be regarded in the formulation of athletic competition for women will be discussed later.

Muscular Strength Data

Arm Strength

Williams³¹ states:

Since the arm strength of girls after puberty is small in relation to weight, their program should avoid activities which require support of the body weight by the arms. Hanging and swinging exercises on apparatus are usually unsuited to girls because of small arm strength on the one hand and a low center of gravity on the other. Many of the activities on the parallel bars, long bars, long horse, flying rings, traveling rings, and the horizontal ladder that girls can do equally as well as boys before puberty become wholly undesirable for them afterward.

Abdominal Strength

Williams³² says:

The female organism is not strikingly a strength unit, and yet girls and women should be strong and vigorous in a feminine way. They are not to be asked to engage in weight lifting; to perform masculine feats on apparatus, or to center their attention on the abdominal muscles and to forget interests, attitudes, minds and emotions.

³¹ Jessie F. Williams, The Principles of Physical Education, Philadelphia: W. B. Saunders Co., 1954, pp. 143-145.

³² Ibid., p. 82.

General

Mosher and Martin³³ conclude that the sex differences in strength are due to differences in the use of the muscles brought about by conventional limitations of activities or by dress. Baldwin's³⁴ study tends to prove this.

In comparing the strength of the left and right arm and upper back (muscles which are used much more by boys than girls) through the ages of seven to seventeen, he found the girls' was inferior at all ages, the closest approximation of strength being at ten or eleven years. The greatest increment of strength was between the twelfth and thirteenth year for girls and between the fifteenth and sixteenth year for boys. After fifteen years of age the strength of the girls increased very little, whereas the period between fourteen and eighteen was one of great increase in boys strength.

Sargent³⁵ found that the muscles of the legs were

33

Clelia D. Mosher, "Causal Factors in the Increased Height of College Women," Journal of American Medical Association, 81, August 18, 1923, p. 535.

34

Bird T. Baldwin, "The Physical Growth of Children from Birth to Maturity," (M. A. Thesis, State University of Iowa).

35

L. W. Sargent, "Some Observations on the Sargent Test of Neuromuscular Efficiency," American Physical Education Review, February 1924, pp. 70-71.

relatively the strongest muscles in the woman, thus substantiating the opinion of Mosher and Martin.

Morris³⁶ found that the average strength of men's muscle to be 9.2 kg/sq. cm. while the average strength of women's muscle was 7.1 kg/sq. cm. Women therefore, has only 78% of the strength of men.

Summary of Strength

Since strength is of vital importance in all physical education activities, this area should be scrutinized carefully. From the studies reported, women have less muscular strength for all parts of the body than men. How these facts will be interpreted in the formulation of a program of athletics or physical education for women is a matter in which the philosophy of the program director must also be considered. If athletic competition were to be conducted between men and women, the factor of strength alone would rule the activity out; however, since women are to compete against women, it seems now that no arguments remain against the establishment of a program of activities that may be geared to the strength of the participants.

36

Carrie B. Morris, "The Measurement of the Absolute Strength of Muscle Relative to the Cross Section," Research Quarterly, Vol 19, December 1948, p. 295.

Educational Data

Kozman, Cassidy and Jackson³⁷ in their text state:

At the present time there is some concern among those responsible for guiding girls' programs with the findings that programs in the past have not always given highly skilled girls opportunities for satisfying competition. Consequently, some of these girls have sought such competition in commercially organized leagues and on teams sponsored by community agencies often well meaning, but lacking insight into ways of protecting the players' physical health and emotional stability. There is a conviction that the masculine pattern of achievement through competition is alien to girls unless the recognition they need is not gained in other ways and they can gain it through their athletic ability.

Williams³⁸ stated:

Wide spread differences of opinion exists relative to athletic competition for girls. At one extreme are those who are in favor of interscholastic program for girls and the other extreme those who are not in favor of it.

37

H. C. Kozman, Rosalind Cassidy and C. O. Jackson, Methods in Physical Education, Philadelphia: W. B. Saunders, 1953, p. 495.

38

Jessie F. Williams and Clifford L. Brownell, The Administration of Health Education and Physical Education, Philadelphia: W. B. Saunders Co., 1951, pp. 208-209.

Between these two points of view are many variations, concerned primarily with such factors as: (1) the extent of competition to be permitted; (2) adequate control over such functions; (3) teams coached by qualified women; (4) games conducted by competent women officials; (5) girls' contest not to be used as added or preliminary attractions for boys games; (6) provision for the athletic participation needs of the average girl who lacks the skill required for school teams; and (7) other problems of similar nature.

Failure to give due recognition to the seriousness of these conflicts, and to the educational needs of individuals, results in many of the untenable positions held by persons interested in girls and women.

Nixon and Cozens³⁹ stated the following:

It is interesting to note that as a rule athletic competition for girls and women in American schools, and colleges has developed in a more rational fashion than that of men and boys and that consequently the program of competitive sports and athletics for girls and women is free from most problems.

39

Eugene Nixon and Frederick W. Cozens, An Introduction to Physical Education, Philadelphia: W. B. Saunders Co., 1948, pp. 38-39.

General

Lebman and Witty⁴⁰ are quoted, (the date of this writing should be noted):

High School girls need physical education activities, and it is fortunate that she is not bound by the social taboos with thirty and more years ago which restrained her from engaging in vigorous sports and games. Her greatly increased interest and participation in sports activities have made her far superior physically to her sister of thirty years ago, and she is better prepared today to fulfill her special biological function. That such traits as sportsmanship, loyalty, co-operation, and emotional control have been undeveloped in the girl and are not foreign to her nature is shown by big improvement in these qualities since the girl had the chance to engage in big-muscle play activities, particularly play competitions. As women are entering more and more the social, political, and economic life of the world, she needs the opportunity for developing these desirable social standards which the false social standards of the past kept her from doing.

Educational Values

The arguments that have been advanced in favor of and against interscholastics and intercollegiate athletics

40

H. C. Lebman and P. A. Witty, The Psychology of Play Activities, New York: A. S. Barnes and Co., 1945, p. 10.

are many and varied.

Williams and Brownell⁴¹ give the following objectives and objections which could be applied to the consideration of women and girls engaging in competitive athletics:

Educational objectives as applied to athletics:

1. To stimulate teachers to do a better job of teaching.
2. To serve as a knowledge expansion aid.
3. To lead to the loyalty horizons.
4. To lead to satisfaction and success.
5. To mold and guide the will to win.
6. To secure support from the general public.
7. To provide an enriched program for the exceptionally skilled players.
8. To aid in shaping students emotional control.
9. To motivate intramural programs, the physical education classes and physical fitness.
10. To aid in the delinquency reduction.
11. To interest non-academic minded boys and girls to stay in school.
12. To give positive citizenship training

Objections to athletics:

1. They stress winning even by breaking rules.
2. They stress finance received.
3. They lead to student rioting and destruction of property.

41

Williams and Brownell, op. cit.

4. They are harmful to the health of girls and women.
5. They cause women to become less attractive in appearance.

Lee⁴² stated:

The real aim of an athletic contest should be not to win but to play one's best according to the rules. This is the form of competitive spirit women educators desire in the education of girls and women.

Because of the particular physical conformation and emotional makeup of girls, we should promote for them a... program free from emotionalism, free from intense competition, free from heart and pelvic strain, free from all attempts to imitate the boys.... We should keep the girls out of spectator athletics.... and build for them a program founded on physical safeguards and moderation. When girls' athletics are promoted for any other reasons other than the physical and educational benefits and recreational pleasures to be derived by the participant themselves it is a safe guess that the players are being exploited.

Hughes and French⁴³ discussed this area thoroughly in their writing which follows:

42

Mable Lee, The Conduct of Physical Education, New York: A. S. Barnes and Co., 1937, pp. 58-59.

43

William L. Hughes and Esther French, The Administration of Physical Education, New York: A. S. Barnes and Co., 1954, pp. 195-199.

All teachers - not just those who are preparing to teach physical education - should understand competitive, know something about the problems in athletics and how improper conduct of athletics reduces the educational outcomes. All teachers should be familiar with the standards for competition proposed by the professional organizations. Many of the students graduating with majors from presentday departments do not know how to analyze performance, how to assist the performer to change a poor movement, how to organize for improvement and best learning as opposed to mere practice. The teaching of skills have been neglected more by women than by men. Many students graduate in physical education without having experienced any interscholastic or intercollegiate competition, without having received any instruction in officiating or even limited experience in officiating. Equally serious is their ignorance concerning the whole question of the desirability of interscholastics and intercollegiates some only know that their teachers are opposed to these forms of competition.

Jay B. Nash⁴⁴ made the following statements:

Within the last few decades a large number of people trained in the area of physical education have made athletics a profession. The girl trained in one of the fields has, if she marries, a better conception of childhood education, of health of her family, and of rich recreational possibilities of the home and healthy children.

44

Jay B. Nash, "Opportunities in Physical Education, Health and Recreation," Vocational Manuel, 1950, p. 9.

Summary

The ideas presented in this section were contrasting and controversial in many instances. It would be too difficult to summarize without analyzing so further remarks concerning this section is left to the discussion chapter.

Conflicting Data

Irvin⁴⁵ is quoted as stating:

Many women teachers in physical education claim that if there are values in interscholastic athletics for boys, they should be beneficial for the girls. Others claim that the advantages of intercollegiate athletic competition outweigh the disadvantages. Still others hold that there is no need for interschool competition in athletics if the proper intramural programs are provided within the individual school.

Intercollegiate athletics for women are not recommended for the average college or university. There are situations, however, in which interschool competition for colleges may be desirable. The need must be determined on an individual basis. There is a greater need for intercollegiate athletics for women in small colleges where there are not enough students to organize intramural teams for equal competition.

Jessie Williams⁴⁶ gives insights on women and girls taking part in competitive athletics as follows:

Due to differences between male and female, the events and their conduct need selection with regards to the characteristic qualities of development, physiological functions and emotional and psychic variation. Track events are generally unsuited

45

Leslie W. Irvin, The Curriculum in Health and Physical Education, St. Louis: 1951, pp. 189-190.

46

Williams and Brownell, loc. cit., p. 210.

to women and basketball, even with women's rules, is a game better adapted to men than women.

Williams⁴⁷ states that:

If girls are to be restricted from engaging in interschool competition while boys are encouraged to do so, the reasons for such restriction must be found in the kind of social qualities desired in the different sexes, rather than in significant differences in biological needs and interest.

Coaching

Williams⁴⁸ says here:

Women teachers should be employed for girls' teams. Men teachers tend to employ boys' standards of performance and to pursue men's practices. Men fail to realize the physical limitations of girls and women and cannot frankly and helpfully discuss health problems with them.

Williams⁴⁹ also states that:

Uterine-ovarian disturbances resulting in dysmenorrhea frequently respond to moderate special exercises prescribed for the condition. Excessive fatigue and sports involving emotional and physical strain should

⁴⁷ Ibid., p. 210.

⁴⁸ Ibid.

⁴⁹ Jessie F. Williams, The Administration of Health and Physical Education, Philadelphia: W. B. Saunders and Co., 1945, p. 209.

be avoided.

A fair administrative treatment of this topic avoids personal or group biases. It respects the judgment of accepted women leaders, and pronouncements of organizations founded to perpetuate the worthwhile physical and social values inherent in sport.

Certainly girls should not be expected to attain standards of excellence established for boys in athletic events requiring great strength, although activities suited to interests and capacities of girls might easily be chosen.

If girls are to be restricted from engaging in interscholastic competition while boys are encouraged to do so, the reason for such restriction must be found in the kind of social qualities desired in the different sexes rather than in any significant differences in biological qualities.

Williams⁵⁰ further says:

It should be quite clear that the profound changes in the pelvis require modification of the program in physical education for the girls. Complete development of the pelvis in woman does not occur until well into the twenties, and this prolonged period of developmental change from twelve years to twenty-five suggests that girls be taught activities that will not make extreme muscular pull upon the pelvic region. This is of significance for maternity.

The emphasis upon competitive excellence in track and field that flows from

the Olympic games and the tendency to select for professional preparation women of masculine type give an improper direction to physical education for girls and women. Williams also reported upon the admission standards for women to the Warsaw Central Institution of Physical Education and observes that the tests used led to the selection of candidates, 79.95 per cent of whom had underdeveloped breasts, 50 per cent had flat and narrow pelves, and 65.3 per cent were leptosomatic (tall, thin, long, flat thoracic cavity). Obviously types of physical education suited to the masculine type of girl are wholly unsuited to the feminine physique.

Lee⁵¹ says:

Today's girls must be sturdy as well as glamorous. Strength does not mean bulky, bulging muscles; it means muscles with more of their fibers able to share in a task.

Participation in competitive games and athletics that give vigorous exercise is excellent for the development of cardio-respiratory endurance because of the intense motivation from within the individual which keeps her continuing the activity long enough to develop endurance.

Reidman⁵² reported:

The only difference between seven-

51

Mable Lee, Fundamentals of Body Mechanics and Conditioning, New York: W. B. Saunders and Co., 1949, p. 14.

52

Riedman, op. cit., p. 477.

teen women and thirty men in response to moderate exercise was a more rapid and higher increase in the pulse rate of women. The maximum pulmonary ventilation, oxygen intake, and R.Q. were higher in men, but there was considerable overlapping in all variables when the eight best women were compared with the ten poorest men.

The following article was taken from Sports Illustrated:

THE GIRLS AT PONCA CITY - by Mary Snow.⁵³

Blonde Gayle Dierks has never been able to compete in interscholastic track and field meets in her home state of Colorado because Colorado, like 47 other states, severely discourages such female frivolity. Nonetheless, 17-year old Gayle recently made her own way to Ponca City, Okla. and the Girls' and Women's National AAU Track and Field Championships. In two days, just for experience, she ran an almost continuous succession of preliminary, semifinal and final heats in the 50 and 100 yard dashes of the girls' division, the 100 and 200 yard dashes in the women's division and, in her spare time, entered the broad jump. In addition to experience, Gayle took home three third-place medals and a burning desire to keep running and jumping.

Nor was Gayle the only ambitious novice on hand. For instance, 15-year old Charity Alker journeyed 1,300 solitary miles in defiance of her gym teacher who called her participation in activities such as the baseball throw and shotput "socially unacceptable in Greenwich, Conn." Yet all the 135 who

53

Mary Snow, "The Girls at Ponca City," Sports Illustrated, July 4, 1955, p. 17.

showed up weren't there merely for experience or to establish their independence. Many were thinking ahead to 1956 and the Olympics.

As expected, the star of the show was 23-year-old Mae Faggs, a senior at Tennessee State University and veteran of two Olympic Games. The best woman sprinter since Stella Walsh, Mae Faggs ticked off a new American record of 10.7 seconds in the 100-yard dash, won the 220-yard dash and anchored the fastest 440-yard relay (49.1) ever run in this country by women.

Mae's supporting cast was loaded with youthful promise. There was Mildred McDaniel, 22, who missed a world's high-jump record by the margin of her flapping track shorts when she knocked off the bar at 5 feet 8 5/8 inches. Pamela Kurrell, 16, stuffed a first-, a second- and two third-place medals in her suitcase for baseball, shot-put and discus-throwing competition. Bertha Diaz Hernandez, an 18-year-old Cuban with a doll-like face and a lanky stride, set an American record in the 80-meter hurdles. But it was up to another Tennessee State sprinter, 17-year-old Isabel Daniels, to almost steal the show. An understudy to Mae Faggs, she won both the girls' 50 and 100 in a breeze, anchored the winning girls' 300-yard relay team, came back to win the women's 50-yard dash and ran a leg on the record-setting relay team.

Summary

This section could be termed the most important section in the whole study. It is interesting to note how some authors change philosophies or retain all the elements of their basic philosophy about a question over a period of

time. It is also interesting to see both sides of a question presented together for evaluation.

ANALYSIS

In analyzing the literature concerning the highly controversial issue, namely competitive athletics for women, several points stand out. Among some certain students of the problem first, there is a tendency to arrive at conclusions which the data hardly appears to warrant.. Secondly, certain of the studies were unquestionably biased. Finally, in a great many instances the American philosophy concerning women was a factor used as the criteria for judging the data found rather than judgment strictly on a basis of empirical data.

As a general rule, the socio-cultural status of women in American Society would preclude her acceptance as a competitor on a level with men. And it appears to be a concession, grudgingly given, that they are permitted to participate in competitive sports at all in the male dominated society such as exists in America. Until the evidence proves otherwise it is this factor primarily which influences the opinion of women in competitive athletics. In American Society the conception of women is that they be beautiful, feminine, graceful, and decorative rather than muscular, and excellent physical specimen of strength and endurance.

On the basis of the general practice, it must be

assumed that these values are for, or can be obtained, by men only. Competitive sports, it is argued, teaches calmness in emergencies, coolness under fire, control of the emotions, and the like. These are learned behavior patterns. No evidence has yet been presented which tends to show that biologically, anatomically, or physiologically, one sex is more predisposed to acquire these qualities through learning than another.

Anthropologically evidence tends to show that where the culture permits, the physical development of women; through strenuous exercise or physical labor, is comparable to that of men and does not interfere with their normal functioning as a woman. The effective employment of women in heavy industry, especially in Russia, during World War II is a case in point. Since the women's national body of physical educators has taken a very dogmatic stand against competitive sports for women, naturally the laymen would follow suit, since the position of this professional body is presumed to be authoritative. Specialized training for women in most instances is not organized. Organized programs of competitive athletics for women exist in very few states and, to a large degree, only in Negro Secondary Schools and a few Negro Colleges.

It is ironical to find authorities in the field of Physical Education suggest a long list of values to be gained

from competitive athletics and at the same time deny women of the opportunities to obtain these values. Since emotional stability and character traits are gained only through experience containing opportunities for learning these elements, it would seem that women, if they are to live and compete in our modern society have much to gain from such participation.

Chapter IV

CONCLUSIONS

Since there is no research which provides sufficient empirical evidence to verify the observation that strenuous athletics have adverse physical effect on women. The general opinion and prevailing belief that women should not participate in competitive athletics must be taken for what it is, merely a value judgment.

Furthermore women compete against women in competitive sports rather than against men. Hence, the level of competition is always comparable.

The analysis of the literature referred to in this study leads the writer to the conclusion that the evidence is less than adequate to support the hypothesis that competitive sports for women have adverse physiological effects on them. There are, of course, individual cases which will be the exception to the rule. This however would be no different from what exist among men in competitive sports. Until such time therefore that more precise and pertinent data can be presented it must be assumed that the denial of women of the opportunities to participate in competitive sports rest upon a value judgment rather than upon scientific verifiable and objective research.

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