

A SURVEY OF INTERSCHOOL PARTICIPATION
IN TRACK AND FIELD

A Thesis
Presented to
the Faculty of the Division of
Health, Physical Education and Recreation
Kansas State Teachers College, Emporia

In Partial Fulfillment
of the Requirements for the Degree
Master of Science

by
Ronald S. Bowen
July 1964

Thesis
1964
B

Approved for the Major Department

ED McCallough

Approved for the Graduate Council

Jimmie R. Byler

213091 ²

TABLE OF CONTENTS

CHAPTER	PAGE
I. THE PROBLEM, PROCEDURE, AND DEFINITION OF TERMS	
USED	1
The Problem	1
Statement of the problem	1
Purpose of the study	1
Specific objectives to be attained	1
Importance of the study	2
The scope of the study	2
Hypothesis	2
Definition of Terms Used	3
Senior high school	3
Track and field meet	3
Dash	3
Middle distance.	3
Distance	3
Doubling	3
Recovery period.	4
Procedure	4
II. REVIEW OF RELATED LITERATURE	6
Introduction	6
III. ANALYSIS OF DATA	12
IV. SUMMARY, FINDINGS AND CONCLUSIONS.	22
BIBLIOGRAPHY	28

LIST OF TABLES

TABLE	PAGE
I. Events Entered by High School Milers and Half-Milers in Kansas	13
II. Events Entered by High School Sprinters in Kansas.	17
III. Events Entered by High School High and Low Hurdlers in Kansas	20
IV. Other Events in Which Coaches of Kansas Would Enter Runners of the 440, 880, and Mile if There were no 440 Yard Limitation Rule	25

runners enter; (3) comparing the kinds of events sprinters enter to the kind of events middle distance runners enter.

Importance of the study. A need for better knowledge and understanding of the competitive track and field situation in the state of Kansas is generally recognized by senior high school coaches.

The scope of the study. A survey was conducted which included 64 class "A" high schools in the state of Kansas as classified by the Kansas State High School Activities Association for the school year 1963-1964. The enrollment range of the schools included in the survey was 252 to 594 students. Three of the schools included in the survey had enrollment figures doubled because they enrolled only boys. All schools in the survey included enrollment of grades 9 through 12.

This study was primarily concerned with the running aspect of track and field, although some mention was made of the field events. The survey covered only the track and field season in the spring of 1964. Only male senior high school athletes were included in the survey. The situations refer only to large one-day track and field meets.

Hypothesis. The major hypothesis of this study was that sprinters were running a longer total distance at a

maximum physical output, in large track and field meets, than were middle distance and distance runners. A second hypothesis was that middle distance runners and distance runners were not competing in as many events as sprinters.

II. DEFINITION OF TERMS USED

Senior high school. Throughout the report of this investigation, the term "senior high school" shall be interpreted as any school with grades 9 through 12 or grades 10 through 12.

Track and field meet. A one-day track and field meet would necessitate preliminary, semi-final, and final races in the 100 yard dash, the 220 yard dash, the 180 yard low hurdles, and the 120 yard high hurdles. This could mean ten or more schools if six lanes were to be used for the dashes and hurdle races. Note: it was recognized that this definition did not include all the track and field events.

Dash. Any race of 100, 220, or 440 yards.

Middle distance. A race of 880 yards.

Distance. The mile run.

Doubling. Doubling refers to participation in more than one running event during a one-day track meet.

Recovery period. That length of time which it takes an athlete to regain his approximate normal rate of breathing and physical strength in order to compete in another event.

III. PROCEDURE

This study utilized the questionnaire as a method of gathering data. The questionnaire was mailed to the head coach of track and field in each class "A" high school in the state of Kansas.

Two types of questions were asked in the questionnaire. One required the respondent to reply by making a prescribed response, the other required an answer of one or two words. Questions covered the additional events that each type of runner entered during the season. Coaches were also asked in what events they would enter their athletes if rules permitted, what distances they were running their athletes in practice, and if they were in favor of the 440 yard limitation rule.

The questionnaire dealt with senior high school male varsity athletes. The coaches questioned determined their school's best two boys in each event. The questionnaire dealt primarily with running events. The reason the survey included only the best two athletes in each event was that

large one-day track meets limited entries in each event to two for each school.

From the data gathered, tables were constructed to show the relationship of the types of events sprinters enter to the types of events middle distance and distance runners enter in one-day track meets. The distances run in practice by each type of runner was recorded in the text.

The conclusions of this study were based upon the text and the tabular evidence presented throughout this study.

CHAPTER II

REVIEW OF RELATED LITERATURE

I. INTRODUCTION

The literature written concerning the total distance any one high school athlete should run in a large one-day track and field meet is rather limited and inconclusive. An attempt will be made to survey thoroughly that information which is available and pertinent to the area of this study.

The Kansas State High School Activities Association, which is the governing body of interscholastic activities in the high schools of Kansas, specifies a definite distance that a boy may not exceed in a one-day track meet. In part the rule states "... he may not run more than one race of 440 yards or more in any one day, whether it be in an open race or a lap in a relay."¹ This rule eliminates any type of doubling in any race of 440 yards or more. If a boy participated in any one of the following events in a one-day track meet he could not participate in any of the others: (1) the 440 yard dash; (2) the mile relay; (3) the

¹Kansas State High School Activities Association, Official Handbook (Topeka, Kansas: Association Head-quarters, 1963-64), p. 30.

880 yard run; (4) an 380 run the mile-medley relay; and (5) the mile run. Therefore, any athlete specializing in middle distance and distance running would be limited to one event. This would mean that the maximum total distance for a boy specializing in this type of running could be 440 yards, 880 yards, or 1,760 yards depending upon which event he entered.

With preliminaries, semi-finals, and finals in all the running events under 440 yards, it is possible for a sprinter entered in the 100 yard dash, the 220 yard dash, the 440 yard dash, and the 880 yard relay to run a total maximum distance of 1,620 yards. Another possibility under the same circumstances would be a boy entered in the 100 yard dash, the 180 yard low hurdles, the 220 yard dash, and the mile relay who would run a total of 1,940 yards in one day.

It is interesting to note the position Seaton takes on this subject:

No competitor below college level should be allowed to compete in a one-day meet in more than two events, exclusive of the relay, no two of which should be the 440, 880, or mile run.²

²Don Cash Seaton, Safety in Sports (Englewood Cliffs, New Jersey: Prentice-Hall, Incorporated, 1948), p. 362.

He took this position primarily as a safety and health protection measure. Contrary to this statement, Kansas track and field rules allow a high school boy to compete in three events and one relay, or two events and two relays in a one-day track meet, providing the athletes adhere to the 440 yard limitation rule.

Fear of injury to vital organs was one of the main reasons that distance and number of event limitations were imposed upon track and field athletes. According to Jordan, physiologists and biologists have not been able to determine the physical limits of a human under given conditions.³ However, evidence indicates that they are closer to knowing these limits than the mental limits of an individual. In reference to track and field events Jordan says, "There is a great amount of evidence to suggest that many barriers are not physical at all but psychological."⁴ Fears are generally prevalent where unknown exist. Doherty states that "old-time fears of injury to the vital organs have been gradually replaced by a strong reliance on the admiration for human adaptability."⁵

³Peyton Jordan, "Emotional Fitness for Track and Field Competition," Journal of Health, Physical Education and Recreation, 32:29-30, February, 1961.

⁴Ibid.

⁵J. Kenneth Doherty, Modern Track and Field (Englewood Cliffs, New Jersey: Prentice-Hall Incorporated, 1963), p. 195.

At one time it was a common belief that athletes who ran long distances developed an enlarged heart that would shorten their life. Breshahan and Tuttle found that strenuous exercise brought about a definite increase in heart size but that it was not disadvantageous to the athlete for it was brought about by the enlargement of the muscle cells and not a dilation of the heart.⁶ They also found that endurance exercises increased the vital capacity as much as 20 per cent, that the pulse of the trained athlete is as much as 15 per cent below that of the untrained individual, and that there is a definite increase in the number of red corpuscles of those athletes who train strenuously.⁷ In support of this information, Cureton cites the following men:

.. . . Sir James MacKenzie is reported as never having seen a case of dilation or enlargement resulting from athletic overexertion; and that Sir Thomas Lewis believes that the 'heart reserve' is never exhausted by burdens caused by physiological acts no matter how strenuous they may be.⁸

It must be brought to the attention of the reader that the studies referred to involved athletes with normal,

⁶George T. Bresnahan and W. W. Tuttle, Track and Field Athletics (St. Louis: The C. V. Mosby Company, 1950), p. 144.

⁷Bresnahan, Ibid.

⁸Thomas Kirk Cureton Jr., Physical Fitness of Champion Athletes (Urbana, Illinois: The University of Illinois Press, 1951), p. 133.

healthy hearts. Many times, heart ailments which show up during athletic participation, are due to some heart defect overlooked in a hurriedly conducted physical examination.

Distance and middle distance athletes require a high degree of endurance in order to be efficient in their event. In order to reach a high level of endurance, the athlete must train diligently over a long period of time. Doherty says, "The organism develops not only resistance to fatigue but also increases its rate of recovery."⁹

Therefore, as endurance is improved, the recovery time decreases. This indicates that the better conditioned distance and middle distance runner could compete in more than one middle distance or distance race in one day. Lietzke said, "The distance 1,000m to 12.5 mi may perhaps define the range in which a trained runner experiences the physiological lift commonly referred to as a 'second wind'."¹⁰

Lietzke refers to A. V. Hill, of the University of London, who pointed out in a scientific study of athletes that the capacity of the body for exercise depended upon

⁹Doherty, op. cit., p. 194.

¹⁰M. H. Lietzke, "An Analytical Study of World and Olympic Racing Records," Science, 119:333-336, March 12, 1954.

two factors: (1) the maximum rate of oxygen intake during exertion which is determined by the efficiency of the heart and lungs; and (2) the maximum oxygen debt the body can tolerate.¹¹

New methods of training track and field athletes have helped to bring about better performances in the sport. Doherty states,

The high intensities of stress required by modern competitive performances at all levels - post college, college, and high school - require a long build-up of effective it is likely to be.¹²

¹¹Lietzke, loc. cit.

¹²Doherty, op. cit., p. 195.

CHAPTER III

ANALYSIS OF DATA

The data presented were gathered by the use of a questionnaire. Of the sixty-four questionnaires sent to coaches, forty-eight were returned for a reply of seventy-five per cent.

It was found that the majority of the sprinters compete in more events in large one-day track and field meets than do distance and middle distance runners. Only two of the forty-eight coaches replied that their sprinters did not compete in more events than their distance and middle distance runners. All forty-eight coaches replied that their milers did not compete in as many events as their sprinters. Seven half-milers were listed as competing in as many events as the sprinters.

Table I shows the types of events that the coaches listed for their best and second-best miler and half-miler. It must be noted that each runner listed in the table could have entered three other events. If each coach would have listed three other events for his best miler the column of figures would total 144. However, because not all milers entered three other events and some entered no other events, the column of figures will not total 144. This will hold true in all the columns in Table I and tables of similar design that will follow.

TABLE I

EVENTS ENTERED BY HIGH SCHOOL MILERS
AND HALF-MILERS IN KANSAS

Other Events Entered	Number 1 Miler	Number 2 Miler	Number 1 Half-Miler	Number 2 Half-Miler
100 yard dash	0	0	1	3
220 yard dash	5	3	20	4
440 yard dash	3	2	5	3
880 yard run	3	2	-	-
Mile run	-	-	3	4
880 yard relay	2	0	10	2
Mile relay	0	0	0	0
Medley relay	2	1	3	4
High Jump	4	2	1	1
Broad Jump	2	0	3	3
Pole Vault	1	0	2	3
Shot put	0	0	0	0
Discus	1	0	1	0
Javelin	0	1	2	1
High Hurdles	0	0	2	4
Low Hurdles	1	0	2	1
None	22	24	10	16

In comparison to the total distance milers ran in one-day track meets is the distance coaches ran their milers in practice. Sixteen of the forty-eight coaches answered that they did not run their milers one distance of a mile or more in one day of practice. Three of the coaches stated that they ran their milers more than a mile in one day of practice but listed no specific distance. Twenty-nine coaches gave exact distances that they ran their milers in one day of practice. It was not assumed that the coaches ran the athletes this distance every day or that they always ran the distance for time.

The shortest distance any coach listed for practice was 1,760 yards, or one mile. The longest distance listed was 8,800 yards, or five miles. The average distance was 4,114 yards, or between two and two and one-half miles.

Thirty-six coaches indicated that they ran their half-milers a distance of 880 yards or more in one day of practice. Four of the thirty-six coaches gave no exact distance that they had their athletes run. The shortest distance listed by the coaches was 1,100 yards. The longest distance listed was 5,280 yards. Some of the coaches stated that the athletes were not run against time, but were run at a prescribed pace. The average distance that the thirty-two coaches ran their half-milers in one practice was 2,465 yards.

The longest possible distance any coach listed a half-miler running in a one-day track meet was 1,740 yards. The combination of events was the 880 yard run, the 220 yard dash, and the 880 yard relay. To arrive at the 1,740 yard figure would have required preliminary, semi-final, and final races in the 220 yard dash.

In comparison to the average distance the coaches ran their milers and half-milers in practice, was the maximum distance possible for a miler to run in a one-day track meet under the existing Kansas State High School Activities Association rules. Under the rules it would have been possible for a miler to run 3,180 yards in a one-day track meet by running preliminary, semi-final, and final races in the 180 yard low hurdles, and 220 yard dash, and running 220 yards in a relay.

It must be brought out that the 4,114 yard average that was run by the milers in practice was not always for time or at maximum effort. The 3,180 yards that it would have been possible for a miler to run in a one-day track meet would have been run at maximum or near maximum effort. None of the coaches listed this combination of events. However, this point was brought out to show what could have been done under the existing rules. Some of the coaches did list a combination of events which could have totaled 2,640 yards of running in one day of competition. This

combination was the mile, the 220 yard dash, and the 880 yard relay. Again, preliminary, semi-final, and final races would have been required in the 220 yard dash to arrive at 2,640 yards.

Table II compares the best and the second-best runner in the 100 yard dash, the 220 yard dash, and the 440 yard dash, to the other events in which each of the athletes was entered. Table II indicates that many athletes who entered one dash event also entered the other dash events. Therefore, if preliminary, semi-final, and final races were run in the 100 yard dash and the 220 yard dash, the athlete who also entered the 440 yard dash could run a total of 1,400 yards in a one-day track meet. Allowing that the athlete also entered a relay, 220 more yards could be added to bring the total yardage for a sprinter competing in a one-day track meet to 1,620 yards. Most of the races would have been run at or near maximum effort.

The combination of events totaling the most yards, listed by any of the coaches on the questionnaire, was the 100 yard dash, the 180 yard low hurdles, the 220 yard dash, and the mile relay. By running preliminary, semi-final, and final races in the three events other than the mile relay, a sprinter could have run a total of 1,940 yards in one day of competition.

A comparison made between Table I and Table II was

TABLE II

EVENTS ENTERED BY HIGH SCHOOL SPRINTERS
IN KANSAS

Other Events Entered	Number 1 100 yard dash man	Number 2 100 yard dash man	Number 1 220 yard dash man	Number 2 220 yard dash man	Number 1 440 yard dash man	Number 2 440 yard dash man
100 yard dash	-	-	30	24	25	15
220 yard dash	39	23	-	-	39	20
440 yard dash	23	12	27	15	-	-
880 yard run	1	1	2	3	5	3
Mile run	0	0	0	0	2	2
880 yard relay	26	26	17	22	14	13
Mile relay	8	8	2	5	1	4
Medley relay	5	12	4	8	3	12
High jump	0	1	3	3	3	4
Broad jump	17	8	13	8	12	6
Pole vault	3	0	2	0	3	2
Shot put	0	0	1	0	0	4
Discus	0	0	1	0	0	0
Javelin	0	1	0	1	1	1
High hurdles	1	1	2	1	0	4
Low hurdles	8	4	7	3	4	10
None	-	-	1	2	4	6

the difference in the total number of additional events entered by sprinters and the distance and middle distance runners. For example, the forty-eight number-one milers in Table I entered twenty-four other events in one day of competition. Six of these entries listed have to be excluded because an athlete who enters the mile run could not, under the existing rules of the Kansas State High School Activities Association, compete in the 880 yard run or the 440 yard dash in the same day. By subtracting the six entries it was found that the forty-eight number-one milers were entering a total of eighteen other events in one day of competition.

Comparing the number-one milers with the forty-eight number-one 100 yard dash men, shown in Table II, it was found that coaches listed a total of 131 other events entered by their number-one 100 yard dash men. The maximum possible number of other events that the forty-eight runners could have entered was 144.

Through the comparison of Table I and Table II it was found that sprinters were competing in more events than distance and middle distance runners.

Thirty-six of the coaches stated an exact distance that they had their 440 yard dash men run in one day of practice. Eight coaches stated that they did not run their

quarter-milers a distance of 440 yards or more in practice but gave no exact distance. The shortest distance listed by the thirty-six coaches was 660 yards. The longest distance listed was 4,400 yards. The average distance the thirty-six coaches had their quarter-milers run in one day of practice was 1,385 yards.

The distances that coaches ran their milers, half-milers, and quarter-milers in one day of practice have been stated previously but no mention has been made of the amount of rest that the athletes were given. All the coaches stated that they allowed some time for the athletes to recover after running in practice. Twenty-nine of the coaches listed the following as the amount of time for recovery:

All in Minutes

Recovery time	3-5	6-10	11-15	16-20	21-25	26-30
Number of coaches	3	10	6	3	1	6

The other coaches stated that the amount of recovery time was dependent upon the amount of running, the day of the week, and whether the athletes were being timed.

The other events that the 120 yard high hurdlers and the 180 yard low hurdlers entered are presented in Table III.

Of all the other events entered by hurdlers the other hurdle race ranked the highest. The coaches indicated that their best and second-best high hurdlers preferred the low hurdles

TABLE III

EVENTS ENTERED BY HIGH SCHOOL HIGH AND
LOW HURDLERS IN KANSAS

Other Events Entered	Number 1 L. Hurdler	Number 2 L. Hurdler	Number 1 H. Hurdler	Number 2 H. Hurdler
100 yard dash	9	5	2	2
220 yard dash	9	6	7	3
440 yard dash	7	5	3	4
880 yard run	2	1	0	2
Mile run	0	0	0	0
880 yard relay	20	6	12	5
Mile relay	15	8	11	0
Medley relay	3	8	2	5
High Jump	2	6	11	6
Broad Jump	8	7	6	4
Pole Vault	4	2	6	3
Shot put	0	2	1	2
Discus	0	1	0	3
Javelin	3	2	0	3
High Hurdles	21	18	-	--
Low Hurdles	-	-	28	17
None	0	3	3	7

over other events by a large margin. The number-one low hurdlers, in turn, preferred the high hurdles, followed closely by the 880 yard relay.

The questionnaire was not designed to include distances run in practice by athletes who participated in the 100 yard dash, 220 yard dash, 120 yard high hurdles, 180 yard low hurdles, or relays.

CHAPTER IV

SUMMARY, FINDINGS AND CONCLUSIONS

The major purpose of this study was to determine whether sprinters or middle distance runners were running the longest total distance in large one-day track and field meets. Through the data collected it was determined that most of the sprinters were running a longer total distance than middle distance runners in track meets where preliminary, semi-final, and final races were held in the two shortest dash events. Among half-milers the most popular second event was the 220 yard dash. Therefore, they could have run 1,540 yards by running preliminary, semi-final, and final races in the 220 yard dash. Most of the sprinters preferred the three dashes and a relay including 220 yards. This made it possible for sprinters to finish one day of competition with a total distance ran of 1,620 yards by making the final races in the two shorter dash events, running a 220 yard leg of a relay, and the 440 yard dash.

The secondary purpose of this study was to determine whether sprinters or middle distance runners were entering more events at large one-day track and field meets. Forty-six of the forty-eight coaches answered that their sprinters were competing in more events than their middle distance and distance runners.

The major hypothesis of this study was found to be partially true. The major hypothesis stated that sprinters were running a longer total distance at a maximum physical output in large one-day track and field meets than were the middle distance and distance runners. It has already been stated that middle distance runners are not running as far as sprinters in the large one-day track meet. However, the hypothesis does not hold true for the distance runner. The milers with their race of 1,760 yards ran 140 yards farther than the sprinters, who entered the three dash events and a relay. This figure was reached by assuming that the sprinters ran preliminary, semi-final, and final races in the 100 yard dash and the 220 yard dash.

It was found that another type of study would need to be conducted to prove or disprove the statement in the hypothesis concerning the maximum physical output. In most instances it is true that sprinters run at or near maximum physical output, but it remains debatable of milers and half-milers over the entire distance of their race.

The second hypothesis, stating that sprinters are competing in more events than middle distance and distance runners, was found to be true in all but two of the forty-eight cases examined.

Evidence revealed that the majority of the coaches are not in favor of the 140 yard limitation rule, with

thirty-eight of the forty-eight of the coaches stating disapproval. Forty of the forty-eight coaches stated that they would allow their 440 yard dash men to compete in the open 440 yard dash and run a 440 on the mile relay if rules permitted. Thirty-five of the coaches also stated that their half-milers would be capable of competing in more events if they were allowed to also run 440 or anchor the mile medley relay with a run of 880 yards.

Table IV lists the other races including 440 yards or more in which coaches would enter their runners if there were not a 440 yard limitation rule.

Some additional conclusions drawn from this study are the following: Most of the coaches favor some sort of rule change by the Kansas State High School Activities Association in regard to the 440 yard limitation rule. Some coaches favor a two-mile relay on the high school level. Coaches agree it depends upon the individual athlete whether he should be run more than one distance of 440 yards or more in one day of competition. Most coaches run their athletes greater distances in practice than the total maximum distance the athlete will run in competition.

Some related questions arise which are not within the scope of this study. Would a rule change bring about a change in the order of events? If a rule change were enacted would it eliminate from competition some of the

TABLE IV

OTHER EVENTS IN WHICH COACHES OF KANSAS WOULD ENTER
 RUNNERS OF THE 440, 880, AND MILE IF THERE WERE
 NO 440 YARD LIMITATION RULE

Other Events	440 Yard Runner	880 Yard Runner	Miler
440 yard dash	-	11	5
880 yard run	10	-	10
Mile run	0	6	-
Medley relay	7	5	13
Mile relay	27	21	18
Two mile relay	0	2	0
None	3	7	11

athletes who have lesser abilities? Are high school athletes physically capable of competing in more than one race of 440 yards or more in one day of competition? Are high school athletes psychologically capable of competing in more than one race of 440 yards or more in one day of competition? Should chronological age, physical maturity, physician's recommendation, or coach's judgement determine whether an athlete is capable of running a race of more than 440 yards or more in one day of competition?

It is the recommendation of the investigator to eliminate the 440 yard limitation rule and replace it with a rule stating combinations of events and maximum yardage athletes should not surpass in one day of competition. A rule could be stated in such a manner as to allow milers to run one additional race of 440 or 880 yards, or any other combination of shorter races not to exceed a distance of 880 yards including preliminary, semi-final, and final races. Half-milers and quarter-milers could run one other race of 440 yards or more, or any combination of shorter races. The existing limit on the number and type of events an athlete can enter would remain the same with the exception of a runner electing to run two races of 440 yards or more.

A final recommendation is that another study be initiated to discover the amount of energy expended by athletes entered in the field events as compared to athletes in the running events. From a study of this type it could also be determined what distances athletes are running in such events as the high jump, broad jump, and pole vault.

BIBLIOGRAPHY

BIBLIOGRAPHY

- Barba, Joseph. "Developing the Beginning Miler," Scholastic Coach, 31:36, March 1962.
- Bresnahan, George T., and W.W. Tuttle. Track and Field Athletics. St. Louis: The C.V. Mosby Company, 1950. 500 pp.
- _____ and Francis X. Cretzmeyer. Track and Field Athletics. Fifth edition. St. Louis: The C.V. Mosby Company, 1960. 538 pp.
- Cureton, Thomas Kirk, Jr. Physical Fitness of Champion Athletes. Urbana, Illinois: The University of Illinois Press, 1951. 485 pp.
- Doherty, J. Kenneth. Modern Track and Field. Second edition. Englewood Cliffs, New Jersey: Prentice-Hall Incorporated, 1963. 557 pp.
- Ecker, Tom. "Planning the Track Man's Daily Workout Schedule," Athletic Journal, 31:444, February, 1964
- Jordan, Peyton. "Emotional Fitness for Track and Field Competition," Journal of Health, Physical Education and Recreation, 32:29-30, February, 1961.
- Kansas State High School Activities Association. Official Handbook: 1963-64. Topeka, Kansas: Association Headquarters, 1963.
- Karpovitch, Peter V. and Creighton J. Hale. "Why Warm Up?" Newsweek, 48:124+, November 19, 1956.
- Lietzke, M.H. "An Analytical Study of World and Olympic Racing Records," Science, 119:333-336, March 12, 1954.
- Pennock, E.W. "Heart Rate and Blood Pressure as Measures of Physical Condition During Adolescence," Supplement to Research Quarterly, 6:120, May 1935.
- Seaton, Don Cash. Safety in Sports. Englewood Cliffs, New Jersey: Prentice-Hall Incorporated, 1948. 415 pp.

The Wichita Eagle and Beacon, July 5, 1964.

Timmons, Bob. "National Track and Field Questionnaire,"
Wichita, Kansas: East High School, Fall 1960.
(Mimeographed.)

Wolfe, J.B. and G.W. Mueller, "The Heart of the Athlete,"
The Physical Educator, 6:2, 305, May, 1949.