A STUDY OF LONGEVITY AND MORBIDITY OF FOOTBALL ATHLETES AT MICHIGAN STATE COLLEGE

Thesis for the Degree of M. A.

MICHIGAN STATE COLLEGE

Mark Hauser O'Donnell

1952

THESIS

This is to certify that the

thesis entitled

"A Study of Longevity and Morbidity of Football Athletes at Michigan State College"

presented by

Mark H. O'Donnell

has been accepted towards fulfillment of the requirements for

MA degree in Physical Education

Henry J. Montoye
Major professor

Date July 29, 1952

O-169

A STUDY OF LONGEVITY AND MORBIDITY OF FOOTBALL ATHLETES AT MICHIGAN STATE COLLEGE

By

MARK HAUSER O'DONNELL

A THESIS

Submitted to the School of Graduate Studies of Michigan State College of Agriculture and Applied Science in partial fulfillment of the requirements for the degree of

MASTER OF ARTS

Department of Physical Education

1952

ACKNOWLEDGMENT

I wish to express my sincere gratitude to Dr. Henry Montoye for his help and guidance throughout the study and in preparation of this paper.

M. H. O.

TABLE OF CONTENTS

LIST OF TABLES

CHAPTER I

THE PROBLEM

Introduction

Since 1873 there has been considerable interest in longevity of athletes. Dr. John Morgan[1], a British physician, made one of the first studies on this subject.

Longevity of athletes has always been an important question confronting the administration responsible for sport activities. In the past, many statements of questionable validity have been made about sports, especially concerning football. One of the chief questions has been whether or not athletic competition shortens the life span of the participant. It remains for research to secure evidence for the support or rejection of existing opinions.

Statement of the Problem

The purpose of this study was to compare the longevity, morbidity, health and other attributes of varsity football letter winners with non-athletes. The Michigan State College football players included were those who participated in this

---

[1] John E. Morgan's study as cited by; P. H. S. Hartley and G. F. Llewellyn, "Longevity of Oarsmen, Study of those who Rowed in the Oxford and Cambridge Boat Races from 1829 to 1928." British Medical Journal, I:658, 1939.

sport from 1928 through 1937. The non-athletes investigated attended Michigan State College during this same period.

Importance of the Problem

The Phi Epsilon Kappa Committee* has recognized the importance of this type of research project. The committee has contacted many colleges and universities throughout the United States urging cooperation in a longevity study. As a result of this encouragement many of these institutions are conducting similar investigations.

The potential value of such a study for the national health is manifest. Hundreds of thousands of boys and girls, youth and adults participate annually in some variety of vigorous sports. The findings of this project and similar undertakings may have a direct bearing on the future planning of sports programs. At best it can be hoped that conclusive research will eliminate in time, those sports activities which are found truly harmful and more important, nullify biased argument against competitive sports found to be beneficial but which are at present severely criticized as health-wreckers.

---

* Phi Epsilon Kappa is a Professional Physical Education Fraternity. Grover Mueller, Chairman, is Director of Physical Education in Philadelphia Public Schools.

Limitations

1. Only 100 major letter winners were selected and a similar number of non-athletes were used as a control group. The period that these athletes and non-athletes attended Michigan State College extended from 1928 through 1937. A questionnaire was sent to each of these 200 former students.

2. A follow-up letter was directed to those who failed to answer the original questionnaire, but this did not secure the desired unanimous response. Hence, in this study there is probably bias as in other questionnaire studies.

3. The validity of the answers is limited to the accuracy of the subjective responses.

4. Athletic programs have changed considerably in the past twenty years; this may affect the outcome of this study.

5. The influence of World War II would well influence the data. For example, the rigors of war and the unhealthy climates in many theatres of operations might have induced disease or otherwise shortened the life span of some former students.

6. Since this investigation dates back only to 1928, not many deaths were anticipated.

7. This project is a cross-sectional study; therefore only the relationship between athletes and non-athletes will be considered.

CHAPTER II

REVIEW OF THE LITERATURE

One of the first studies completed on longevity was done by Dr. John Edward Morgan[1]. Morgan was a physician of distinction on the staff of the Manchester Royal Infirmary in England. In 1873 he published his "Critical Enquiry into After-health of the Men Who Rowed in the Oxford and Cambridge Race from the Year 1829 to 1859".[2]

Morgan's method consisted of taking each crew separately, working out the number of years of life each member enjoyed up to 1859. Then Morgan employed "Dr. Farr's English Life Tables" to compute the life expectancy of those living. This first attempt to arrive at some answer to this problem deserves great credit, but in some ways Morgan's study was weak. The number of crewmen, 200, were divided into small groups of 8 so that the expectation of life could be determined for each minute group. These small groups were then compared to Dr. Farr's life tables which were based on the mortality of the general population. This is not comparable to a body of select lives such as university oarsmen.

---

[1]John E. Morgan's study as cited by; P. H. S. Hartley and G. F. Llewellyn, "Longevity of Oarsmen, Study of Those Who Rowed in the Oxford and Cambridge Boat Races from 1829 to 1928." British Medical Journal, I:658, 1939.

[2]Loc. cit.

The results of Morgan's research revealed that the subjects studied would survive the overall population by two years.

Another research dealing with this topic was completed by George L. Meylan[3] (1903-1904) who published the findings on 152 men who rowed in the Harvard University Crews from 1852 to 1892. He employed a similar technique as that utilized by Morgan, namely comparing the oarsmen to life expectancy tables of the general population. Here again the study is open to similar criticism. From his research, Meylan concluded that the excess expectation of life for each oarsman over that shown by the mortality table used for comparison was 2.88 years; and 5.09 years if there was allowance made for those killed in the Civil War.

In 1928 Louis L. Dublin[4] reported a study on longevity of college athletes. The study was confined to athletes who attended ten eastern colleges prior to 1905. The number of men engaged in each sport is as follows.

Baseball	1,111
Crew	576
Football	1,233
Track	1,076
Two or more sports	822

---

[3] Ibid., p. 657.

[4] Louis L. Dublin, "Longevity of College Athletes", Harpers, CLVII:228, June, 1928.

Minor sports 158

Dublin used two standard insurance tables for comparison purposes. The tables used were the Medico-Actuarial Table and the American Men Table of Mortality. Dublin does suggest that standard tables made from the mortality rates of the classmates would be much more valid, since the insured population is not of the same grade physically or economically as is the college athlete. The insurance tables had to be used because there were none better to be had.

Tables can best express the results of Dublin's study. Three of the most important tables are reproduced below.

TABLE I

PER CENT ACTUAL OF EXPECTED DEATHS
ACCORDING TO AMERICAN MEN TABLE
(From Dublin, 1928)

Sport	Under 45	45 and Over
All sports combined	96.0	88.5
Baseball	108.1	93.9
Crew	107.9	89.2
Football	88.7	87.9
Track	97.8	82.9
Two or more sports	84.7	71.9

It may seem strange, but the highest mortality rate was found among baseball players. Of all the men engaging in one sport only, those who played football made the best showing. There were 1,233 of these athletes, the largest number reported in any single sport. Their experience covered 36,143 years and 263 deaths actually occurred. A total of 293 deaths were expected by the table. Therefore, the ratio of actual to the expected deaths is 88.3 per cent.

TABLE II

PER CENT ACTUAL OF EXPECTED DEATHS ACCORDING TO AMERICAN MEN TABLE
(From Dublin, 1928)

Sport	All Classes Combined	Classes Prior to 1880	Classes 1880 to 1889	Classes 1890 to 1899	Classes 1900 to 1905
All sports combined	91.5	94.1	94.6	93.6	72.6
Baseball	98.0	98.6	97.4	103.1	81.4
Crew	94.1	92.2	72.1	124.0	113.4
Football	88.3	87.6	94.7	91.6	63.4
Track	91.8	-	121.7	86.6	73.0
Two or more sports	78.3	85.8	80.8	81.0	62.9

The most surprising result is the extraordinarily favorable mortality of the men who won letters in more than one sport.

Except for a single exception of Dartmouth, the athletes from the smaller colleges enjoyed very favorable mortality conditions. To illustrate this difference Table III is shown below. This is a portion of a table presented by Dublin.

TABLE III

MORTALITY OF ATHLETES OF TEN COLLEGES, COMPARED WITH EXPECTED MORTALITY ACCORDING TO AMERICAN MEN ULTIMATE TABLE
(From Dublin, 1928)

College	Per Cent of Deaths
All colleges combined	91.5
Amherst	74.7
Brown	74.1
Cornell	94.6
Dartmouth	113.4
Harvard	100.1
Mass. Ag.	84.4
Tulane	94.2
Wesleyan	85.3
Williams	79.5
Yale	89.2

Dublin was able to obtain facts of sufficient trustworthiness in only 566 cases out of the 1,202 deaths which occurred.

Of the 315 who died at ages over 45, and whose cause of death was known, 32 per cent were ascribed to diseases of the heart.

Among carefully selected insured lives, it is rarely found that even 20 per cent of deaths at ages over 45 years, result from heart diseases. Consequently, from this study it is found that athletes enjoyed a longer life span, but more heart conditions were noted in those over the ages of 45. This is significant and might be an outgrowth of participation in sports.

In 1929, Dr. Friedrich-Wilhelm Brickert[5] of Germany made a study which closely resembles the present investigation. The author of this report searched year books, organizations and permanent periodicals to find the death announcements of sports people. Questionnaires were sent to the Turner (gymnastic) and sport clubs which the champions represented. The following questions appeared on the questionnaire.

1. Name.
2. Vocation.
3. Birthplace.
4. Time when participating and in which Turner or Sports Club.
5. Particular ability within the clubs.
6. Particular turning or sports performance.

---

[5] Dr. Friedrick-Wilhelm Brickert, "Einfluss des Wettkampfmassig betniben Sports auf die Lebensduer und Todesursache," Deutsche Medizinische Wochenschrift, 55:23-5, January, 1929.

7. Up to which age (year) active in turning or sports.
8. Where and when died.
9. Cause of death.
10. Address of living relatives.
11. Address of living contemporary.

There were 2,000 questionnaires sent out succeeded by many follow-up letters and reminders. About 400 were returned and of these only 264 questionnaires were of any value.

Brickert spent up to two years' time to complete this study. It is somewhat discouraging after many hours spent in this research, only to find the people contacted fail to answer their questionnaires. This was also brought out in the present study.

The answers employed in the statistical analysis were transferred onto index cards and separated by sports. The causes of death of 232 turners and 32 rowers were expressed in tables. (See Table IV.)

The 32 rowers investigated showed the following causes of death:

1. 10 died from circulatory attacks.
2. 7 died of arteriosclerosis and apoplexy.
3. 3 died of edema.
4. 12 died of miscellaneous diseases.

In this study no comparison was made. Only the cause of

death was of interest to the author.

Louis I. Dublin[6] in a second investigation (1930-1932) studied the life histories of 38,269 graduates from eight eastern colleges in the United States. Of these, 6,500 were honor men and 5,000 athletes. From the entire group as a whole (38,269), when compared with the American Men Table of Insured Lives, the mortality rate of the college graduates was 91 per cent of that experienced by the insured group. (See Table V on Page 13.) Dublin then compared the mortality of the college graduates with the college athletes alone and the honor students alone. This comparison verified that the honor students showed the lowest mortality. The mortality of the graduates as a group and that of athletes was about par, up to the age of 50. From 50 on up the mortality of the athletes proved to be appreciably greater.

If the college graduates had died at the same rate as prevailed among American white men in 1926, there would have been 11,595 deaths instead of 9,640. The college men had, therefore, a mortality rate 17 per cent less than the general insured population.

---

[6]Special Feature Section, New York Times, July 20, 1930.

TABLE IV

STATISTICS ON CAUSES OF DEATH OF GYMNASTS
(From Brickert, 1929)

232 Gymnasts	Acute Infection	Tuberculosis	Poisoning	Attacks—Circulatory	Weakness of Old Age	Swelling	Heart and Fat Disease	Arteriosclerosis and Apoplexy	Pneumonia	Other Sickness of Lungs	Stomach	All Others	Unknown	TOTAL
15-30	2	5	-	3	-	-	-	1	1	-	1	2	-	15
30-35	-	8	-	3	-	-	-	2	1	-	-	1	-	15
35-40	-	2	-	-	-	1	-	1	1	-	-	2	-	7
40-45	1	1	-	2	-	2	-	2	1	-	1	1	1	12
45-50	1	-	-	1	-	2	1	3	3	1	-	1	-	13
50-55	2	-	-	2	-	3	2	5	2	-	-	4	-	20
55-60	-	1	1	1	-	4	2	12	1	-	3	2	-	27
60-65	1	2	-	-	1	3	3	16	2	-	6	2	1	37
65-70	2	-	-	-	1	2	1	4	3	-	2	3	1	19
70-75	-	-	-	1	1	1	6	9	-	1	-	-	-	19
75-80	-	-	-	1	7	1	-	9	-	2	-	2	2	24
80	-	-	-	-	14	1	1	4	1	-	-	1	2	24
TOTAL	9	19	1	14	24	20	16	68	16	4	13	21	7	232

TABLE V

LIFE EXPECTANCY OF ATHLETES AND HONOR STUDENTS AS COMPARED TO VARIOUS MORTALITY TABLES AND POPULATIONS
(From Dublin, 1930)

A	At Age 22	At Age 52
Athletes	45.56	20.86
Graduates Generally	45.71	21.43
Honor Men	47.73	22.79
Insured Men 1900-1915 (American Men Ultimate Table)	44.29	19.79
New Zealand Males 1921-1922	46.91	21.95
U. S. White Males 1901 (Original Registration States)	40.71	19.40
U. S. White Males 1926 (Registration States of 1920)	43.46	19.23

This study gave the striking result that men graduating from smaller colleges had enjoyed greater longevity.

In final conclusion, the college men surpassed the general population in longevity. However, in classifying honor students, general graduates and athletes over the age of 50, the author found that athletes were exceeded by both groups.

In both of the studies completed by Dublin, he explains the weakness due to the comparison made to the standard tables. He pointed out that comparing the selected groups to subjects who lived the same type of life, physically, socially and economically

at the same period of time would have made the results of the study more valid.

In 1938 W. Knoll[7], a German, did a study on longevity of the varsity crews of Oxford and Cambridge. The reason for this study according to Knoll was that in the past there appeared in medical literature, statements which specified that performers who participated in hard rows, did not reach the age of 50. In this regard the contests were partly responsible.

There were 1,600 men who participated in the 100 Oxford-Cambridge races (1829-1929). Only the men who actually raced in at least one race were considered, and many had participated in more than one race. Of the 1,600 men, only 880 had useable case histories. Of these 880 men, 27 per cent had participated in one race; 29.5 per cent in two races; 24.5 per cent in three races and 14.5 per cent in more than four races.

There was little difference between the two colleges during the 100 years in terms of the type of students, age and matriculation.

The mean age that rowers participated, was 21.4 years with a slight scattering. The absolute count of both colleges showed that 62.5 per cent of the subjects had passed their 50th year. The mean is 56.1 with slight scattering. This disproves the statement that most rowers die before they reach the age of 50.

---

[7] W. Knoll, "Welches Lebensalter erreichen die Riederer von 'Oxford-Cambridge'?", Medizinische Klinik 34:464 - 466, April 8, 1938.

Many of the men between the age groups of 20 to 40 and 40 to 50 met their death in World War I and other wars. Also, many of these men participated in colonial military affairs; therefore, some of the causes of deaths were also tropical diseases. Many of the participants met death in accidents.

The 155 causes of death out of the first two groups are as follows:

Acute infections	8
Accidents	12
Tropical sickness	17
War prisoners	45
TOTAL	80

The number of deaths due to natural causes was 8.1 per cent of the first two groups. This is an abnormally low figure.

In 1939, Hartley and Llewellyn[8] reported a study of 767 oarsmen who rowed in the Oxford and Cambridge Boat Races from 1829 to 1928. Of these, 376 were from Oxford and 391 from Cambridge. Of the 767 investigated, 431 had died before December 31, 1928 leaving 336 living. Each oarsman was included only once and was observed from the occasion of his first race until the end of 1928 or until his death occurred. The authors devised four standard tables to be used in making the comparisons in

---

[8] P. H. S. Hartley and C. F. Llewellyn, "Longevity of Oarsmen: Study of Those Who Rowed in the Oxford-Cambridge Boat Races from 1829 to 1928." British Medical Journal, I:657, 1939.

longevity. The period 1829 to 1928 was divided into four sections of which a thirty year span was the length for the first three groups. They then used the life insurance tables in which the participants would be exposed to risk in that period of time. Basing the findings on these standard mortality tables, their results showed the following: (See Table VI).

The longevity of the college oarsmen was appreciably superior to that of insured lives of their own generation. In late years, the relative superiority has shown a tendency toward decline.

TABLE VI

MORTALITY OF ROWERS FROM 1829-1928
AS COMPARED WITH EXPECTED MORTALITY
(From Hartley and Llewellyn, 1939)

AGE GROUP	ACTUAL DEATHS	EXPECTED DEATHS BY STANDARD TABLES	ACTUAL AS PERCENTAGE OF EXPECTED
	PERIOD 1 1829-1862		
	STANDARD MORTALITY TABLE H. M.		
Up to 50	22	25.2	87.3
51 - 70	1	1.0	100.0
Over 70	-	-	-
All Ages	23	26.2	87.8

TABLE VI (continued)

MORTALITY OF ROWERS FROM 1829-1928
AS COMPARED WITH EXPECTED MORTALITY
(From Hartley and Llewellyn, 1939)

AGE GROUP	ACTUAL DEATHS	EXPECTED DEATHS BY STANDARD TABLES	ACTUAL AS PERCENTAGE OF EXPECTED
	PERIOD 2 1863-1893		
	STANDARD MORTALITY TABLE O^m.		
Up to 50	53	62.1	85.3
51 - 70	39	59.8	65.2
Over 70	18	21.6	83.3
All Ages	110	143.5	76.7
	PERIOD 3 1894-1923		
	STANDARD MORTALITY TABLE OF O^m. AND A 1924-1929		
Up to 50	32	40.7	78.6
51 - 70	85	98.0	86.7
Over 70	108	125.8	85.9
All Ages	225	264.5	85.1
	PERIOD 4 1924-1928		
	STANDARD MORTALITY TABLE A 1924-1929		
Up to 50	3	3.4	88.2
51 - 70	13	13.2	98.5
Over 70	20	21.9	91.3
All Ages	36	38.5	93.5

In this study the authors compared the oarsmen to a body of men who lived at the same time, were insured and accepted for life insurance at ordinary rates and free from any disease. But as a slight criticism, these men who were used as a control group probably did not possess the physical fitness, social and economic standards enjoyed by the athletes who were studied. Because of this, the value of their study is limited.

In February, 1941, Van Mervenne[9] of Holland made a study similar to Brickert's[10] in which the causes of death of 100 soccer players were investigated. The results are summarized in Table VII. This study only pursued the causes of death and no comparison of any type was made.

In 1944 Mark C. Wakefield[11] reported a study of mortality among men who played in high school basketball tournaments from 1911 to 1935. The purpose of this study was to find out whether this group of men who played strenuous basketball while in high school compared favorably or unfavorably in death rate with men in the general population. An additional purpose was to determine if the cause of death among basketball players may be

---

[9] C. J. Van Mervenne, "Life Span of Athletes," (in Dutch) Nederlandsch Tijdschrift Voor Genesskunde, 85:535-43, February 8, 1941.

[10] Brickert, op. cit., p. 23-25.

[11] Mark C. Wakefield, "A Study of Mortality Among the Men Who Have Played in the Indiana State Final Basketball Tournaments." Research Quarterly, 5:1-9, March, 1944.

TABLE VII

STATISTICS ON CAUSES OF DEATH OF SOCCER PLAYERS
(From Van Mervenne, 1941)

100 Soccer Players	Acute Infection	Tuberculosis	Attacks--Circulatory	Swelling	Heart and Fat Disease	Pneumonia	Deviations Ear and Nose Infections	Stomach and Intestinal Injury	Kidney--Deviations	Neurology Deviations	All Others	TOTAL
15-20	6	1	6	0	1	0	0	2	1	0	0	17
21-25	1	4	6	1	3	0	1	2	0	1	1	20
26-30	1	2	5	1	2	0	3	1	0	0	0	15
31-35	2	2	2	1	1	0	0	1	2	1	1	13
36-40	1	0	0	1	0	2	0	1	0	1	1	7
41-45	0	1	2	0	3	0	0	0	0	0	0	6
46-50	0	0	0	1	3	0	0	2	2	0	0	8
51-55	0	0	0	3	4	2	0	0	0	0	0	9
56 and over	0	0	0	1	3	0	0	0	0	1	0	5
TOTAL	11	10	21	9	20	4	4	9	5	4	3	100

attributed to basketball playing.

Wakefield investigated 2,900 boys who played during the twenty-five year period. The United States Life Tables published by the Bureau of Census was used as ready made measures for comparison of the subjects. Causes of deaths were obtained from such sources as State Boards of Health, County Boards of Health, Cemetery Records and records of Morticians.

The most important results derived from this study were:

1. The total expected deaths among basketball players was 181.1 - the number of actual deaths 123. Therefore, the ratio of actual to expected deaths was 67.9 per cent. This showed an advantage for basketball players of 32.1 per cent.

2. With respect to age at the time of playing, ratio of actual to expected deaths for the younger group (14, 15 and 16) was 54.2 per cent. The ratio of the older group (18, 19 and 20) was 78.9 per cent. From this evidence it seemed that longevity was more favorable in younger players.

3. Those players who played three games in one day were considered. Of these 379, there were 17 actual and 24.5 expected deaths. This ratio is 69.4 per cent as compared to 67.9 per cent of the entire group.

4. Men who were substitutes exhibited lower mortality rates than those who were regulars.

5. The most significant cause of death among basketball players was external violence. 34 per cent of all the deaths

were due to this cause, as compared to the general population of the State of Indiana, which has only 17 per cent. But comparing other causes of death to the general population of Indiana, it showed a 50 per cent ratio between actual and expected deaths from diseases of all types. From these results, Wakefield felt justified in stating that basketball playing has no effect upon the mortality of the players who participate.

CHAPTER III

METHOD OF PROCEDURE

Introduction

The survey method of gathering data was employed in this thesis. The questionnaire (Appendix A) utilized was developed by the Phi Epsilon Kappa Committee, which is conducting a national longevity and morbidity study. There are many colleges and universities participating in this national study, Michigan State College included. A letter of transmittal (Appendix B) was sent with the questionnaire to all the subjects selected.

Six weeks after the first letter of transmittal and questionnaire were sent to the subjects, a follow-up letter (Appendix C) was sent out to those who did not respond to the original letter. From the returns of these questionnaires, the author based his results and conclusions.

Selection of Subjects

The athletes chosen for this comparison were major football award winners who participated in this sport from the year 1937 on back until 100 subjects were selected. It so happened that the author had to go through a span of nine years to get one hundred major letter winners. The names of these players were selected from the official files at Jenison Gymnasium Office.

The non-athletes which the author selected, were taken from the old student directories, which are available in the record section of the Administration Building at Michigan State College. For each year a like number of athletes and non-athletes were questioned for this study. However, since questionnaire and follow-up letter returns were incomplete, in some years there will be a lack of balance in athlete questionnaires and non-athlete questionnaires used in computing data. Data are available for 49 athletes and 43 non-athletes, who returned the desired information. The author picked these subjects by the random sampling technique, from years 1928 through 1937.

After a complete list of 100 football players and 100 non-athletes were completed, the author traced down their addresses through the files at the Alumni Office, located in the Union Building. One hundred and eighty-five of the 200 addresses were found in these files. The remaining 15 were found in the vault section of the Administration Building. These addresses were the home addresses of the subjects while attending Michigan State College.

Statistical Method

The large sample method was the technique employed in computing the significance of the difference in mean scores for the quantitative findings. Chi square was the statistic applied to analyze the scores of the qualitative items. The results are elucidated in Chapter IV.

CHAPTER IV

RESULTS

The largest portion of the results are summarized in Tables VIII, IX and X, which appear below.

Three of the subjects are deceased. Their questionnaires were sent in by some living relative. Two of the subjects were athletes; one was a non-athlete.

Causes of Death	Age
Plane crash (non-athlete)	21
Coronary thrombosis	43
Cancer of the brain	42

Ninety-five and eighty-three hundredths per cent of the athletes and 90.40 per cent of the non-athletes reported that they were in good health. None of the subjects proclaimed that he was in poor health.

Of the individuals questioned; 97.82 per cent of the athletes and 75.90 per cent of the non-athletes, considered college athletics beneficial.

Data which were taken from the medical histories revealed the information illustrated in Tables XI and XII.

The following portions of the questionnaire (see Appendix A) were not used in this study: athletic and general sports history, activity during adult life, and the "causes of death"

column under hereditary history. Not enough data were available from the questionnaires to draw valid conclusions in the above listed areas. These data, however, could contain significant information when added to a study national in scope.

TABLE VIII

QUANTITATIVE DATA FOR FORMER FOOTBALL PLAYERS AND NON-ATHLETES

	Football Players (Mean)	Non-Athletes (Mean)
Present age	39.04	39.21
Weight at graduation from college	189.24	159.53
Pounds gained from graduation to 1952	9.04	16.29
Per cent gain in weight from graduation to 1952	4.80	10.31
Paternal grandfather's age*	74.57	67.39
Paternal grandmother's age*	73.40	69.45
Maternal grandfather's age*	70.70	67.93
Maternal grandmother's age*	71.56	71.40
Father's age*	62.34	62.33
Mother's age*	63.59	64.71
Father's age (living)	67.20	67.50
Mother's age (living)	66.23	66.92
Brothers (number)	2.06	1.60
Sisters (number)	2.12	2.00

*Ages living and dead

TABLE IX

A COMPARISON OF THE DIFFERENCE IN MEANS
FOR FORMER FOOTBALL PLAYERS AND NON-ATHLETES

	Difference in Means	t	P
Present age	- 0.17*	1.42	.16
Weight at graduation from college	+29.70	8.05	.00
Pounds gained to 1952	- 7.25	4.90	.00
Per-cent gained to 1952	- 5.50	3.14	.00
Paternal grandfather**	+ 7.80	2.34	.02
Paternal grandmother**	+ 3.95	1.23	.22
Maternal grandfather**	+ 2.77	.66	.52
Maternal grandmother**	+ 0.02	.99	.93
Father's**	+ 0.01	0.03	.97
Mother's**	- 1.12	0.57	.58
Father's age (living)	- 0.30	0.16	.10
Mother's age (living)	- 0.69	0.40	.47
Number of brothers	+ 0.46	1.23	.22
Number of sisters	+ 0.12	1.66	.10

*Plus value indicates mean of football players was greater.

**Ages living and dead.

TABLE X

QUALITATIVE DATA FOR FORMER FOOTBALL PLAYERS AND NON-ATHLETES

	Football Players (%)	Non-athletes (%)	x^2	P
Economic status previous to and during college (satisfactory)	89.79	81.39	1.33	between .30 and .20
Economic status after leaving college (satisfactory)	100.00	100.00	-	-
Smokers				
Heavy	0	0	-	-
Average	75.00	60.90	2.02	between .90 and .80
None	25.00	39.10		
Drinkers				
Heavy	0	0	-	-
Moderate	93.61	75.60	3.49	between .10 and .05
Non-drinkers	6.69	24.40		
Military service	55.10	51.16	0.07	between .90 and .80
Medical ailments	16.14	46.51	8.57	between .02 and .01

TABLE XI

MEDICAL AILMENTS OF FORMER FOOTBALL PLAYERS

Ailment	Age of Detection	Number of Subjects
Appendectomy	36	1
Arthritic condition (shoulder)	36	1
Hemorrhoids	32	1
Ruptured discs (4)	30	1
Stomach ulcers	39-35	2
Thrombophlebitis	38	1
Undulant fever	23	1

TABLE XII

MEDICAL AILMENTS OF NON-ATHLETES

Ailment	Age of Detection	Number of Subjects
Appendectomy	10-27-35	3
Angina pectoris attacks	30	1
Amoebic dysentery Fatigue syndrome Prostate infection	35 38 43	1
Bladder (wounds)	31	1
Defective eye	Lifetime	1
Fungus (tropical)	24	1
Gall bladder stones	43	1
Hemorrhoids	38-39	2
Jaundice	23	1
Hypertension	31-40	2
Kidney removed (right)	24	1
Neuro-anxiety	29	1
Pituitary deficiency	24	1
Pilonidal sinus	27	1
Sinusitis deviated septum	38	1

CHAPTER V

ANALYSIS OF DATA

The findings of this study could help modify some of the generalizations which are common in the coaching profession. This study seems to indicate that athletes acquire more readily undesirable social habits (drinking and smoking) than do the non-athletes. The types of professions which are followed by the majority of the varsity football players may be one of the reasons which lead this select group to drink and smoke more than the non-athlete. Many of the positions held by former athletes, demand that they get out into the communities and mingle with the people. If they are to keep up good public relations, an occasional drink or smoke sometimes is a necessity rather than a desire to fulfil some pleasure soothing urge. Oftentimes, after a football player's college days are over, he goes into business, becomes a salesman, public official or is engaged in another similar profession which could make him more susceptible to these habits.

The type of environment and economic conditions which the football player was exposed to before attending college could directly affect his moral attitude toward the adoption of such habits. Also, the psychological effect of not smoking and drinking during the time that players participated in sports could induce the athlete to become attracted to these habits.

Medical doctors claim that excessive drinking and smoking can shorten the life span of certain people. This is a very controversial question, and by no means does this study answer that question.

From the data taken in this research project, the mean age of the athlete and non-athlete is practically identical. This can be accounted for by the method employed in sampling the subjects. The football players and non-athletes were paired off equally from the years 1928 through 1937.

The medical history of the football players and non-athletes revealed that the non-athlete had considerably more ailments than the athlete. In analyzing closely the various types of ailments, the non-athlete has more circulatory defects than the football player. Such disorders as angina pectoris and hypertension could have a great influence on shortening the life span of the subjects. (See Tables XI and XII). Although one football player died from coronary thrombosis, there was no further evidence in the medical histories of the football players to indicate circulatory and heart malfunctions. This may be an indication that playing football does not over-burden the heart as so many people believe.

The football player far exceeded the non-athlete in weight at the time of graduation from Michigan State College. A decade back, the football player had to be big physically to compete against the power play type of football which was played in the

early 1930's. There was no unlimited substitution and no two platoon system. A player had to be a sixty minute performer. Consequently, one would expect the subjects who participated in football to be heavier than the non-athlete.

Excessive weight in later years has been proven to shorten the life span. The football players in this study have gained less weight than the non-athletes. Therefore, it can be stated that previous assertions specifying that athletes increase rapidly in weight after they cease to participate in football is false. Example (often heard): Athletes do not taper off from physical activities. The sudden change has an effect in their increase in weight.

From the data taken in this research project, the non-athlete gained 16.21 pounds as compared to a 9.04 pound gain by the football player. It could be that the non-athlete was slow in developing physically, thus gaining more after graduation. Also, the athlete may have a deep desire to participate in some other forms of physical activity. This could make them more active in such activities as golf, bowling and similar sports. It could be possible that such activities prevented the athlete from gaining much in weight.

Many former football players are coaching in high schools and colleges. Being in such close contact with this type of profession can make them condition conscious. They would also have to be active in demonstrating various types of plays, blocks

and similar fundamentals of football. Oftentimes coaches work as officials for sports events, which requires a great amount of physical activity. This could be an additional reason why the non-athlete gained 10.31 per cent of his college weight since graduation as compared to 4.80 per cent for the football player.

Although it is not very significant, the maternal and paternal grandfathers' and grandmothers' ages seem to favor the athletes. It is believed that heredity does influence longevity. Consequently, this could signify that athletes would live a longer life than the non-athletes. This is hypothetical thinking and by no means does it purport to be a significant discovery.

Most of the subjects' mothers and fathers are living. Therefore, these data cannot be employed to arrive at conclusions concerning longevity.

In comparing the number of subjects who served in the Armed Forces, the football players exceeded the non-athletes by a slight margin. This, no doubt, is due to chance (probability between .90 and .80) and does not signify that the athlete was more patriotic. Medical ailments of the football players were far less in number than those reported by the non-athletes. It may be possible that some of the maladies of the non-athlete may have prevented him from meeting the physical requirements of the Armed Forces.

The economic status of the football player before and during college was a few points higher than that of the non-

athlete. This could be due to chance as the probability quotient indicates, although the football player could have received some additional help while attending college through athletic scholarships.

The majority of the subjects in this research project attended college during the great depression of the early 30's. It could have been possible that being a member of the football squad would be an asset in obtaining summer and part time employment which would enable him to enjoy a higher economic status. Since leaving college, both groups have enjoyed satisfactory economic conditions.

The former football players came from slightly larger families than did the non-athlete. Many players in general seem to be of Irish, Polish and Slovak descent. These nationalities tend to have larger families which may have some relation to this finding.

CHAPTER VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The purpose of this study was to compare longevity, morbidity and other characteristics of athletes and non-athletes. As was brought out in the limitations, this project would not produce much about causes of death. More data were received with regard to living habits which may have a direct effect upon the morbidity of the subjects.

The survey method was employed to gather the desired information. Questionnaires were sent to 100 football players and a similar group of non-athletes. A letter of transmittal was included with the questionnaire explaining the importance of this study. A follow-up letter was sent to those subjects who did not respond to the original letter of transmittal. Forty-nine athletes and forty-three non-athletes responded. From the responses the qualatative and quantitative data were summarized.

The results of this study do not solve the query whether athletics is beneficial or detrimental to the participant. This study does prove there is a difference in some respects between athletes and non-athletes. Whether this difference will have an effect on their longevity cannot be answered. This project can only give an indication of what might happen in the future.

Conclusions

1. The mean weight of the former football player attending Michigan State College was much greater than that of the non-athlete.

2. The non-athlete gained more weight than the football players from graduation up to 1952.

3. The percentage gain in weight was higher among non-athletes.

4. Medical ailments are more prevalent in the non-athlete.

5. The paternal and maternal grandparents of the football players enjoyed a longer life span than the non-athletes' grandparents. This was nearly statistically significant in the case of the paternal grandfathers and grandmothers, but the degree of significance was much less in the case of the maternal grandparents.

6. The mean ages of the football players and non-athletes are practically identical.

7. The majority of the fathers and mothers of the subjects are living. Their mean ages are approximately equal.

8. The football players have acquired the habit of smoking and drinking, more so than the non-athlete. This was statistically significant in the case of drinking but not in smoking.

9. Football players enjoyed a more satisfactory economic status before and during college. This finding was not statistically significant.

10. A higher percentage of the football players served in the Armed Forces. The data denoted no statistical significance.

Recommendations

1. The question was too extensive. If we are to discover through research that athletics is either harmful or beneficial, a more thorough study of less items should be made. Such questions as smoking and drinking should be so constructed that a person performing this type of study could make an actual count of the number of cigarettes a subject smoked, or the number of drinks taken per day. The type of beverage preferred would also be helpful. Oftentimes chronic drinking of carbonated beverages can be detrimental to health.

2. The questionnaire when referring to the medical history could be improved by including the date of the last medical examination. This would give considerably more validity to the answers concerning medical history.

3. Continue this research back to where records cease to be available.

4. Make similar comparisons between various varsity sports such as basketball, baseball, track and field.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. PERIODICAL ARTICLES

Brickert, Friedrick-Wilhelm., "Einfluss des Wettkampfmassig betniben Sports auf die Lebensduer und Todesursache," Deutsche Medizinische Wochenschrift, 55:23-5, January 1929.

Dublin, Louis L., "Longevity of College Athletes," Harpers, CLVII:228, June, 1928.

Hartley, P. H. S. and G. F. Llewellyn, "Longevity of Oarsmen: Study of Those Who Rowed in the Oxford-Cambridge Boat Races from 1829 to 1928," British Medical Journal I:657, 1939.

Knoll, W., "Welches Lebensalter erreichen die Riederer von 'Oxford-Cambridge'?", Medizinische Klinik, 34:464-466, April 8, 1938.

Van Mervenne, C. J., "Life Span of Athletes," (in Dutch) Nederlandsch Tijdschrift Voor Genesskunde, 85:535-43, February 8, 1941.

Wakefield, Mark C., "A Study of Mortality Among the Men Who Have Played in the Indiana State Final Basketball Tournaments", Research Quarterly, 5:1-9, March, 1944.

B. NEWSPAPERS

The New York Times, July 20, 1930.

APPENDICES

NATIONAL STUDY OF LONGEVITY AND MORBIDITY OF ATHLETES IN COLLEGES AND UNIVERSITIES

Please Fill in This Form as Completely and Accurately as Possible

Date .....

Name of Athlete (please print)	Year of Birth	Weight at Graduation from College
.....	.....	.....

IF ATHLETE IS LIVING

Present address .....

.....

.....

Present weight ..... lbs.

Present general condition of health

(Check one):

Good .....

Fair .....

Poor .....

Married ..... Single .....

(Check one)

IF ATHLETE IS DECEASED

Age at death ..... yrs.

Cause of death stated on death certificate:

Primary .....

Secondary .....

If answer is unknown, state the generally accepted cause of death

.....

.....

Was death sudden ..... or lingering .....

Was he married ..... or single .....

Person entering information on this form:

Name .....

Address .....

Relationship .....

Athletic and General Sports History of Athlete

Name of Sport	High School	College	Amateur Non-School	Profes-sional	Age
					yrs. to yrs. of age
					yrs. to yrs. of age
					yrs. to yrs. of age
					yrs. to yrs. of age
					yrs. to yrs. of age
					yrs. to yrs. of age

Activity During Adult Life, Excluding Playing Participation In Sports

Include vocational and avocational activities

Number of hours of physical activity (daily or almost daily)

Age		Vigorous	Moderate	Mild
yrs. to	yrs.	hrs.	hrs.	hrs.
yrs. to	yrs.	hrs.	hrs.	hrs.
yrs. to	yrs.	hrs.	hrs.	hrs.
yrs. to	yrs.	hrs.	hrs.	hrs.

Military Service

Branch of Service ..... Age ..... yrs. to ..... yrs.

Physical activity involved (check): Vigorous ..... Moderate ..... Mild .....

If more than one branch of the Service, name the others and indicate the amount of physical activity involved .....

.....

Economic Status of Home From Early Childhood Upward

Before and During College Years	After College Years	Comments
(check one)	(check one)	
Satisfactory	Satisfactory	
Unsatisfactory	Unsatisfactory	

Medical History

AILMENT

1. Infectious and Contagious Diseases (State age of occurrence).

.....

.....

2. Childhood rheumatism (State, if possible, age of occurrence of any manifestations in this group).

Growing pains .. ... Chorea .....

Rheumatic fever .....

1st attack .....

2nd attack .....

3rd attack .....

Tonsilitis..... Tonsils removed.....

Heart defects (give as complete a diagnosis as possible, such as murmurs, enlargement, irregularity, heart failure, etc). .....

.....

.....

3. Hypertension (Mention complications such as strokes, coronary thrombosis, heart failure, uremia, etc., along with age of occurrence) .....

.....

4. Arterio Sclerosis .....

.....

5. Angina Pectoris ..... Coronary Thrombosis .....

Indicate frequency of attacks

Diabetes ..... Peripheral Vascular Disease .....

6. Other Diseases (mention organ or body system affected, and age of occurrence): .....

.....

.....

.....

Smoking and Drinking Habits

Use alcoholic drinks: never ..... moderately ..... excessively .....

Use tobacco: What form ..... How much .....

Hereditary History

Relationship	If Living		If Deceased	
	Age	Ailment, if any	Age at Death	Cause of Death
Paternal grandfather				
Paternal grandmother				
Maternal grandfather				
Maternal grandmother				
Father				
Mother				
Brothers				
Sisters				

(If Hypertension, Coronary Thrombosis or Diabetes present in family, please indicate)

Do you think that your program of athletics was beneficial, harmful, or had no effect?

Please comment; if critical of program, give reasons .....

.....

.....

.....

.....

.....

.....

Other comments which will provide additional information on your participation in sports.

Some examples: "Played basketball for high school during afternoons and for a club in the evenings in 1926." "Did not play football during junior college year on account of fracture or operation." "Etc....." .....

.....

.....

.....

.....

MICHIGAN STATE COLLEGE
EAST LANSING

DEPARTMENT OF PHYSICAL EDUCATION
HEALTH AND RECREATION FOR MEN
JENISON GYMNASIUM AND FIELD HOUSE

Dear Sir:

Michigan State College along with a number of other selected colleges and universities throughout the country has undertaken a research project of extremely great importance to present and future generations. It is a national study of longevity and morbidity of former college and university athletes as compared with a random sampling of students who were not active in college sports.

The potential value of such a study for the national health must be evident to all. Literally hundreds of thousands of boys and girls, youth, and adults participate annually in a variety of vigorous competitive sports. This participation is the result of both a strong natural urge and the ever increasing encouragement which is being applied by schools and colleges, clubs, and other organizations throughout the land.

The findings of our national study will without question affect the future planning of sports programs everywhere, including those in which your own children and grandchildren may take part. Differences of opinion among laymen and among medical men as to the good and bad effects of competitive sports are common; so also are the fears of many parents of participants. It is high time that the real facts be established and made available to all.

In order to obtain the information so vitally needed, we are writing to all of our former athletes who earned their letters during or before 1937, and a similar group of non-athletes. In the cases of deceased men, we are endeavoring to get the facts from a close relative or friend. We are asking that you along with former athletes and other non-athletes assist in this needed scientific study by filling in the enclosed questionnaire form and returning it to us at the earliest convenient date.

Obviously, the complete cooperation of all is necessary; the results can be only as good as the degree of cooperation which is given. Accuracy and completeness of answers is of extremely great importance. Please check with all persons and records which may help to insure correct answers. If there are any items for which you can not find an answer, please write "Unknown".

We wish to express in advance our thanks to you for your participation in this study. We are certain that when the results are published it will be satisfying to you to know that you shared actively in the project.

Sincerely yours,

MICHIGAN STATE COLLEGE
EAST LANSING

DEPARTMENT OF PHYSICAL EDUCATION
HEALTH AND RECREATION FOR MEN
JENISON GYMNASIUM AND FIELD HOUSE

Dear Sir:

About four weeks ago, a questionnaire and letter were sent to you from the Physical Education Department here at Michigan State College. The letter of transmittal explained to you the purpose and need of this study (National Study of Longevity and Morbidity of Athletes in Colleges and Universities) which is being conducted on a nationwide scale.

Often times you receive a questionnaire, set it aside, and without meaning to, forget about it. I know it has happened to me, and when a follow-up card notified me, I realized its importance and responded immediately.

The outcome of this study will have a bearing on the administration of future sports. Therefore, it is important that we get as much information as possible. It will only take a few minutes of your time to answer the questions, and please bear in mind that we are anxiously awaiting your reply.

If, by any chance, you have lost the questionnaire, please notify us and we shall promptly send you another.

Thank you for your kind attention to this matter.

Yours very truly,

Mark H. O'Donnell