

A STUDY OF THE LONGEVITY AND MORBIDITY OF TRACK
ATHLETES AT MICHIGAN STATE UNIVERSITY

By
Herbert W. Olson

A THESIS

Submitted to the College of Education of Michigan State
University of Agriculture and Applied Science
in partial fulfillment of the requirements
for the degree of

MASTER OF ARTS

Department of Health, Physical Education, and Recreation

1956



Thomas Campbell

1774-1844

The River of Life

The more we live, more brief appear

Our life's succeeding stages:

A day to childhood seems a year,

And years like passing ages.

Heaven gives our years of fading strength

Indemnifying fleetness;

And those of youth, a seeming length,

Proportion'd to their sweetness.

ACKNOWLEDGMENTS

In acknowledgment of the guidance and assistance so generously given me in this research project by Dr. Henry J. Montoye I wish to express my indebtedness and appreciation. I am also grateful for the cooperation and moral support given by Andrew J. Hudec.

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AN ABSTRACT

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Approved by

Henry J. Montoya

Statement of
the Problem

This study was completed for the purpose of comparing two groups of subjects: track athletes who won letters during the years 1886 to 1937 and non-athletes matched by years of attendance in college. The comparisons were made on longevity, morbidity and other closely related areas.

Methods and
Procedures

The track athletes' names were located in the permanent records of letter winners at the athletic office of Michigan State University. The non-athletes' records were found in the files of the registrar. The last known addresses of both groups were obtained from the alumni files.

A letter and questionnaire were sent to each track athlete and non-athlete. To accelerate the number of returns, two follow-up letters at intervals of four and six weeks were also sent. There were 210 questionnaires returned by track athletes and 165 questionnaires returned by non-athletes. A coding system for entry of all information on I.B.M. cards was devised. The information from the questionnaires was punched into I.B.M. cards and was then analyzed using chi square and critical ratio tests.

Literature on
Longevity

The best studies completed in the area of longevity were those of Alan Rook¹ (1954) and Louis Dublin^{2,3} (1928, and 1932). In Rook's study a

control group of non-athletes selected at random were used. The mean ages of death were not significantly different when a comparison was made, but a group of intellectuals was found to live two years longer than either the sportsmen or non-sportsmen.

Louis Dublin, a foremost authority on longevity, made two studies. One was completed in 1928 and the other in 1932. His first study used insurance statistics for his comparisons and made his study less valid. His second study was more complete in that he used a control group of college non-athletes. Dublin found little difference between sportsmen and non-sportsmen, but the honor students were found to have a longer length of life. Other studies in the area of longevity used insurance statistics which did not give as valid comparisons as a group of control subjects at random.

Summary In the present study many statistically significant differences in the data were obtained. Track athletes were found to weigh more during college. They also had a greater percentage serve in the armed forces with a larger mean number of years in service. A greater proportion of track athletes drink alcohol than do non-athletes. Track athletes have more living brothers, and a greater number of deceased sisters. More of the non-athletes are of the opinion that athletics are harmful. Distribution of causes of death for grandparents shows that there are more deaths due to heart

ailments among paternal grandparents of the non-athletes than of the athletes.

There were some trends that were not statistically significant but were of some interest. The track athlete showed no significant difference in mean age of death. The number of accidental deaths occurred at an earlier age than those of the non-athletes. Track athletes seem to have come from larger families. The economic status of both groups improved slightly after college. Track athletes appear to use more tobacco when a comparison was made. It was observed that the mean age of death for parents and grandparents of the non-athletes is slightly higher.

References

1. Rook, Alan, "An Investigation into the Longevity of Cambridge Sportsmen," British Medical Journal, 4865, 773-777, April, 1954.
2. Dublin, Louis I., "Longevity of College Athletes," Harpers Monthly Magazine, 157: 229-238, 1928.
3. Dublin, Louis I., "College Honor Men Long-lived," Statistical Bulletin of the Metropolitan Life Insurance Company, 13: 5-7, August, 1932.



TABLE OF CONTENTS

	PAGE
I. INTRODUCTION	1
Statement of the Problem	2
Importance of the Study	2
Limitations	3
II. REVIEW OF THE LITERATURE	4
III. METHODS OF PROCEDURE	28
Introduction	28
Questionnaire	28
Athletes	29
Non-Athletes	30
Methods Used in Mailing Questionnaires and Follow-up Letters	31
Tabulation of Results	32
Statistical Analysis	32
IV. RESULTS, INTERPRETATION, AND ANALYSIS OF THE DATA	34
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS . . .	59
Summary	59
Conclusions	61
Recommendations	62
BIBLIOGRAPHY	64

TABLE OF CONTENTS (Cont.)

	PAGE
APPENDIX A. QUESTIONNAIRES	66
B. LETTER SENT WITH QUESTIONNAIRE	68
C. FIRST FOLLOW-UP LETTER	69
D. SECOND FOLLOW-UP LETTER	70

LIST OF TABLES

TABLE	PAGE
I. A Comparison between the Actual and Expected Deaths of Yale Letter Winners 1855-1905 (From Anderson, 1916)	7
II. Deaths among Yale Graduates, as Compared with Expected Deaths of American Men Ultimate Table 1905-1923 (From Greenway and Hiscock, 1926) . . .	9
III. Comparison of Cricketers with General Male Population (From Hill, 1927)	11
IV. Comparison of Amateurs and Professionals (From Hill, 1927)	12
V. Percent Actual of Expected Deaths According to American Men Table (From Dublin, 1928)	13
VI. Percent Actual of Expected Deaths According to American Men Table (From Dublin, 1928)	14
VII. Expectation of Life (From Dublin, 1932)	17
VIII. Longevity of Oxford and Cambridge Oarsmen Compared to Insurance Tables (From Hartley and Llewellyn, 1939)	20
IX. Statistics on Causes of Death of Soccer Players (From Van Mervenne, 1941)	22
X. A Comparison of Non-Athletes and Athletes Mean Age of Death (From Schmid, 1952)	24
XI. Death Causes in Percentages for Sportsmen and Controls (From Rook, 1954)	26
XII. Mean Ages of Track Athletes and Non-Athletes Living and Deceased	34
XIII. Ages and Causes of Death of Track Athletes and Non-Athletes	35
XIV. Present State of Health of Track Athletes and Non-Athletes	36

LIST OF TABLES (Cont.)

TABLE	PAGE
XV. The Weights of Track Athletes and Non-Athletes . . .	37
XVI. Marital Status of Track Athletes and Non-Athletes Living and Deceased	38
XVII. The Mean Hours Spent in Vocational and Avocational Activities in the Years After College by Track Athletes and Non-Athletes	39
XVIII. Military Service Experience of Track Athletes and Non-Athletes	41
XIX. The Economic Status of Track Athletes and Non- Athletes During and After College	43
XX. A Comparison Between Track Athletes and Non- Athletes in Use of Alcohol	44
XXI. A Comparison of the Amounts of Tobacco Used by Track Athletes and Non-Athletes	45
XXII. A Comparison of the Types of Tobacco Used by the Track Athletes and Non-Athletes	45
XXIII. Diseases of Track Athletes and Non-Athletes During and After Childhood	47
XXIV. Other Diseases Reported by Track Athletes and Non-Athletes	48
XXV. The Percent Living and the Mean Age at Death of the Parents for Track Athletes and Non-Athletes .	49
XXVI. Mean Age at Death of the Maternal and Paternal Grandparents	50
XXVII. The Mean Number of Brothers and Sisters for Track Athletes and Non-Athletes	51
XXVIII. Ailments of Mothers and Fathers of Track Athletes and Non-Athletes	52
XXIX. The Causes of Death of Mothers and Fathers of Track Athletes and Non-Athletes	53

LIST OF TABLES (Cont.)

TABLE	PAGE
XXX. The Causes of Death of Maternal Grandparents of Track Athletes and Non-Athletes	54
XXXI. The Causes of Death of Paternal Grandparents of Track Athletes and Non-Athletes	55
XXXII. The Opinion of Track Athletes and Non-Athletes on Whether Athletics are Harmful or Beneficial to Competitors	57



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LIST OF FIGURES

FIGURE	PAGE
1. Graph of Mean Hours Spent in Vocational and Avocational Activities by Track Athletes and Non-Athletes	40

CHAPTER I

INTRODUCTION

This country has always held the basic premise that competition is the essence of the business and sports worlds. The American way of life emphasizes this idea, and has brought about a keener interest in all areas of athletics. The schools of our country are now including athletics in their programs to a far greater extent than they had previously. Grade schools are beginning to produce teams for inter-school competition in numerous sports. This development of athletic teams from the lower grades to the college level has cost a great deal of time and money. Many educators of today are not in agreement with the idea that this intensive development of athletic programs is worth the time and expense for the returns that are forthcoming. Critics have indicated numerous times the great number of athletes who have died early in life, implying that athletics, and athletic training are the cause of these deaths. These accusations are in no way to be considered trivialities. All areas of sports must be thoroughly investigated to determine whether this line of reasoning is of any merit.

Statement
of Problem

The present study has been carried on for the purpose of procuring and comparing information on the Longevity, Morbidity and other closely related areas of a group of varsity track athletes, and a comparable age group of college non-athletes. The Track Athletes that were used are varsity letter winners from the years 1886 to 1937. The group of non-athletes were analogous in that they also attended Michigan State University in comparable years. These non-athletes were picked at random from the registrar's student directories.

Importance
of the Study

A study of Longevity and Morbidity of athletes holds some importance in the future of athletics. People are beginning to wonder if there aren't too many harmful effects from sports and athletic training. Very little good research has been completed to produce evidence for either aspect of this question. Every authentic study completed in these areas may clarify many of these questions which have been forthcoming from the critics of athletics.

The conclusions of this study may have some effect on training programs and future trends in sports. This study may well be another objective reached in an endeavor to discover information for the purpose of making sound conclusions on the length of life of athletes as compared to non-athletes.

Limitations The limitations of this study are as follows:

1. The questionnaire was made up by the Phi Epsilon Kappa fraternity's committee on Longevity, and in some instances the questions were ambiguous.
2. Many of the relatives of deceased athletes and non-athletes could not complete certain areas of the questionnaire because they lacked this information.
3. In the process of picking out non-athletes in a random stratified sampling, some of these former students were from foreign countries or had moved to areas outside the continental United States. These subjects were a little more lax in their replies to the questionnaire and to the follow-up letters.
4. In the process of mailing questionnaires and follow-up letters there could have been a few letters that were not forwarded to subjects who had moved to new locations, thus limiting the number of responses.
5. This study could bring out some conclusions that may differ with other Universities' findings due to environmental conditions, different methods used in training and program planning.
6. The results of this thesis, as in most questionnaire studies, contained a certain number of bias answers due to the fact that all the responses are on a subjective basis.

CHAPTER II

REVIEW OF THE LITERATURE

The length of life that the populace may expect to reach is of great interest to people in all walks of life. Particularly interesting are the expected longevity and morbidity figures of the athlete. Numerous opinions have been voiced on the subject with a great deal of feeling, seemingly, opposed to athletics. This, however, is not accepted as true fact because there has been a number of studies completed which hail athletics as beneficial to the people who participate.

One of the first studies of this nature was completed in 1893 by John E. Morgan.¹ In Morgan's study, a comparison was made between the calculated longevity of oarsmen from the years 1829 to 1859, and the English Life tables of those times. The comparison appeared to be in favor of the oarsmen by a mean average of two more years of life. This was a step in the right direction, but due to the method of comparison, this study cannot be taken as positive proof of the superiority of the athlete in longevity. Morgan used a group of selected

¹J. E. Morgan, "Critical Inquiry Into the After-Health of the Men Who Rowed in the Oxford and Cambridge Boat Race from the Year 1829-1859," University Oars, p. 300, 1873, cited by P. V. Korpovich, "Longevity and Athletics," Research Quarterly, Vol. 12, (May 1941), pp. 451-55.

athletes and computed their longevity in groups of eight, presuming that this could be done with accuracy in such a small group. He then compared them to an English Life table based on the mortality of the general populace. This in itself draws criticism, because a comparison of a selected group of athletes as against the longevity of the general population is not justifiable as a good comparison.

Meylan's² study of "Harvard University Oarsmen" was the next research project of this nature to be completed. In this study Meylan selected 152 oarsmen from the years 1852 to 1892 inclusive. The data were collected by a personal interview or with the help of the family physician. The information sought was the length of life and the causes of death of this group. The selected group of athletes had 123 of their number still living on November 1, 1902. In his comparison of longevity, Meylan used the American Experience Tables of Mortality, and it seemed that a healthy young athlete of 20 years could expect to live 42.2 more years. According to Meylan's tables, the oarsmen lived 2.88 years in excess of expected mortality table figures. If the normal expectation of life for those oarsmen that were killed by wars and accidents had been added to the figure of 2.88 an increase to a mean of 5.09 years for each athlete would have been recorded.

²George L. Meylan, "Harvard University Oarsmen," Harvard Graduates Magazine 9: 115-124, March, 1904.

In the causes of death of the deceased athletes of this study only 22 of the 32 were known. The list of these causes is as follows: six in Civil War; two in accidents; two with heart disease; three with pneumonia; two with apoplexy; one with paresis; one with cancer; one with consumption; two with Bright's disease; one of alcoholism, and one by a tropical climate.

Meylan did not believe that rowing was a significant factor for any cause of death in his study. He further thought that rowing was a benefit to competing oarsmen.

A study of the longevity of Yale athletes by William G. Anderson,³ a Director and Professor at the Yale Gymnasium, was completed in 1916. Dr. Anderson secured his information on a group of 880 Yale athletes from the files of the College Publication Obituary.

Anderson presents his data in Table I on the number of deaths and their distribution among four sports during a fifty-year span from 1855 to 1905. Table I also presents a fairly clear picture of the ratio of expected deaths to actual deaths, and this information is based on the statistical tables of insurance companies from those same years. The author states, as shown by the table, that Yale letter winners do not die younger than the general population. He also

³William G. Anderson, "Further Studies in the Longevity of Yale Athletes," Mind and Body, 23: 374-378, December, 1916.

TABLE I
A COMPARISON BETWEEN THE ACTUAL AND EXPECTED DEATHS
OF YALE LETTER WINNERS 1855 - 1905
(FROM ANDERSON, 1916)

	Number of Letter Winners	Number of Deaths	Expected Deaths by Actuarial Societies Selected Tables	Ratio Percent of Actual to Expected Deaths by Actuarial Societies Tables	Expected Deaths by American Tables	Ratio and Percent of Actual Deaths by American Table	Year of Earliest Death
Crew	171	18	40.2	45	44.0	41	1855
Football	213	16	27.7	58	30.9	52	1872
Track	276	13	21.1	62	24.8	52	1868
Baseball	148	11	23.6	47	26.2	42	1865
Total	880	58	112.6	52	125.9	46	----

contends that the letter winners may not owe this extra long life to athletics.

The causes of death among athletes in this study were as follows: twelve had consumption; six had pneumonia; five had typhoid; two had typhoid pneumonia; four drowned; four had heart failure, and five were unknown. The other twenty deaths were each of a different cause.

Anderson concludes that lung trouble and heart disease were the greatest causes of death, but the percentage from these causes was no greater for the athlete than for the non-athlete.

Greenway and Hiscock⁴ completed a study in 1926 on "Mortality Among Yale Men," and in their study, a group of 686 lettermen and a group of 9,421 non-letter men were studied for their length of life and causes of death. The athletes that were picked as subjects had won their letters during the years 1904 to 1923. This excluded any of the athletes that were used in the study by Anderson. The information on the deaths among both groups can be discerned in Table II.

The mortalities that were caused by war injuries are 50 percent higher among the athletes than among the non-athlete subjects in this study. The authors further presented information that the athletes have one more man per thousand

⁴James C. Greenway, and Ira V. Hiscock, "Mortality Among Yale Men," Yale Alumni Weekly, 35: 1806-8, June, 1926.

TABLE II

DEATHS AMONG YALE GRADUATES, AS COMPARED WITH EXPECTED
DEATHS OF AMERICAN MEN ULTIMATE TABLE, 1905 - 1923
(GRADUATES WHOSE DEATHS WERE DUE TO WAR INJURIES EXCLUDED)
(FROM GREENWAY AND HISCOCK, 1926)

Groups	Number of Deaths	Expected Deaths by American Men Ultimate Table	Ratio of Actual to Expected Deaths
Non "Y" Men	317	381	83%
"Y" Men	27	29	93%
All Graduates	344	410	84%

dying than the non-athletes. This might lead people to believe that non-athletes from college live longer than athletes, but Greenway and Hiscock point out that this percentage of war deaths account for that figure. The evidence presented is interpreted by the authors as being attributable to the athletic type having a greater abundance of physical energy and natural courage which causes them to endanger themselves by undue risks.

The limited number of subjects used in this study could not establish enough conclusive evidence to assure the validity of the information. It does seem that in all these studies it might be fairly easy to conclude that college athletes and non-



athletes seem to live longer than the general populace involved in the insurance tables statistics.

The study that was completed by Bradford Hill⁵ in 1927 on "Cricket and Its Relation to the Duration of Life" was an investigation of 3,424 cricket players from Oxford, Cambridge and other English counties. The data was taken from the 1926 "Wisden's Cricketers Almanac" which devoted one whole section to biographical information on first class cricketers that were born between 1800 and 1888. Hill divided this group of athletes into two groups. The cricketers born between 1800-1849, and those born between 1850-1888. He then compared each of these groups with an English Life Table for those same years. The information on these comparisons is elucidated in Table III. The figures show a distinct advantage in favor of the cricketers all through the tables. This may not be quite correct because of certain errors that could be the fault of the almanac death records.

Hill's study also compares in Table IV the amateur cricketers and professional cricketers.

The figures in the table indicate that the amateur athlete shows a longer length of life, and according to the author, these amateurs could have had an easier life in a greater number of cases. There are a great number of causes that could affect

⁵A. Bradford Hill, "Cricket and Its Relation to the Duration of Life," Lancet, 2: 949-950, 1927.

TABLE III

COMPARISON OF CRICKETERS WITH GENERAL MALE POPULATION
(FROM HILL, 1927)

Age	No. of Cricketers Exposed at Each Age	No. Cricketers Who Died Born Between 1800 - 1849	Expected Deaths Eng. Life Table #4	No. of Cricketers Exposed at Each Age	No. Cricketers Who Died Born Between 1850 - 1888	Expected Deaths Eng. Life Table #8
25	1287	45*	89*	2137	35*	47*
30	1265	70	106	1867	46	60
35	1229	92	128	1565	61	78
40	1176	97	153	1252	83	102
45	1116	107	187	978	117	138
50	1062	146	235	684	122	190
55	997	186	300	417	--	--
60	908	237	392	180	--	--
65	743	343	512	---	--	--
70	470	451	652	---	--	--

*Indicates the number who died within 10 years out of 1,000 commencing at that age from key of Table III

this study, such as, amount of participation, length of participation and social background.

TABLE IV
COMPARISON OF AMATEURS AND PROFESSIONALS
(FROM HILL, 1927)

Age	Exposed to Risk at Each Age	No. Amateurs Born Between 1800 - 1874 Who Died	Exposed to Risk at Each Age	No. Professionals Born Between 1800 - 1874 Who Died
25	1705	40*	993	36*
30	1676	52	980	65
35	1637	63	957	99
40	1539	74	890	118
45	1328	99	766	130
50	1122	139	625	146

* indicates the number who died within 10 years out of 1,000 commencing at each age.

The most noted authority on length of life is probably Louis I. Dublin, who in 1928 published an article on the "Longevity of College Athletes."⁶ In this study the author examined the records of 4,976 lettered athletes from ten Eastern Universities. These athletes were separated into different

⁶Louis I. Dublin, "Longevity of College Athletes," Harpers Monthly Magazine, 157: 229-238, 1928.

sports, and the totals for each sport were: baseball 1,111; crew 576; football 1,233; track 1,076; two or more sports 822; and minor sports 158. Table V with information on the percentage of actual to expected deaths of athletes gives a brief analysis of a segment of Dublin's study.

TABLE V
PERCENT ACTUAL OF EXPECTED DEATHS
ACCORDING TO AMERICAN MEN TABLE
(FROM DUBLIN, 1928)

Sport	Under 45	Over 45
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
All sports	96.0	88.5

This table shows a slightly high mortality under 45 years of age for certain sports, but this condition seems to change for the better after 45 years of age. A table which gives an interesting concept of what the mortality depicts for different year groupings is illustrated in Table VI.



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TABLE VI
PERCENT ACTUAL OF EXPECTED DEATHS ACCORDING
TO AMERICAN MEN TABLES
(FROM DUBLIN, 1928)

Sports	All Classes Combined	Classes Prior to 1880	Classes 1880-1889	Classes 1890-1899	Classes 1900-1909
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 findings of these tables are seriously hampered by a comparison of longevity of athletes to insurance statistics as has been done in so many of the previous studies. The differences in percentages of expected deaths of the various sports for these groupings show baseball to be the highest in most classes. This would be hard to explain because baseball is not as strenuous as many of the other sports. Dublin also points out that the low percentage of death for athletes in two or more sports might be caused by their being in better physical condition and staying in this condition longer than single sport men.

The results of another study were published in 1929 by F. W. Bickert⁷ on "The Causes of Death in Gymnastics and Sports Clubs." The author sent out a total of 2,000 questionnaires to relatives and sports clubs of deceased athletes. The number of returns from this effort was 400 questionnaires and only 264 of these were useful in the statistical analysis. The breakdown of this group was 32 rowers, 232 gymnasts, and sportsmen.

In causes of death, tuberculosis seemed to affect the athletes less than the general population. Whether this was caused by the sports themselves, or the selection of athletes is not known. The diseases of the vascular system, which included heart diseases, were more prominent in athletes than the general population. Bickert's study was not as complete as other studies that did a comparative analysis on similar type of data.

The longevity of Army officers was studied in 1931 by Reed and Love.⁸ These authors found that due to careful selection, army officers seem to have greater longevity than male white civilians. The athletes in this group of 5,021 studied

⁷F. W. Bickert, "Einfluss, des Wettkampfmässig Betriebenen Sports Auf die Lebensdauer und Todesursache," Deutsche Medizinisch Wochenschrift, 55: 23-5, 1929.

⁸Lowell J. Reed and Albert G. Love, "Longevity of Army Officers in Relation to Physical Fitness," The Military Surgeon, 69: 379-385, October, 1931.

were found to be slightly longer lived than the average personnel of the group. The men who won letters at West Point had approximately .25 to 1.25 years greater life expectancy than other West Pointers studied, and other athletes lived about five years longer than the football players.

A more thorough report on longevity was completed by Dublin⁹ in 1932. In this study the author used not only more and better comparisons for the group of athletes, but an inner comparison between different types of college graduates. The data were gathered from the life history of 38,269 graduates of eight Eastern colleges between the years 1870 - 1905. There were 6,500 honor students in this group as well as 5,000 athletes from ten universities and colleges. Table VII shows that the expectation of longer life for college graduates is better for the non-sportsman group than for the athletic group. The honor men had a much better life expectancy than either of the other college groups. Mortality in New Zealand is lower than that of the college honor men as shown by the table. Dublin thinks that this longer length of life of honor men could possibly be caused by the need for good physical condition, as well as, mental fitness to be a scholar.

⁹Louis I, Dublin, "College Honor Men Long-Lived," Statistical Bulletin of the Metropolitan Life Insurance Company, 13: 5-7, August, 1932.

TABLE VII

EXPECTATION OF LIFE
(FROM DUBLIN, 1932)

Age	Graduates	Athletes	Honor Men	American Men (1900-1915)	U.S. 27 Registration States (1919-1920)	New Zealand (1921-1922)
22	45.71	45.56	47.73	44.29	43.35	46.91
27	41.68	41.41	43.61	40.18	39.45	42.57
32	37.59	37.25	39.48	36.03	35.62	38.27
37	33.51	33.09	35.30	31.83	31.83	34.05
42	29.44	28.92	31.07	27.66	28.02	29.92
47	25.37	24.80	26.85	23.62	24.23	25.88
52	21.42	20.85	22.79	19.79	20.53	21.95
57	17.78	17.34	19.03	16.25	17.06	18.17
62	14.48	14.09	15.56	13.06	13.85	14.68
67	11.47	11.06	12.36	10.28	10.96	11.58
72	8.81	8.41	9.50	7.91	8.49	8.87
77	6.52	6.15	7.06	5.96	6.43	6.55
82	4.56	4.24	4.98	4.41	4.82	4.58
87	3.01	2.77	3.30	3.21	3.59	3.02
92	1.92	1.75	2.11	2.30	2.55	1.92

Cooper, O'Sullivan and Hughes¹⁰ in 1937 studied a group of 100 oarsmen for the late effects of vigorous exercise. The group did their rowing between 1885 and 1905 for Ormand College. The number of deaths in this group was twenty-four, of which seventeen died of natural causes, and seven died of war injuries. The death of twenty-four athletes compared to 38.8 of the general male population designates a lower mortality rate for the oarsmen.

The study by Knoll¹¹ in 1938 was a counter-action against dubious claims made in medical works about longevity in oarsmen without scientific basis. The results of this inquiry into the records of 880 oarsmen, who rowed in the Oxford-Cambridge races, were very enlightening. The average age of death of the participants was 56.1 years. This average would have been much higher had the cases of premature death been subtracted that were due to causes other than those that may have been influenced by athletic training. The 155 deaths included eight infectious diseases, seventeen tropical diseases, twelve accidents and forty-five war casualties, or over one-half of the total mortalities. There was no comparison with

¹⁰Eric L. Cooper, John O'Sullivan, and E. Hughes, "Athletics and the Heart: An Electrocardiographic and Radiological Study of the Responses of the Healthy and Diseased Heart to Exercise," Medical Journal of Australia, 1: 569-579, 1937.

¹¹W. Knoll, "Welches Lebensalter Erreichen die Ruderer von Oxford-Cambridge?" (What Age Can the Members of the Oxford Rowing Team Expect to Reach) Medizinische Klinik, 34: 464-466, 1938.

any other standard life tables, or a similar group of college non-athletes as subjects.

Another study on the oarsmen from Oxford and Cambridge was completed in 1939 by Hartley and Llewellyn.¹² The information that was used in this study was gained through the Official Centenary History of the University Boatmen. The oarsmen that were studied had competed in 80 races between 1829 and 1928. There were 431 oarsmen who had died by the end of 1928, and this group was used in the statistics of the study. The data were compared to a table of expected deaths to give a better view of the results that were attained.

In Table VIII, four sets of insurance tables were used which was an improvement from the previous method because of the increased longevity through the years.

The use of standard tables is not a fair comparison, but this method used by Harley and Llewellyn is better than using one mortality table for this range of ages. The authors mention that it would be better to use fellow graduates as a comparison of life expectancy.

A study of the causes of death of 100 soccer players was completed in 1941 by C. J. Van Mervenne.¹³ This study

¹²Percival Horton-Smith Hartley, and Geoffrey F. Llewellyn, "A Study of Those Who Rowed in the Oxford and Cambridge Boat Race from 1829 to 1928," British Medical Journal, 1: 657-662, April, 1939.

¹³C. J. Van Mervenne, "Life Span of Athletes," Nederlandsch Tydschrift Voor Geneskunde, 85: 535-543, 1941.

TABLE VIII

LONGEVITY OF OXFORD AND CAMBRIDGE OARSMEN
 COMPARED TO INSURANCE TABLES
 (FROM HARTLEY AND LLEWELLYN, 1939)

Age Group	Actual Deaths	Expected Deaths by Standard Table	Actual as Per- centage of Expected
PERIOD I: 1829-62 Standard Mortality Table HM			
Up to 50	22	25.2	87.3
51 - 70	1	1.0	100.0
Over 70	--	--	--
All Ages	23	26.2	87.8
PERIOD II: 1863-93 Standard Mortality Table OM			
Up to 50	53	62.1	85.3
51 to 70	39	59.8	65.2
Over 70	18	21.6	83.3
All Ages	110	143.5	76.7
PERIOD III: 1894-1923 Standard Table Mean OM and A 1924-9			
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 IV: 1924-8 Standard Mortality Table A 1924-9			
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

*Excluding 37 Great War deaths.



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showed the age at death and the cause of death for soccer athletes. Heart disease and circulatory attacks seem to be the greatest cause of death among this group killing 41 soccer players out of the 100 men in the group. The information on all the causes of death of this group of soccer players is in Table IX.

In 1944, a study of mortality was completed on basketball players from the state high school finals of Indiana.¹⁴ This research was done by Wakefield to perceive what comparison there was between high school basketball players, and the mortality rate of the general population. The record of basketball players that competed in the state tournaments from 1911 to 1935 were taken from files of Indiana High School Athletic Association. The age and cause of death of most of these players were found in the State Board of Health records, cemetery records and morticians records. The final number of subjects was 2,919 basketball players, and among this group, there were 123 actual deaths. The expected deaths as taken from death rates of the general population was 181.1, which was 67.9 percent of actual deaths to expected deaths.

Among the group that died, the causes of death were: external violence 34.1 percent; cardiovascular-renal diseases 16.3 percent; tuberculosis of all types 13.8 percent; pneumonia

¹⁴Mark C. Wakefield, "A Study of Mortality Among the Men Who Have Played in the Indiana High School State Final Basketball Tournaments," Research Quarterly, 15: 2-11, 1944.

TABLE IX
STATISTICS ON CAUSES OF DEATH OF SOCCER PLAYERS
(FROM VAN MERVENNE, 1941)

Ages	Acute Infection	Tuberculosis	Attacks Circulatory	Swelling	Heart and Fat Diseases	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

and influenza 10.6 percent. These percentages were favorable except for cardiovascular-renal and external causes. These were in favor of the general populace.

The basketball player that played in one, two or three games in a day all seem to live longer than the expected death rate. The fourteen, fifteen and sixteen-year olds who played in the tournaments had a better life expectancy than the seventeen, eighteen and nineteen year olds; 54.2 percent to 78.9 percent respectively. The general conclusion was in favor of the basketball players as compared to United States Life Tables.

Schmid¹⁵ in 1952 published an article on the length of life of 400 former sportsmen from Bohemia and Moravia who had at least ten years of sports competition. The athletes who were killed during the first and second world wars were omitted from the study. The ages reached by these athletes were: cyclists 64.83 years; competitors in apparatus work 58.53 years; oarsmen 54.66 years; swimmers 53.67 years; track and field athletes 52.50 years; football players 50.93 years; tennis player 50.64 years, and heavy-weight athletes 46.84 years. The mean age of all the athletes was 54.72 years, but when the number that died of external violence was subtracted, the mean age is 57.81 years. The author compares this group

¹⁵L. Schmid, "How Long the Sportsmen Live," Sport and Health, (Oslo, Norway: Published by Royal Norwegian Ministry of Education, 1952), pp. 100-109.

of athletes with a group of non-athletes from the population in the table below.

TABLE X
A COMPARISON OF NON-ATHLETES AND ATHLETES
MEAN AGE OF DEATH
(FROM SCHMID, 1952)

Year of Birth	Non-Athlete Mean Age	Athlete Mean Age
1861-1870	58.24	66.90
1871-1880	60.28	61.72

The author found that the influence of marriage proved interesting. The athletes had a ratio of 8:1 of married men to unmarried men. The mean age of the deceased married athlete was 57.15 years, while the mean age of the deceased unmarried athletes was 42.17 years. Removing all those who had met death by external violence, the mean ages are 57.90 years and 48.80 years. This was still in favor of the married athletes. This could be caused by a number of athletes dying of all causes before having a chance to marry.

The latest and, one of the best, studies in this area of longevity was published in the British Medical Journal by Dr.



Alan Rook,¹⁶ Senior Health Officer at Cambridge University 1954.

A group of 834 Cambridge sportsmen were chosen to be investigated and information on 772 was secured. The control group numbered 761 men, and information on 710 was obtained. In this group of 710 there were 374 intellectuals, and the other 336 were chosen at random.

The mean age at death of all sportsman and control groups, excluding those deaths due to war and accidents, are as follows: Random Control 67.43 years; Intellectual Control 69.41 years; and Sportsmen 67.97 years. This study is very similar to Dublin's study published in 1932 on athletes, graduates and honor students.¹⁷ Rook's study also shows the mean ages of deaths of individual sports. Track and Field men have a mean age of 67.41 years; Cricketers 68.13 years; Rowers 67.08 years; and Rugby Footballers 68.84 years at death. Another interesting area of this study was the difference in the age at death between the heavy and light-weighted men. The author divided each sport according to the weights of the sportsmen, and then found the mean age of death for light group was 68.46 years, and the heavy group was 66.73 years. The difference is slight, but it seems to be a trend that light-weight people live longer than heavy-weight people.

¹⁶ Alan Rook, "An Investigation into the Longevity of Cambridge Sportsmen," British Medical Journal, 4865: 773-777, April, 1954.

¹⁷ Dublin, 1932, op. cit., pp. 5-7.

The causes of death in Rook's study are in Table XI.
The number of intellectuals listed as suicide is less than .01 percent, and according to Rook, was due to chance.

TABLE XI
DEATH CAUSES IN PERCENTAGES FOR SPORTSMEN AND CONTROLS
(FROM ROOK, 1954)

Diseases	Track and Field (110)	Cricketers (99)	Rowing (130)	Rugby (100)	Intellec- tuals (172)	Random (142)
Infection	11.8	14.1	14.6	16.0	11.7	16.2
Pneumonia and bronchitis	6.4	13.1	8.4	8.0	8.2	10.5
Cardiovascular conditions	36.4	37.2	31.5	42.0	39.9	41.5
Neoplasms	13.6	10.1	18.4	12.0	12.3	12.8
Genito-urinary diseases	5.5	7.0	4.6	4.0	8.2	7.1
Accidents and war deaths	13.6	9.1	10.8	8.0	4.7	7.0
Senility	3.9	5.1	3.8	3.0	6.4	2.8
Suicide	0.9	1.0	---	3.0	4.1	---
Miscellaneous	7.9	3.3	7.9	4.0	4.5	2.1

Verginella¹⁸ made a study in 1954 and in his research found that upon examination of the data, there had been no

¹⁸A. Verginella, "Sulla Rarita Del Suicidio Negli Sportivi Praticanti," Medicina Sportiva, 8: 488-492, November, 1954.

cases of suicide among athletes in Trieste. This induced Verginella to believe that sportsmen are comparatively healthier mentally than the non-athlete.

CHAPTER III

METHODS OF PROCEDURE

Introduction The results of studies that have been completed in the areas of longevity and morbidity of athletes from many different regions of the world, have been presented in the preceding chapters to show what has been completed to date. The explanation of the procedure that was used in picking the subjects, and the methods used in sending questionnaires, follow-up letters, and tabulating of this data will be explained in this chapter. There will be an explanation of what statistical analysis will be used to clarify the results obtained in this study.

Questionnaire The questionnaire that was utilized in this survey was developed by a committee from the Phi Epsilon Kappa fraternity for the purpose of investigating longevity and morbidity on a national basis (see Appendix A). Many different colleges and universities all over the country were to survey their athletes with this questionnaire to gain greater insight into these problems. The questionnaires were of two types: one for the athlete, and one for the non-athlete. The difference in the questionnaires was concerned with the general sports history of the athlete. There is a section on each questionnaire for a relative to fill in all the information

that could be found on a deceased subject. Some of the areas covered in the questionnaire are:

1. Weights at graduation and the present time.
2. Marital status.
3. Present state of health.
4. Athletic and general sports history of the athlete.
5. Activity during adult life, excluding playing participation in sports.
6. Military service.
7. Economic status from early childhood through adult life.
8. Medical history.
9. Smoking and drinking habits.
10. Hereditary history.

Athletes The track athletes included in this thesis have all earned a major letter in track at Michigan State sometime between 1886 and 1937. A permanent record of all athletes that earned letters at Michigan State is kept in the official files in the ticket office at Jenison Gymnasium. The information that was collected includes: (1) name and most recent address with the last date at this address; (2) the sport at which the athlete competed for his major award; (3) the year or years when these letters were won; and (4) the date of graduation, or the date of departure from school.

The next step was a double check on the addresses of the athletes. This second check was made from the official files

of the Alumni Office. These files keep an address of all persons who have graduated, or attended Michigan State. They also keep a record of the deceased alumni, and their last address. Many times their wives had attended Michigan State and had an address that could be used in contacting someone to fill out the questionnaire. A questionnaire was sent out to the last address listed by either the Alumni Office or the Ticket Office. The words "Please Forward" were typed on each letter to make sure every effort was made to contact the subject or a close relative.

Non-athletes To make a better comparison between athletes and non-athletes, a group of college non-athletes were selected rather than using a set of insurance statistics which would compare a group of college men with the general populace. This group of college non-athletes was selected from the registration rolls in the Administration Office. A stratified random sampling was utilized to make the comparison more accurate. A non-athlete was chosen as a control for each athlete from the first year that a major letter was won. This means an athlete who won a letter as a sophomore had a sophomore non-athlete chosen as a control for the study. In picking these controls from the registration catalogues, a subject was chosen by selecting every fifteenth name. If this control happened to be a girl, the next man on

this list was taken. The same procedure was used in finding the correct addresses for the control group as had been done with the athletes.

Methods Used in
Mailing Question-
naires and Follow-up
Letters

The addresses of all these athletes and controls were typed on envelopes. A questionnaire, a return envelope and a letter were sent explaining the type of project in which they would be participating (see Appendix B). This letter explained the possible importance this study could have on the future of sports and athletes.

The questionnaires that were returned were placed in a file in alphabetical order, and the letters that were returned with incorrect addresses, or no forwarding address were re-checked to see if a mistake in typing, or a mistake in recording had been made. The letters that had been found in error were retyped with the proper address and name and re-sent to the subjects.

Four weeks after the questionnaires were mailed, a follow-up letter was sent out in an endeavor to remind the subjects that they had not as yet sent in their questionnaire (see Appendix C). In a further attempt to get more returns, a second follow-up letter was sent out two weeks after the first follow-up letter to those subjects failing to answer the previous correspondence (see Appendix D). This whole process did a great

deal to bring about a better percentage of replies to the questionnaires.

There were 361 questionnaires sent out to the athletes, and the same number for the non-athletes. The athletes returned 210 questionnaires for a 57.6 percent return, and the non-athletes returned 165 questionnaires for a 45.3 percent return. The post office returned unopened, 63 questionnaires for the athletes, and 90 questionnaires for the non-athletes. This would raise the percentage of returns for the athletes and non-athletes to 69.7 percent and 60.2 percent respectively.

Tabulation of Results

The questionnaires were all alphabetized and then numbered so the information could easily be tabulated in the correct area on the I.B.M. sheets. A coding system was devised for ease in recording this information. The data was then punched on I.B.M. cards. This would bring about a better statistical analysis of the results. A group of 75 tables were devised to procure the information that was to be dealt with in the comparison between the athletes and the controls.

Statistical Analysis

The statistical analysis of part of these data was made by using the critical ratio as a measure of significance. This was a ratio of the differences between the athlete and the non-athlete, divided by the probable error



of that difference. The critical ratio is the technique that was used on all quantitative data in this study.

The qualitative data were analyzed by the use of Chi-Square. This method of analysis was used when there was a need to know how the individuals distributed themselves in certain areas of the questionnaires, and a comparison between these distributions of the athletes and controls.

The results of the statistical analyses are shown in the presentation of the findings reported in the following chapter.

CHAPTER IV

RESULTS, INTERPRETATION AND ANALYSIS OF THE DATA

The tables that were the products of the tabulated information from the questionnaires were statistically analyzed, and the results of this information are interpreted in this chapter.

TABLE XII

MEAN AGES OF TRACK ATHLETES AND NON-ATHLETES
LIVING AND DECEASED

	Track Athlete	Non- Athlete	C.R.	P
Age living	53.01	53.37	.27	.79
Age deceased	59.11	62.80	*.63	.50-.70
Ages of deceased less accidental deaths	67.1	69.5	*.52	.54

* indicates small sample - t

The mean ages of the living demonstrates that the stratified random sampling technique used in this study gives a very close age relationship between the track athlete and the control group. A comparison of this type helps to validate the sampling technique in that the idea was to pick a control group of similar ages from the same college. The differences between ages of the deceased groups were not significant.

The comparison between the ages and causes of death in Table XIII gives a little insight into the reason for the low mean ages of death for the track athletes and non-athletes. In analyzing these data, it was found that upon removal of all those subjects who died due to accidental causes the mean age difference dropped from 3.79 years to 2.40 years. This is not significant in itself with this small number of cases, but it is conceivable that with a larger number of cases this could possibly be of some significance.

TABLE XIII
AGES AND CAUSES OF DEATH OF TRACK
ATHLETES AND NON-ATHLETES

Ages	Accidental	Heart Disease	All Other Causes	No Information
25-34	2 (2)*			
35-44	2			
45-54	1 (1)	2	(1)	
55-64	1		1 (2)	
65-74	(2)	6 (3)	1	
75-84		1 (2)	(1)	2
85-94		(1)		
Totals	6 (5)	9 (6)	2 (4)	2

* parentheses denotes non-athletes

Table X gives the ages at death, and the causes of death. This again has no statistical significance, but it denotes that accidents cause death earlier in life in most cases. Heart disease was another principle cause of death of athletes and non-athletes and usually came in later years. The other diseases occurred in the middle years and included cancer, vascular lesions affecting the central nervous system, pneumonia, intestinal obstruction, and several other diseases classified under all other diseases. A table with a greater number of cases would give a better concept of what the main causes of death might be in both groups.

TABLE XIV

PRESENT STATE OF HEALTH OF TRACK ATHLETES AND NON-ATHLETES

State of Health		Subjects	
		Track Athletes	Non-Athletes
Good	N	165	130
	%	78.6	78.8
Fair	N	20	18
	%	9.5	10.9
Poor	N	6	1
	%	2.9	.6
No Response	N	19	16
	%	9.0	9.7
χ^2		.104	
P		.70-.80	

The difference between the state of health of the athletes and the controls was not significant, but the athletes seem to have mentioned poor health more frequently with a percentage of 2.9 and .6 for non-athletes. Chi square was used in the analysis of these data, and the poor and fair categories were combined due to the lack of numbers in these areas. The percentages are very similar in good, fair and poor health. This similarity is probably due to chance.

TABLE XV

THE WEIGHTS OF TRACK ATHLETES AND NON-ATHLETES

	Track Athletes	Non- Athletes	C.R.	P
Mean Weight in College	155.49	152.66	1.75	.08
Mean Change in Weight	17.71	15.09	1.36	.17
Percent Change in Weight	11.8	12.8	.84	.40

The difference in the mean weight of track athletes and non-athletes during college is almost significant. This difference in weight might have been caused by the heavier men in discus, shotput and decathlon. The differences in the change of weight from college to present day weights was very similar, which may dispel some criticism of track athletes gaining so much weight after training.



This table on the weight of track athletes and non-athletes takes into consideration the mean weight of both groups in college, the mean change in weight from college days to the present and also the percent change in weight. The difference of 4.69 pounds per man may not appear to be great, but it is close to being significant. The change in weight from college to the present time was not significant, but it showed the athletes had gained an average of 2.62 pounds more per man than the non-athletes. The percent change in weight showed that non-athletes have a slightly higher percent gain in weight. In reading the tables we must consider that even though the athlete seems to gain more weight, it is the percent change in weight that tells the real story of how much weight in relation to body size is being gained. This percent change in weight seems to show that track athletes probably stay in a little better physical shape, even though the difference was not statistically significant.

TABLE XVI

MARITAL STATUS OF TRACK ATHLETES
AND NON-ATHLETES LIVING AND DECEASED

	Track Athletes				Non-Athletes			
	Married		Single		Married		Single	
	%	N	%	N	%	N	%	N
Living	97.89	186	2.11	4	97.99	146	2.01	3
Deceased	93.75	15	6.25	1	93.33	14	6.67	1
Combined	97.57	201	2.43	5	97.56	160	2.44	4

The marital status of the athletes and non-athletes was very similar for the living, deceased and combined groups. The percentage for single subjects deceased were higher than for the married subjects deceased which indicates a similarity to other studies in the same area.

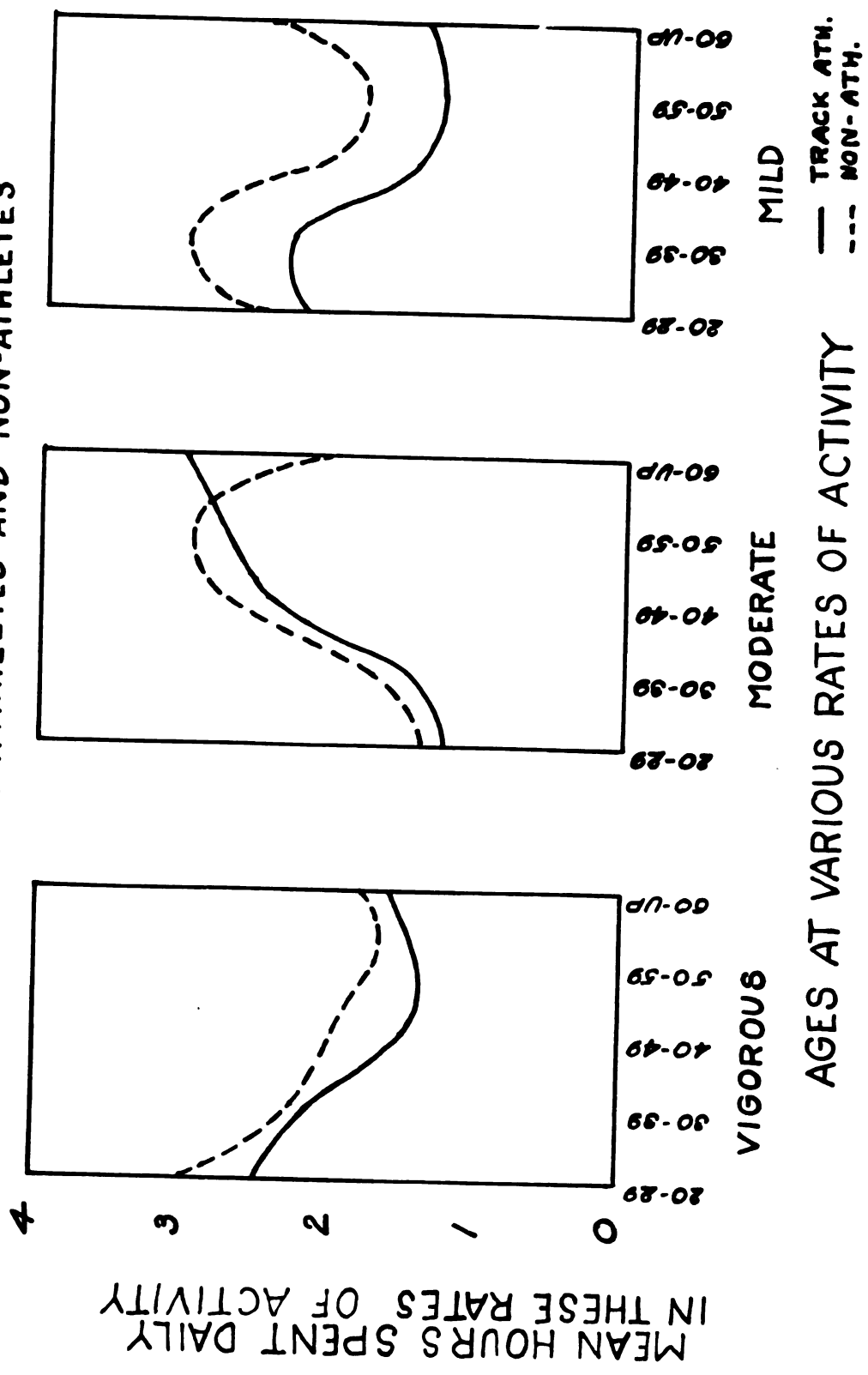
TABLE XVII

THE MEAN HOURS SPENT IN VOCATIONAL AND AVOCATIONAL
ACTIVITIES IN THE YEARS AFTER COLLEGE
BY TRACK ATHLETES AND NON-ATHLETES

Ages and Activity	Mean Hours Spent Daily by Track Athletes	Mean Hours Spent Daily by Non-Athletes	C.R.	P
20 - 29				
Vigorous	2.47	3.01	1.30	.19
Moderate	1.27	1.38	.34	.73
Mild	2.22	2.50	.74	.46
30 - 39				
Vigorous	2.15	2.22	.17	.87
Moderate	1.46	1.75	.85	.40
Mild	2.33	3.01	1.75	.08
40 - 49				
Vigorous	1.49	1.96	1.08	.28
Moderate	2.47	2.76	.66	.51
Mild	1.49	2.15	1.69	.09
50 - 59				
Vigorous	1.40	1.67	.46	.64
Moderate	2.72	2.98	.40	.69
Mild	1.32	1.83	.97	.33
60 - Plus				
Vigorous	1.59	1.79	.24	.81
Moderate	3.03	2.04	1.24	.22
Mild	1.41	2.54	1.54	.12



FIGURE 1
GRAPH OF MEAN HOURS SPENT IN VOCATIONAL AND AVOCATIONAL
ACTIVITIES BY TRACK ATHLETES AND NON-ATHLETES



The table on vocational and avocational time spent after college seems to show a trend toward the non-athletes spending more time daily in both of these areas. The graph, Figure 1, shows this trend very well. The only exception to this inclination was in the moderate sixty plus years. The athletes spent almost one hour more per day in physical exercise in their vocation and avocation than the non-athletes. The two cases that came close to being significant were the groups in the 30 - 39 mild and 40 - 49 mild areas. These were critical ratios of .08 and .09 respectively. These figures do not indicate a great deal of difference and may be due to athletes spending some of their spare time participating in some type of sports activity not included in their vocational and avocational activities.

TABLE XVIII

MILITARY SERVICE EXPERIENCE OF TRACK ATHLETES AND NON-ATHLETES

	Track Athletes	Non- Athletes	C.R.	P
Mean Years of Time in Service	3.26	2.08	1.86	.06
Percent of Subjects in Service	63.3	51.3	*4.03	.05-.02
Percent of Subjects in Types of Activity			*3.41	.20-.10
Vigorous	28.7	18.6		
Moderate	58.5	61.0		
Mild	12.8	20.4		

*These figures are chi-square

Track athletes in this study have spent more time in military service, and a greater percentage of them entered some armed service, than the group of non-athletes that were chosen as the control group. This could be influenced by the physical well-being of the athletes and their ability to stand up under the rigors of training. The difference in the mean number of years in service may have been determined by a greater number of track athletes staying in service longer, which seems to be borne out by the statistics.

There were twenty track athletes who stayed in the service for six years or longer, and the mean number of years for the group of twenty was 13.9 years. The non-athletes had only seven men stay in the service longer than six years, and this mean was 15.1 years. This large number of years included in the total group caused quite a difference in mean years per man. The percentage of track athletes in service as compared to non-athletes showed a 12 percent difference between the two groups. In the statistical analysis of the information, a chi square having a probability between .05 to .02 was found. This could be caused by a more adventurous spirit for hazardous activities. They may have liked their training in the Reserve Officers Training Corps that all freshmen and sophomores were required to take well enough to enter the service.

The difference in activity in service was not significant, but it would appear that a larger percentage of track athletes

were in vigorous activity during their military experience than non-athletes.

TABLE XIX
THE ECONOMIC STATUS OF TRACK ATHLETES AND
NON-ATHLETES DURING AND AFTER COLLEGE

	<u>During College</u>		<u>After College</u>	
	Percent Satis- factory	Percent Unsatis- factory	Percent Satis- factory	Percent Unsatis- factory
Track Athletes	91.14	8.86	98.53	1.47
Non- Athletes	92.50	7.50	98.76	1.24

The athletes and non-athletes are very similar in their answers to questions on the economic status that they maintained during and after college. The differences are of very little consequence and, therefore, are not significant. The table does show that both groups were in better economic status after college than they had been before college. There was a difference of 6.26 and 7.39 percent for non-athletes and track athletes respectively between college years and the years after college. This is very logical because most people after college begin their careers and find a certain amount of success at whatever they are doing and would probably feel more secure in their economic status.

TABLE XX
A COMPARISON BETWEEN TRACK ATHLETES
AND NON-ATHLETES IN USE OF ALCOHOL

	Percent Non-users	Percent Users	χ^2	P
Track Athletes	24.88	75.12	5.34	.02-.05
Non-Athletes	37.35	62.65		

The comparison of track athletes and non-athletes on the consumption of alcoholic beverages shows a significant difference in the number of non-drinkers and drinkers. There were 12.47 percent more non-athletes who did not use any alcohol through life than the athletes. The statistical analysis showed a probability of .02-.05. This difference could be caused by many different and varied reasons. The first conclusion reached on the significance of this information is the idea that after abstaining from the use of alcohol during training athletes want to break training and this is one way. Athletes, many times, select jobs in areas of a more social nature, and therefore, use alcohol due to pressures of his clientele. The athlete may also use alcohol as a method of relaxing himself as a substitute for the physical exertion that he used as a means of releasing tension in competition.

The differences in smoking habits in Tables XXI and XXII were not significant, but indicate that the athletes seemed to

TABLE XXI

A COMPARISON OF THE AMOUNTS OF TOBACCO USED BY
TRACK ATHLETES AND NON-ATHLETES

Tobacco Amounts	*Track Athletes		*Non-Athletes	
	%	N	%	N
No Response	12.9	27	5.5	9
Never	28.6	60	41.8	69
Little	9.0	19	9.7	16
Moderate	36.6	77	31.5	52
Heavy	12.9	27	11.5	19

*Chi square (three degrees of freedom) 5.44 P = .20 - .10

TABLE XXII

A COMPARISON OF THE TYPES OF TOBACCO USED BY THE
TRACK ATHLETES AND NON-ATHLETES

Tobacco Types	*Track Athletes		*Non-Athletes	
	%	N	%	N
No Response	41.1	76	44.8	74
Cigarettes	29.5	62	35.8	59
Pipe	6.2	13	5.5	9
Cigars and Chew	7.1	15	3.6	6
Two or More	16.1	34	10.3	17

*Chi square (three degrees of freedom) 5.92 P = .20-.10



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smoke more than the non-athletes. The difference between the no response groups was due to many of the subjects not indicating the type of tobacco that they used.

The reasons for the differences between athletes and non-athletes possibly might be the same as those for the greater usage of alcohol. These reasons being the breaking of training and the more social type of job. Another possible reason might be that athletes many times turn to the sales and coaching profession. To relieve the tension of selling or coaching duties, they take up smoking and drinking habits.

The diseases of track athletes and non-athletes during and after childhood were compared in Table XXIII and were found to be very similar. The groups were almost the same in percentage of tonsillitis and tonsils removed. In the area of heart defects, there was a difference of .9 percent in favor of the track athletes. The non-athletes had no chorea at all while the athletes had 1.4 percent. These were the main differences. There were so few cases of disease after childhood that no logical conclusion can be reached. The disease, hypertension, had the greatest number of cases and showed a difference of 4.7 percent in favor of the non-athletes with a mean age difference of 13 years. This is not significant because of the limited number of cases. This difference in hypertension could be caused by many of the events that were mentioned in regards to smoking and drinking. The social type of job athletes seem to move into may cause this difference.

TABLE XXIII

DISEASES OF TRACK ATHLETES AND NON-ATHLETES
DURING AND AFTER CHILDHOOD

Diseases During Childhood	Track Athletes			Non-Athletes		
	% Yes	% No	% No Response	% Yes	% No	% No Response
Heart Defects	10.0	87.6	2.4	10.9	85.5	3.6
Chorea	1.4	96.2	2.4	0.0	96.4	3.6
Rheumatic Fever	2.8	94.8	2.4	2.4	94.0	3.6
Tonsillitis	25.2	72.4	2.4	25.5	70.9	3.6
Tonsils Removed	44.7	52.9	2.4	44.9	51.5	3.6
Growing Pains	8.6	89.0	2.4	6.1	90.3	3.6

Diseases After Childhood	% with the Disease		Mean Age at Onset	% with the Disease		Mean Age at Onset
Hypertension	11.4		51.0	6.7		64.0
Arteriosclerosis	2.4		67.4	1.2		*62.0
Diabetes	.9		*54.0	.6		*51.0
Coronary Thrombosis	1.0		*58.0	.6		*71.0
Angina Pectoris	.5		*72.0	0.0		0.0

*Two cases or less

TABLE XXIV
OTHER DISEASES REPORTED BY TRACK
ATHLETES AND NON-ATHLETES

Disease	Track Athletes	Non-Athletes
Tuberculosis	3	1
Cancer and Tumors	4	3
Heart Vascular and Renal Diseases	3	7
Influenza, Pneumonia and Bronchitis	16	25
Ulcers, and Digestive Disorders	21	21
Other Diseases	91	82

In filling out the questionnaire, the two groups were asked to list any other diseases that they had contracted during their lifetime. The use of percentages was not advantageous in this table because anyone subject could list more than one disease. The number listed under heart ailments is the only noticeable difference and is probably of no significance.

TABLE XXV

THE PERCENT LIVING AND THE MEAN AGE AT DEATH OF THE
PARENTS OF TRACK ATHLETES AND NON-ATHLETES

	Track Athletes	Non-Athletes	X ²	P
<u>Mother</u>				
Percent Living	37.6	41.8	.748	.30-.50
Mean Age at Death	65.5	68.2	*1.09	.28
<u>Father</u>				
Percent Living	25.7	28.4	.509	.30-.50
Mean Age at Death	67.4	68.6	*.55	.58

*The critical ratio was used in the analysis of this data.

The percent of mothers and fathers living of track athletes and non-athletes are fairly similar, but the non-athletes are a few percentage points ahead in both cases. The mean age at death of fathers were slightly higher than mothers which is unusual from the standpoint of statistics on this subject. The statistical analysis of these data showed no significant differences and therefore, was probably due to chance.

TABLE XXVI
THE MEAN AGES AT DEATH OF THE MATERNAL
AND PATERNAL GRANDPARENTS

	Track Athletes	Non-Athletes	C.R.	P
Paternal Grandfather	71.5	72.3	.48	.63
Paternal Grandmother	70.2	73.0	1.48	.14
Maternal Grandfather	70.9	72.5	.92	.36
Maternal Grandmother	68.8	70.7	.96	.34

In the mean age of death for all grandparents, the statistical analysis does not show any significance, but throughout, the non-athletes grandparents show a slight advantage in the length of life. This same difference was shown in the mean age of death of the parents which might be the cause of the difference in the length of life between the track athletes and the non-athletes. A hereditary characteristic might possibly be the cause of all these mean differences. Some of the parents and grandparents of the track athletes probably had a lower standard of living and had to work hard throughout their lifetime. In all probability, many of the track athletes were from a lower income group and were only able to go to school through the use of scholarships.

TABLE XXVII
THE MEAN NUMBER OF BROTHERS AND SISTERS FOR
TRACK ATHLETES AND NON-ATHLETES

	Mean Number for Track Athletes	Mean Number for Non-Athletes	C.R.	P.
Sisters Living	.91	1.08	1.35	.18
Sisters Deceased	.34	.20	1.83	.07
Brothers Living	1.00	.78	1.85	.06
Brothers Deceased	.33	.30	.51	.61
Combined	2.56	2.36		

Track athletes had greater numbers in their families than the non-athletes, although the differences were not extreme. This difference could be caused by the tendency of lower income groups to have larger families. The only areas where the statistics were approaching significance were sisters deceased and brothers living.



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TABLE XXVIII
AILMENTS OF MOTHERS AND FATHERS OF
TRACK ATHLETES AND NON-ATHLETES

Diseases	*Track Athletes		*Non-Athletes	
	% Fathers	% Mothers	% Fathers	% Mothers
Tuberculosis	0.0	1.3	0.0	0.0
Cancer and Tumors	1.9	2.5	0.0	1.5
Heart, Vascular and Renal Diseases	12.9	12.7	25.5	13.4
Influenza, Pneumonia and Bronchitis	0.0	0.0	4.3	0.0
Ulcers and Digestive Disorders	1.9	1.3	0.0	0.0
Other Diseases	12.9	15.2	12.8	14.9
Senility without mention of Psychosis	1.9	1.3	2.1	1.5
Total Cases (causes of ailment unknown)	68.5	65.7	55.3	68.7

*Chi square (21 degrees of freedom) 11.06 P = .94

TABLE XXIX

THE CAUSES OF DEATH OF MOTHERS AND FATHERS OF
TRACK ATHLETES AND NON-ATHLETES

Diseases	<u>*Track Athletes</u>		<u>*Non-Athletes</u>	
	% Fathers	% Mothers	% Fathers	% Mothers
Tuberculosis	3.2	2.3	1.7	2.0
Cancer and Tumors	10.9	13.7	7.6	7.1
Heart, Vascular and Renal Diseases	33.3	28.2	33.9	29.6
Influenza, Pneumonia and Bronchitis	4.5	9.2	9.3	4.1
Ulcers and Digestive Disorders	3.2	2.3	.9	6.1
Other Diseases	11.5	9.2	10.2	14.3
Accidents, Suicides, Homicides and War Deaths	5.8	2.3	7.6	3.0
Senility without mention of Psychosis	9.6	9.2	11.0	9.2
Total cases (causes of death unknown)	18.0	23.6	17.8	24.6

*Chi square (27 degrees of freedom) 30.59 P = .28

TABLE XXX

THE CAUSES OF DEATH OF MATERNAL GRANDPARENTS OF
TRACK ATHLETES AND NON-ATHLETES

Diseases	<u>*Track Athletes</u>		<u>*Non-Athletes</u>	
	% G.Father	% G.Mother	% G.Father	% G.Mother
Tuberculosis	.9	1.4	1.2	.6
Cancer and Tumors	1.9	6.7	4.2	3.0
Heart, Vascular and Renal Diseases	13.8	9.1	13.3	15.8
Influenza, Pneumonia and Bronchitis	4.8	2.9	6.1	4.9
Ulcers and Digestive Disorders	2.4	.5	1.2	1.2
Other Diseases	3.3	7.1	7.9	7.3
Accidents, Suicides, Homicides and War Deaths	4.3	.5	3.6	.6
Senility without mention of Psychosis	16.2	16.7	13.3	16.4
Total Cases (causes of death unknown)	52.4	55.1	49.2	50.2

*Chi square (27 degrees of freedom) 28.39 P = .38

TABLE XXXI

THE CAUSES OF DEATH OF PATERNAL GRANDPARENTS OF
TRACK ATHLETES AND NON-ATHLETES

Diseases	<u>*Track Athletes</u>		<u>*Non-Athletes</u>	
	<u>%</u> G. Father	<u>%</u> G.Mother	<u>%</u> G.Father	<u>%</u> G.Mother
Tuberculosis	1.4	1.4	1.8	.6
Cancer and Tumors	1.4	3.8	1.2	.6
Heart, Vascular and Renal Disorders	12.4	8.6	14.6	10.9
Influenza, Pneumonia and Bronchitis	5.7	3.3	3.7	3.0
Ulcers and Digestive Disorders	0.0	.5	2.4	.6
Other Diseases	4.3	2.9	3.0	6.7
Accidents, Suicides, Homicides and War Deaths	7.2	2.9	6.7	.6
Senility without mention of Psychosis	15.7	13.8	13.9	18.8
Total Cases (causes of death unknown)	51.9	62.8	52.7	58.2

*Chi square (27 degrees of freedom) 46.5 P = .01



In Tables XXVIII to XXXI, the ailments and causes of death of parents and grandparents, there is a great deal of similarity between the grandparents and also between the parents of the track athletes and non-athletes. The one great difference in these groups was in heart ailments. The percentage was twice as great among parents as it was among grandparents. This could possibly be due to the differences in diagnosis today from what it was during the time of the grandparents' deaths. This could also be caused by the accelerated life of today having caused a greater amount of heart ailment than that era of almost pioneer life of the grandparents of the athletes and non-athletes. In Table XXVIII in the area of heart disease, the fathers of non-athletes had 12.6 percent more heart ailments than the fathers of track athletes. This was the one greatest difference between the parents of these two groups.

A chi square was computed for this table and there was no significant difference between these groups. Table XXXI on the causes of death of paternal grandparents was statistically significant when a chi square was computed. The greatest difference seemed to be in the area of heart, vascular and renal diseases. The paternal grandparents of the track athletes had less heart disease when compared with the paternal grandparents of the non-athletes.

TABLE XXXII

THE OPINION OF TRACK ATHLETES AND NON-ATHLETES
ON WHETHER ATHLETICS ARE HARMFUL
OR BENEFICIAL TO COMPETITORS

Categories	Track Athletes		Non-Athletes	
	N	%	N	%
Harmful	5	2.37	15	9.09
Beneficial	108	51.43	59	35.75
Beneficial with Reservations	55	26.19	44	26.67
No Effect	19	9.05	11	6.67
No Opinion	2	.95	6	3.64
No Response	2	.96	15	9.09
Deceased	19	9.05	15	9.09

The analysis of the data in Table XXXII was of some benefit because the judgment of people is always interesting if not very scientific. The largest number of subjects from both groups thought that athletic competition was in the main beneficial to its participants. A chi square was used and it was found to be 13.44 for three degrees of freedom which has a probability of .007 for the differences between harmful, beneficial, beneficial with reservations and no effect. This shows a significant difference between the ideas of track athletes and non-athletes on whether athletics are detrimental to the competitor. The track athletes whose

expressed opinion that athletics were harmful, have probably been injured in athletics or have formed their impression through some person in connection with athletics. The non-athletes that believe athletics are harmful to those who compete may also have been injured or observed an injury to someone else in athletics. They may also have been disappointed in some attempt to become a letter winner.

CHAPTER V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary The present study is a comparison between a group of track athletes taken from the athletic record books at Michigan State University and a control group of non-athletes taken from the undergraduate records in the Office of the Registrar. The track athletes were letter winners from the years 1886 to 1937. The non-athletes were picked using a random stratified sampling from the same years that the athletes won their letters.

A questionnaire was sent out to 361 track athletes and 210 questionnaires were filled out and returned. There were 63 questionnaires returned by the post office unopened. The non-athletes returned 165 questionnaires of a possible 361 with 90 questionnaires returned by the post office. The percentages for returned were 57.6 and 45.3, respectively.

During this process of receiving the questionnaires, there were two follow-up letters sent out at intervals of four and six weeks to accelerate the number of returns.

The questionnaires were numbered for ease in tabulating this information on I.B.M. sheets and cards. A coding system for entry of all information on I.B.M. cards was devised, and the information was punched onto these cards. A group of

three cards per subject were needed for all the information that was used in the study.

A group of seventy-five tables was obtained from the information that was taken from the questionnaires. These tables were then statistically analyzed for their results.

There have been a few good studies completed in the area of longevity. The best of these was a study by Alan Rook¹ (1954) on "An Investigation Into the Longevity of Cambridge Sportsmen." In this study Rook used a control of similar non-sportsmen for a comparison between the two groups. He found very little difference in the mean ages at death of the random control group, but the intellectuals lived about two years longer. Louis Dublin² completed two studies, one in 1928 and his more complete study in 1932. He used a control group of college subjects in his second study to make his comparisons. Dublin used insurance statistics for his comparisons in the first study, and this made the study less valid. Dublin found that there was not a great deal of difference in the mean age at death between sportsmen and non-sportsmen, but the honor men had a longer length of life, which was similar to the results of Rook's³ study. Most of the other studies

¹Alan Rook, "An Investigation into the Longevity of Cambridge Sportsmen," British Medical Journal, 4865: 773-777, April, 1954.

²Louis I. Dublin, "College Honor Men Long-Lived," Statistical Bulletin of the Metropolitan Life Insurance Company, 13: 5-7, August, 1932.

³Rook, Op. cit.,

used insurance statistics for comparing, which does not give a valid comparison of the differences in the length of life between these groups.

Conclusions The following statistically significant differences were observed.

1. Track athletes in college have a greater mean weight than college non-athletes.
2. Non-athletes spend less time in military service than track athletes.
3. A larger percent of track athletes enter military service than non-athletes.
4. Non-athletes are more often non-drinkers of alcohol than track athletes.
5. It is the opinion of more non-athletes, as compared to track athletes, that athletics are harmful to the people active in this type of physical activity.
6. There are more sisters deceased from the families of track athletes than non-athletes.
7. There are more brothers living from the families of track athletes than non-athletes.
8. Paternal grandparents of track athletes have less heart disease than the paternal grandparents of the non-athletes.

The following observations were not statistically significant.

1. There are more brothers and sisters in the families of track athletes than in the families of non-athletes.
2. The sampling techniques used in selecting the non-athletes for this study seem to be adequate.
3. There was no significant difference in the mean ages of death for track athletes and non-athletes.
4. Accidental deaths seem to have occurred at a younger age than other causes of death for track athletes and non-athletes.
5. The economic status of track athletes and non-athletes appears to have been better after college than during college.
6. Track athletes are users of tobacco more often than non-athletes.
7. The mean age of death of parents and grandparents of track athletes appears to be slightly lower than the parents and grandparents of non-athletes.

Recommendations The recommendations that might help to better this study and future studies of this type are as follows:

1. A similar study should be made on all the athletes at Michigan State University with a control group of non-athletes similar to those that were used in this study.

2. The area of alcohol use should be more adequately defined in regard to amounts consumed.
3. The questionnaire should have had a question on the occupation of both track athletes and non-athletes.
4. To facilitate the I.B.M. work, the type of sport for every athlete should be punched into all three cards.

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

Form A. This Form is for graduates who earned a college letter in one or more sports.

(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	Professional	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 _____	

(OVER)

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, irregu-
 larity, heart failure, etc). _____

3. Hypertension (Mention complications such as strokes, coro-
 nary 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 participation in athletics is beneficial, harm-
 ful, or has no effect?

Please comment; if critical of program, give reasons _____

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

Some examples: "I played basketball for high school dur-
 ing 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 _____"

NATIONAL STUDY OF LONGEVITY AND MORBIDITY OF MALE GRADUATES OF COLLEGES AND UNIVERSITIES

Form B. This Form is for men who did not earn a letter in sports
(Please Fill in this Form as Completely and Accurately as Possible)

Date _____

Name of Alumnus (please print) _____

Year of Birth _____

Weight at Graduation from College _____

IF ALUMNUS IS LIVING

Present address _____

Present weight _____ lbs.

Present general condition of health

(Check one):

Good _____

Fair _____

Poor _____

Married _____ Single _____

(Check one)

IF ALUMNUS 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 Alumnus

Name of Sport	High School	College	Amateur Non-School	Professional	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

(check one)

Satisfactory _____

Unsatisfactory _____

After College Years

(check one)

Satisfactory _____

Unsatisfactory _____

Comments _____

(OVER)

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, irregu-
 larity, heart failure, etc). _____

3. Hypertension (Mention complications such as strokes, coro-
 nary 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 participation in athletics is beneficial, harm-
 ful, or has no effect?

Please comment; if critical of program, give reasons _____

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

Some examples: "Did not participate in college because I
 was no longer an amateur athlete." "Did not participate on
 advice of a physician." "Did not participate because I had
 to work my way through college." "I wasn't good enough
 to make the team." 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.

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.

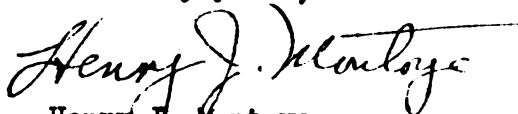
The findings of our national study will without question affect the future planning of sports programs everywhere, including those in which your own children and grandchildren may take part. Differences of opinion among laymen and among medical men as to the good and bad effects of competitive sports 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. 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 all of our other former 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 cannot 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,



Henry J. Montoye
Assistant Professor

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 was 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.

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,


Henry J. Montoye
Assistant Professor

HJM:jlm



MICHIGAN STATE UNIVERSITY
OF AGRICULTURE AND APPLIED SCIENCE • EAST LANSING

DEPARTMENT OF INTERCOLLEGIATE ATHLETICS

June 4, 1954

Dear Sir:

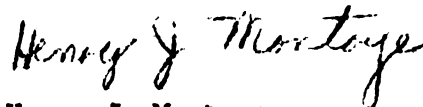
About six weeks ago a questionnaire was sent to you regarding a longevity study being conducted in the Physical Education Department at Michigan State. Four weeks later a follow-up letter was sent but we still have not received your return. Your immediate attention to this matter would be greatly appreciated.

The greater the number of returns the more valid and reliable will be the study. The future of athletic policy may well be influenced by the results and we are sure that you would like to be a part of this influence.

If by chance your questionnaire has been misplaced or did not reach you, we would be more than happy to send another.

Thank you for your kind cooperation.

Yours very truly,



Henry J. Montoye
Assistant Professor

HJM:ed



THE UNITED STATES OF AMERICA
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
WASHINGTON, D. C. 20250

TO: [Name]
FROM: [Name]
SUBJECT: [Subject]

DATE: [Date]

Very truly yours,
[Signature]
[Name]
[Title]



ROOM USE ONLY

ROOM USE ONLY

Date Due

Aug 9 '57	NOV 19 1969
Apr 18 '58	
Nov 4 '58	DEC 4 1969
5 Aug '59	JAN 7 1970
6 Aug '59	JAN 19 1970
10 Aug '59	JAN 29 1970
12 Aug '59	
NOV 19 1969	
FEB 7 1960	
AUG 3 1961	
JUN 9 1962	
JUN 20 1962	
JUN 29 1962	
JAN 6 1966	
JUN 13 1967	
OCT 29 1969	R ¹⁴ 18
NOV 5 1969	
NOV 18 1969	760

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