A FOLLOW-UP STUDY OF EXERCISE HABITS AND RELATED CHARACTERISTICS OF FORMER MICHIGAN STATE UNIVERSITY ATHLETES AND NON-ATHLETES

Thesis for the Degree of M. A.

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Wayne Bruce Neely

1960

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by

WAYNE BRUCE NEELY

AN ABSTRACT

Submitted to the College of Education
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

1960

Approved: Henry J. Montoye

WAYNE BRUCE NEELY

ABSTRACT

The purpose of this study is to compare health, race, marital status, occupation, and vocational and non-vocational activity of former varsity athletes with a similar group of non-athletes.

Michigan State University letter winners who competed between the years 1886-1937 were the athletes selected for this study. The non-athletes used as the control group were picked by a stratified random sampling technique in such a manner that a non-athlete who was a senior in 1925 was matched with a letter winner who was also a senior in 1925.

Questionnaires were sent to 567 athletes and 511 non-athletes along with an explanatory letter and a summary of a previous study done. The athletes returned 476 useable questionnaires compared to 437 for the controls. Information was taken from the questionnaires and placed on tabulation sheets by use of a coding system and then punched onto I.B.M. cards for ease of compiling data. The Chi-square and t-test were used in analyzing the data.

Many previous studies have been done comparing the longevity of college letter winners with the general population taken from insurance statistics but these studies are of little value. Not until 1932, did Louis Dublin[1] complete

his study where he used a control group of college non-athletes with which to make a comparison. Dublin found little difference between the athlete and non-athlete groups but the honor students in his study were found to live longer.

Rook (1954)[2] also found little difference between athletes and controls which were selected at random from the same University as the athletes. The group of honor students involved in his study enjoyed a longer life than either athletes or non-athletes and the results were significant.

The following differences were found to be statistically significant in the present study:

1. A greater percentage of athletes smoke than non-athletes.

2. A greater percentage of athletes drink than non-athletes.

3. Athletes are heavier drinkers than the non-athletes.

4. The athletes are more flexible in the types of liquor they consume than are the non-athletes. The controls have higher percentages in the beer classification but more athletes drink whiskey and also lead in the "two or more" classification.

5. More non-athletes do house and yard maintenance than do the athletes.

6. A higher percentage of athletes do sit-up exercises in the summer than the control group.

The following areas were examined; however, they are not statistically significant:

1. There was no significant difference in occupational distribution for athletes and non-athletes.

2. There was no significant difference in occupational activity between the athletes and non-athletes.

3. The total number of children, and the differences between athletes and non-athletes with respect to total sons and total daughters proved to be insignificant.

4. There was no significant differences in marital status for athletes and non-athletes.

5. Comparisons of athletes and controls in relation to racial distribution were insignificant.

6. No differences were found between athletes and non-athletes and the amount of tobacco they used.

7. There was no significant difference between the athletes and non-athletes in relation to the

percentages of each group working in their gardens.

8. The comparison of the athletes and non-athletes doing sitting-up exercises in the winter months was insignificant.

9. There was no significant difference in summer or winter sports activity between the athletes and controls.

10. The retirement habits between athletes and non-athletes were not statistically significant.

11. No significant differences were found when length of time spent in present occupation was examined.

12. There was no significant difference in type of tobacco used between the athletes and non-athletes.

13. The comparison of athletes to non-athletes concerning amount of work done around the house and yard was not statistically significant.

14. No significant differences were found between the two groups when the percentage mowing their lawn was examined.

15. No significant differences were found with respect to interests or activity in hobbies.

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

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

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CHAPTER I

Introduction

Competitive athletics consisting of many different sports play an important role in the cultures of people all over the world and if the trend continues as it has in the past hundred or so years, an even greater emphasis will be placed on our sport's programs.

It is the belief of many individuals not only here in America but in other countries as well, that athletes die at a younger age than those who do not participate in athletics.

Research is the best method we have to determine the answer to our problem and it is hoped that through this study a portion of the answer will be derived.

Statement of the Problem

The purpose of this study is to compare health, race, marital status, occupation, and vocational and non-vocational activity of former varsity athletes with a similar group of non-athletes. The athletes were selected if they had earned a varsity letter between the years 1886 and 1937 and the non-athletes were picked at random from the Michigan State University registrar's student directories

and were also graduates of the years 1886-1937. A total of 567 athletes and 511 controls were sent questionnaires to gather data for this study.

Importance of the Study

A study of this type concerning athletes and non-athletes holds a great deal of importance to the field of athletics and what will become of it in the future. Participation in sports has resulted in injury and in some cases even death. On the other hand there are many people who truly believe athletics build character through sportsmanship, punctuality, cooperation, etc., and a strong healthy body through exercise at the competitive level and that these good effects far outweigh the detrimental ones. Due to our nature of living, it is inevitable that a boy who dies from head injuries received in a football game at the age of sixteen will receive much more attention and public interest than ten former athletes playing a fast game of polo at the age of seventy and thereafter feeling no ill effects.

Longitudinal studies of research involving comparisons appears to be the best method that we possess which can answer the questions concerning athletics. We need facts to rid ourselves of the many controversies we now have on the subject.

It is possible that due to the outcome of this follow-up study and the facts obtained therefrom, that our training programs or even our whole athletic programs may be changed. If through the findings of this research it is found that athletics are harmful, then we need a revision in our programs. The sooner we find out the answer to this question, the sooner we can begin to extend the lives of individuals.

Limitations

(1) The grouping of the subjects into athletes and non-athletes has its limitations as it is very possible that some men classified as non-athletes, were more active than those classified as athletes.

(2) Due to the great distances remote from the campus of Michigan State University that some of the individuals now live, a questionnaire had to be used to gather the data. When questionnaire studies are done, there is a chance for biased answers in some cases.

(3) Evidence could be obtained in this study that would differ greatly from other work done, because of training methods, geographical location or environmental conditions.

(4) In the process of mailing the questionnaires and follow-up letters, it was possible to mail letters with incorrect addresses. It was also possible that letters were

not forwarded to new addresses by the postal department or by other individuals thinking that the letter was unimportant.

(5) The questionnaire itself may have been inadequate in that some of the questions could be vague and ambiguous.

(6) Over the period that the individuals earned letters in various sports, the methods of training may have changed sufficiently to alter the results.

(7) Many of the participants of this research project served in the armed forces in World War II, and it is believed that the conditions with which they came in contact such as foreign countries, environmental factors etc., may have had some bearing on their longevity and morbidity.

CHAPTER II

REVIEW OF THE LITERATURE

For many years now, man has been faced with the controversial problem of strenous exercise through competetive sports and its effect on the general health and longevity of the individuals who engage in it. A number of people have voiced their opinions on this subject, some with scientific data to back up their opinions and others just because they are in favor of or against strenous activity through competitive sports. There are a few research projects completed in this area of concern, some have great contributions to make but most are of limited value. The only way by which a definite answer can be derived is to select two comparable groups, follow these individuals throughout their entire lives, collect data periodically during their life span and through this data determine if strenuous exercise has or has not brought about significant changes in relation to the general health and longevity of those individuals.

The earlier studies are comprehensively reviewed in a monograph, "Longevity and Morbidity of College Athletes," by Dr. Henry J. Montoye and his associates of Michigan State University.(5)

Since the monograph was published, Karvonen and his associates in 1956 did a study of 318 champion skiers who competed between the years 1889-1930.[4] Information was sought on these men, of which only 166 could be traced and data collected on them after the year 1930. Of the 166 men, 43 were still alive in 1955 when the study was started, 55 were dead and 68 had disappeared alive from observation since 1930.

When compared to the general male population of Finland in 1931-35, taking 15 years as a starting age, the skiers life expectancy proved to be seven years more that of the general male population, the figures stand at 71 for the skiers and 64 for the general male population.

When causes of death were studied of the 55 who had died, it was concluded that the deaths were distributed similar to those among the general population. Although the skiers could expect no different causes of death they lived on the average of seven years longer than the average man of Finland. The authors concluded that the difference of seven years in favor of the skiers was due to the following factors: Skiing is intense training for the circulatory system and skiing is often practiced through many years up to advanced ages unlike most other forms of sports. The small number of subjects may also have a drastic effect on the results.

In 1958, Pomeroy[8] and White presented a study on the prevalence of coronary heart disease in mesomorphic ex-athletes and the influence of different factors upon its development. Four hundred twenty-four Harvard men who won letters in football between 1901 and 1930 inclusive were used for subjects in this study. In 1955 when the actual study was being conducted, 126 had died, 292 were still alive and six could not be traced. Causes of death were found for 87 of the 126 and of these 87, 38% died of cardiovascular diseases, 13% from cancer, 10% from pneumonia and war, 9% from accidents, 5% from suicide and the balance was miscellaneous.

The authors tried to compare these football players with a similar age group of white males from Massachusetts but the mortality of the athletes as compared with the healthy males from Massachusetts (general population), could not be determined because the data that was obtained were considered inadequate.

Other areas studied were body build, weight gain, personal family status, family history, habits of exercise, use of alcohol and tobacco, and diet. These relationships in the group of football players were compared with persons whose history revealed coronary heart disease and those without it.

Body build between the two groups did not differ significantly but more weight gain was revealed in the

coronary group. More divorces were prevalent in the coronary group. The most significant finding revealed in this study was that connected with exercise and its relation to coronary heart disease. The individuals who exercised heavily did not develop coronary heart disease and those that even had moderate habits of exercise were less prone to develop coronary heart ailments. There were more heavy smokers in the coronary group but nothing significant. Little relation was found with alcohol and heart disease and the relationship with diet was not completed successfully because of the lack of accurate information.

The major defect found in this study was the difficulty of comparing extremes because of the inadequate number of subjects represented in the study.

Dr. Pearl,[7] a professor at John Hopkins University compiled figures which show the relationship of occupation to longevity and that after the age of 40 the intellectual has the best chance for survival. The data on which he based his conclusions were derived from "The Statistics on Mortality of Occupied Males," published by the office of the Registrar General of England and Wales. The statistics covered a three year period and a range of 132 occupations. The death rates were put into five year periods, thereby allowing for the observation of mortality trends according to the age of the worker. The physical energy expenditure of each occupation was put into five classifications and the grouping for

the indoor occupations was separated from the outdoor occupations.

After working with the data for men under 40 years of age, Dr. Pearl came to the conclusion that it is very difficult to kill a man by hard physical work before he is 40, (industrial hazards being excluded), and indoor, outdoor occupations being taken into consideration in the analysis. After a man reaches 40 years of age the picture begins to form, revealing the relationship of occupation to longevity. From 35 to 44 inclusive, the death rate of the heavier indoor occupations is 3.9% greater than that for the light indoor occupations. From 45 through 54 it rises to 12.8% and from 55 through 64, it is 18.6% greater.

Pearl points out that although the death rate of the outdoor workers is lower than that of the indoor workers, the same relationship between heavy and light occupations and the duration of life is evident. The author also points out that it is wholly probable that the same relationship between physical exertion and duration of life holds good for women as well as for men.

The important limitation of this study is ones inability to determine whether environmental conditions arising from social class distinctions may not have been the primary factor between these groups instead of hard physical labor.

Whitney[11] in his study in 1934 clarifies the relationship between grade of occupation and length of life. Workers of ten states in the study were grouped into seven social and occupational classes which include professionals, proprietors, managers, officials, clerks and kindred workers, agricultural workers, skilled workers and foremen, semi-skilled workers, and lastly those in the unskilled group.

It was found that the rate of death of the lower social-economic group was almost double that of men in the professions and higher social-economic groups. There was a constant rate of increase in mortality from the higher to the lower groups with the exception of agricultural workers who showed a lower death rate than any other group.

The author felt that the figures could not be regarded as rigorously measuring the comparative mortalities of the seven groups listed because of the variations in age at which the different occupations are entered, yet they undoubtedly reflect the fundamental relations. Whitney did not attempt to explain the low death rate of the agricultural workers participating in this study but apparently there are a number of factors contributing to their low mortality rate.

Stamler[10] and his fellow workers in 1960, analyzed the distribution of arteriosclerotic heart disease rates occurring in the city of Chicago for the year 1951. This distribution was applied to the occupation of the men involved in this study and the death rate is presented in

numbers per 1,000 men involved. Grouped into five occupational classifications Stamler found that professionals and managers had a death rate of 3.65 per 1,000, clerical and sales 5.59, craftsmen and farmers 3.70, service workers 4.40, and laborers 8.13 per 1,000 men. It was brought out that the results of this study were not in line with most studies which were made in England. It is known that the social mobility and job changing is much greater in this country than in England and since the information for this study was derived from death certificates, the information and conclusions presented in the study may not be reliable for establishing a physical activity history and classification.

In 1948, J. N. Morris[6] and his associates of the Social Medicine Research unit studied the illnesses that occurred in 31,000 bus drivers and conductors. Data were collected from the London Transport Company for the period 1949-50.

The figures presented were for a standardized annual rate per 1,000, ages 35 to 64 years. Male conductors having their first clinical occurrence of coronary heart disease were as follows: Angina pectoris 0.8, coronary infarction 0.8, and thrombosis 3-day mortality 0.4, for a total of 1.9. The drivers first clinical occurrence of angina pectoris was 0.4, coronary infarction 1.5 and thrombosis 3-day mortality 0.9, for a total of 2.7. It is shown that the drivers had a

higher rate of coronary infarction, and total incidence. It was felt that one of the most important points brought out in this study was that when a driver did get an attack of coronary occlusion, he was less apt to survive the initial attack than was the conductor. Conductors had a higher incidence of angina pectoris but this type of coronary disease was considered a milder form, there-by possibly explaining the lower thrombosis 3-day mortality of the conductors. Having to exert themselves more than the drivers, it is likely that conductors become aware of coronary disease at an earlier date than drivers.

CHAPTER III

METHODS OF PROCEDURE

Introduction

All of the material in the preceding chapter has been placed there to show the reader what has been accomplished through research in the area of longevity and morbidity of athletes all over the world. This chapter will be concerned with the techniques used in collecting and compiling data for this study. It covers the procedure in picking the subjects, methods used in sending out the questionnaires, follow-up letters, tabulation, and statistical techniques employed in analyzing the data.

Selection of Subjects

Athletes

All of the athletes who were used in this study earned a letter in a varsity sport at Michigan State University between the years 1886 and 1937. The subjects selected for use in this study were exactly the same as those used in the original study which was done seven years ago.(5) The same addresses that were used in the previous study were used again to try to contact the subjects for this

study. It is important to note that only the living subjects that successfully returned their questionnaires in the original study (1953) were used in this study.

Non-Athletes

The same sample of non-athletes was also used as was used seven years ago. These individuals are college graduates comparable by year to the athletes that were selected in this study. It is felt, and proven to some degree, that by selecting a comparable group as was done in this study that the results would be more accurate than if a comparison were made with insurance tables as so many studies have done in the past. The same method was utilized here that was used in securing correct addresses for the athletes.

Methods Used in Mailing Questionnaires and Follow-Up Letters

The names and addresses of all the athletes and non-athletes were typed on envelopes which contained a covering letter, the questionnaire, a self-addressed return envelope, and a two-page summary of the original study[5] (see Appendix A). The letter explained the purpose of the study and its importance to future sports and athletic events. The summary was included to let the addressee know that something was being done with the questionnaires he was returning and also to make available to him some very interesting factual material in which he took part. It was also felt that this summary would increase the percentage of returns.

When the questionnaires started to return, they were placed in a filing box in sport activity classifications and sport control group classifications and the address cards (3 x 5) taken from their file, placed in a new location and marked useable returned questionnaires.

The questionnaires that were returned unopened, wrong addresses, etc. were checked with the alumni records and when the most recent address was found the questionnaire was immediately remailed. If no recent address was found the man was dropped from the study and classified as lost. A few of the subjects were deceased who we received unclaimed mail from and in some instances were located in the deceased files in the alumni records room. The cause of death, city and state which death occurred in, along with the date of death were recorded and a death certificate was obtained from the state department of that particular state.

Five weeks after the first questionnaire was mailed, a follow-up letter was sent out to remind those subjects who had not returned their questionnaires that it had not been received and that it was anxiously being awaited.

A fairly good return was recorded by this first follow-up letter and it was felt that a second follow-up letter would also give a good return. Three weeks after the first follow-up letter was sent, a second follow-up letter was on its way and the returns from this letter were also very rewarding. After the second follow-up letter had been

out three weeks, all the addresses of men who had not returned a questionnaire were checked in the alumni records room and those men whose addresses had changed were sent a third follow-up letter and questionnaire. In conjunction with this third follow-up letter, all the individuals who lived in the greater Lansing area and had numbers listed in the Lansing area phone book were contacted and told of the third follow-up questionnaire being sent to them and asked if they would fill out the questionnaire and return it.

There was a total of 1,078 questionnaires sent out, 567 to athletes and 511 to non-athletes or the control group. Of the 567 athletes, 520 were received completed for a percentage of 92.03 and the non-athletes returned 465 for a 90.99 percentage. A combined percentage returned from the two groups was over 91. A total of 72 subjects had died in the last seven years (1953-1960), and of these men 44 were athletes and 28 were non-athletes.

Tabulation of Results

The questionnaires were all numbered in the upper righthand corner and placed in order so that the information could be more easily transferred to code sheets. A coding system was worked out (Appendix B), then the information was placed from the questionnaires to the code sheets and ready to be punched on I.B.M. cards. Each subject,

both athletes and non-athletes had information punched on two full cards of 80 columns each. With the large number of cases participating in this study it was felt that International Business Machines would be necessary to make the many comparisons that were needed.

Statistical Analysis

For the statistical analysis of the data collected two techniques were used. The Chi-Square was used in all cases where qualitative data were analyzed and the t-Test where quantitative data were analyzed.

The results of the statistical analysis of all the data are shown in the following chapter.

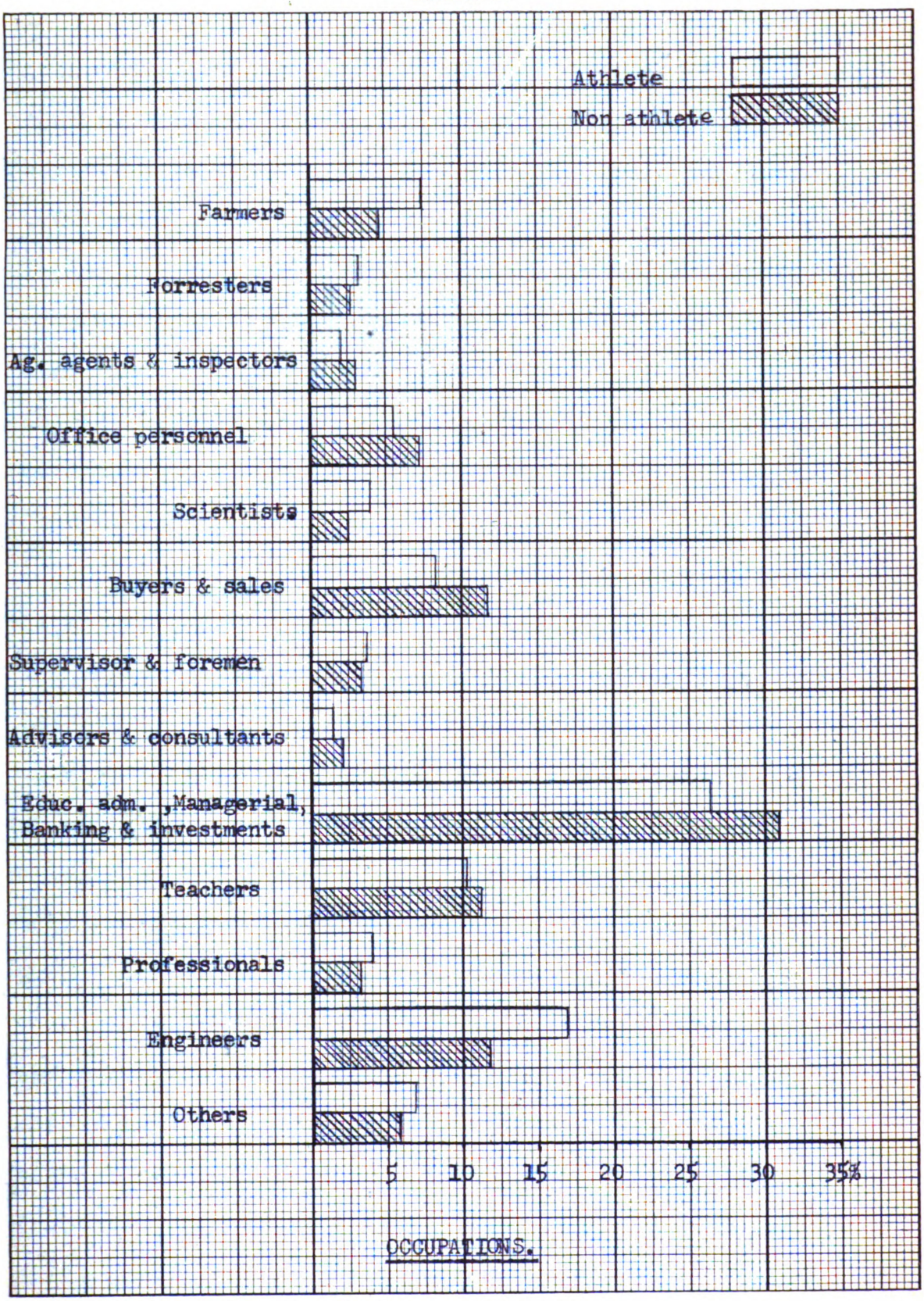
CHAPTER IV

RESULTS, INTERPRETATION AND ANALYSIS OF THE DATA

The following graphs and tables are products of the tabulated information received from the questionnaires. They were statistically analyzed and the results and interpretations are presented in this chapter.

The present occupations listed by the participants of this study were categorized into thirteen different classifications so a more accurate comparison could be made between the athlete and non-athlete groups within each occupational area. Presented in Graph I are the percentages of participants employed in each occupational area both in the athlete and control group. This type of comparison helps to give insight into the type of occupational area each group is more likely to enter, thereby possibly revealing personality strengths and weaknesses of the two groups. It is interesting to note that the athlete group engages more in the administrative, managerial, advisory, and buying and selling areas and the control non-athlete group in the professions, such as doctors, lawyers, etc. and also engineering and farming. The differences between the two groups were analyzed but were not significant, the Chi-Square being 12.25.

GRAPH I

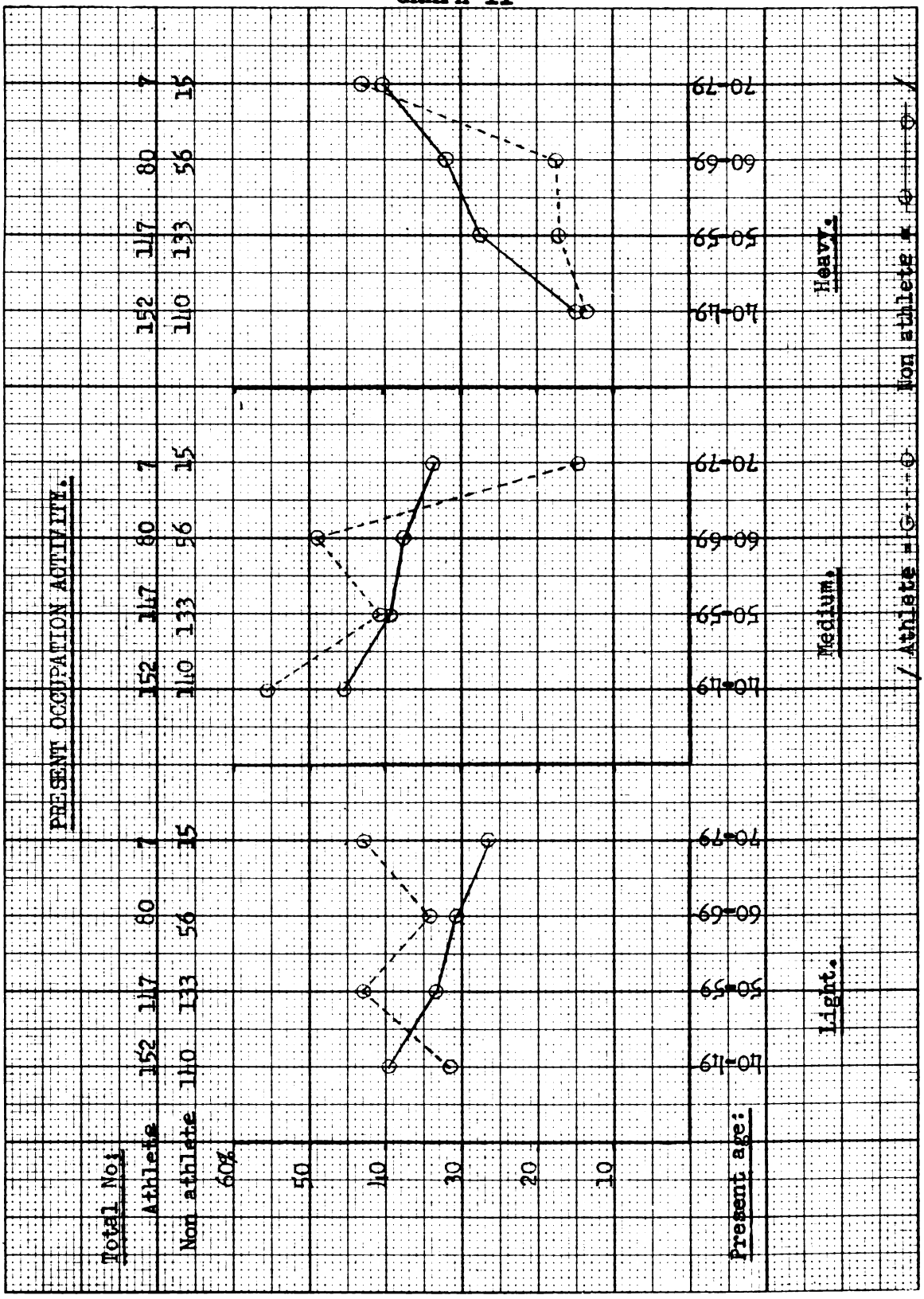

Athlete
Non athlete
Farmers
Forresters
Ag. agents & inspectors
Office personnel
Scientists
Buyers & sales
Supervisor & foremen
Advisors & consultants
Educ. adm. ,Managerial,
Banking & investments
Teachers
Professionals
Engineers
Others
5
10
15
20
25
30
35%
OCCUPATIONS.

A comparison of occupational activity (present occupation) is presented in Graph II between the athlete and control groups. The activity rating for each occupation was derived from the "Estimates of Worker Trait Requirements For 4,000 Jobs as Defined in the Dictionary of Occupational Titles."[3] Because of small numbers in the sedentary and very heavy groups the sedentary group was combined with the light activity group and the very heavy group with the heavy activity group; the medium classification was large enough to analyze without combining it with one of the other groups.

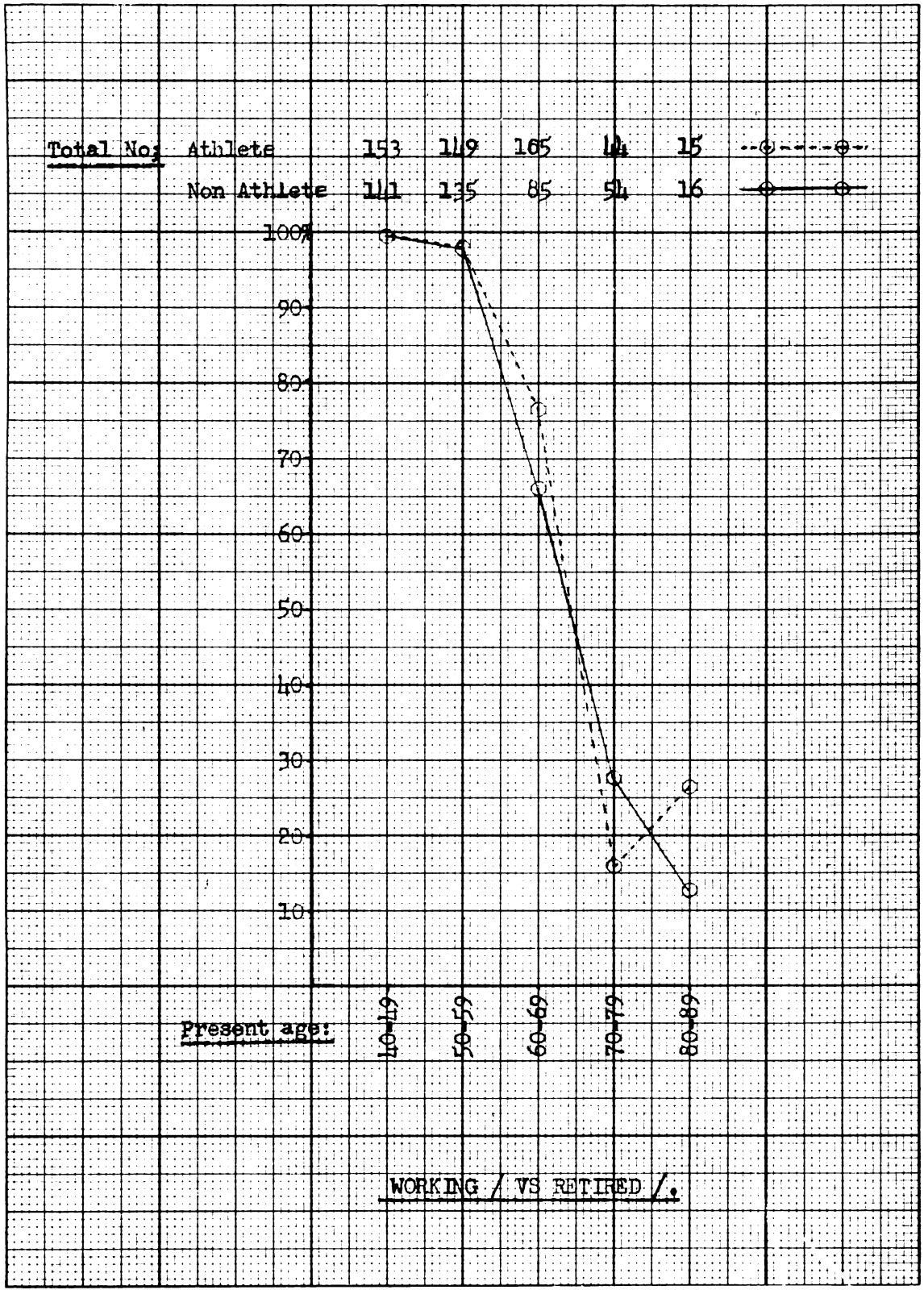
There is a higher percentage of athletes engaged in light and medium activity occupations overall than there are non-athletes but the non-athletes are employed more readily in the heavy activity occupations. It is interesting to note that in the heavy activity graph, over 40 percent of both athletes and non-athletes in the 70-79 age group are still engaged in heavy activity occupations. The differences between the two groups in relation to occupational activity were found to be not statistically significant.

In Graph III a comparison was made between athletes and non-athletes and their retirement habits, taking into consideration their ages at retirement. This again has no statistical significance but it does point out that in the last age group 80-89 a higher percentage of athletes are still active in their occupations than are non-athletes.

GRAPH II


PRESENT OCCUPATION ACTIVITY.
Total No.
Athlete 152 117 80 7
Non athlete 110 133 56 15
60%
50
40
30
20
10
Present age:
40-49
50-59
60-69
70-79
Light.
Medium.
Heavy.
Athlete
Non athlete

GRAPH III

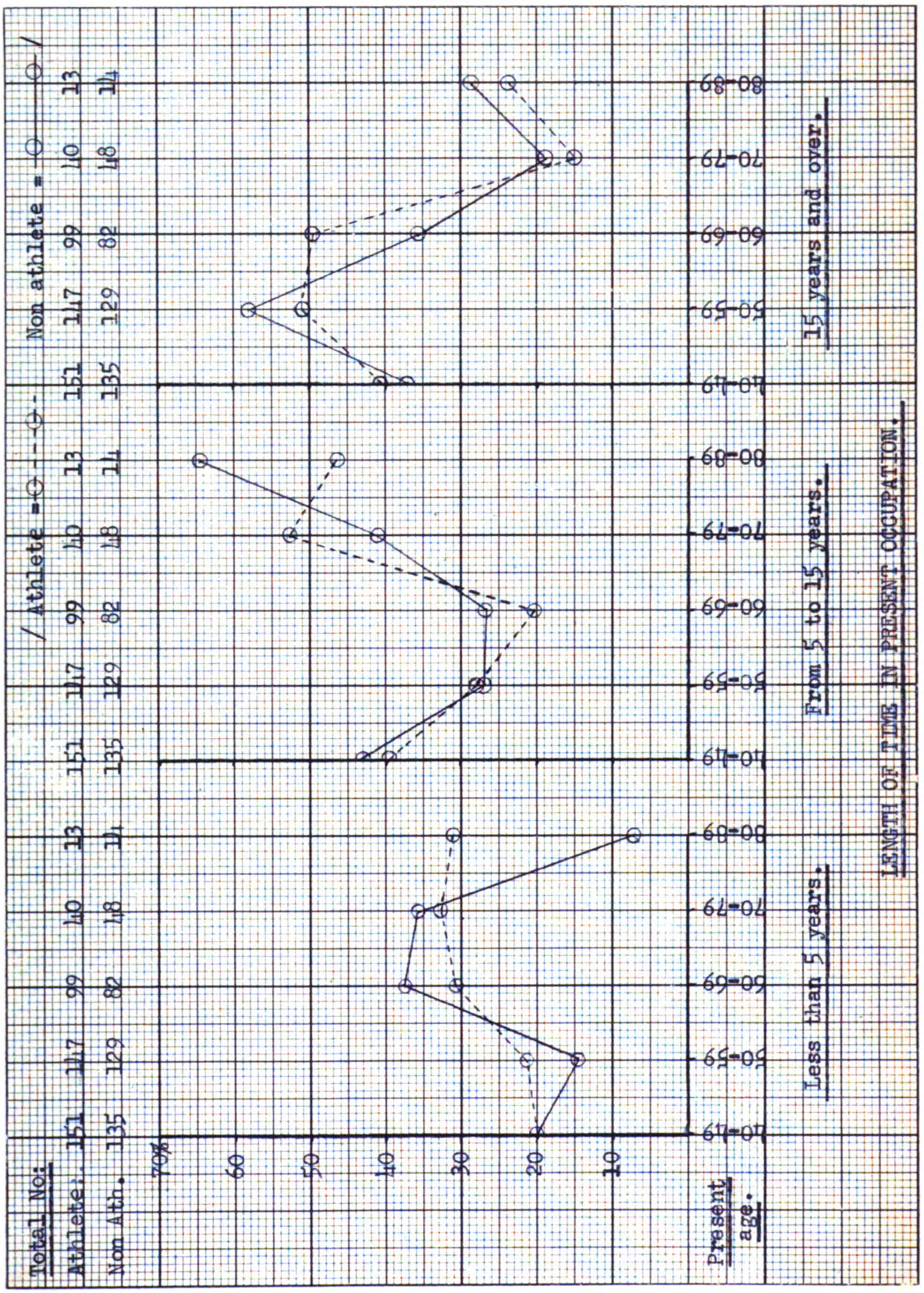

Total No; Athlete 153 149 165 44 15
Non Athlete 141 135 85 54 16
100%
90
80
70
60
50
40
30
20
10
Present age:
40-49
50-59
60-69
70-79
80-89
WORKING / VS RETIRED /.

A study with a much larger number of cases in the last two age groups might prove very worthwhile.

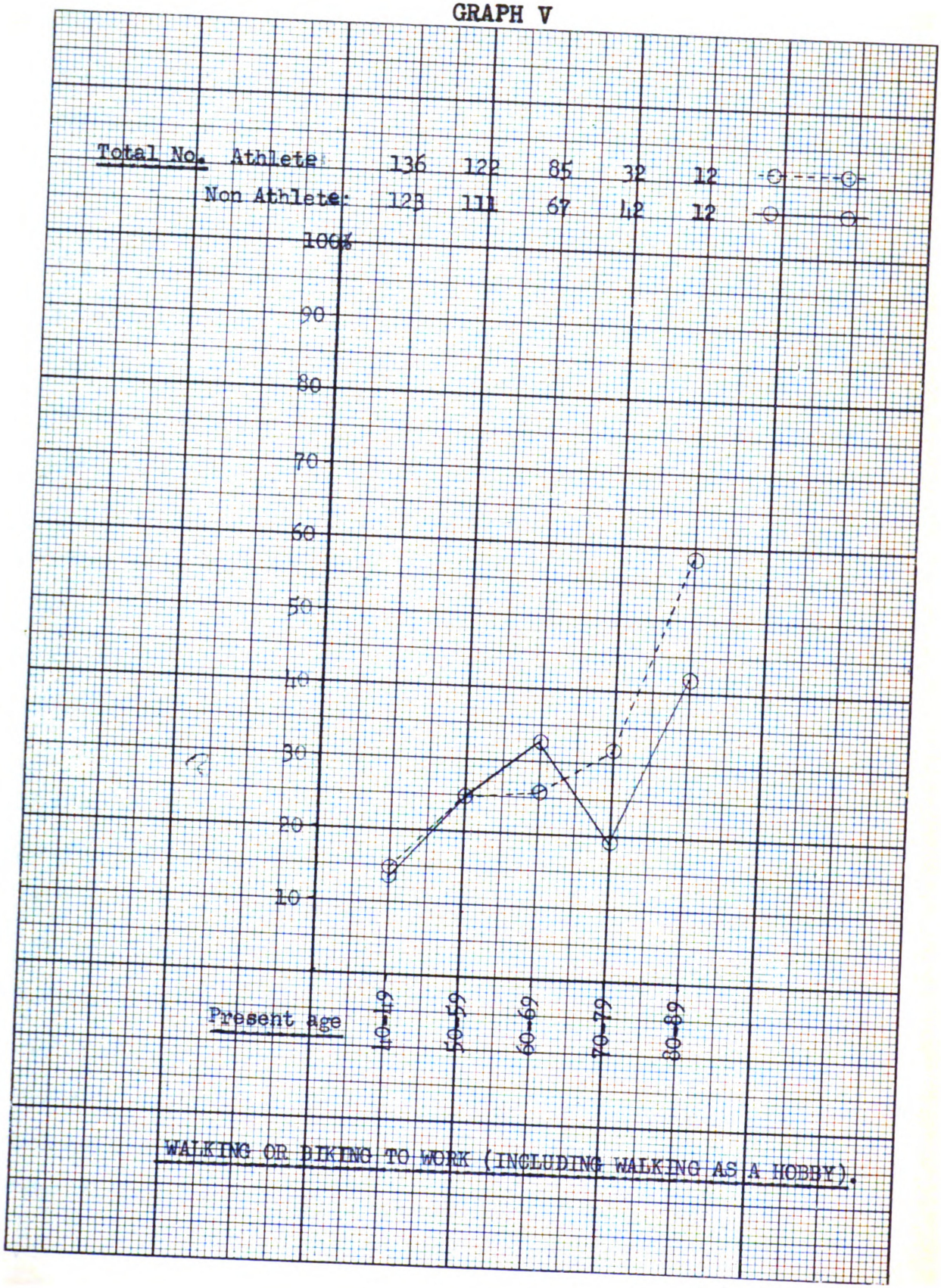
The differences in the length of time spent in the present occupation of athletes and controls was not significant with the Chi-Square being used in the analysis of the data. The categories used were less than five years, from five to 15 years, and 15 and over. Graph IV follows a similar pattern of the other graphs in the area of occupation with the lines crossing very frequently and revealing no clear-cut separation of the athlete and non-athlete group. The generally large separation of percentages in the 80-89 age group is probably due to the low number of subjects in that age group. The Chi-Square for length in present occupation is 9.24 revealing the close coordination of both groups.

In Graph V more activity in connection with the subjects occupation was sought but due to a flaw in the construction of the questionnaire, walking as a hobby had to be included to get a more accurate picture of activity. The older the subjects were the more they walked or biked, probably because many of the older subjects were walking a few miles a day just as a hobby. The athlete group in the last two age ranges 70-79 and 80-89, appear to have much more activity from walking or biking than do the non-athletes. These large increases in percentages are wholly from walking as a hobby. The 70-79 age range contributed nearly half the

GRAPH IV


Total No:
Athlete: 151 117 99 82 129 135 151 117 99 82 129 135
Non Ath. 135 129 82 99 117 151 135 129 82 99 117 151
/ Athlete = ○ - - ○ -
Non athlete = ○ —— ○ /
70%
60
50
40
30
20
10
Present age.
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
15 years and over.
From 5 to 15 years.
Less than 5 years.
LENGTH OF TIME IN PRESENT OCCUPATION.

GRAPH V

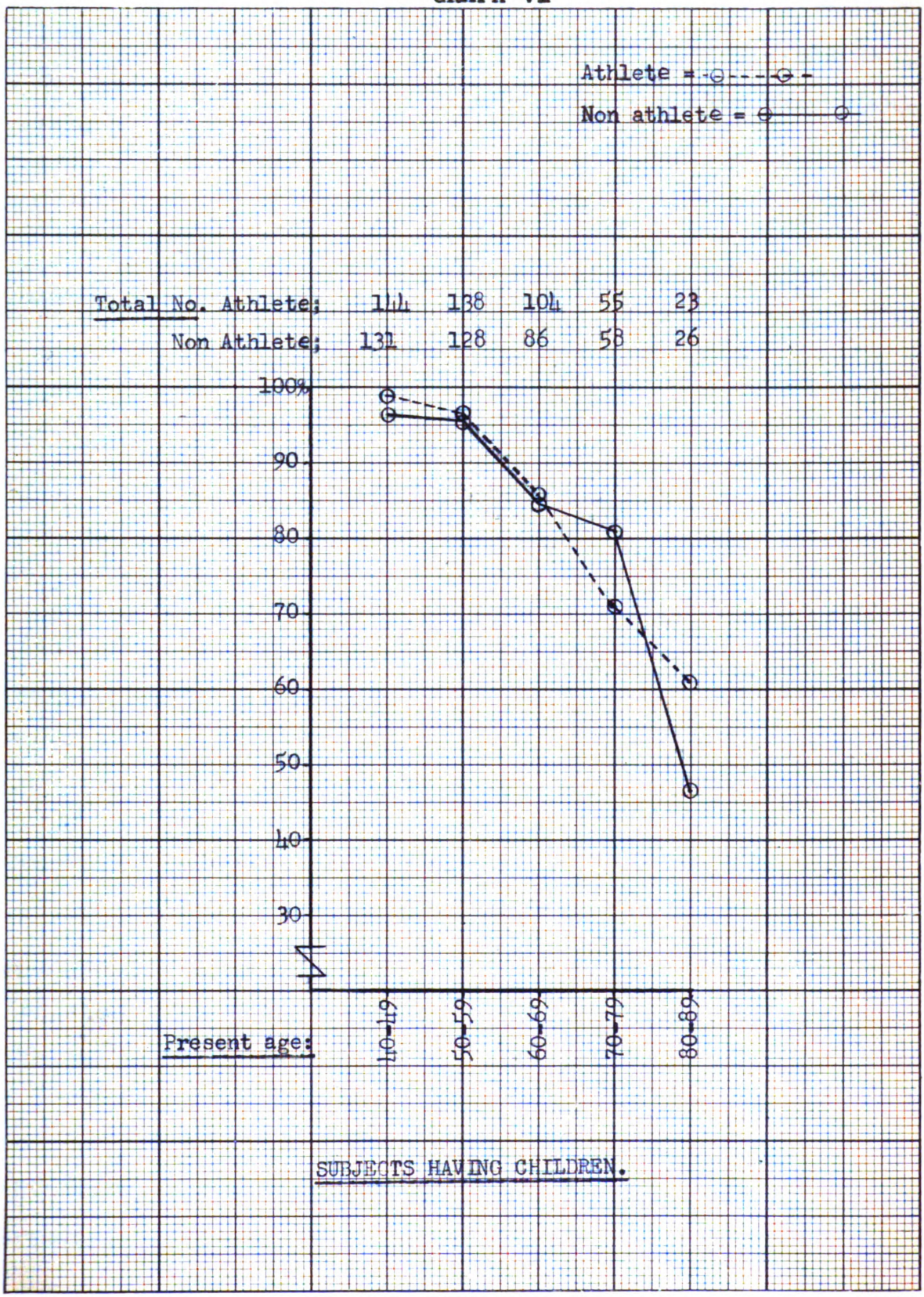

Total No. Athlete: 136 122 85 32 12
Non Athlete: 123 111 67 42 12
100%
90
80
70
60
50
40
30
20
10
Present age
40-49
50-59
60-69
70-79
80-89
WALKING OR BIKING TO WORK (INCLUDING WALKING AS A HOBBY).

total Chi-Square of 3.03 which was not significant. A larger number of cases in all age groups would undoubtedly give a much better and more accurate picture of activity and its relation to occupation.

Presented in Graph VI are the percentages of athletes having children and non-athletes having children in each age group. The steady decrease in percentages of the last four age groups cannot be explained other than a misinterpretation of the questionnaire, the subjects thinking that they were only to answer the question yes, if they had children living. Due to the consistent drop in the curve this assumption is probably correct. On the whole, more athletes had at least one child than did the control non-athlete group but the Chi-Square of 4.98 was not statistically significant.

It was sought to determine if athletes really do have more daughters than sons which is the common conception of some people connected with athletics. The findings of this study do not support the old saying as the subjects participating had a few more sons than they did daughters. The statistical analysis however was not significant. The non-athlete group had slightly more sons than did the athletes, however a t of 1.22 was not statistically significant. The athletes had more daughters than did the control group but the difference was not of significance here either (t = 0.72).

GRAPH VI


Athlete = -o---o-
Non athlete = o-----o
Total No. Athlete; 144 138 104 55 23
Non Athlete; 131 128 86 58 26
100%
90
80
70
60
50
40
30
Present age:
40-49
50-59
60-69
70-79
80-89
SUBJECTS HAVING CHILDREN.

When total sons and daughters were investigated it was found that the control group had more children than did the athletes but the difference was not significant for this case either ($t = 0.37$).

TABLE I

MARITAL STATUS OF ATHLETES AND NON-ATHLETES LIVING

	Percent Single	Percent Married	Percent Widowed	Percent Divorced	Total Number
Athletes	2.97	93.33	2.79	1.07	465
Non-Athletes	1.86	93.95	3.48	0.69	430

The marital status of both groups as presented in Table I is very similar with a Chi-Square of 1.54 not being statistically significant.

TABLE II

RACIAL DIFFERENCE OF LIVING ATHLETES AND NON-ATHLETES

	Percent White	Percent Negro	Total Number
Athletes	95.90	4.09	464
Non-Athletes	97.45	2.54	432

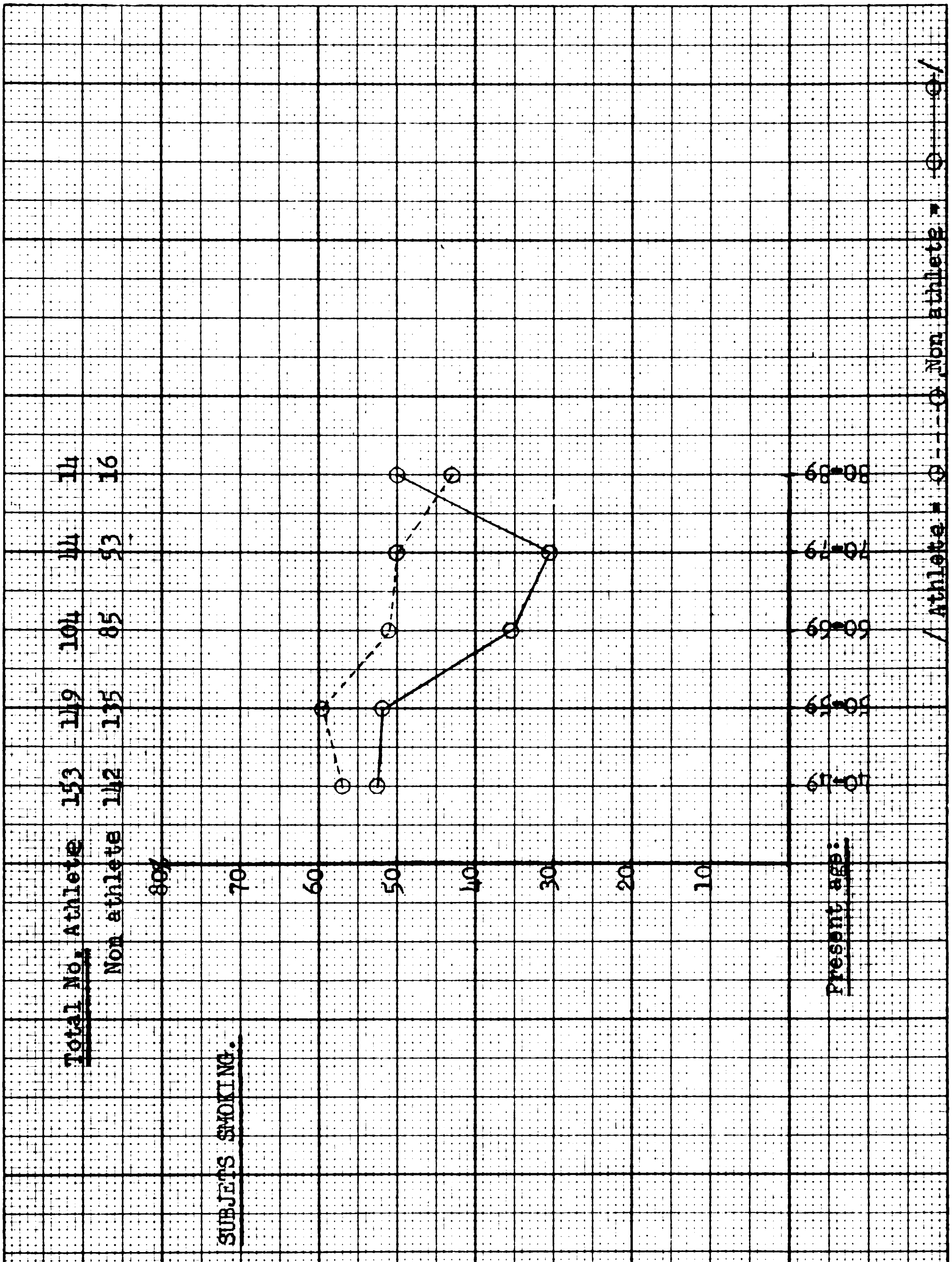
Due to such small numbers in other races than white and negro, the subjects of those classifications were dropped from this analysis. Two subjects were dropped in all, one

was an athlete and the other a non-athlete. A larger number of negroes were in the athlete group than were in the non-athlete group, 4.09 and 2.54 percent respectively. This is not unusual, for many of the colored athletes were probably on athletic scholarships and would not have attended the University otherwise. The Chi-Square = 1.66 and is not significant.

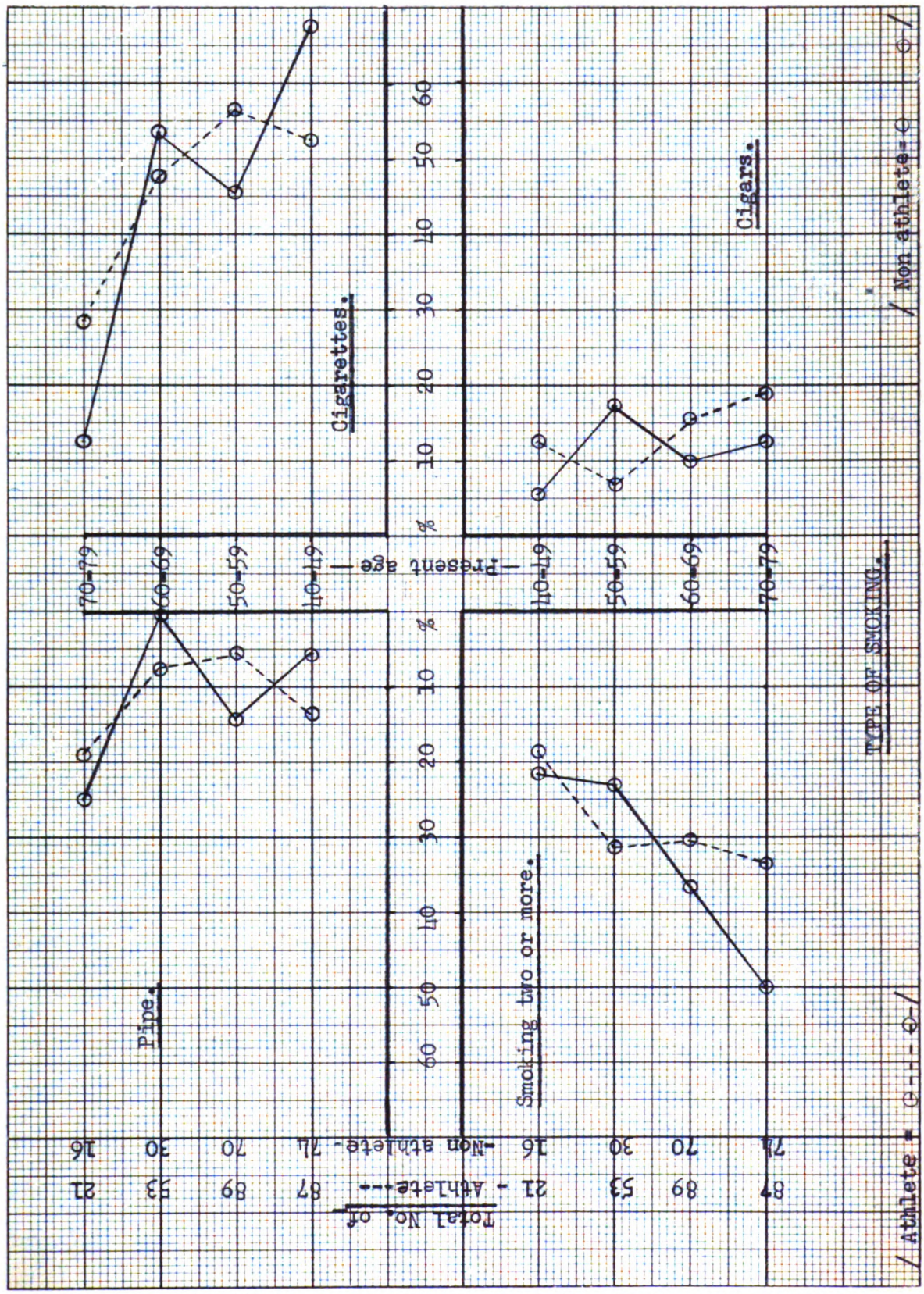
Smoking habits analyzed in previous studies between athletes and non-athletes show a larger percentage of athletes smoking. This study supports the previous work done on smoking, as the findings were significant at the 5% level. In all but the last age group 80-89, the athletes had higher percentages smoking than did the non-athletes, the last group being different probably because of the small number of cases involved. Graph VII presents the comparison of the two groups and reveals the distinct gap between the athletes and controls. It is interesting to note that over half the individuals in the first two age groups, both athletes and non-athletes use tobacco in some form.

In Graph VIII subjects were separated into the different categories depending upon which type or types of tobacco they were presently using. Types not listed were disregarded in the analysis because of insufficient numbers. No significant differences were found but it is interesting to see that cigarettes have by far the highest percentage of users yet the trend is toward the lower percentages in the

GRAPH VII


Total No. Athlete 153 149 104 14 14
Non athlete 142 135 85 93 16
SUBJETS SMOKING.
80%
70
60
50
40
30
20
10
Present age:
40-49
50-59
60-69
70-79
80-89
/ Athlete = ⊕- - -⊕ Non athlete = ⊕——⊕/

GRAPH VIII

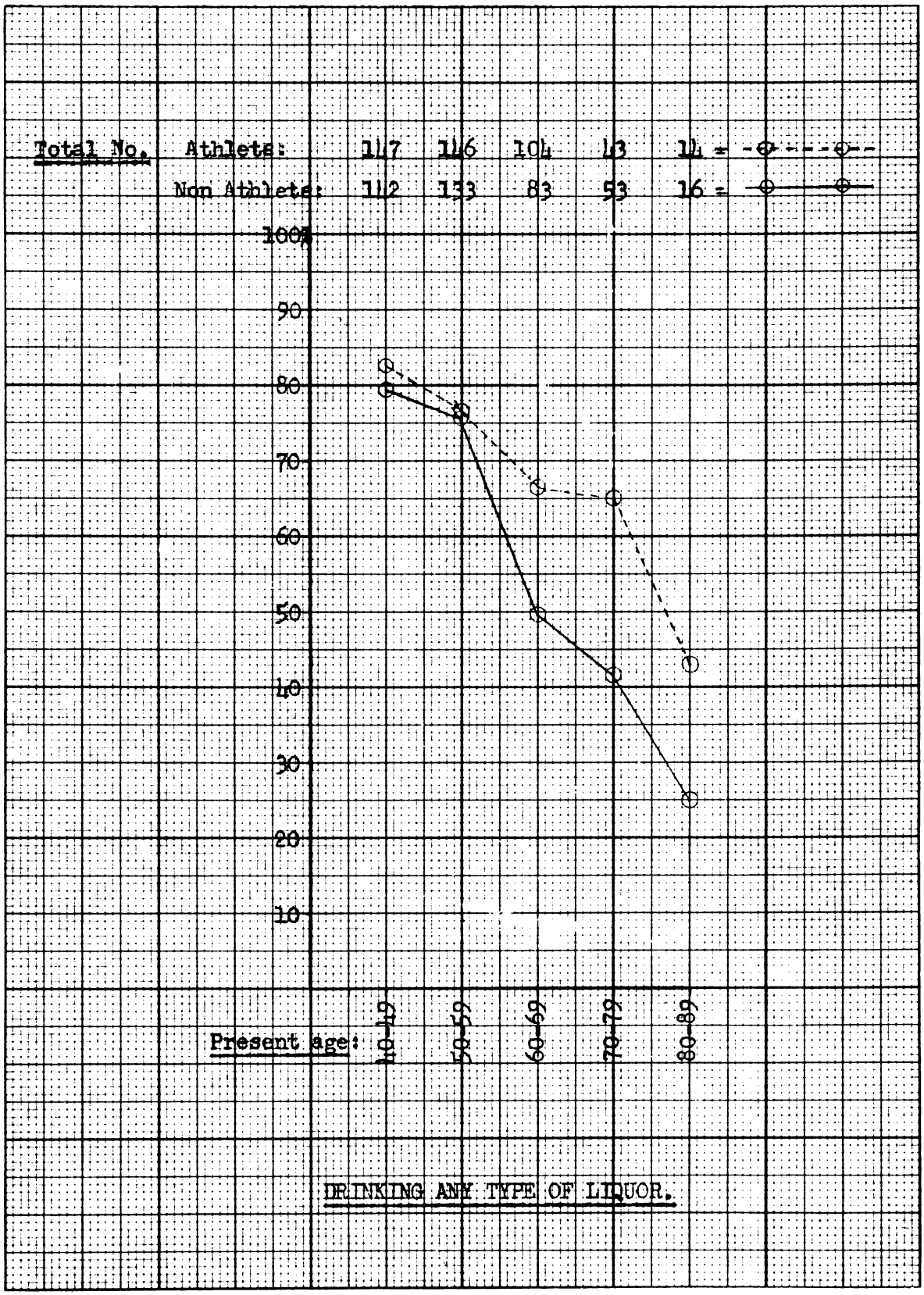

Cigarettes.
Cigars.
Pipe.
Smoking two or more.
TYPE OF SMOKING.
— Present age —
70-79
60-69
50-59
40-49
%
10
20
30
40
50
60
/ Athlete
/ Non athlete
Total No. of
21 - Athlete -
87 89 53 21
-Non athlete- 74 70 30 16

older age groups. On the other three graphs presented the trend goes in the opposite direction of that of cigarette smokers, i.e., from the lower percentages at younger ages to slightly higher levels at older ages. Possibly those that are giving up smoking cigarettes as they get older, switch to one of the other types of tobacco or add another type of tobacco along with cigarettes which would put them into the two or more classification.

The amount of tobacco used is just as important as the type being used and for purposes of analysis in this study, a scale of light, medium and heavy was constructed (see Appendix B). The data presented in Graph IX were anlyzed by the Chi-Square technique and found to be insignificant (Chi-Square = 11.66). It is to be noted that the control group have slightly higher percentages over all in the light smoking group, the athletes have higher percentages in every age range in the medium smoking group, and the two are intermingled in the heavy smoking group.

The graph on drinkers and non-drinkers shows very clearly that athletes are a larger drinking group than the controls. The graph, (No. X), when analyzed statistically shows a difference in the two groups being analyzed significant at the 5% level. The two age groups 60-69 and 70-79, contributed to over 75% of the Chi-Square which was 12.14. There is a steady decrease of individuals drinking from the younger men to the older men and part of this might be

GRAPH X


Total No. Athletes: 117 116 104 43 14
Non Athletes: 112 133 83 53 16
100
90
80
70
60
50
40
30
20
10
Present age: 10-19 50-59 60-69 70-79 80-89
DRINKING ANY TYPE OF LIQUOR.

attributed to doctors advising their patients (the subjects) to quit drinking in favor of their health. It is mentioned here that the pattern of drinking in the athlete group closely follows the smoking pattern of the athletes. The significant difference in the two groups could be attributed to many different and varied reasons. The first conclusion reached on the significance of these data is that after abstaining from the use of alcohol during training, athletes want to rid themselves of training rules and drinking is an excellent way. Athletes, as has been previously discussed in this chapter, select jobs in areas of a more social nature than do non-athletes and, therefore, they use alcohol due to social pressures. It is also possible that the athlete uses alcohol to relax himself as a substitute for the physical exertion that he used as a means of relaxing tension in competition.

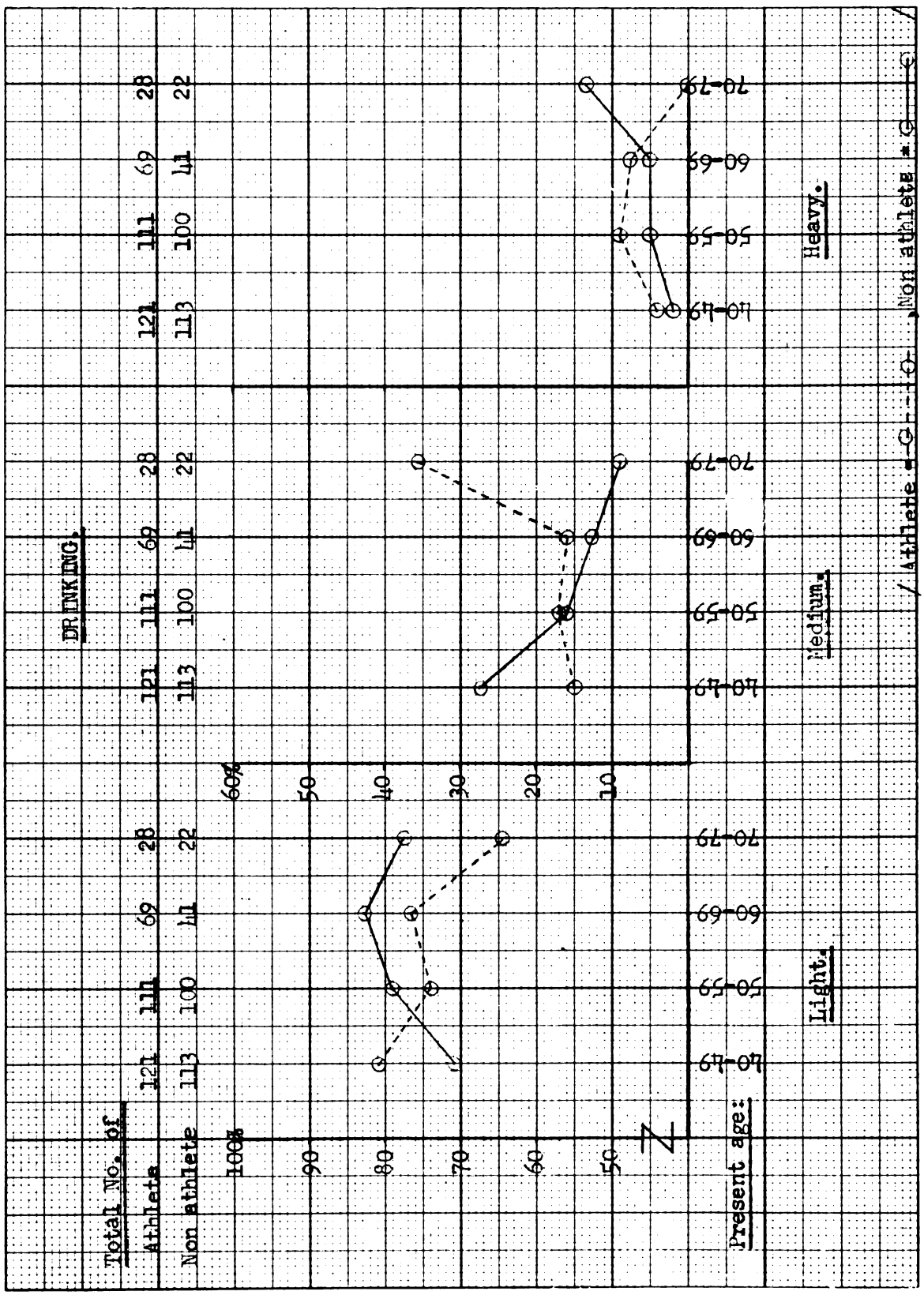
The types of liquor consumed presented in Graph XI are also significant at the 5% level, the Chi-Square being used to determine significance. Those types of alcohol not presented were disregarded because of lack of numbers to be statistically analyzed. Non-athletes had higher percentages at every age group in the area of beer drinking, so it appears that when the athletes did drink, they did not settle for just beer, it was either whiskey or a combination of beer and whiskey. Both athletes and non-athletes are similar in that when a subject drinks he generally drinks more than

one type of alcoholic beverage.

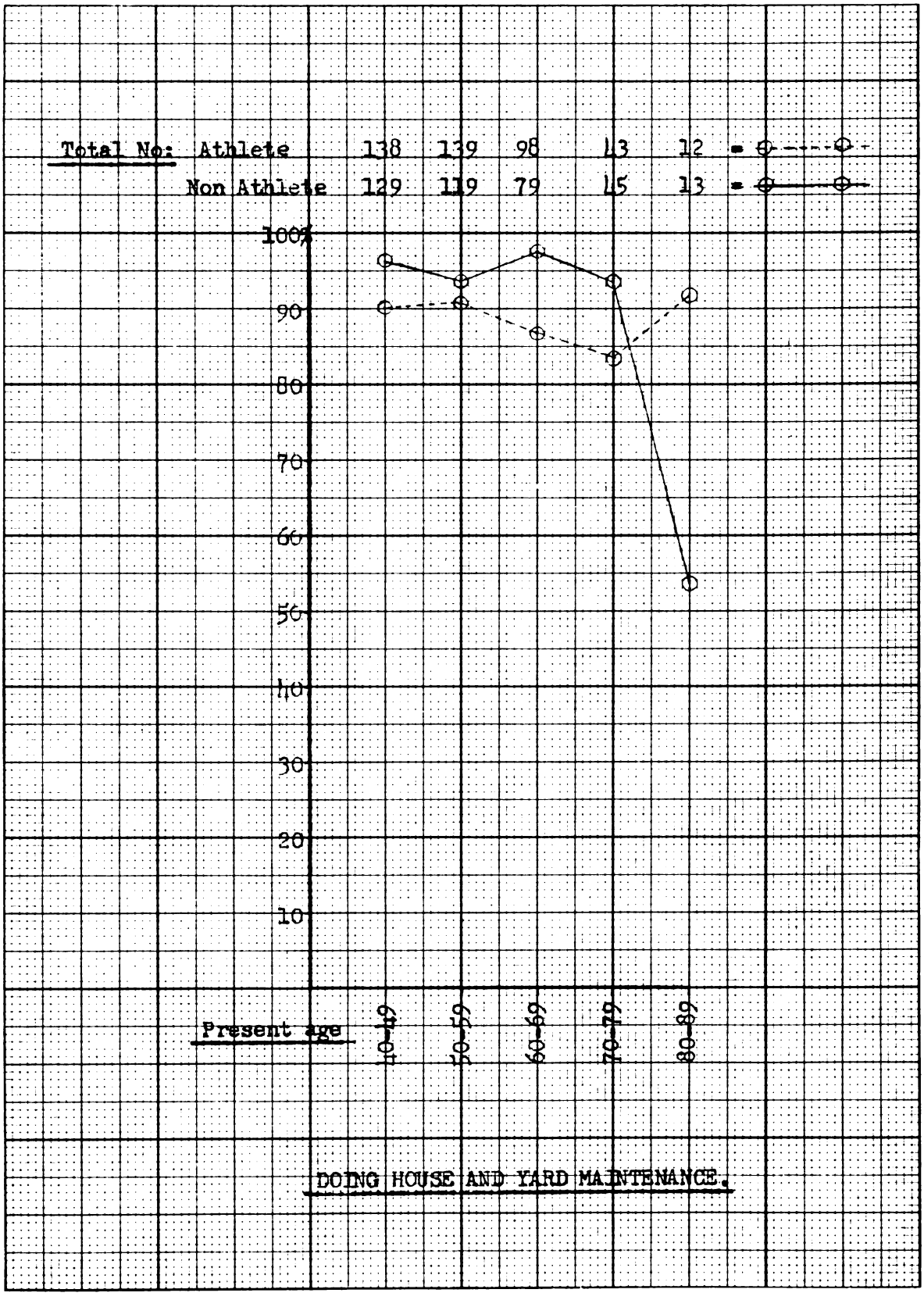
The amount of drinking presented in Graph XII was determined by putting each subject who did drink into a three group classification of light, medium and heavy (see Appendix B). Non-athletes had higher percentages in the area of light drinking with the exception of the first age group 40-49. In the medium drinking group the athletes had higher percentages with the exception of the first age group and the athletes also had higher percentages in the heavy drinking classification. The Chi-Square technique was used in analysis of the data and it was significant at the 5% level as were the other two analyses in the area of drinking.

Lacking in other studies concerning athletes and non-athletes is the area of maintenance being done around the house. In Graph XIII there is presented a comparison between the athletes and controls and their activity around the house and yard. The non-athlete had higher percentages working around the house and yard in every age group but the last and this one may not give an accurate picture due to the small number of subjects in that age group. The analysis of data proved to be statistically significant with the total Chi-$S_q$uare at 17.70 and 5 degrees of freedom. There is a slight tendency for men to do less house and yard work when they reach the older age ranges, probably due to disability, old age, etc.

GRAPH XII


DRINKING.
Total No. of
Athlete 121 111 69 28
Non athlete 113 100 41 22
100%
90
80
70
60
50
40
30
20
10
60%
Present age:
40-49
50-59
60-69
70-79
Light.
Medium.
Heavy.
Athlete
Non athlete

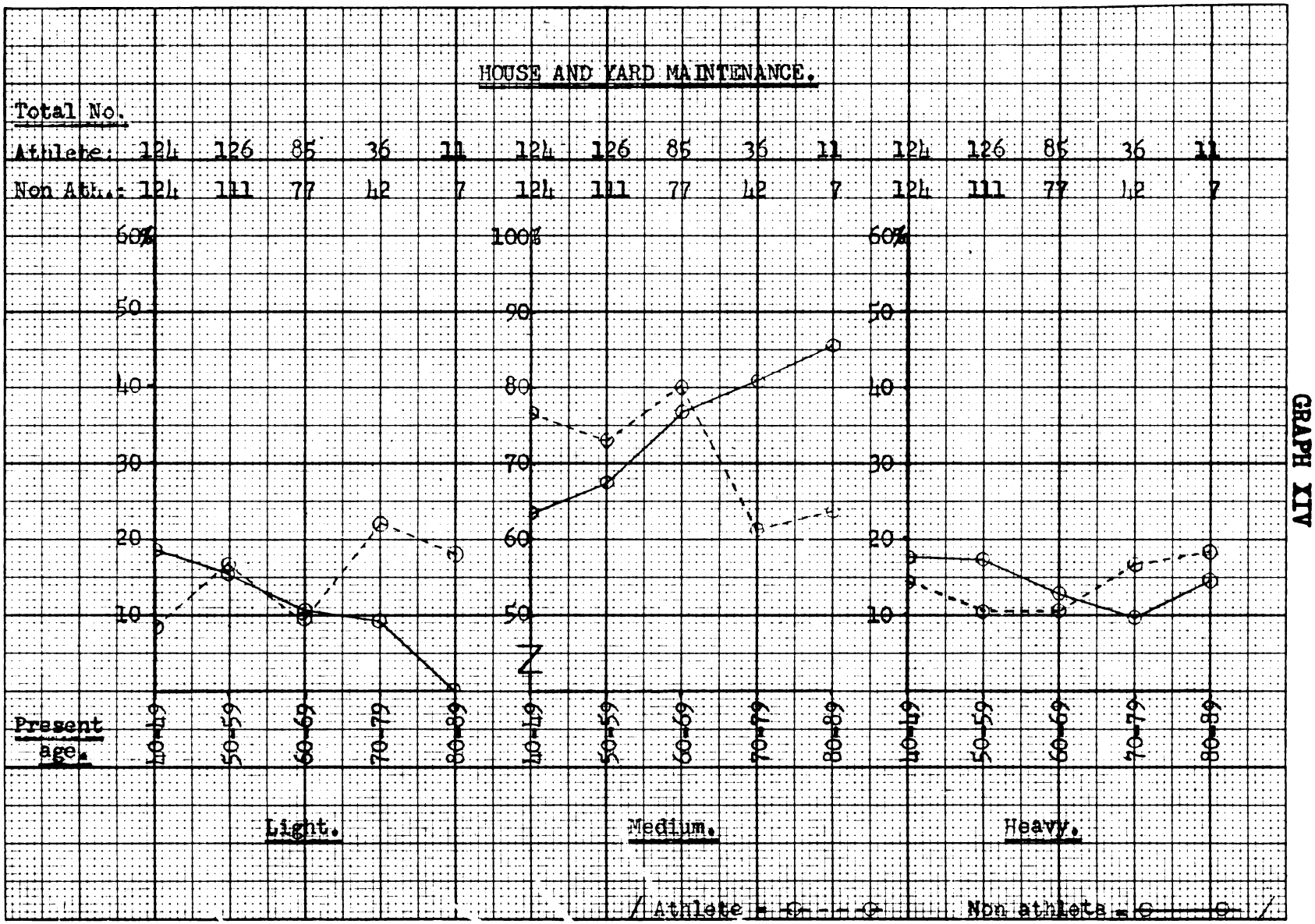
GRAPH XIII


Total No: Athlete 138 139 98 43 12
Non Athlete 129 119 79 45 13
100%
90
80
70
60
50
40
30
20
10
Present age
40-49
50-59
60-69
70-79
80-89
DOING HOUSE AND YARD MAINTENANCE.

Along with those being active in yard and house maintenance a scale was devised to determine just how much work is actually done and make a comparison of the two groups on this basis. A scale of light, medium and heavy was set up (see Appendix B) and each man placed into his proper activity setting just as he answered the question on the questionnaire. A Chi-Square of 14.30 proved to be insignificant but it is interesting to note in Graph XIV, that over 60% of all subjects fall into the medium classification. It is possible that the construction of the scale itself may have caused this to happen.

Mowing the average American family lawn is quite a task for many men in their forties and over even if a power mower is used. Graph XV displays a comparison of athletes and controls and the regularity with which they mow their lawns. The percentages of both groups run very close together until the last age group where the non-athletes drop well below the 50% mark. The small number of cases in that group could easily cause the sharp drop. The data when statistically analyzed was not significant but the slight drop in activity should be noted as the men in this study reach the older ranges.

In Graph XVI it appears that the athletes are slightly more inclined to work in their gardens than the controls but the difference was not significant. (Chi-Square = 3.29). The sharp drop in the last two age groups could be caused by


HOUSE AND YARD MAINTENANCE.
Total No.
Athlete: 124 126 85 36 11 124 126 85 36 11 124 126 85 36 11
Non Ath.: 124 111 77 42 7 124 111 77 42 7 124 111 77 42 7
60%
50
40
30
20
10
100%
90
80
70
60
50
Present age.
40-49 50-59 60-69 70-79 80-89
Light.
Medium.
Heavy.
Athlete
Non athlete

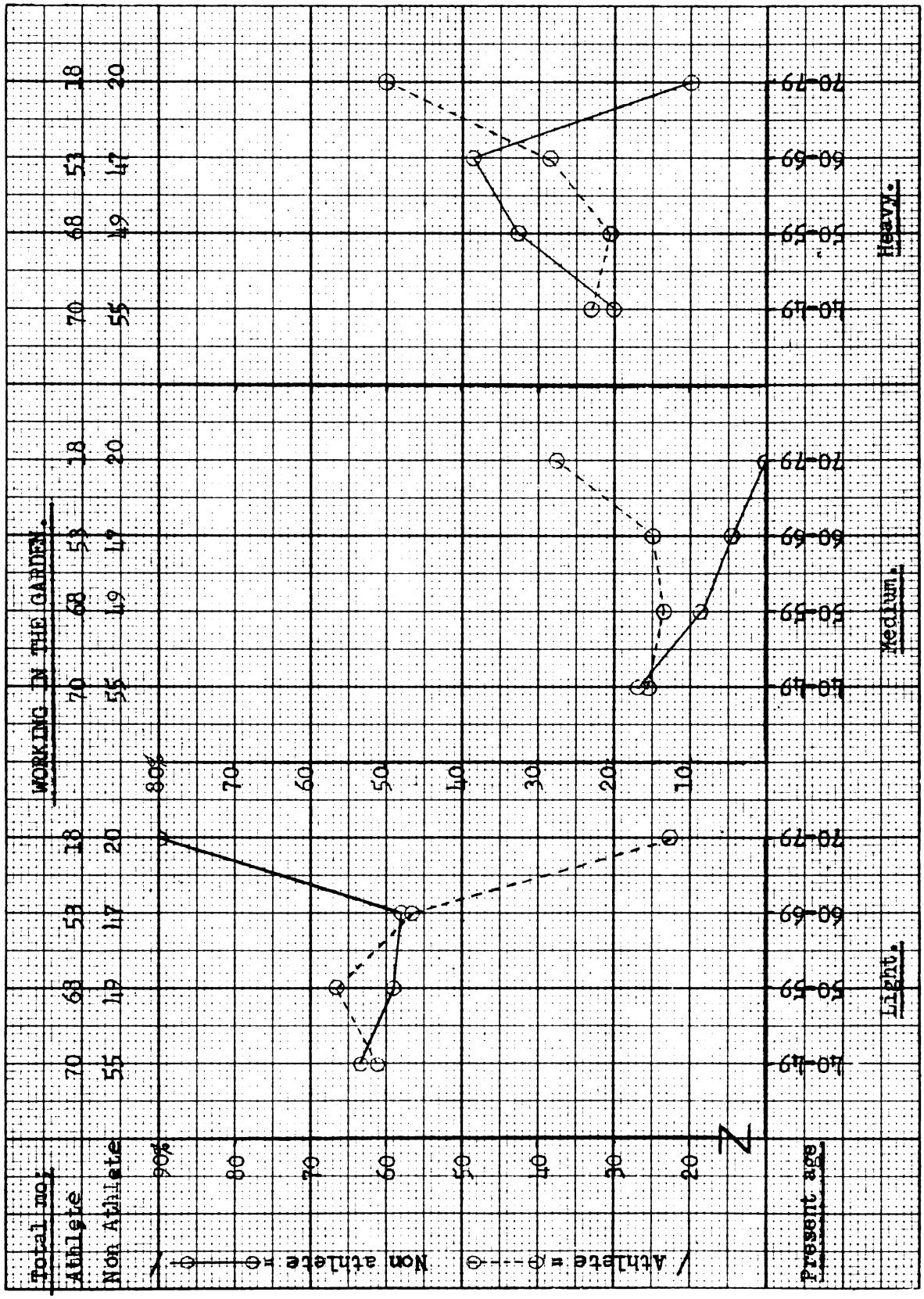
GRAPH XIV

the small numbers in those two groups but it could also be caused by two other factors. The first being loss of interest in garden work in the later years of life, and the second possibility being too much hard work for a man in his 70's and 80's.

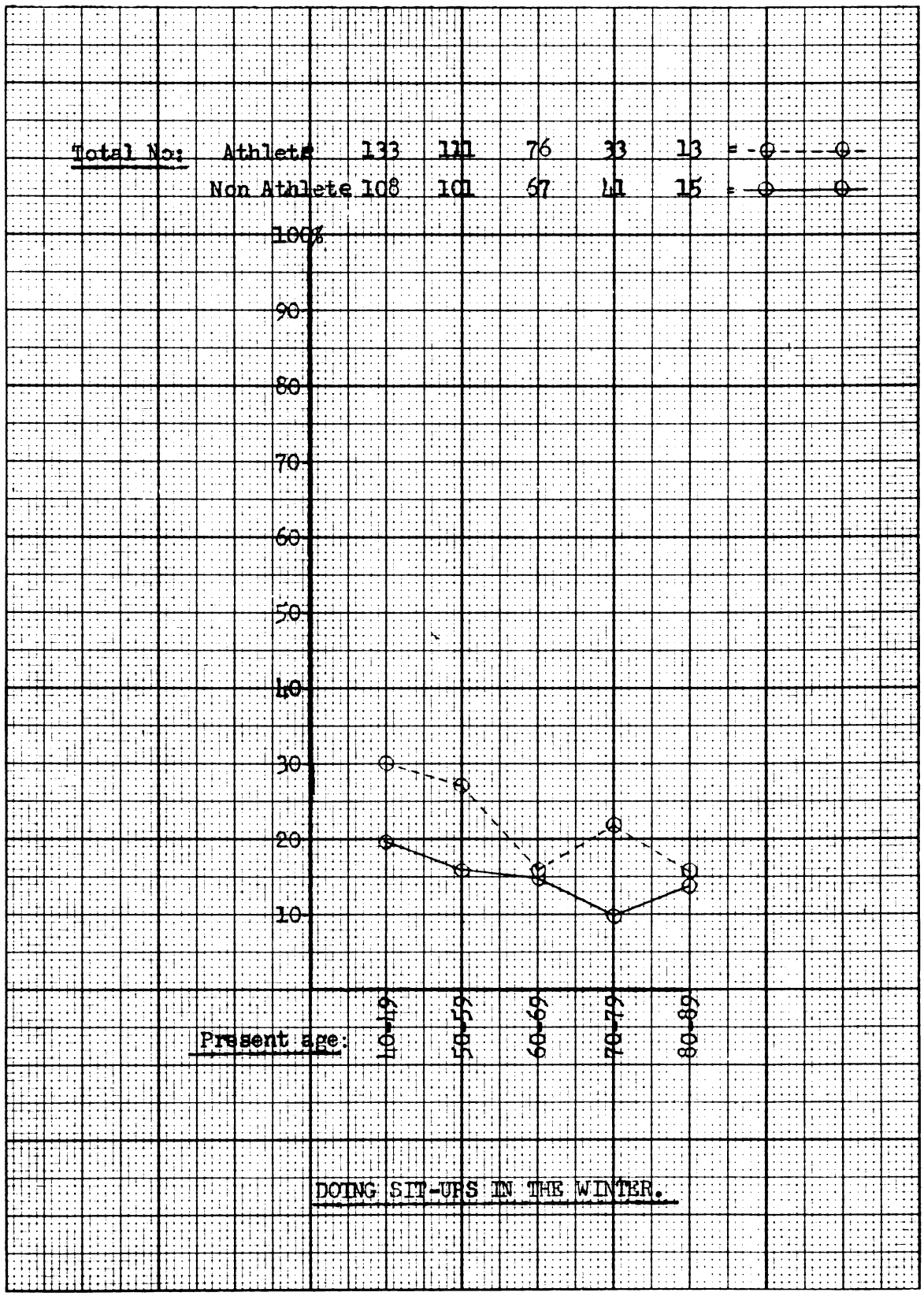
The amount of work was also sought in this area of gardening and is presented in Graph XVII at three different activity levels of light, medium and heavy (see Appendix B). The statistical analysis proved to be significant with the Chi Square at 24.41 and $P < .01$. The 70-79 age group contributed nearly 75% of the total Chi-Square with wide variations in percentages at all three activity levels. It is interesting to note that a greater percentage of subjects do heavy work in their gardens than those doing medium work. The only graph that appears consistent is that concerned with medium activity where the athletes have higher percentages overall.

Presented in Graph XVIII is the comparison of the two groups in relation to doing sitting up exercises in the winter. When analyzed by the Chi-Square technique it was found to be not quite significant at the 5% level but from the appearance of the graph the athlete group has a higher percentage doing such exercises in the winter than does the control group. This is probably a carryover value obtained from the great number of calesthenics done while competing in athletics.

GRAPH XVII


WORKING IN THE GARDEN.
Total no:
Athlete
Non Athlete
Non athlete
Athlete
Present age
Heavy.
Medium.
Light.
70-79
60-69
50-59
40-49
80
70
60
50
40
30
20
10
18
20
53
47
68
49
70
55

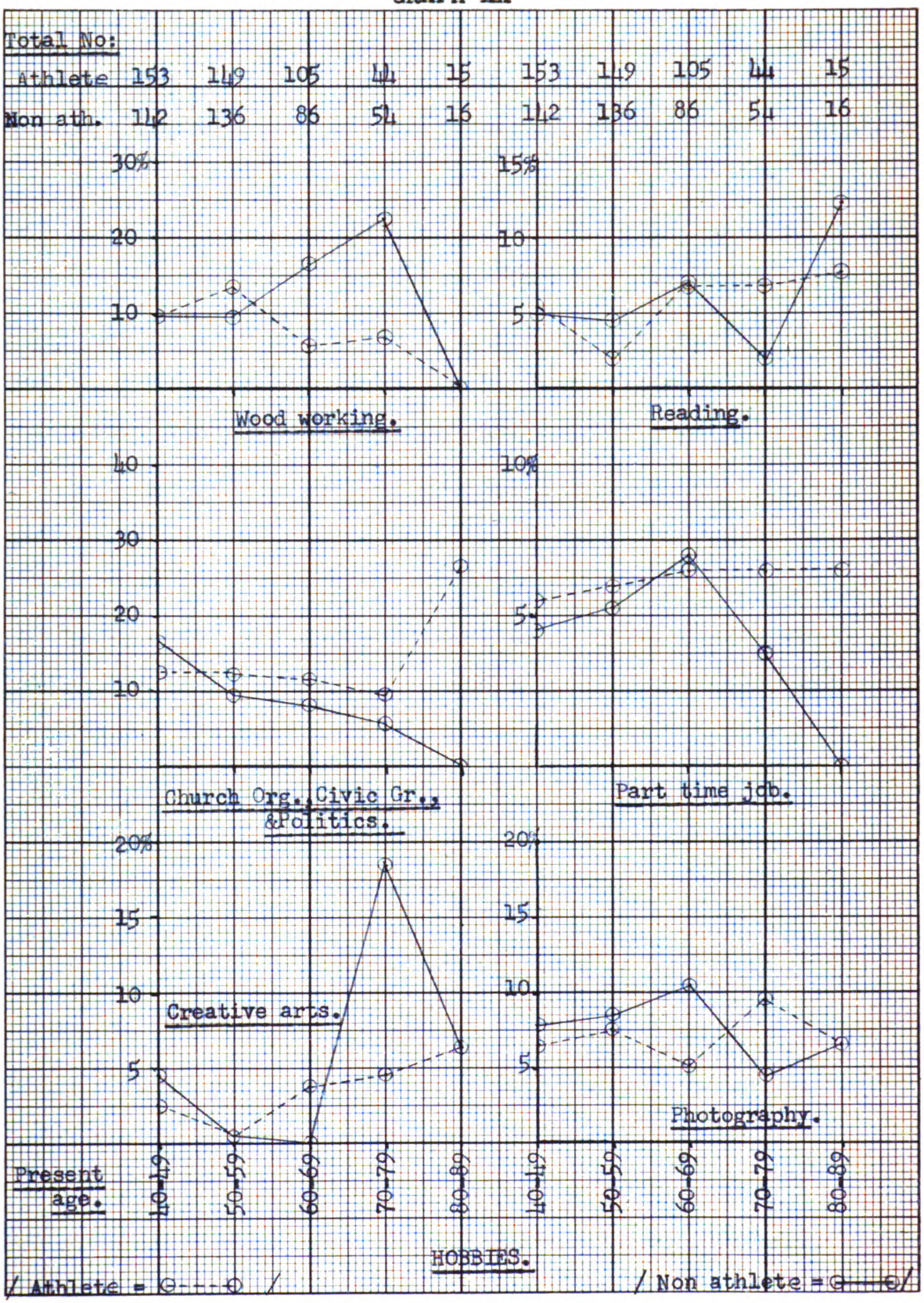
GRAPH XVIII


Total No: Athlete 133 111 76 33 13
Non Athlete 108 101 67 41 15
100%
90
80
70
60
50
40
30
20
10
Present age: 40-49 50-59 60-69 70-79 80-89
DOING SIT-UPS IN THE WINTER.

When sitting up exercises were examined for the summer months in Graph XIX, the two groups did show a significant difference at the 5% level. Both groups appear to show a drop in percentage active during the summer months but the athlete percentage does not drop nearly as much as does the non-athletes. The same subjects are primarily responding to both summer and winter activity; therefore, it can be said that athletes are more consistent the year around than are the controls. Twenty-four to thirty percent of all athletes in the first two age groups do sit-up exercises the year around compared to less than 20 percent for the controls. There is also a noticeable drop in the sit-up activity as the subjects inctease in age.

Hobbies are an excellent way to release excess tensions that build up within the human body and cause mental breakdowns and other similar mental disturbances. In this study an attempt is made to get a list of all the hobbies each individual participated in regularly and then compare the athletes with the control group for statistical differences. Plotted on Graph XX are six of the most commonly listed hobbies mentioned by the subjects. There was no statistically significant difference between the two groups in the hobbies that they participated in, both groups active in each hobby listed at about the same percentage. Other hobbies with percentages of participation in both athlete and control groups worthy of mentioning are as follows: Music, 2.4% for athletes and

GRAPH XX

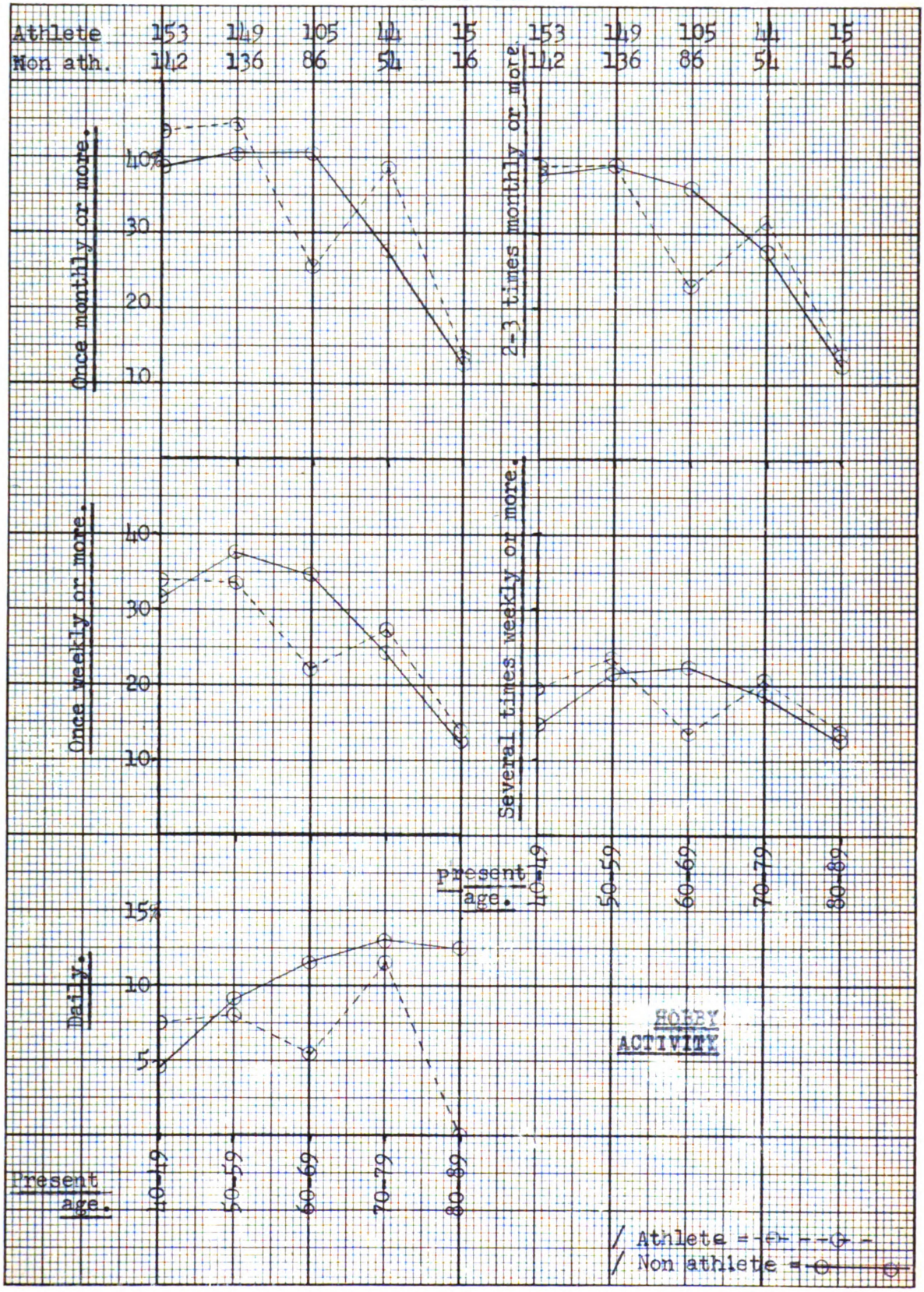

Total No:
Athlete 153 149 105 44 15 153 149 105 44 15
Non ath. 142 136 86 54 16 142 136 86 54 16
30%
20
10
15%
10
5
Wood working.
Reading.
40
30
20
10
10%
5
Church Org., Civic Gr., & Politics.
Part time job.
20%
15
10
5
20%
15
10
5
Creative arts.
Photography.
Present age.
10-19
50-59
60-69
70-79
80-89
10-19
50-59
60-69
70-79
80-89
HOBBIES.
/ Athlete = O---O /
/ Non athlete = O---O /

4.8% for controls; Youth work, 3.0% for athletes and 4.4% for controls; Traveling, 2.6% for athletes and 2.5% for controls; Sedentary games such as cards, etc., 71.% for athletes and 4.8% for controls; Boating and boat clubs, 2.8% for athletes and 2.3% for controls; Gardening and gardening clubs, 5.6% for athletes and 4.6% for controls. It was generally true that when a subject listed any hobbies at all, he had two or three that he participated in regularly. Very few subjects listed only one hobby and many had no hobby at all.

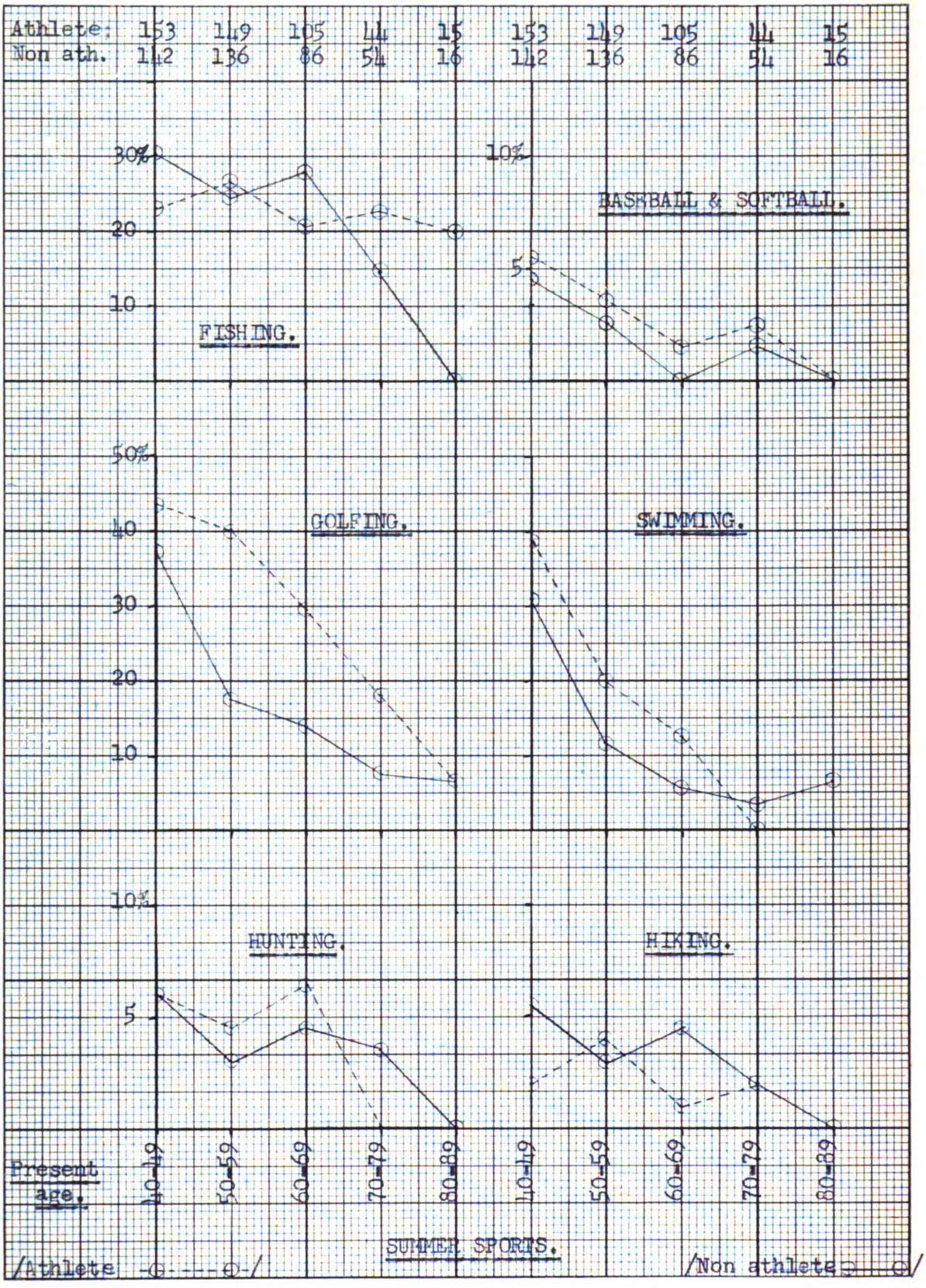
The hobby activity was grouped into occurrence of participation and placed on Graph XXI. Each degree of occurrence (once per month or more, two to three times per month or more, once weekly or more, several times weekly or more, and daily), was plotted on a graph separately and a Chi-Square was calculated to determine significance. No statistical significance was found between the athletes and non-athletes and their regularity of participation in hobbies. The same general trend can be seen in each graph with the older age groups tending to be less active in all classifications except the graph which shows daily participation. It can be concluded that little difference exists between athletes and non-athletes in relation to the hobbies that they engage in or the time spent in each hobby.

Sports activities of the subjects were separated into summer and winter participation and handled separately for all statistical analysis. Graph XXII presents six of

GRAPH XXI


Athlete 153 149 105 44 15 153 149 105 44 15
Non ath. 142 136 86 54 16 142 136 86 54 16
Once monthly or more.
2-3 times monthly or more.
Once weekly or more.
Several times weekly or more.
Daily.
Present age.
40-49
50-59
60-69
70-79
80-89
HOBBY ACTIVITY
Athlete
Non athlete

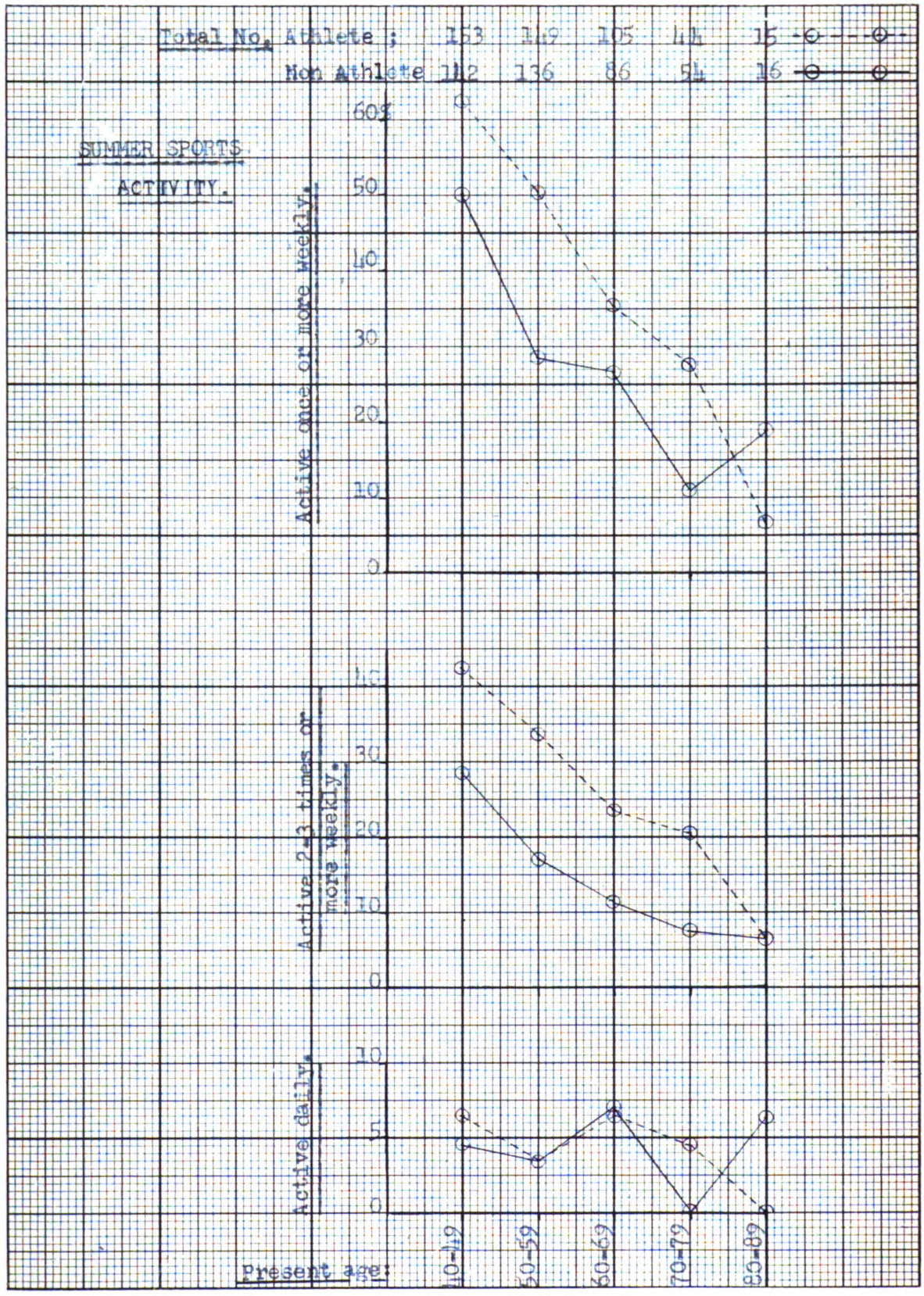
GRAPH XXII


Athlete: 153 149 105 44 15 153 149 105 44 15
Non ath. 142 136 86 54 16 142 136 86 54 16
30%
20
10
FISHING.
10%
5
BASKBALL & SOFTBALL.
50%
40
30
20
10
GOLFING.
SWIMMING.
10%
5
HUNTING.
HIKING.
Present age.
40-49
50-59
60-69
70-79
80-89
40-49
50-59
60-69
70-79
80-89
SUMMER SPORTS.
/Athlete -⊙----⊙-/
/Non athlete ⊙----⊙/

the most common summer sports participated in by both athletes and non-athletes with the greatest variation occurring in golf and swimming where the athletes seemed to be much more active. The other four sports plotted showed little difference between athletes and controls participation. Other sport areas with relatively high percentages of participation worth mentioning are as follows: Bowling, 2.1% for athletes and 2.1% for controls; Tennis, 3.2% for athletes and 2.5% for controls; Skiing, 2.1% for athletes and 2.1% for controls; and table tennis, 2.4% for athletes and 1.4% for controls. Overall, it appears that athletes participate more in the various summer sports listed than do the controls but the difference is small.

The degree of participation is presented in Graph XXIII for summer sports and is categorized into three different levels of activity, (active once weekly or more, active two to three times weekly or more, and active daily). Two of the graphs show the athletes percentages above those of the controls and the third graph is evenly distributed at all age levels. Differences between athletes and non-athletes were not statistically significant. The downward trend on the weekly graphs show that the subjects as they become older do not participate as often in some of the more strenuous sports. The daily participation graph is very stable from young to old but the percentages are relatively low, all being below the 7% level.

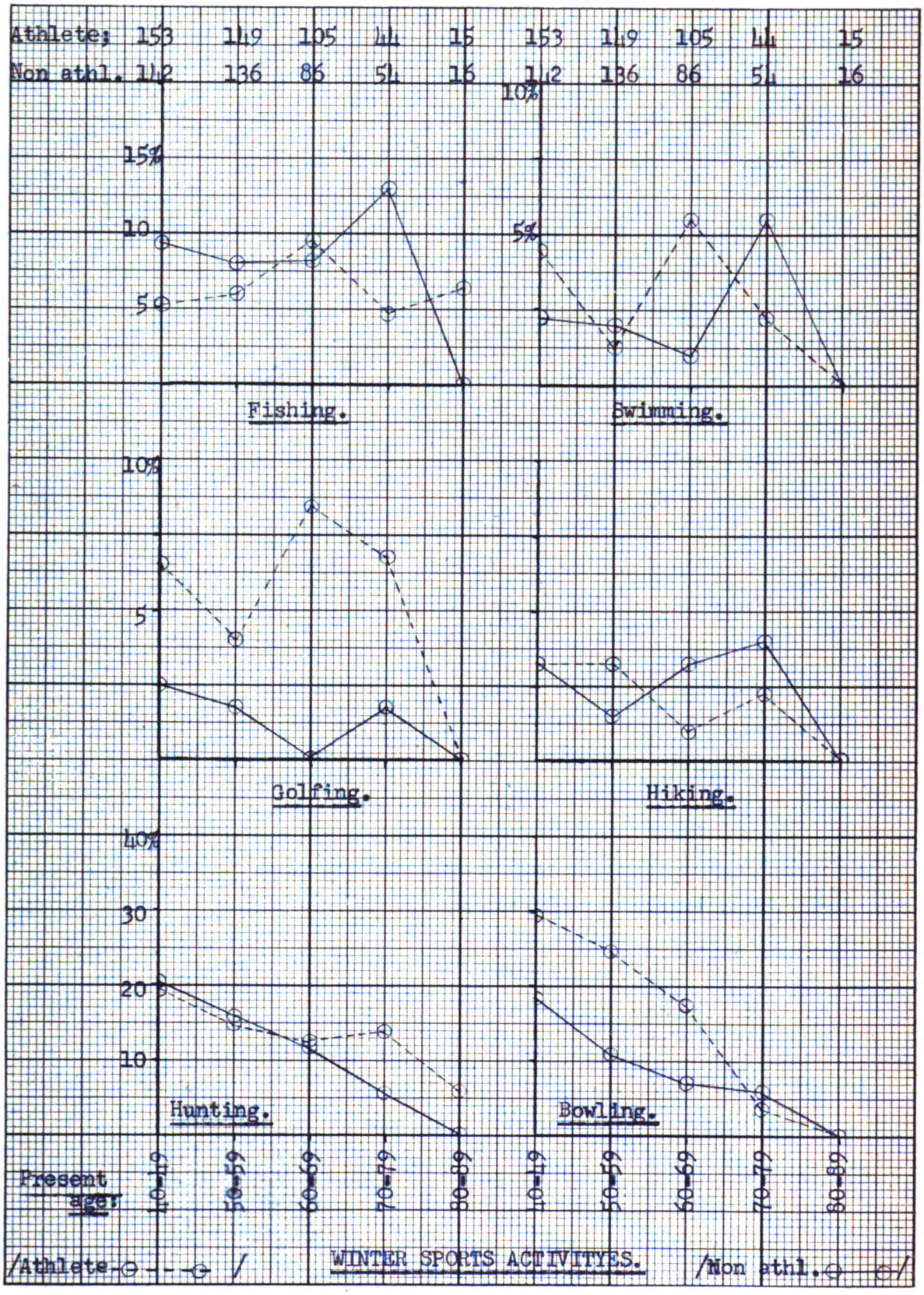
GRAPH XXIII


Total No. Athlete ; 153 149 105 44 15
Non Athlete 112 136 86 54 16
SUMMER SPORTS ACTIVITY.
Active once or more weekly.
60%
50
40
30
20
10
0
Active 2-3 times or more weekly.
30
20
10
0
Active daily.
10
5
0
Present age:
10-19
50-59
60-69
70-79
80-89

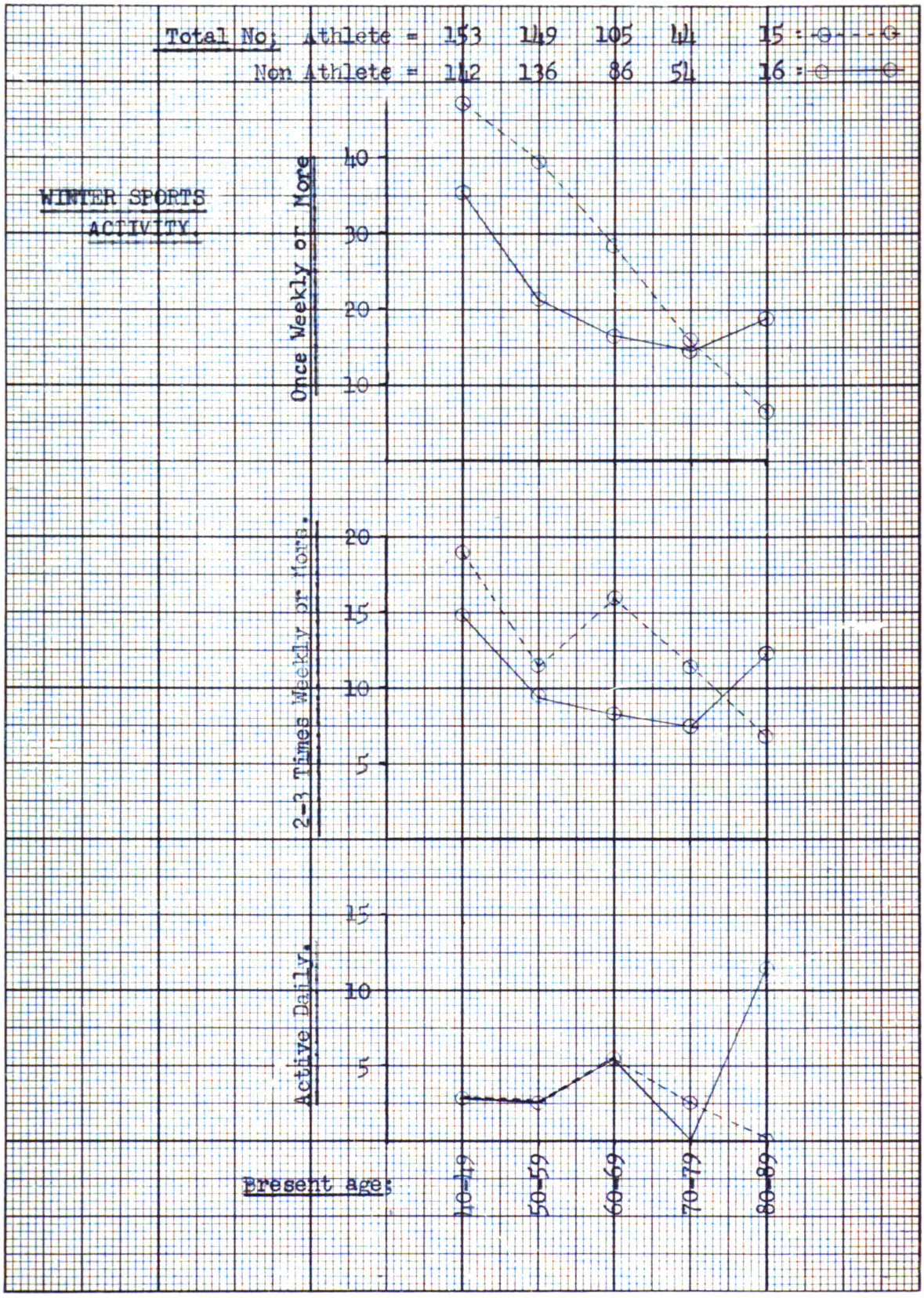
Winter sport activities in which the percentages were greatest are presented in Graph XXIV and of the six curves presented only bowling and golfing show athletes having more activity than non-athletes. Other sports with percentages worth mentioning are: Ice skating, 5.8% for athletes and 4.8% for controls; Skiing, 2.4% for athletes and 2.1% for controls; Table tennis, 3.6% for athletes and 3.2% for controls. Here again in Graph XXIV there is a slight downward trend from the younger to older age ranges but not nearly as much of a trend as was evident for the summer months.

For purposes of showing a better comparison of regular sport activity during the winter months between athletes and controls, three activity classifications were set up and plotted on separate graphs just as in the case of summer sport activity (Graph XXV). Here again it appears that the athletes were more active up to the daily activity graph much the same as they were for the summer months. When analyzed however, there was no statistically significant difference in the two groups of individuals. It appears that the older a person is, the less time he spends on any type of sport or hobby whether it be winter or summer.

GRAPH XXIV


Athlete; 153 149 105 44 15 153 149 105 44 15
Non athl. 142 136 86 54 16 142 136 86 54 16
15%
10
5
10%
5%
Fishing.
Swimming.
10%
5
Golfing.
Hiking.
40%
30
20
10
Hunting.
Bowling.
Present age:
10-19
20-29
30-39
40-49
50-59
60-69
70-79
80-89
/Athlete ⊖ - - ⊖ /
WINTER SPORTS ACTIVITYES.
/Non athl. ⊖ — ⊖/

GRAPH XXV


Total No: Athlete = 153 149 105 44 15
Non Athlete = 142 136 86 54 16
WINTER SPORTS ACTIVITY.
Once Weekly or More
40
30
20
10
2-3 Times Weekly or more.
20
15
10
5
Active Daily.
15
10
5
Present age:
10-19
50-59
60-69
70-79
80-89

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study is a comparison between a group of former athletes from various sports who competed at Michigan State University and a control group of non-athletes picked from the records of the registrar. The athletes were letter winners between the years 1886 and 1937 and the non-athletes were selected by using a random stratified sampling technique for the same years that the athlete group won their letters.

A total of 1078 questionnaires were sent. Of the 567 athletes sent a questionnaire, 476 returned useable questionnaires and 44 relatives returned the small colored questionnaire indicating date and cause of death. Of the 511 non-athletes sent questionnaires, 437 returned useable questionnaires and 28 relatives returned the small colored questionnaire giving date and cause of death. The percentages of returns were 90.99 for the non-athletes and 92.03 for the athletes.

Two follow-up letters were sent out to those individuals that had not returned a questionnaire. The follow-up letters were spaced about six to eight weeks apart in hopes they would increase the number of returns.

Every returned questionnaire was numbered the same as the address card from which it was mailed, this was done for ease in filing and ease in tabulating the information on I.B.M. cards. Next, a coding system was devised and all information was placed on tabulation sheets and then punched into I.B.M. cards. Two cards were needed to contain all the information on each subject used in the study.

There were 25 graphs and two tables derived from the information punched on the cards. These 27 graphs and tables were then statistically analyzed by the use of the Chi-Square technique and the t-Test to arrive at the results of this study.

Very few good studies have been done in the area of longevity. Probably the best study completed in this area was by Alan Rook[9] in 1954 on "An Investigation Into the Longevity of Cambridge Sportsmen." In Rook's study, a comparable group of non-athletes were used as controls. When analysis was made of the data collected, there appeared to be very little difference in the mean ages at death between the two groups. Rook also worked with an intellectual group and found that this group out-lived both the athletes and the random control group by about two years. Louis Dublin[1] completed an excellent study in 1932, "College Honor Men Long Lived," in which he used a comparable group of college subjects from which to draw his conclusions. He

also found little difference between his athletes and random control group. Dublin discovered that his group of intellectuals with which he was working out-lived both athletes and his control group by a few years.

Conclusions

The following conclusions are drawn from the results of this study:

1. A greater percentage of athletes smoke than non-athletes.

2. A greater percentage of athletes drink than non-athletes.

3. Athletes are heavier drinkers than the non-athletes.

4. The athletes are more flexible in the types of liquor they consume than are the non-athletes. The controls have higher percentages in the beer classification but more athletes drink whiskey and also lead in the "two or more" classification.

5. More non-athletes do house and yard maintenance than do the athletes.

6. A higher percentage of athletes do sit-up exercises in the summer than the control group.

The following areas were examined; however, they are not statistically significant.

1. There was no significant difference in occupational distribution for athletes and non-athletes.

2. There was no significant difference in occupational activity between the athletes and non-athletes.

3. The total number of children, and the differences between athletes and non-athletes with respect to total sons and total daughters proved to be insignificant.

4. There was no significant differences in marital status for athletes and non-athletes.

5. Comparisons of athletes and controls in relation to racial distribution were insignificant.

6. No differences were found between athletes and non-athletes and the amount of tobacco they used.

7. There was no significant difference between the athletes and non-athletes in relation to the percentages of each group working in their gardens.

8. The comparison of the athletes and non-athletes doing sitting-up exercises in the winter months was insignificant.

9. There was no significant difference in summer or winter sports activity between the athletes and controls.

10. The retirement habits between athletes and non-athletes were not statistically significant.

11. No significant differences were found when length of time spent in present occupation was examined.

12. There was no significant difference in type of tobacco used between the athletes and non-athletes.

13. The comparison of athletes to non-athletes concerning amount of work done around the house and yard was not statistically significant.

14. No significant differences were found between the two groups when the percentage mowing their lawns was examined.

15. No significant differences were found with respect to interests or activity in hobbies.

Recommendations

The following recommendations it is hoped will better future studies done in this area of research.

1. A new questionnaire should be constructed allowing less chance for misinterpretation of questions. In relation to the question concerning medical history, some of the subjects interpreted the question that only the examples listed were the ailments desired, whereas this was not the intention of the question at all. Either a complete list of ailments should be presented or the question phrased differently.

2. Check blanks in future questionnaire construction should never be placed in front of the questions such as was done in questions concerning race, smoking, drinking, marital status, non-vocational activity record, and the question asking if the subject had any children.

3. In future studies, questions concerning non-vocational activity such as lawn mowing, house maintainance, gardening, etc., should be stated in such a way as to get a summer-winter breakdown of activity.

4. The questionnaire included too many areas of fruitful information, it is felt that for a study similar to the one just presented, the questionnaire should be more detailed and cover just a few areas.

5. Different geographical areas should be sectioned off and subjects placed in their proper areas to see if there is any relationship between longevity and morbidity and the area of the country in which the subject lives. It would also be interesting to discover the relationship of non-vocational activity to the climate in which the subject lives.

6. In future studies, time should be allowed for a trial run of the questionnaire constructed to eliminate mistakes.

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APPENDIX A

Questionnaires
Covering Letters
Brief Summary of Original Study

MICHIGAN STATE UNIVERSITY, East Lansing

College of Education
Department of Health Physical Education and Recreation

Dear Sir:

About six years ago you were sent a questionnaire which was part of a national study of the longevity and morbidity of former college athletes and non-athletes. I would like to take this opportunity to thank you again for your wonderful cooperation. The complete results have been published in the form of a monograph by Phi Epsilon Kappa Fraternity, 3747 North Linwood, Indianapolis, Indiana, ($3.25). A brief summary of the study is enclosed with this letter.

We are hoping to maintain contact with the original participants, all of whom are graduates of Michigan State University. Would you be kind enough to furnish us the information requested on the enclosed form. This questionnaire will require considerably less time than the original one. These data will be correlated with some of the information originally furnished by you. Accuracy and completeness, of course, is of great importance. If there are any items for which you do not have the answer, please write "unknown."

May I express in advance my appreciation for your continued participation in this study and for your interest in our work.

Sincerely,

/s/ Henry J. Montoye

Henry J. Montoye
Professor

HJM:cs

Enclosure

MICHIGAN STATE UNIVERSITY, East Lansing

College of Education
Department of Health Physical Wducation and Recreation

Dear Sir:

About seven weeks ago you were sent a questionnaire from the Physical Education Department here at Michigan State University. The questionnaire was in connection with our follow-up study of the longevity and morbidity of male graduates of Michigan State University.

The results of this study are important because they will have a bearing on the administration of future sports programs. It is necessary for us to get as many returns from the participants of this study as possible. Will you take the few moments necessary to give us the answers we so urgently need to make this study a success? We are anxiously awaiting your reply.

Since you may have misplaced our questionnaire, I have included another copy.

Thank you for your cooperation.

Sincerely yours,

/s/ Henry J. Montoye

Henry J. Montoye
Professor

HJM:mb

Enclosure

MICHIGAN STATE UNIVERSITY, East Lansing

College of Education
Department of Health Physical Education and Recreation

Dear Sir:

Approximately eight weeks ago you were sent a questionnaire concerning a longevity and morbidity study being conducted here at Michigan State by the Physical Education Department. Five weeks later you were sent a follow-up letter, but we have still not received your return. Your attention to this matter would be appreciated very much.

From the careful follow-up we are making, it must be evident that this study is of great importance, not only to those of us here at Michigan State, but to people all over the world. We are sure you would like to be a part of this research.

If by chance, your questionnaire has been misplaced or did not reach you, we are sending you another copy.

Thank you for your cooperation.

Yours truly,

/s/ Henry J. Montoye

Henry J. Montoye
Professor

HJM:mmb

Enclosure

Longevity and Morbidity of College Athletes: Brief Summary

Questionnaires prepared by a national study committee were mailed to 1,129 Michigan State University athletes who earned varsity letters prior to 1938 and to a like number of non-letter winners matched by period of school attendance. Responses were received from 628 athletes and 563 controls or their next of kin. The data were tabulated and statistically analyzed with the aid of IBM punch cards and equipment. A brief summary of the findings together with those of previous studies is presented below under the major areas investigated.

Longevity

There was no appreciable difference in the longevity of athletes and non-athletes. The superiority in favor of athletes reported previously was due to inadequate controls used for comparison. There were insufficient numbers to compare athletes by sport specialty.

Causes of Death

There is considerable evidence in the literature that men who received distinction in sports are more prone to die from violent deaths (war deaths, accidents, suicides). There is no evidence of any other difference in cause of death. Again, athletes in various sports have not been compared.

Medical History

There has never been an adequate comparison of the medical histories of athletes and non-athletes. There is some indication that coronary thrombosis, hypertension, and arteriosclerosis occur at a later age among athletes.

Hereditary History

No differences were observed in average age at death of grandparents, parents, or siblings of athletes compared to non-athletes. There is convincing evidence that athletes come from larger families than non-athletes. The difference is accounted for by the number of brothers and not the number of sisters in the family. There is also a tendency among athletes for wrestlers to come from larger families and tennis players from smaller families. As in the medical and other portions of the hereditary histories, the differences among sports appear greater than the differences between athletes and non-athletes.

Weight in College

It is clear that athletes are heavier in college than non-athlete controls. The average weight of letter winners has steadily increased over the years whereas the increase of the controls is not nearly so pronounced. Wrestlers and football players were appreciably heavier and tennis players, track athletes, and cross-country runners lighter in college.

Weight Gain Since College

Between graduation from college and about the age of 35, the non-athletes gained about seventeen pounds on the average, whereas the athletes during this period gained only a little more than half this amount. However, the non-athletes show little gain after this age, but the athletes continue to gain until at about 45 years of age and thereafter the weight gain of athletes is greater.

Economic Status

There is appreciable evidence that athletes are more successful after graduation from college if one accepts the criteria of financial income and frequency of appearance on lists of eminent graduates. However, graduates who are active while on the campus in activities other than sports appear to fare about as well.

Marital Status

There appears to be no significant difference between athletes and non-athletes in percent who get married. The percentage among tennis players, however, is appreciably lower than other sports.

Smoking Habits

A larger proportion of former athletes smoke than is true of other graduates. However, among those who do smoke, there is no appreciable difference in degree or form of tobacco use. Among sports there is no significant difference in percent who smoke or in degree, but a disproprotionately large number of former baseball players chew tobacco and an unusually large percentage of pipe smokers were found among the cross-country runners.

Service in the Armed Forces

There is no decided difference in percent of athletes or non-athletes who saw service in the armed forces, but more

athletes served during both world wars than was true for the non-athletes. There is also some evidence that their activity was more vigorous while in service than that of the controls. It is clear that a greater proportion of the athletes saw service in the navy and marine corps. The differences by sport in any of these service factors were not significant.

Evaluation of Athletics

There is overwhelming evidence that both athletes and controls consider participation in intercollegiate athletics beneficial.

(This is a copy of the green slip attached to the top of the questionnaire.)

If addressee is deceased, please furnish the four items of information on this colored questionnaire. The larger questionnaire may be disregarded. Thank you.

Name of Addressee _____

Cause or Causes of Death _____

Date of Death _____

Place of Death (City and State) _____

Michigan State University
Department of Health Physical Education and Recreation

FOLLOW-UP STUDY OF LONGEVITY AND MORBIDITY OF MALE GRADUAGES OF MICHIGAN STATE UNIVERSITY

NAME OF ALUMNUS (please print) _____ Date _____

PRESENT ADDRESS _____

MARITAL STATUS (check one)
___ Married ___Single ___Widowed ___ Divorced

PRESENT WEIGHT _____lbs. If your weight has changed more than 15 lbs. within the last 7 years please explain _____

RACE ___ White ___ Negro ___ Other _____

PRESENT OCCUPATION _____ From 19__ to 19__

ANY PREVIOUS FULL TIME OCCUPATIONS:
1. _____ From 19__ to 19__
2. _____ From 19__ to 19__
3. _____ From 19__ to 19__
4. _____ From 19__ to 19__

SMOKING HABITS:
(please check only those which apply)

___Smoke ___Do Not Smoke
(If you do not smoke please disregard the remaining questions in this section)

Cigaretts:
1. Less than ½ pack per day __
2. ½ to 1 pack per day __
3. Over 1 pack per day __

Cigars
1. Less than 3 per day __
2. 3 to 6 per day
3. Over 6 per day

Pipe
1. Less than 4 bowls a day __
2. 4 to 10 bowls per day __
3. Over 10 bowls per day __

DRINKING HABITS:
(please check only those which apply)

___ Drink ___ Do Not Drink
If you do not drink please disregard the remaining questions in this section)

Beer
1. Occasional bottle __
2. 1 to 3 bottles per day __
3. Over 3 bottles per day __

Wine
1. Occasional glass other than for religious use __
2. Daily but less than ½ bottle __
3. Over ½ bottle per day __

Whiskey (gin, etc.)
1. Occasional glass __
2. 1 to 3 shots per day __
3. 4 to 6 shots per day __
4. Over 6 shots per day __

Chew
1. Less than ½ pack per day __
2. ½ to 3/4 pack per day __
3. Over 3/4 pack per day __

LONGEVITY OF BROTHERS AND SISTERS: (If any of your brothers or sisters have died in the past 7 years please furnish information requested)

Relationship	Cause of Death	Age at Death
Brothers		
Sisters		

MEDICAL HISTORY: What ailments have you had in the last 7 years? (Examples - Coronary Thrombosis, High Blood Pressure, Cancer, Diabetes, T.B., etc.)

		Age at Occurrance
1.		
2.		
3.		
4.		

FAMILY: Do you have any children? ___Yes ___ No
(If your answer is Yes please furnish information requested)

Sons: Number living _____
Number deceased _____, Age and cause of death
_____

Daughters: Number living _____
Number deceased _____, Age and cause of death
_____

NON-VOCATIONAL ACTIVITY RECORD FOR THE PAST YEAR:

1. Do you: __Mow your own lawn? __ Do other yard or house maintainence? (Please describe) _____

2. Do you: __Have a garden? What do you do in connection with this? _____

3. Do you: __Do any sitting up exercises in the winter? __In the summer? How long does each session last? _____ When was the last time? _____ The time before that? _____.

4. Do you walk or bike to work? _____ How far? _____
How often? _____

5. Do you have any hobbies or engage in other non-vocational work or recreation regularly? EXCLUDING SPORTS. (Please list below)

	Hobby or activity	How often do you participate
a.	_____	_____
b.	_____	_____
c.	_____	_____
d.	_____	_____

6. What sports did you engage in <u>regularly</u> during the past summer months? (Please use the list below as a guide)

	Sport	How often	When was the last time	The time before that
a.	_____	_____	_____	_____
b.	_____	_____	_____	_____
c.	_____	_____	_____	_____
d.	_____	_____	_____	_____
e.	_____	_____	_____	_____

7. What sports did you engaged in <u>regularly</u> during the past winter months? (Please use the list below as a guide)

	Sport	How often	When was the last time	The time before that
a.	_____	_____	_____	_____
b.	_____	_____	_____	_____
c.	_____	_____	_____	_____
d.	_____	_____	_____	_____
e.	_____	_____	_____	_____
f.	_____	_____	_____	_____

<u>LIST OF SPORTS ACTIVITIES</u>

Angling(fishing)	Curling	Ice Boating	Skeet and/or trap shooting
Archery	Fencing	Jai Alai	Skiing
Badminton	Field Ball	JuJuitsu	Snow Shoeing
Baseball	Football	Lawn Bowling	Squash Rackets
Basketball	Golf	Mountain climbing	Swimming
Bicycling	Gymnastics	Paddle Tennis	Table Tennis
Birling	Handball	Polo (horse)	Tennis
Bob-Sledding	Hiking	Polo (water)	Track and Field
Bowling	Hockey(field)	Rowing and sculling	Trapping
Boxing	Hockey (ice)	Sailing	Volley Ball
Canoeing	Horseback Riding	Shuffleboard	Walking Competitive
Codeball	Hunting	Skating (ice)	Weight Lifting
Criket	Hurling	Skating (roller)	Wrestling
Cross-Country			

APPENDIX B

IBM Coding Plan

CARD 4

Columns

1-5 Serial Number

6 Athlete (1), None-Athlete (2)

7-8 Year of birth (coded in five year intervals): 1855-9 (01), 1860-4 (02), 1865-9 (03), 1870-4 (04), 1875-9 (05), 1880-4 (06), 1885-9 (07), 1890-4 (08), 1895-9 (09), 1900-4 (10), 1905-9 (11), 1910-4 (12), 1915-9 (13)

9-10 Over-all activity rating (see coded classification in appendix)

11-12 Classification of present occupation: (see coded list of occupations in appendix)

13 Race: No response (x), White (1), Negro (2), Other (3)

14 Marital Status: No response (x), Single (1), Married (2), Widowed (3), Divorced (4)

15-17 Present Weight: No response (xxx), weight presented by exact numerical figures, example - 147 pounds is shown 147

18 Weight Change: No response (x), None (0), Gained more than 15 lbs. (1), Lost more than 15 lbs. (2)

19 Smoking Habits: No response (x), Don't smoke (0), Cigarettes (1), Cigars (2), Pipe (3), Chew (4), Two or more (5)

Columns

20 Smoking: No response (x), None (0), Light (1), Medium (2), Heavy (3); (On the questionnaire under each type of tobacco there are three possible answer blanks, these blanks have been given labels of light, medium and heavy. When a combination of answers occurred, the following code was used to determine under which classification each man fell):

1-3 lights is classified as a light
1 light and 1 medium is classified as medium
2 light and 1 medium is classified as a medium
1 medium is classified as a medium
2-3 mediums are classified as a heavy
any heavy is classified as a heavy

21 Drinking Habits: No response (x), Don't drink (0), Beer (1), Wine (2), Whiskey (3), Two or more (4).

22 Drinking: No response (x), None (0), Light (1), Medium (2), Heavy (3), (Same as column 20)

23-24 Deceased brothers 1st: No response (xx), None deceased (00), (for cause of death, see coded list of causes of death in appendix)

25-26 Deceased brothers 1st: No response (xx), None deceased (00), Age at death (01-99)

27-30 Deceased brothers 2nd: No response (xx), None deceased (00), Cause and age at death

31-35 Deceased brothers 3rd: No response (xx), None deceased (00) Cause and age at death

Columns

35-36 Deceased sisters 1st: No response (xx), None deceased (00), (For cause of death, see coded list of causes of death in appendix)

37-38 Deceased sisters 1st: No response (xx), None deceased (00) Age at death (01-99)

39-42 Deceased sisters 2nd: No response (xx), None deceased (00), Cause and age at death

43-46 Deceased sisters 3rd: No response (xx), None deceased (00), Cause and age at death

47-48 Ailments in past 7 years, 1st: No response (xx), None (00), Ailments (01-59) (See codedlist of ailments in appendix)

49-50 Ailments 1st: No response (xx), None (00), Age at occurrance (01-99)

51-54 Ailments 2nd: No response (xx), None (00), Ailment and age at occurrance

55-58 Ailments 3rd: No response (xx), None (00), Ailment and age at occurrance

59-62 Ailments 4th: No response (xx), None (00), Ailment and age at occurrance

63 Any children: No response (x), Yes (1), No (2)

64 Number of sons living: No response (x), No children or none living (0), one (1), two (2), three (3), four (4), five (5), etc.

Columns

65 Number of sons deceased: No response (x), No children or none living (0), one (1), two (2), three (3), four (4), five (5), etc.

66-67 Deceased sons 1st: No response (xx), None deceased (00), (For cause of death see coded list of causes of death in appendix)

68-69 Deceased sons 1st: No response (xx), None deceased (00), Age at death (01-99)

70-73 Deceased sons 2nd: No response (xx), None deceased (00), Cause and age at death

74-77 Deceased sons 3rd: No response (xx), None deceased (00), Cause and age at death

78 Number of daughters living: No response (x), No children or none living (0), one (1), two (2), three (3), four (4), five (5), etc.

79 Number of daughters deceased: No response (x), No children or none deceased (0), one (1), two (2), three (3), four (4), five (5), etc.

80 Card Number 4

CARD 5

Columns

1-5 Serial Number

6 Athlete (1), None-Athlete (2)

7-8 Year of birth (coded in five year intervals): 1855-9 (01), 1860-4 (02), 1865-9 (03), 1870-4 (04), 1875-9 (05), 1880-4(06), 1885-9 (07), 1890-4 (08), 1895-9 (09), 1900-4 (10), 1905-9 (11), 1910-4 (12), 1915-9 (13)

9-10 Overall activity rating (see coded classification in appendix)

11-12 Classification of present occupation: (See coded list of occupations in appendix)

13 Activity rating of present occupation: No response (x), Retired (o), Insufficient information (1), Sedentary (2), Light (3), Medium (4), Heavy (5), Very Heavy (6): (These classifications were recorded from the estimates of worker trait requirements as defined in the Dictionary of Occupational Titles)*

14 Length in present occupation: No response (x), No occupation (0), Less than 1 year (1), one to three years (2), three to five years (3), five to ten years (4), ten to fifteen years (5), fifteen to twenty years (6), twenty to twenty-five years (7), and over twenty-five years (8)

*Estimates of Worker Trait Requirements for 4,000 Jobs, as defined in the Dictionary of Occupational Titles (an alphabetical index), United States Department of Labor, Bureau of Employment Security; prepared by U.S. Employment Service.

Columns

15-16 Classification of 1st previous occupation: (same as 11-12)

17 Activity rating of 1st previous occupation: No response (x), No occupation and insufficient information (0), Sedentary (1), Light (2), Medium (3), Heavy (4), Very Heavy (5)

18 Length in 1st previous occupation: (same as 14)

19-20 Classification of 2nd previous occupation: (same as 11-12)

21 Activity rating of 2nd previous occupation: (same as 17)

22 Length in 2nd previous occupation: (same as 14)

23-24 Deceased daughters 1st: No response (xx), None deceased (00), (For cause of death, see coded list of causes of death in appendix)

25-26 Deceased daughters 1st: No response (xx), None deceased (00), Age at death (01-99) (children less than 1, classified as 01)

27-30 Deceased daughters 2nd: No response (xx), None deceased (00), Cause and age at death

31-34 Deceased daughters 3rd: No response (xx), None deceased (00), Cause and age at death

35 Mow your own lawn; No response (x), No (0), Occasional (1), Yes, regularly (4)

Columns

36 Do other house and yard maintainence: No response (x), None (0), Light (2), Medium (4), Heavy (8); (The breakdown into categories of light, medium and heavy are as follows)

Light - Minor repairs only, limited amounts
Medium - Does house and yard maintainence, but gives no discription, active but insufficient information, does a lot but not all of it.
Heavy - Does all yard and house maintainence

37 Have a garden and work done in connection with garden: No response (x), None (0), Light (3), Medium (5), Heavy (7) (The breakdown into categories of light, medium, and heavy are as follows)

Light - Plants and maintains
Medium - Plants, maintains, and harvests
Heavy - Prepares ground, plants, maintains, harvests and cleans up ground after harvest

38 Sitting up exercises in winter: No response (x), None (0), About once per week, less than four minutes per workout (1), About once per week, four to ten minutes per workout (2), About once per week, ten minutes or more per workout (3), Several times per week, less than four minutes per workout (4), Several times per week, four to ten minutes per workout (5), Several times per week, ten minutes or more per workout (6), Daily, less than four minutes per workout (7), Daily, four to ten minutes per workout (8), Daily, ten minutes or more per workout (9)

Columns

39 Sitting up exercises in Summer: (same as 38)

40 Walk or bike to work (including as a hobby): No response (x), No (0), Once per week, six blocks or less (1), Once per week, seven through twelve blocks (2), Once per week, thirteen blocks or over (3), Several times per week, six blocks or less (4), Several times per week, seven through twelve blocks (5), Several times per week, thirteen blocks or over (6), Daily, six blocks or less (7), Daily, seven through twelve blocks (8), Daily, thirteen blocks or over (9)

41-42 Hobbies and non-vocational activity 1st: (See coded list of hobbies in appendix)

43 Occurrance of participation in 1st hobby: No response (x), None (0), Hobbies yes, but no information as to time spent (1), Less than once per month (2), Once per month (3), Two or three times per month (4), Once weekly (5), several times weekly (regularly) (6) Daily (7)

44-45 Hobbies and non-vocational activity, 2nd hobby: (same as 41-42)

46 Occurrance of participation in 2nd hobby: (same as 43)

47-48 Hobbies and non-vocational activity, 3rd hobby: (same as 41-42)

Columns

49 Occurrance of participation in 3rd hobby: (same as 43)

50-51 Hobbies and non-vocational activity, 4th hobby: (same as 41-42)

52 Occurrence of participation in 4th hobby: (same as 43)

53-54 Sports engagements in summer months, 1st sport: (See coded list of sports in appendix)

55 Occurrence of participation in 1st sport: No response (x), None (0), Less than once per month (1), Once monthly (2), Two to three times monthly (3), Once weekly (4), Two to three times weekly (6), Once every two days (8), Daily (9)

56-57 Sports engagements in summer months, 2nd sport: (same as 53-54)

58 Occurrence of participation in 2nd sport: (same as 55)

59-60 Sports engagements in summer months, 3rd sport: (same as 53-54)

61 Occurrence of participation in 3rd sport: (same as 55)

62-63 Sports engagements in summer months, 4th sport: (same as 53-54)

64 Occurrence of participation in 4th sport: (same as 55)

65-66 Sports engagements in winter months, 1st sport: (See coded list of sports in appendix)

Columns

67 Occurrance of participation in 1st winter sport: No response (x), None (0), Less than once per month (1), Once monthly (2), Two to three times monthly (3), Once weekly (4), Two to three times weekly (6), Once every two days (8), Daily (9)

68-69 Sports engagements in winter months, 2nd sport: (same as 65-66

70 Occurrance of participation in 2nd sport: (same as 67)

71-72 Sports engagements in winter months, 3rd sport: (same as 65-66)

73 Occurrance of participation in 3rd sport: (same as 67)

74-75 Sports engagements in winter months, 4th sport: (same as 65-66)

76 Occurrance of participation in 4th sport: (same as 67)

77 Seasons of non-vocational activities: No activities (0), Predominantly summer (1), Predominantly winter (2), Distributed year around (3), If the total of either the winter or the summer weighted sports exceeded the other by two or more points, then the activity for that man would be classified as predominantly summer or predominantly winter. If only one point separated the two (summer and winter) when

Columns

weights were totaled, then the activities or sports were considered distributed. If a man had only one sport in one of the two seasons and this sport happened to have a weight of only one, the man was marked as no activity.

78-79 Non-vocational activity rating: No activity (0), Sedentary (1), Light (2), Medium (3), Heavy (4), Very heavy (5); (see coded classification for non-vocational activity rating in appendix)

80 Card Number 5

CLASSIFICATION OF AILMENTS

XX	No response
00	No ailments
01	Tuberculosis of respiratory system
02	Tuberculosis, other forms
03	Syphilis and its sequelae
04	Hemorrhoids
05	Dysentery, all forms
06	Other infective diseases commonly arising in intestinal track
07	Certain diseases common among children
	7a Scarlet fever
	7b Diphtheria
	7c Whooping cough
	7d Measles
	7e Mumps
08	Low blood pressure
09	Malaria
10	Diseases due to helminths
11	All other diseases classified as infective and parsitic
12	Malignant neoplasms, including neoplasms of lymphatic and haematopoietic tissues
13	Benign neoplasms and neoplasms of unspecified nature
14	Allergic disorders
15	Diseases of thyroid gland
16	Diabetes mellitus
17	Arteriosclerosis
18	Anemias
19	Psychoneuroses and psychoses
20	Vascular lesions effecting central nervous system
21	Diseases of the eye
22	Diseases of ear and mastoid process
23	Rheumatic fever
24	Chronic rheumatic heart disease
25	Other arteriosclerotic and degenerative heart disease
26	Hypertensive disease
27	Diseases of veins
28	Acute nasopharyngitis (common cold)
29	Acute pharyngitis and tonsillitis, and hypertrophy of tonsils and adenoids
30	Influenza
31	Pneumonia
32	Bronchitis
33	Silicosis and occupational pulmonary fibrosis
34	All other respiratory diseases
35	Diseases of stomach and duodenum, except cancer
36	Appendicitis
37	Hernia of abdominal cavity

38 Diarrhea and enteritis
39 Diseases of gall bladder and bile ducts
40 Other diseases of digestive system
41 Nephritis and nephrosis
42 Diseases of genital organs, male and female
43 Delivery complications of pregnancy, childbirth and puerperium
  43a Normal deliveries
  43b Complications of pregnancy, childbirth and the puerperium
44 Boil, abscess, cellulitis and other skin infections
45 Other diseases of skin
46 Arthritis and rheumatism, except rheumatic fever
47 Diseases of bones and other organs of movement
48 Congenital malformations and diseases peculiar to early infancy
49 Other specified and ill-defined diseases
50 Motor vehicle accidents
51 All other accidents
52 Violence--operations of war, etc., all others
53 Prostate
54 All other heart diseases
55 All other vascular diseases
56 Nervous disorders and psychiatric cases
57 Angina pectoris
58 Coronary thrombosis
59 Avitaminosis and other deficiency states

CODED LIST OF SPORTS

XX	No response
00	No sport
01	Angling (fishing)
02	Archery
03	Badminton
04	Baseball
05	Basketball
06	Bicycling
07	Birling
08	Bob-sledding
09	Bowling
10	Boxing
11	Canoeing
12	Codeball
13	Cricket
14	Cross-country
15	Curling
16	Fencing
17	Fieldball
18	Fishing
19	Football
20	Golf
21	Gymnastics
22	Handball
23	Hiking
24	Hockey (field)
25	Hockey (ice)
26	Horseback riding
27	Horseshoe pitching
28	Hunting
29	Hurling
30	Ice Boating
31	Jai Alai
32	Jujitsu
33	Lawn Bowling
34	Mountain climbing
35	Paddle tennis
36	Polo (horse)
37	Polo (water)
38	Rowing and sculling
39	Sailing

40	Shuffleboard
41	Skating (ice)
42	Skating (roller, small)
43	Skeet and/or trap shooting
44	Skiing
45	Snow shoeing
46	Squash rackets
47	Swimming
48	Table tennis
49	Tennis
50	Track and field
51	Trapping
52	Volley ball
53	Walking (competitive)
54	Weight lifting
55	Wrestling
56-98	Blank
99	Unknown

CLASSIFICATION OF CAUSES OF DEATH*

XX	No response
00	No death
01	Tuberculosis of respiratory system
02	Tuberculosis, other forms
03	Syphilis and its sequelae
04	Typhoid fever
05	Cholera
06	Dysentery, all forms
07	Scarlet fever and streptococcal sore throat
08	Diphtheria
09	Whooping cough
10	Meningococcal infections
11	Plague
12	Acute poliomyelitis
13	Smallpox
14	Measles
15	Typhus
16	Malaria
17	All other diseases classified as infective and parasitic
18	Malignant neoplasm, including neoplasms of lymphatic and hematopoietic tissues
19	Benign and unspecified neoplasms
20	Diabetes mellitus
21	Anemias
22	Vascular lesions affecting central nervous system
23	Meningitis
24	Rheumatic fever
25	Chronic rheumatic heart disease
26	Arteriosclerotic and degenerative heart disease
27	Other diseases of the heart
28	Hypertension with heart disease
29	Hypertension without mention of heart
30	Influenza
31	Pneumonia
32	Bronchitis
33	Ulcer of stomach and duodenum
34	Appendicitis
35	Intestinal obstruction and hernia
36	Gastritis, duodenitis, enteritis and colitis, except diarrhea of newborn

*Reference: Manual of the International Statistical Classification of Diseases, Injuries and Causes of Death, Sixth Revision, 1948, Vol. I and II, World Health Organization, Geneva, Switzerland. Bulletin of the WHC, Supplement 1.

37	Cirrhosis of liver
38	Nephritis and nephrosis
39	Hyperplasis of prostate
40	Complications of pregnancy, childbirth and the puerperium
41	Congenital malformations
42	Birth injuries, postnatal asphyxia and atelectasis
43	Infections of the newborn
44	Other diseases peculiar to early infancy and immaturity unqualified
45	Senility without mention of psychosis, ill-defined and unknown cases
46	All other diseases
47	Motor vehicle accidents
48	All other accidents
49	Suicide and self-inflicted injury
50	Homicide and operations of war

HOBBY AREAS

(XX) No response
(00) None
(01) Wood working
(02) Lecturing
(03) Cooking
(04) Spectator
(05) Shooting (pistol and rifle)
(06) Active Construction
(07) Reading
(08) Studying
(09) Writing
(10) Music
(11) Church, Organizations, Civic Groups and Politics
(12) Youth Work
(13) Trustees, commissioners and office duties
(14) Other occupations (part time)
(15) Creative arts
(16) Traveling
(17) Dancing and Dancing Clubs
(18) Photography
(19) Sport officiating
(20) Electronics
(21) Mechanical
(22) Forestry and Lumbering
(23) Sedentary games
(24) Collecting guns and gun smithing
(25) Music listening
(26) Poultry
(27) Boating and boating clubs
(28) Collecting and/or mounting small items
(29) Camping and associated activities
(30) Antiques
(31) Astronomy
(32) Training animals
(33) Flying
(34) Pool and billiards
(35) Gardening and gardening clubs
(36) Walking
(37) Other hobbies

OCCUPATION AREAS

(XX) No response
(00) No previous occupations
(01) Retired
(02) Engineers
(03) Professional people, Dr.'s, lawyers, etc.
(04) Teaching
(05) Educational administration
(06) Managerial Jobs
(07) Advisors and Consultants
(08) Supervisory and Foremanship Jobs
(09) Inspection Work
(10) Banking and Investments
(11) Buyers
(12) Contractors
(13) Scientists
(14) Sales
(15) Office Personnel
(16) Literary Work
(17) Ministry
(18) Agriculture Agents (including extension agents)
(19) Skilled workers (non-labor)
(20) Skilled labor
(21) Unskilled labor
(22) Armed Services
(23) Foresters
(24) Farmers
(25) Professional Sports
(26) Others