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AN INVESTIGATION INTO THE LONGEVITY OF CAMBRIDGE SPORTSMEN

BY

Sir ALAN ROOK, K.B.E., C.B., F.R.C.P.

Senior Health Officer, Cambridge University

(From the Department of Human Ecology)

Some people prescribe frequent and violent labour and exercises . . . ; the most forbid, and by no means will have it go farther than a beginning sweat, as being perilous if it exceed.—ROBERT BURTON.

The reaction of the human body to the effects of strenuous exertion in youth and early manhood has long been a subject of interest to everyone concerned with the promotion of health and of physical efficiency. Many observers, both in ancient and in more modern times, have pointed out the alleged dangers of such activities, and these opinions have been summarized by Horton-Smith Hartley and Llewellyn (1939). How many regard what they consider to be the folly of undue exertion may be exemplified by the story of the elderly don, himself approaching his hundredth year, who deplored the death of a colleague some three years his junior with the remark that in his youth the dead man had been addicted to climbing mountains, and such exertions must unquestionably have shortened his life. Too often when some well-known sportsman has died at an early age the Jeremiahs, shaking their heads mournfully, have connected two quite unrelated circumstances, much in the way that Morgagni recounted the case of the man "who had been too much given to the exercise of tennis." As this man died of a ruptured aortic aneurysm it seems likely that activities other than tennis were to blame.

The effects of physical exertion are felt by every part of the body, but the cardiovascular system is usually regarded as bearing the chief strain of athletic activities. The problem which the doctor who is called upon to advise about participation in strenuous sports and pastimes is asked to solve has at least two aspects. Firstly, can these exertions cause direct damage to any of the organs of the body, particularly the heart; and, secondly, does exertion, in some way that is not immediately obvious, cause trouble in later life which may result in premature demise?

In answering the first part of the problem the doctor is on firm ground. There now seems to be general agreement, the evidence for which has been restated by Abrahams (1951) in his Lumleian Lecture, that strenuous exertion has no immediate ill effect on the normal heart. This opinion, backed as it is by such giants of cardiology as Mackenzie and Lewis, seems incontrovertible. It is the second part of the problem that has never been answered satisfactorily.

Most observers have found that men taking part in sports which entail long-continued exertion have, on the average, hearts that are demonstrably bigger than those of a control group (Bramwell and Ellis, 1931). Where exertion, although strenuous, is maintained for only short periods it has not been so easy to demonstrate an increase in heart size. Whether any differences which have been observed are the result of training or whether the possession of a heart bigger than normal to start with is a factor in the athletic superiority of these men is not certain. An apparent increase in size of the heart has been reported as occurring during periods of active training (Wilce, 1943), a finding which others have failed to confirm (Parnell, 1951). In any case does an apparently normal heart that is bigger than the average indicate a lasting increase in cardiac efficiency, or does it, as has been suggested, constitute a relative inferiority? If this latter argument is correct it would appear that the hearts of athletes might not last so well and that cardiac disease should figure more prominently among them, and at an earlier age, than it does in non-athletes.

During recent years a great deal of work has been done, partly in this country but largely in America, to answer the problem by inquiring into the life-histories of sportsmen of earlier days. The conclusions of the various observers have been somewhat conflicting, but the general findings may be summarized as follows. When comparing the expectation of life of these men with that of males in the general population there was no doubt that university sportsmen had an advantage, according to one computation by as much as five years. Comparison between American college sportsmen and other college graduates showed that, while there was little to choose before the age of 50 years, after 50 the advantage was slightly with the other graduates. The difference was even more apparent when comparison was made between sportsmen and a group of "honours men," men of high intellectual status, who had a distinctly greater expectation of life.

This work may be criticized for various reasons; the principal ones are that the number of lives investigated have been too few, the follow-up has been for too short a period, and in some cases comparison has been with standard life-tables made from a population not comparable with the men under investigation. Even in those instances where comparison has been made with groups

of people closely allied to the sportsmen, there are so many variable factors to be taken into account that there could be no certainty that any differences in longevity occurring in the groups were the results of strenuous exertion. The influences of inheritance cannot be neglected, while variations in physical development affecting the height-weight ratio are known to play a part. The period of life when strenuous activities are undertaken is usually a limited one, and subsequent factors such as the economic situation, occupation, and, in particular, habits as regards the intake of food, alcohol, and tobacco affect longevity quite apart from the more direct influences of certain diseases. The psychological factors which attract men to take part in strenuous and sometimes hazardous pastimes are often not wholly satisfied by such activities, and sportsmen are more inclined to live dangerously than their less energetic neighbours.

Hence, while a study of the longevity and of the cause of death of sportsmen is probably the only method at present available of ascertaining whether in the long run strenuous exertion is, or is not, harmful to the cardiovascular system it is a method that is beset with pitfalls and one which justifies only tentative conclusions.

Scope of the Investigation

An opportunity for reinvestigating the matter has been afforded by the completion of *Alumni Cantabrigienses* (Venn, 1953), a biographical list of all known students, graduates, and holders of office at Cambridge University from the earliest times until 1900, compiled during a period of over 30 years by the President of Queens' College, Dr. J. A. Venn, whose kindness and help in this investigation must be gratefully acknowledged. This work contains information about Cambridge men, including the date of birth, the school, the college, and often details of University distinctions both academic and sporting. In many instances there are notes of the career after leaving the University and, when appropriate, the date of death.

When planning the investigation it was decided to limit inquiries to men who during a certain period had represented the University in the contests with Oxford University (Abrahams and Bruce-Kerr, 1931) at rowing, cricket, rugby football, and certain branches of athletics, the whole group being called the sportsmen group, and to compare them with a control group of men who had been at the University during the same period of time. The years chosen were those between 1860 and 1900 inclusive, the former date because regular contests started about this time, and the latter so that young or middle-aged men should not be included.

The group with which comparison is made, called the control group, has been composed from two sources, the first being selected at random (random group) and the second from men of special academic distinction (intellectual group). It is possible that the men selected at random were enthusiastic sportsmen whose physical activities equalled or even exceeded those of the men who took part in inter-university contests, while the intellectual capacity of some in the sportsmen or random group may have been on a par with that of the men who formed the intellectual group. Similarly, there is evidence that the sporting activities of some of the men in the intellectual group were not inconsiderable. It can only be argued that, despite obvious drawbacks, these men form a better basis for comparison than do those from whom actuarial tables of assured lives or the Registrar-General's tables have been made.

As was to be expected, the after-histories of a number of the men in all the groups could not be ascertained, so that roughly one in every fourteen names had to be discarded. This failure chiefly affected the men whose university careers had not been particularly distinguished, so that after-histories

for the group selected at random could not be obtained in one out of every nine cases. This may have been due in some cases to an early death, and life tables made for this group in which the greatest number of unknowns occurred may be somewhat optimistic.

This investigation inevitably suffers, as have previous ones, from the smallness of the numbers involved, so that the differences to be observed in studying the life-tables made from the various groups are never more than might have resulted from chance in so small a sample. Nevertheless, certain trends are apparent both of a positive and of a negative nature.

Composition of the Various Groups (Table I)

Sportsmen

Athletes.—The athletes chosen for study were those running the short-distance races (the 100 yards and 440 yards), the longer-distance races (the mile and three miles), and those competing in throwing the hammer and putting the weight. The records of inter-university athletic contests start in the year 1864. During the earlier years there were a number of changes in the events, so that in the first sports the distance events were the mile and a steeplechase and there was no hammer or weight contest. In 1865 the steeplechase was altered to a two-mile race and putting the weight was included. The two-mile race was continued in the 1866 and 1867 contests but was omitted in 1868, when a three-mile race was introduced. Throwing the hammer began in 1866 and has been contested since, although in this and in putting the weight the actual weight used and the method of competing varied somewhat in the first few years. The records consulted give the names of all men taking part, and not only the first and second strings. All names mentioned as competing in the selected events in the inter-university contest have been included in the group.

Cricket.—Cricket was the first of the inter-university contests, beginning in 1827, two years before the first recorded boat race. It was played intermittently after that until 1838 and thereon each year except during the world wars. Cricket was the second game for which a blue was awarded, rowing being the first.

Rowing.—The first boat race was rowed in 1829, but it was not until 1856 onwards that it became an annual event. The coxes have not been included in the group, which is confined to oarsmen.

TABLE I.—Total Numbers Under Investigation*

Group	No.	Information		Dead	Alive
		Complete	Incomplete		
Sportsmen:					
Athletes	252	221	31	206	15
Cricketers	187	177	10	162	15
Rowing men	178	171	7	155	16
Rugby footballers ..	217	203	14	180	23
Total	834	772	62	703	69
Controls:					
Intellectuals	382	374	8	332	42
Random group	379	336	43	293	43
Total	761	710	51	625	85
Grand total ..	1,595	1,482	113	1,328	154

*Double and triple "blues" and "half-blues" have been shown once only. The athletes group includes all men who took part in the inter-university contests in the sprints, long-distance races, hammer, and weight. The cricket group does not include men who took part in the athletic contests as well as gaining a cricket blue. The rowing group does not include men who, besides gaining a rowing blue, took part in the athletic contests or who played cricket for the university, and similarly the rugby footballers comprise only men not included in the other three groups. Six of the intellectual group obtained blues or half-blues, and have been included in the appropriate sportsmen group, so that there is some duplication, the number of separate individuals for whom information is complete being 1,476 and not 1,482.

Rugby Football.—Rugby football was the last of the four sporting events to be recognized by the award of a blue. The first inter-university contest was in 1872, but it was not till the winter of 1873 that the names of the players

were recorded in the *Book of Blues* (Rysden, 1900). Two games were played in 1873—one in February and one in December. At first the numbers varied, 21 being the usual number on each side, made up of 14 forwards and 7 backs. On one occasion fog prevented a number of players reaching the ground, and the game was played with 14 a side. The present number of 15 a side was first used in 1875, but the team then consisted of ten forwards and five backs and in later games of nine forwards and six backs. It was not until 1893 that the present formation of eight forwards and seven backs came into use. As records of rugby football teams began in 1872 it follows that the men in this group are not spread over the whole of the period studied but belong only to the middle and later years.

Double and Triple Blues.—A number of men took part in two of the different sporting events and two men took part in three—in athletics, cricket, and rugby football. In the athletic group five men also played in the cricket side, six rowed in the university boat, and eleven played in the rugby side; one cricketer rowed in the boat race, and eleven played in the inter-university rugby match, as did two of the rowing men. Thus 38 men in the sportsmen group took part in contests against Oxford University in more than one of the four sports under review. In the subsequent tables, when comparing the men who have taken part in the different sports contests with one another, these men have been included in the appropriate groups, so that there has been duplication; when comparing sportsmen with the control groups these 38 men have been entered only once.

Controls

Intellectual Group.—This group is made up of men whose names were taken from the honours lists of the Historical Register of the University. It comprises those men included in the first four places of the mathematical tripos for each of the years 1860 to 1900, and similarly those in the first class of the classical tripos for the years 1860 until 1882. In 1882 new regulations came into force which altered the composition of the lists slightly, and from this date until 1900 the first four names in division 1 of the first class were taken. In some years more than four men were bracketed together for the first four places, so that the numbers in the group exceed the estimated total of 328. Included in the group are six men who in addition to their classical or mathematical honours obtained blues or half-blues for one or other of the sports which are under investigation. One man, a fourth classic, obtained blues for both rowing and athletics; two men, a third wrangler and a fourth classic, took part in the inter-university athletics contest; two men, a first classic and a fourth classic, obtained rugby blues; and one, a fourth classic, got a cricket blue. These men have been included in both the intellectual group and the sportsmen group.

Random Group.—This group, chosen at random, was made up of men who have been at the university in the years under survey and who had not distinguished themselves sufficiently either academically or as sportsmen to be included in the other groups. The man selected was the first one on every tenth page of *Alumni Cantabrigienses* who fulfilled the requirements. In this way 379 names were taken, and it was possible to obtain the after-histories of 336 of them.

Method of Investigation

Probably the simplest method of studying the longevity of a group of people is by the construction of life-tables showing the survival rates experienced during a chosen period of time. If the group is large enough this can be done in yearly periods or with smaller groups in five- or ten-year periods. Where the groups studied are sufficiently large the rates of mortality are likely to be regular and chances of gross error are remote, but with small groups a methodical progression is unlikely, and any peculiar happening resulting in a few deaths within a short period may distort the tables considerably. Despite these obvious drawbacks

it seems probable that for the present purpose these tables are the best way of making comparisons, but it is essential that the failings of the method should be kept in mind.

I am indebted to Dr. W. L. Smith, Ph.D., statistician to the medical school of Cambridge University, for advice and for the construction of the following tables.

One of the striking things about life-tables which have been compiled within the last century has been the improvement in the expectation of life experienced by the general population. This improvement is shown in life-tables published by the Registrar-General and by the Institute of Actuaries, but it does not affect the lives of the men under investigation to any appreciable degree. In the first place the improvement occurred largely in the latter part of the period, not in the earlier years which are being dealt with here. Secondly, advances in hygiene have chiefly benefited the poorer elements of the population and not the group now being investigated. University men of these times were a specially selected group drawn almost entirely from the more prosperous sections of the community, most of them subsequently having successful professional or business careers. When the whole group is divided up into those born (1) before January 1, 1850; (2) from between January 1, 1850, and December 31, 1859; (3) from between January 1, 1860, and December 31, 1869; and (4) those born on January 1, 1870, and thereafter, the survival rates in the four subgroups show surprisingly little variation (Table II).

TABLE II.—Comparison of Survival Rates of Men Born in Different Decades. Excluding Deaths Due to War and Accident

Age	No. of Survivors at Each Age			
	Year of Birth			
	Before 1850	1850-9	1860-9	1870 Onwards
20	1,000	1,000	1,000	1,000
25	990	989	997	989
30	957	976	986	967
35	931	952	978	953
40	914	918	967	914
45	881	881	948	872
50	855	851	923	847
55	822	798	873	817
60	776	729	813	736
65	697	634	730	650
Percentage living aged over 70	56.6	51.5	56.7	52.2
No. in group	305	376	362	361

The smaller number in the subgroup born before 1850 is due to the almost complete absence of rugby footballers, as rugby football games against Oxford did not start until 1872.

This is of some importance in reading the subsequent life-tables, for as a result of the fact that rugby football games did not start till 1872, and also to a less extent because the athletic contests did not start till 1864, the spread of the men whose lives are under investigation has not been distributed evenly over the period. Had there been any marked improvement in the expectation of life in the university population it would have given the rugby footballers and the athletes an advantage which would have been difficult to gauge. It seems justifiable, however, to assume that in university men of the period 1860 to 1900 any change in expectation of life as the result of improving medical and social conditions with the passage of time has been negligible, and that the life-tables which follow have not been distorted from this cause.

Comparison of the Various Groups

Comparison of Sportsmen and Controls

It will be seen from Table III that the average age at death varied comparatively little, being slightly better for the intellectuals, who lived on the average nearly two years longer than the random group and nearly one and a half years longer than the sportsmen.

TABLE III.—*Survival Rates of Sportsmen and Controls. Excluding Deaths Due to War and Accidents*

Age	No. of Survivors at Each Age		
	Sportsmen	Intellectuals	Random Group
20	1,000	1,000	1,000
25	996	987	985
30	982	962	964
35	963	948	949
40	934	937	913
45	898	910	889
50	870	888	867
55	825	841	837
60	763	791	754
65	673	738	634
70	523	597	532
75	377	434	364
80	186	231	193
85	82	92	82
90	23	26	23
No. in group ..	723	362	325
Average age at death	67.97	69.41	67.43
Variance of estimate of average age at death	0.29	0.61	0.74

From these survival rates it would appear that up to the age of 40 the sportsmen had slightly better prospects, the differences seen in the other two groups probably being the result of deaths of weaklings who from their physical attributes would be unlikely to be drawn to sports. At 40 years the intellectual group has caught up to the sportsmen; after this the sportsmen and the random group keep closely together, while the intellectuals have a slight but distinct advantage at each age.

Comparison of Different Sporting Groups

Comparison of the survival rates of the different sporting groups (Table IV) is not satisfactory in view of the small numbers of men involved. In the groups of men under

TABLE IV.—*Comparison of Different Sporting Groups. Excluding Deaths Due to War and Accidents*

Age	No. of Survivors at Each Age				
	Athletes	Cricketers	Rowers	Rugby Footballers	Random Group
20	1,000	1,000	1,000	1,000	1,000
25	991	995	1,000	1,000	985
30	972	978	983	996	964
35	949	951	959	996	949
40	920	935	930	955	913
45	886	912	888	918	889
50	866	873	841	895	867
55	827	822	787	854	837
60	763	765	733	776	754
65	668	679	650	659	634
70	508	529	487	554	532
75	377	379	362	368	364
80	172	193	181	184	193
85	76	77	82	81	82
90	7	39	31	15	23
No. in each group	203	176	167	218	325
Average age at death ..	67.41	68.13	67.08	68.84	67.43
Variance of estimate of average age at death	1.10	1.26	1.38	0.82	0.74

review those playing rugby football have a slight advantage, closely followed by the cricketers, whose chances of longevity have been commented upon by Bradford Hill (1927). They are followed by the athletes, and lastly come the rowing men. Differences are, however, small and within the limits of statistical error. It is tempting to adduce reasons why the cricketers had the greatest number of nonagenarians, perhaps attributing this to the more contemplative aspects of the game, though such speculations might well lead to another cricket controversy, a state of affairs which too often engenders heat, a good deal of sound, but usually very little light.

Light and Heavy Physiques (Table V)

Physique is a factor which has been shown by life assurance companies to have a bearing on longevity. The assurance companies do not usually cavil at a stature and musculature above the average, but they dislike an increase in abdominal girth, a body build where weight has increased out of proportion to height. Thus it has been computed that at the age of 45 to 50 years an overweight of 20 lb. (9 kg.), when compared with the normal for the height, increases the death rate over average by 18%; for 40 lb. (18 kg.) overweight the increase is by 45%, and for 60 lb. (27 kg.) overweight by 67% (Sinclair, 1953). Conybeare (1937) observes that a deviation up to 15% is usually allowable, especially in the younger age groups; if abdominal girth exceeds the expanded chest it is an unfavourable sign, but overweight due to a heavy frame can be passed. It has been stated that sportsmen tend to put on weight when they have to give up strenuous exercise, and if this is so it would be an adverse factor tending to lessen longevity. So far as is known, there has been no inquiry into this point, and it may well be one of those statements that are copied from book to book without justification.

TABLE V.—*Survival Rates of Light and Heavy Sportsmen. Excluding Deaths Due to War and Accident*

Age	No. of Survivors at Each Age		
	Light	Heavy	Random Group
20	1,000	1,000	1,000
25	994	1,000	985
30	979	989	964
35	964	969	949
40	933	926	913
45	899	879	889
50	868	859	867
55	830	815	837
60	786	720	754
65	695	624	634
70	542	480	532
75	396	338	364
80	194	166	193
85	95	62	82
90	14	18	23
No. in group ..	315	251	325
Average age at death	68.46	66.73	67.43
Variance of estimate of average age at death	0.68	0.85	0.74

It has been possible roughly to divide the athletes, rowing men, and rugby men into heavy-weight and light-weight groups. With the athletes this has been done by taking the running men on the one hand, and the hammer and weight men on the other; the rowing men have been divided into those rowing at a weight below 168 lb. (76 kg.) and those above this figure, and the rugby men into backs and forwards. While this division is distinctly arbitrary, it has probably resulted in a great majority of the light-weights and the heavy-weights being divided into correct groups.

It will be seen that once again the differences in the average age at death are not outside the range of statistical error. The trend of the table is for the heavy men to have a slight advantage over their lighter confrères up to middle age, a tendency which is reversed with advancing years.

Some further evidence bearing on this point can be found in the group of athletes. In this group, after excluding those who were killed in the war or died from accident, there were 61 short-distance men (100 yards and 440 yards), 89 long-distance men (1, 2, and 3 miles and the steeplechase), and 53 men who took part in the hammer and weight contests. Of the short-distance and the long-distance men 57% and 56% respectively lived to be over 70 years of age; of the hammer and weight men only 34% lived over this age. The numbers involved are again so small that chance may be playing a large part in these findings.

Causes of Death (Table VI)

Another way to tackle the problem is to ascertain the causes of death of those who have died, for if strenuous exertion in youth had damaged the heart cardiovascular diseases should figure more prominently in the death certificates and at an earlier age in the sportsmen than in the controls.

The use of death certificates as the basis for a statistical analysis of this nature is not entirely satisfactory and numerous difficulties are encountered. Diagnoses are often vague; fashions in diagnosis even on death certificates change with the years, possibly capriciously or possibly as the result of more accurate methods and greater knowledge of pathological causes. Sometimes when two or more possible causes of death figure on a certificate it is difficult to choose the most important. For a variety of reasons it was possible to seek the causes of death in only a sample of each group, and only of those who had died in England. The sample chosen comprised all the rowing blues and, of the other groups, all men whose surnames began with the letters A to O inclusive. Though such limitation is unlikely to influence the comparisons here made, it must be acknowledged, on the general grounds given above, that the evidence so obtained is open to serious criticism. Certain points of interest do, however, emerge.

Death certificates were found for roughly half of all those under investigation, and an attempt was made to classify the causes given on the certificates into nine groups: (1) Infections, made up chiefly of cases of phthisis, enteric-group infections, and septic conditions of all sorts. (2) Pneumonia and bronchitis. (3) Cardiovascular conditions, including apoplexy, valvular disease of the heart, coronary disease and angina, heart failure and myocarditis, and arteriosclerosis. (4) Neoplasms. (5) Genito-urinary diseases. (6) Accidental and war deaths. (7) Senility. (8) Suicides. (9) Miscellaneous group, including such conditions as the blood diseases, cirrhosis, intestinal obstruction, and various organic nervous diseases.

TABLE VI.—Causes of Death In a Sample From Each Group

Group	Athletes	Cricket-ers	Rowing	Rugby	Intellectuals	Random
Size of sample ..	149	120	171	155	232	230
Alive	10	10	16	18	30	32
Cause of death known	110	99	130	100	172	142
Cause of death unknown	29	11	25	37	30	56

Cause of Death Arranged as Percentages of the Total where the Cause is Known

Infection ..	11.8	14.1	14.6	16.0	11.7	16.2
Pneumonia and bronchitis ..	6.4	13.1	8.4	8.0	8.2	10.5
Cardiovascular conditions ..	36.4	37.2	31.5	42.0	39.9	41.5
Neoplasms ..	13.6	10.1	18.4	12.0	12.3	12.8
Genito-urinary diseases ..	5.5	7.0	4.6	4.0	8.2	7.1
Accident and war deaths ..	13.6	9.1	10.8	8.0	4.7	7.0
Senility ..	3.9	5.1	3.8	3.0	6.4	2.8
Suicide ..	0.9	1.0	—	3.0	4.1	—
Miscellaneous ..	7.9	3.3	7.9	4.0	4.5	2.1

Death from Cardiovascular Conditions.—In the sample from the control group, deaths due to cardiovascular conditions formed just over 40% of all causes of death; in the sample from the sportsmen group this figure was slightly exceeded only in the rugby footballers, with the rowing men showing the lowest percentage. It might be suggested that cardiovascular causes of death occurred at earlier ages in sportsmen, but there is no evidence of this. In the control group sample 27.3% of deaths due to cardiovascular conditions occurred before the age of 65, compared with 22.5% in the sportsmen group sample; the percentages between the ages of 65 and 75 years are controls 39.7% and sports-

men 37.5%, and after 75 years of age 33% for the controls and 40% for the sportsmen. There is thus little evidence from these figures either that sportsmen are more likely to die from cardiovascular causes than are the controls or that they were affected at an earlier age.

Accidental and War Deaths.—There were 72 deaths in the whole of the sportsmen and control groups known to be due to accident (38) and war injuries (34). In the sample from these groups the number was 32 for accidents and 29 for deaths due to war injuries. It may be that the incidence of war and accident deaths is somewhat exaggerated because such deaths are more likely to be reported, though the generations of young men under review were not those most likely to have been involved in Britain's wars. A few men died in the second Boer war, when the British Forces deployed were small, while the numbers engaged in hostilities in the first world war cannot have been large, for only a small proportion were under 40 years of age in 1914, and more than half were over 50 years. When the rates for the various groups are worked out the increased liability of sportsmen to die from one of these two causes becomes apparent. While 70.4 per 1,000 of the random group sample and 46.7 of the intellectual group sample died from accident or war injuries, 97.9 per 1,000 of the sportsmen group sample died from these causes. In the sportsmen and random group samples war deaths and accidental deaths were roughly equal in numbers; in the intellectual group sample the accidental deaths, chiefly due to mountaineering accidents, exceeded the war deaths by 3 to 1.

Suicide.—This was given as the cause of death of seven men in the sample from the intellectual group, and may conceivably have been the cause in others in which the death certificate was worded ambiguously. In all others forming the rest of the samples (581 men) there were five cases of suicide, which gives rates of 40.9 per 1,000 for the intellectuals and 8.6 for the remainder, a ratio of nearly five to one. The likelihood that these figures are due to chance is less than one in a hundred.

Summary

The longevity of 834 Cambridge University sportsmen has been investigated and information about 772 has been obtained.

As controls, 761 men who were at the University at the same time were chosen and information was obtained about 710 of them. They were made up of a group of intellectuals numbering 374 men and a group of 336 men chosen at random.

There was no evidence that the sportsmen died at an earlier age than the group chosen at random; the intellectuals lived longer by a period averaging about 1.5 years, but this small difference might well be due to chance.

There was some evidence that the prospects of longevity for the heavily built men was not so good as it was for those more lightly built.

No evidence could be adduced from the information available that cardiovascular causes of death were more prominent in the sportsmen or occurred at an earlier age.

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