physical activity in later life

Further analysis of the Allied Dunbar National Fitness Survey and the Health Education Authority Survey of Activity and Health

Physical Activity Research

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Further analysis of the Allied Dunbar National Fitness Survey and the Health Education Authority National Survey of Activity and Health

D Skelton
A Young
University Department of Geriatric Medicine
The Royal Free Hospital, London
A Walker
E Hoinville

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1 The following conventions have been used within tables:

- – no observations
- 0 non-zero values of less than 0.5% and thus rounded to zero
- * figures from bases of less than 40

2 Values for means and standard deviations (sd) are shown to an appropriate number of decimal places.

3 The subgroup bases may not add to the total because of rounding of the weighted base numbers.

4 Where an item has missing values because the respondent refused or was unable to answer a particular question, these are omitted from the base used in percentaging.

5 Unless stated otherwise, differences mentioned in the text have been found to be statistically significant at the 95% confidence level.

Summary

This section identifies the key messages or results that have emerged from the analysis of the data obtained from the Allied Dunbar National Fitness Survey and the HEA National Survey of Activity and Health in men and women aged 50+.

Methods and definitions

The data have been obtained from two questionnaires (one for adults up to the age of 69 and one for adults aged 70+) and from two physical appraisals (one for adults up to the age of 74 and one for adults aged 75+). The total sample for the questionnaires was 3078 people and the total sample for the physical appraisals was 1318 people.

The recommended frequency and intensity of exercise, in order to obtain a health benefit, is considered to be at least five times a week, for at least half an hour, at a moderate intensity. Moderate intensity is commonly taken to be 5–7.5 kcal/min, but this does not take into account the decline in physical capacity with increasing age. The analysis presented in this report, however, acknowledges the reduction in the absolute intensity of activities corresponding to a moderate intensity.

In this report, the term 'sedentary' has been used to describe those people participating less than once a week in activities of the recommended duration and intensity. The term 'frequently active' has been used to describe those achieving the recommended duration and intensity of physical activity at least five times a week.

Participation in physical activity

Irrespective of current health

Around 40% of all men and women aged 50+ were sedentary, that is they participated less than once a week in activity lasting for 30 minutes and of sufficient intensity to produce a health benefit. The proportion of sedentary women increased with age despite taking into account the decline in physical capacity, with 28% of women aged 50–54 and 65% of women aged 80+ being described as sedentary.

Only one in four men and one in six women aged 50+ were frequently active, that is they participated at least five times a week in activity lasting for 30 minutes and of the recommended intensity.

After excluding those with current ill health

When considering the older population, it is appropriate to consider the data both including and excluding those whose potential for habitual activity is limited primarily by the presence of severe disease, rather than by the effects of physical inactivity or of ageing.

Among those aged 50+ who were free of immobilising disease, at least 31% of men and 34% of women were sedentary and at most 30% of men and 19% of women were frequently active.

Types of physical activity

Housework

It emerged that 25% of men and 40% of women aged 50+ had done 'heavy' housework at least once per week. Doing heavy housework shows an age-related decline in women only, from half (49%) of those aged 50–69 to a quarter (24%) of those aged 70+.

Gardening and DIY

More than half (57%) of men and a third (32%) of women aged 50+ participated at least once a week in gardening or DIY. Gardening or doing any DIY showed an age-related decline in men and women, from 63% of men and 37% of women aged 50–69 to 42% of men and 19% of women aged 70+.

Walking

Only 13% of men and 10% of women aged 50+ were walking at least once a week at an intensity sufficient to be likely to produce a health benefit. Nevertheless, walking was a popular form of physical activity; nearly half of men (49%) and women (46%) aged 50+ walked a mile or more at any pace at least once a week.

However, one quarter of men and one third of women aged 70+ said they were unable to walk a quarter of a mile on their own. The proportion of women who were unable to walk a quarter of a mile increased from 22% of those aged 70–74 to 50% of those aged 80+.

Stairs

Of those aged 50+, 16% of men and 20% of women climbed no stairs at all in the previous week. There was an age-related increase in the number of people climbing no stairs, from one in ten people (11% of men, 12% of women) aged 50–69 to a third of people (31% of men, 33% of women) aged 70+.

Sports and exercise activities

Sports and exercise activities do not play a large part in the overall activity levels of people aged 50+. Participation in sporting activities of an intensity likely to produce a health benefit showed a decrease with age among both men and women, from 15% of men and 14% of women aged 50–69 to 10% of men and 6% of women aged 70+. 'Exercises', cycling, social dancing and swimming were the four most popular activities. Of these activities 'exercises' showed the least decline with age.

Past participation

Regular participation in sports and exercise activities when aged 16–24 was reported by rather similar percentages of men and women now aged 50–69 and of men aged 70+ (83%, 73% and 70% respectively) but by a lower percentage of women currently aged 70+ (45%). Among those who had been regular walkers at some time in their lives, 42% of men and 37% of women said they still walked regularly; 19% of men and 24% of women had stopped walking regularly after the age of 50.

Physical activity compared with self-assessment of exercise levels

More than half of the sedentary respondents aged 50+ thought they got enough exercise to keep fit (52% of men and 57% of women), thought they were very or fairly physically active (59% of men and 65% of women) and thought they were very or fairly fit (68% of men and 78% of women).

The proportion of sedentary men and women aged 50+ who thought that they got enough exercise to keep fit increased with age (from 41% and 45% of sedentary men and women aged 50–59, to 65% and 63% of sedentary men and women aged 70+).

Physical activity and smoking

Men aged 50+ who smoked 20 or more cigarettes a day were more likely than non-smokers to take no regular physical activity of an intensity likely to benefit health. About half (46%) of the heavy smokers but only a third (34%) of non-smokers were sedentary. There was no evidence of an association between physical activity and smoking among women aged 50+.

Physical activity and well-being

Frequently active men and women aged 50+ were more likely to have a positive mood than those who were sedentary. For example, only 29% of sedentary men aged 70+ demonstrated a positive mood compared with 64% of those who were frequently active. Part of this difference is associated with poor health among those who are sedentary.

Physical appraisal

Body mass index

Body mass index values (weight/height^2) between 25 and 30 kg/m^2 are considered 'overweight'. Values greater than 30 kg/m^2 are considered 'obese'. On this basis, 58% of men and women aged 50+ were at least overweight (> 25 kg/m^2). One in eight men (12%) and one in five women (19%) were obese (> 30 kg/m^2) with very little evidence of a systematic difference with increasing age.

Body fat

Skinfold thickness measurements were used to estimate percentage body fat. Greater than 25% body fat in men and 30% body fat in women is considered obese. Obesity was extremely common in men aged 50+ (mean body fat = 28.0%) but was even more pronounced in women aged 50+ (mean body fat = 36.9%).

Waist/hip ratio

Men had a stable waist/hip ratio from the age of 50–75 but there was a steady increase with age in the waist/hip ratio of women aged 50+. A waist/hip ratio corresponding to an increased risk of stroke was found in 29% of men.

Shoulder abduction

Shoulder abduction of at least 120° is considered necessary to wash hair without difficulty. A quarter (26%) of men and more than a third (37%) of women aged 70+ had shoulder abduction less than this functional threshold value.

Handgrip strength

The mean handgrip strength of men and women aged 80+ was nearly 30% less than that of those aged 50–54. Women were typically 30% weaker (per kg body weight) than men.

Explosive power/weight ratio and functional consequences

Men had the equivalent of a 20-year advantage over women in terms of explosive power/weight ratio. When the power/weight ratio is less than 1.5 W/kg (1.5 watts/kg), some people will not manage a 30 cm step and fewer than one in three will manage a 50 cm step. Only 7% of men but 28% of women aged 50–74 had a power/weight ratio below 1.5 W/kg. The age-related decline was particularly important in women as 47% of women aged 70–74 were below this threshold value of power/weight ratio.

Knee extension strength/weight ratio and functional consequences

People need a knee extension strength equivalent to 35% of their body weight to be confident of getting up from a low chair without using their arms. Among 50–74 year olds, 2% of men and 14% of women had knee extension strength less than this. A quarter of women aged 70–74 had this degree of weakness.

Men aged 75+ had little difficulty in actually rising from a low stool without using their arms, but among women aged 75+ the proportion unable to rise from a low stool increased from 8% of those aged 75–79 to 42% of those aged 85+.

Aerobic power/weight ratio and functional consequences

Men had the equivalent of a 15-year advantage over women in terms of maximal aerobic power/weight ratio (maximal oxygen consumption/body weight). A maximal aerobic power/weight ratio of 25 ml/kg per min is necessary for comfortable walking on the level at 3 miles per hour.

Among those aged 50–74, 9% of men and 38% of women were below this threshold value. There is a marked age effect, the percentage below this threshold increasing from 1% and 23% for men and women aged 50–54 to 35% and 80% for men and women aged 70–74.

1 Introduction

Background

The health benefits of physical activity are important at all ages[1–3] but may be of particular importance to older people.[4] The role of physical activity in promoting an individual's health changes as they get older, with the importance of disease prevention becoming less important than the role physical activity has to play in the maintenance of functional ability and the prevention of disability, immobility and isolation (see Figure 1):

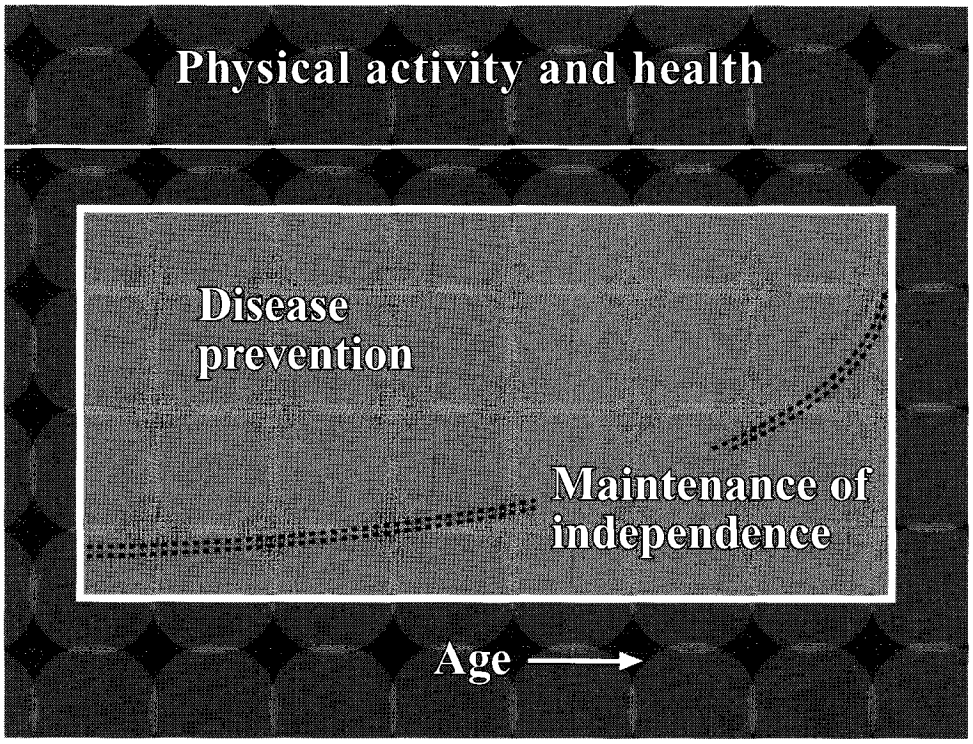
- prevention of disease – regular physical activity helps weight control and helps prevent osteoporosis, non-insulin dependent diabetes mellitus, hypertension, ischaemic heart disease, stroke and probably also colonic cancer;
- even healthy people lose strength, power and endurance as they get older and this has important functional consequences for the performance of everyday activities – regular physical activity increases strength, power, endurance and flexibility even in old age;
- prevention of disability – appropriate physical training improves the physical performance of people with disabling symptoms of intermittent claudication, angina pectoris, heart failure, asthma, arthritis and chronic bronchitis;
- prevention of immobility – for people with severe disabilities immobility itself can lead to further health problems, including faecal impaction, incontinence, deep vein thrombosis, pulmonary embolism, gravitational oedema and skin ulceration;
- prevention of isolation – recreational physical activity offers opportunities for socialisation, reducing the problems of loneliness and depression.

It is likely that the intensity of physical activity is unimportant for the prevention of immobility or isolation. For prevention of disability and maintenance of physical performance, it is the relative intensity of physical activity (for example, moderate or vigorous compared to that individual's maximum), as opposed to the absolute intensity (for example, 4 or 5 kcal/min irrespective of that individual's maximum), which is most important. For the prevention of disease, it is not known if it is the absolute or relative intensity of physical activity which is critical. Owing to the shift in the role of physical activity towards the importance of maintaining independence, this report will assume that it is the relative intensity of physical activity which is most important in determining its benefit to the health of older people.

This report is based on the merged results of two surveys of physical activity, conducted in 1990 and 1991, using the same survey instruments – the *Allied Dunbar National Fitness Survey* (ADNFS) and the *Health Education Authority National Survey of Activity and Health* (HEANSAH). The methodology of these two surveys has been fully described elsewhere.[5–7] The ADNFS was a national study incorporating details of current and past activity and the results of a physical appraisal to measure fitness levels. The HEANSAH did not include a physical appraisal (see Appendix F).

Previous analyses of these data had been limited to respondents aged less than 75. This report is based on the data for all people aged 50 and over (although it should be noted that the surveys were not

Figure 1 The changing role of physical activity for the health of an individual



designed specifically for older people). The combined samples give a nationally representative total of 3078 people aged 50 and over of whom 1373 were men and 1705 were women. A physical appraisal was carried out in 588 men and 730 women aged 50 and over. The ratio of men to women was similar to that in the population (see Appendix F).

The measurement of physical activity

One of the aims of the two surveys was to measure all types of physical activity that might contribute towards people's health, fitness and well-being. Information was collected on walking, cycling, sport and physical recreation, DIY, gardening, heavy housework, climbing stairs and caring for children or people with disabilities. Details of frequency, duration and some information regarding intensity were collected during the interview. Different types of activity were allocated energy cost scores based on the interview information and existing data. Full details of this process are given in Appendix A.

Relative intensities of activity

Previous analyses of the data sets from ADNFS and the HEANSAH had been based on two main summaries of activity. One identified people who were regular 'vigorous' exercisers. The other identified those who were participating in larger volumes of at least 'moderate' activity.

Although the latter approach reflects current thinking about the amount and type of activity associated with health benefits, its definition of 'moderate' intensity activity in absolute terms (that is, 5 kcal/min or more) is not appropriate for older people. This definition relates to the intensity of physical activity as experienced by an average middle-aged man for whom 5 kcal/min will represent around 35% of maximum capacity (or around 50% for an average middle-aged woman). Older people

have, on average, a lower capacity for physical activity than younger people. This has implications for the use of an absolute definition of 5 kcal/min as 'moderate' intensity activity since, as people get older the relative intensity of physical activity increases, and this means that for many older people a level of energy expenditure of 5 kcal/min represents an intensity of exercise greater (much greater for some) than 'moderate'.

With increasing age, a constant *relative* intensity of exercise is provided by progressively lower *absolute* levels of energy expenditure. Similarly a woman reaches the same relative level of exertion at a lower absolute level than a man.

These changes with gender and age were addressed to some extent, for people aged 16–74, in the report of the ADNFS.[5] Chapter 2 and Appendix A describe the development, for the present report, of an age-related definition of 'moderate' intensity activity applicable from age 50 to beyond 75 years of age. This definition was used in the present analysis.

Other surveys of activity and fitness among older people

There are very few national studies of activity or fitness among older people. Some data are available from studies of the general population but very few take into account the decline in physical capacity with age and health exclusion.

The *Health Survey for England*[8–10] is a continuous survey, which has been running since 1991. Each year since 1993 more than 15,000 adults aged 16 and over have taken part in a face-to-face interview which covered various aspects of health and lifestyle. A short clinical examination included blood pressure and the taking of a blood sample. Participation in current physical activity was assessed on the basis of a shortened form of the questionnaire used in the ADNFS.

Two general population studies in the US included questions on physical activity and presented data for older people. The *Third National Health and Nutrition Examination Survey*[11] was based on an interview in the home and a clinical examination in a mobile unit. Current physical activity was assessed through questions on the type and frequency of physically active hobbies, sports and exercises in leisure-time physical activity. The National Health Interview Survey[12] was a nationwide household interview survey which incorporated questions on current physical activity, including some specified, less vigorous, activities such as walking, yoga and golf.

A recent English study of dietary behaviour among older people, *The National Diet and Nutrition Survey: people aged 65 years or over*,[13] also included an assessment of physical activity based on a face-to-face interview with a modified form of the ADNFS questions.

However, **none** of these studies took account of the decline in physical capacity with age; all used an absolute definition of exercise intensity based on values for middle-aged men.

A study of older people in Nottingham[14] in 1985 which involved a face-to-face interview 1042 people aged 65 and over did acknowledge the lower capacity of older people by concentrating on those activities with a probable minimum energy cost of 2 kcal/min. Nevertheless, it did not attempt to use a 'sliding scale' of absolute exercise intensities which might correspond to the same relative intensity of exercise across a wide range of ages.

Health exclusion issues

Typically, people less than 50 years of age are free of significant disease. With increasing age, however, the likelihood of chronic disease (and its resultant medication) increases rapidly. Many such pathologies will limit physical performance. For example, the prevalence of serious diseases and conditions of the circulatory system increases from 4% at age 25–44 to 36% at age 75 and over.[15] When considering the exercise beliefs, practices and abilities of the older population, it is appropriate to attempt to consider the extent to which these are influenced primarily by the presence of significant disease, rather than by the effects of physical inactivity or of ageing. This is addressed in Chapter 6.

It also seems appropriate to compare the physical appraisal data of people aged 50+ from this report with those who have aged without significant disease. Skelton *et al.*[16] have published data on the strength and power of men and women aged 65 to 89 who are free of diagnosed or symptomatic disease. Therefore, in Chapter 5 of this report, mention will be made of Skelton's data for comparison with general population data.

2 Variation in levels of physical activity

This analysis of activity levels among people aged 50 and over reflects the fact that the constant relative intensity of activity required for a possible health benefit corresponds to a decreasing absolute level of energy expenditure as maximal aerobic power decreases with increasing age (as discussed in Chapter 1 and detailed in Appendix A).

Definition of the age-related activity scale

The unit for the scale was an occasion of activity lasting at least 30 minutes and of an intensity likely to be sufficient to produce a health benefit. The scale is presented as a weekly frequency although the data were collected for a 4-week period:

- 'sedentary'
  - less than once per week (i.e. less than four occasions in the past 4 weeks, including no such occasions)
  - one to two occasions per week on average
  - three to four occasions per week on average
- 'frequently active' – at least five occasions per week on average.

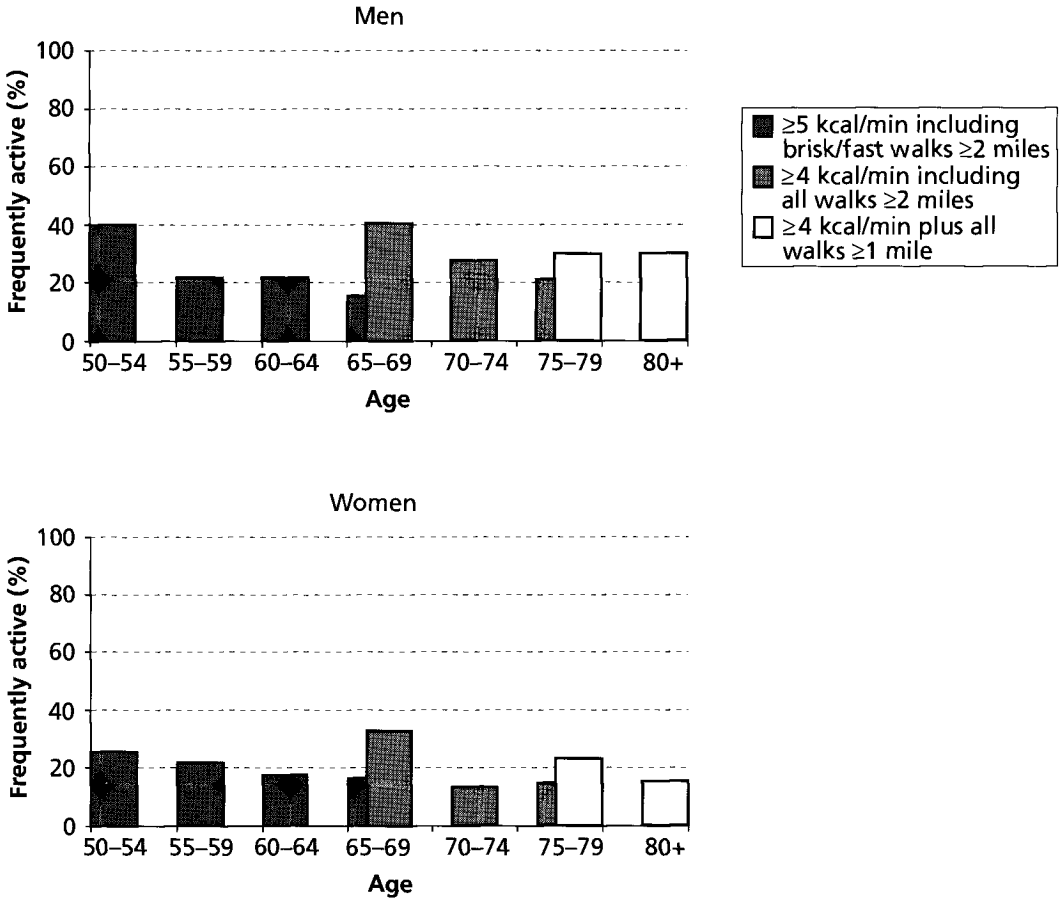
In summary, activity of an intensity sufficient to be likely to produce a health benefit (see Appendix A) was defined as below. The definitions are presented for overlapping age bands to represent the gradual nature of the change with increasing age. Where analysis required non-overlapping age bands, 50–69, 70–79 and 80+ were used.

- age 50–69 Activities with a nominal average intensity of at least 5 kcal/min. These include heavy home activities, walks of 2 miles or more at a 'brisk' or 'fast' pace (where 'fast' means approximately 4 mph) and any sports activity or cycling where the nominal energy cost was 5 kcal/min or more. For some sports, this nominal energy cost was allocated only if respondents reported that it made them 'out of breath or sweaty'. Occupational activity was categorised using job title and information from the interview.
- age 65–79 Activities with a nominal average intensity of at least 4 kcal/min. These include the activities listed above plus lighter gardening and DIY activities, walks of 2 miles or more at any pace, and any sports activity where the nominal energy cost was at least 4 kcal/min.
- age 75+ All activities with a nominal average intensity of at least 4 kcal/min but irrespective of whether respondents said it made them out of breath or sweaty. Also included were walks of 1 mile or more at any pace.

Data referring to stair climbing, which did not satisfy the duration criterion, were not quantifiable in the same way as the other activities and so have been considered separately.

Detailed definitions can be found in Appendix A.

Figure 2 Proportion of people aged 50+ participating in activity at least five times a week at an intensity defined as sufficient, at their age, to be likely to produce a health benefit



Overall levels of physical activity among people aged 50+

Only one in four men and one in six women aged 50+ were frequently active (see Figure 2, Table 1). Around 40% of men and women aged 50+ were sedentary (Figure 3, Table 1). The rather similar overall figures of sedentary men and women aged 50+ conceal an important difference. There was a marked age effect among the women. The proportion of women judged sedentary increased steadily with increasing age, doubling between those aged 50–54 (28%) and those aged 80+ (Figure 3, Table 1).

The proportion of people participating less than once a week for 30 minutes at an absolute intensity of 5 kcal/min shows a more marked age effect, apparent in both men and women (see Table A1, Appendix A). This is because such an analysis makes no allowance for the effects of age on maximal oxygen consumption.

Table 1 shows two proportions at ages where the definition for a beneficial intensity of activity changes. The first figure of each pair relates to the higher intensity definition. It is suggested that the 'true' proportion of people at these ages achieving the required level of activity lies somewhere between the two figures given. For example among 65–69-year-old men the proportion described as sedentary is likely to lie somewhat between 46% and 19%. The full set of figures on which this table is based can be found in Appendix A (Table A1).

Table 1 Proportion of people participating† at different frequencies in activity defined as having an intensity sufficient, at their age, to be likely to produce a health benefit‡

Weekly frequency	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	30	41	43	46/19	30	47/41	39	39
At least once/week	70	59	57	54/81	70	53/59	61	61
At least five times/week	40	22	22	16/41	28	22/31	36	26
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*
Weekly frequency	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	28	30	37	45/29	44	55/49	65	42
At least once/week	72	70	63	54/71	56	45/51	35	58
At least five times/week	23	20	16	15/30	12	14/22	15	17
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† For at least 30 minutes per occasion.

‡ The full distribution used to produce this table are presented in Table A1, Appendix A. The figures are based on three minimum requirements for activity of an intensity sufficient to produce a health benefit (i.e. moderate activity). An intensity of 5 kcal/min can be described as moderate intensity activity on average for younger people but with increasing age 4 kcal/min is more likely to represent moderate activity. The activity levels in this table for all people aged 50+ are based on the following intensities: for people aged 50–69, at least 5 kcal/min; for people aged 70–79, at least 4 kcal/min; for people aged 80+, as for aged 70–79 but with the addition of walks of 1–2 miles at any pace. Since the age-related decline in capacity forms a continuum, the change in boundary is presented in the body of this table as an overlap. Thus, for age 65–69 the left-hand figure is based on activities of at least 5 kcal/min and the right-hand figure is based on activities of at least 4 kcal/min, and for age 75–79 the left-hand figure is based on activities of at least 4 kcal/min and the right-hand figure on activities of an average of 4 kcal/min with the addition of walks of 1–2 miles at any pace.

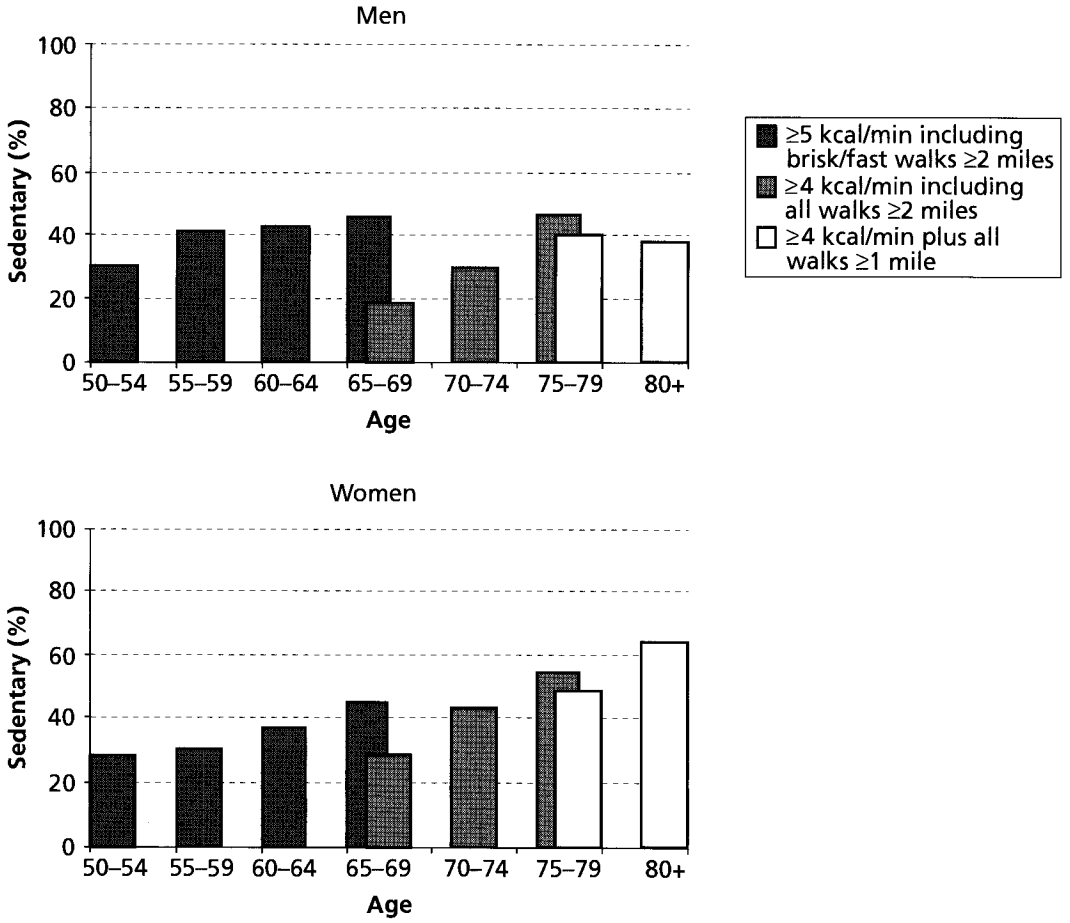
Participation in different types of physical activity

Housework

The vast majority of respondents had done some housework in the 4 weeks prior to the interview (77% of men and 94% of women). When asked about housework described as 'heavy' in the interview (and with examples based on an intensity of at least 5 kcal/min, see Appendix A), only 25% of men and 40% of women aged 50+ had done such housework at least once a week for 30 minutes or more (Table A2, Appendix A).

Just under 10% of women aged 50–69 did 'heavy' housework for at least 30 minutes on at least five separate occasions a week compared with less than 5% of women aged 70+. A considerably larger proportion of women in each group spent a total of at least two and a half hours a week doing such housework but there was still a noticeable decrease between those aged 50–69 and those aged 70+. The figures for the younger men were considerably lower than those for the younger women but there was no decrease with age among the men. This means that there was little difference between the proportions of men and women aged 70+ who were extensive participants in this intensity of housework.

Figure 3 Proportion of people aged 50+ participating in activity less than once a week at an intensity defined as sufficient, at their age, to be likely to produce a health benefit



Gardening and DIY

Respondents aged 50–69 were asked about their participation in 'light' (4 kcal/min) and 'heavy' (7 kcal/min, see Appendix A) gardening and DIY activities; they were shown cards with examples of the types of activity to include. People aged 70+ were not shown cards of examples and no distinction was made between different intensities; all gardening and DIY activities for people in this age group were scored at 4 kcal/min but it is possible that these respondents may have included even lighter activities in their answers. This may have resulted in overestimates of their participation in gardening and DIY activities of an intensity equivalent to a sufficiently high proportion of their maximum oxygen uptake for a beneficial effect.

Over half (57%) of men and a third (32%) of women aged 50+ had participated at least weekly in gardening or DIY for 30 minutes or more (Table 3). In each age group, participation was higher among the men than the women; 15% of men had done some gardening or DIY (of any intensity) at least five times a week. This proportion was highest among the men aged 65–69 (20%) compared with those in the older and younger age groups.

However, as was the case with housework, people reported that they were spending considerably more time in total than was indicated by the frequency of occasions lasting 30 minutes or more. Among people aged 50+, one in two men (49%) and one in four women (23%) had spent a total of at least two and a half hours per week in gardening or DIY activities.

Table 2 Frequency of participation† and time‡ spent participating in 'heavy' housework#

Weekly frequency	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	75	78	74	71	72	77	86	75
At least once/week	25	22	26	29	28	23	14	25
At least five times/week	2	4	2	5	2	5	1	3
Proportion spending 2.5 hours‡ or more per week	9	11	11	14	12	14	8	11
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

Weekly frequency	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	48	50	50	56	71	76	83	60
At least once/week	52	50	50	44	29	24	17	40
At least five times/week	8	7	8	9	1	1	3	6
Proportion spending 2.5 hours‡ or more per week	36	30	33	28	14	9	11	24
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† For at least 30 minutes per occasion.
‡ Total time based on all duration occasions of appropriate activity.
# Based on examples of housework corresponding to an intensity of at least 5 kcal/min. This will be moderate activity for the younger people but will not represent increasingly strenuous activity for older people.

Walking

Walking is an activity beneficial to people of all ages but is of particular importance to older people both because it is an exercise which is familiar and comparatively safe, and because it requires a higher percentage of their maximum oxygen uptake than is the case for younger people.

As age increases, the ability to walk any distance becomes an important factor. Respondents aged 70+ were asked both if they thought they could walk a quarter of a mile or more on their own and for how long they thought they could walk, in each case without stopping or severe discomfort. These data are presented in Table 4 with no reference to limitations due to poor health, which are discussed elsewhere in this report. One quarter of men and one third of women aged 70+ said they were unable to walk a quarter of a mile on their own without stopping or severe discomfort (Figure 4). This proportion increased with age for both men and women, but especially for the women (Table 4).

Respondents were asked about the frequency of walks over different distances and about their walking pace. The questionnaire gave an 'absolute' cue for the meaning of 'fast pace', that is at least 4 mph, so self-assessed walking pace is assumed to represent an absolute measure of intensity and this is supported by the finding that its prevalence shows a marked decrease with age (see Table A6, Appendix A). (If the answers to this question had represented relative interpretation, the proportions

Table 3 Frequency of participation† and time‡ spent participating in gardening or DIY#

Weekly frequency	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	33	39	40	36	50	60	69	43
At least once/week	67	61	60	64	50	40	31	57
At least five times/week	16	12	15	20	15	15	13	15
Proportion spending 2.5 hours‡ or more per week	58	51	55	57	40	35	22	49
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

Weekly frequency	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	58	56	62	66	78	78	89	68
At least once/week	42	44	38	34	22	22	11	32
At least five times/week	6	8	8	7	4	4	3	6
Proportion spending 2.5 hours‡ or more per week	30	33	28	25	16	14	6	23
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† For at least 30 minutes per occasion.
‡ Total time based on all duration occasions of appropriate activity.
# For people aged 50–69, gardening and DIY activities in this table include all listed activities which were scored as having an intensity of 4 kcal/min or more (whereas the overall activity summary for people aged 50–69 includes only those activities with an intensity of at least 5 kcal/min). For people aged 70+, the different types of gardening and DIY activities were not specified and so include all intensities from very light upwards.

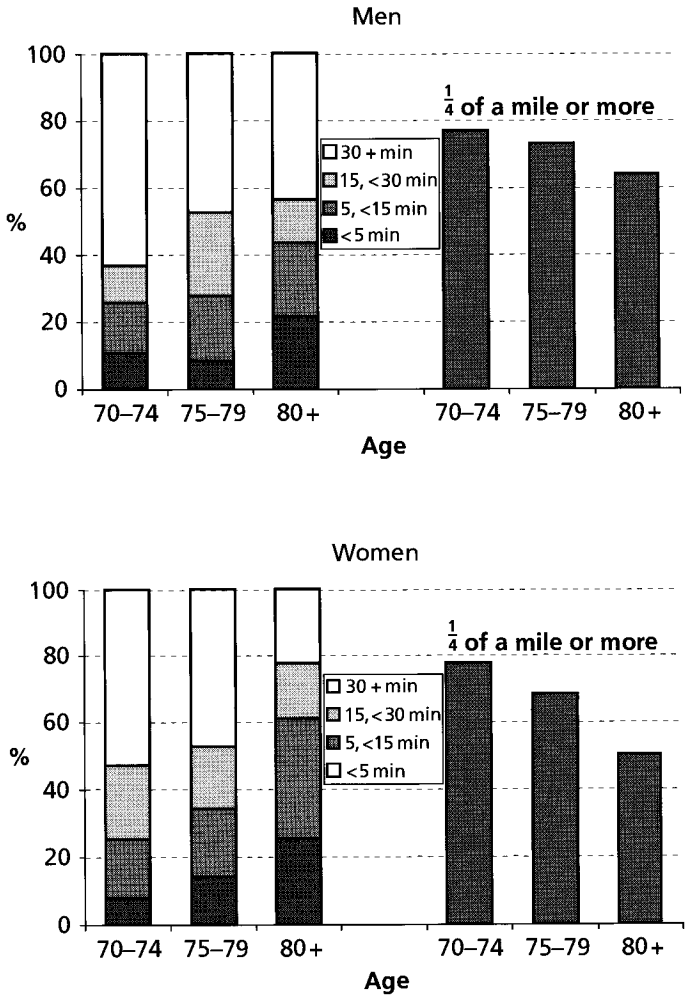
assessing their pace as slow, average, brisk or fast would probably have remained constant, but as Table A6 shows this was not the case.)

Previous analysis (for adults up to age 74) had been confined to walks of 2 miles or more at a brisk or fast pace. This approach has been maintained in the overall measure of activity for people aged 50–69 but, in line with the age-related definitions of intensity, the pace and distance criteria have been reduced for those aged 70+. The overall measure of activity includes walks of at least 2 miles at any pace for people aged 70–79, and walks of at least 1 mile at any pace for those aged 80+. (The effect of these two changes on the figures for participation can be seen in Table A7, Appendix A.)

Among people aged 50+, 13% of men and 10% of women were walking at least once a week at a sufficient intensity, at their age, to be likely to produce a health benefit (Figure 5, Table 5).

Although walks of the recommended duration and intensity were rare, around a half of men and women aged 50+ had walked at least a mile at any pace at least once in the past week (Table A5, Appendix A). Men and women aged 65–69 were the most likely to have walked for a mile or more although, for the women, the differences between this group and the younger age groups were not

Figure 4 Proportion of people aged 70+ able to walk for different periods of time and lengths of walk, without discomfort



significant. (This is a similar pattern to that seen for gardening and may represent an increase in activity at the men's retirement.)

At the upper end of the frequency scale (Table A5, Appendix A), 20% of men and 17% of women had walked a mile or more at least five times in the past week. Among women, there was a steady reduction with age from a peak of 25% at age 60–64 to 9% at age 80+. Among men this reduction with age was less marked.

Comparison of these figures with those referring to the ability to walk (Table 4) indicates that this decrease is consistent with the high proportions of older women who said they could not walk for more than 15 minutes without severe discomfort (61% of women aged 80+). The participation figures were re-analysed omitting all those unable to walk for more than 15 minutes without stopping or severe discomfort. This analysis showed that among older people who could walk for more than 15 minutes, 13% of men and 15% of women aged 75–79 walked 1 mile or more at least five times a week; among those aged 80+, these proportions increased to 30% for men and 23% for women. It should be noted that the figures for the 80+ age group who could walk for more than 15 minutes represent a higher participation level than those found among the 50–54-year-olds (24% of men and 19% of women, Table A7, Appendix A), the majority of whom should have been physically able to walk a mile.

Table 4 Length of time† and distance able to walk on own‡ (people aged 70+)

	Men			
	70–74	75–79	80 +	All 70+
	(%)	(%)	(%)	(%)
Less than 5 mins	11	7	22	13
5 mins or more	89	93	78	87
15 mins or more	74	72	56	68
30 mins or more	63	47	43	53
Proportion able to walk ¼ mile on own	78	74	65	74
Base	*178*	*105*	*103*	*386*

	Women			
	70–74	75–79	80 +	All 70+
	(%)	(%)	(%)	(%)
Less than 5 mins	7	14	27	15
5 mins or more	93	86	73	85
15 mins or more	74	66	39	61
30 mins or more	53	47	22	42
Proportion able to walk ¼ mile on own	78	69	50	66
Base	*243*	*175*	*189*	*607*

† 'For how long can you walk on your own without stopping or severe discomfort?'
‡ 'Can you walk for a quarter of a mile on your own without stopping and without severe discomfort?'

Table 5 Proportion of people participating at different frequencies in walking defined as having an intensity and duration sufficient, at their age, to be likely to produce a health benefit†

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week‡	88	93	91	89/70	83	91/70	66	88
At least once/week	12	7	9	11/30	17	9/30	34	12
At least five times/week	4	2	5	5/12	5	3/10	17	5
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week‡	91	92	89	93/79	88	90/69	84	90
At least once/week	9	8	11	7/21	12	10/31	16	10
At least five times/week	3	2	3	3/5	3	5/10	9	4
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† The full distributions used to produce this table are presented in Table A7, Appendix A. The figures are based on three minimum requirements for walking sufficient to produce a health benefit. Since this decline forms a continuum, the change in boundary is presented for overlapping age groups. Pace is taken as an absolute measure. Participation up to age 69 is based on walks of at least 2 miles at a fast (at least 4 mph) or brisk pace. Participation from age 65–79 is based on walks of at least 2 miles at any pace. Participation for people aged 75 and over is based on walks of at least 1 mile at any pace. Distances were related to time spent walking: '2 miles or more ... that would usually take at least 40 minutes' and '1–2 miles ... that would usually be continuous walking for about 20–30 minutes'.
‡ Less than four occasions of the type of walking specified in the past 4 weeks including people who did not walk at all.

Figure 5 Proportion of people aged 50+ participating at least once a week in walking at an intensity sufficient, at their age, to be likely to produce a health benefit

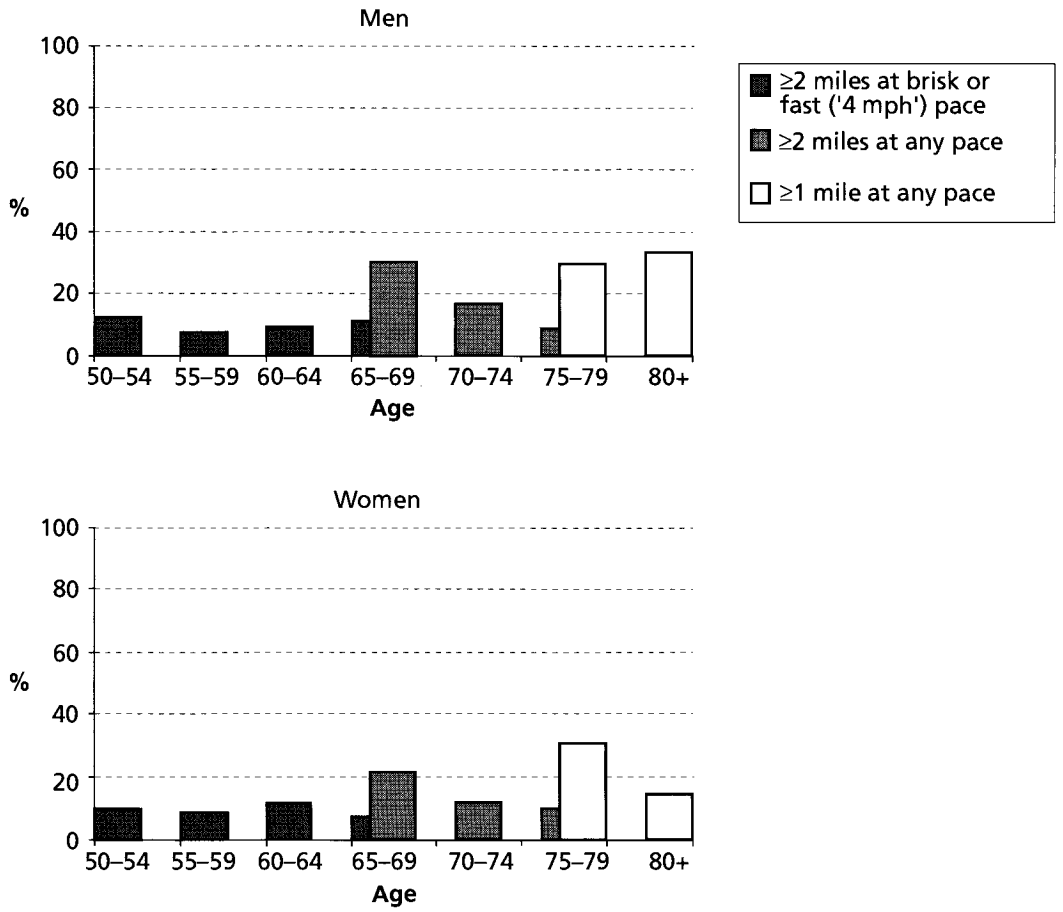


Table 6 Average number of steps climbed per day

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
None	5	8	12	19	25	30	44	16
Some	95	92	88	81	75	70	66	84
300 or more	16	13	13	9	6	3	–	10
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
None	6	9	16	18	21	32	50	20
Some	94	91	84	82	79	68	50	80
300 or more	13	11	9	5	1	1	3	7
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

Table 7 Frequency of participation† in sports and exercise activities (including cycling) at an intensity sufficient, at their age, to be likely to produce a health benefit‡

Weekly frequency	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	82	86	86	87/84	93	96/94	91	87
At least once/week	18	14	14	13/16	7	4/6	9	13
At least five times/week	5	1	2	2/2	2	3/3	5	3
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

Weekly frequency	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week	80	84	88	92/89	94	95/94	96	89
At least once/week	20	16	12	8/11	6	5/6	4	11
At least five times/week	4	1	3	2/3	1	1/2	1	2
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† For at least 30 minutes per occasion.

‡ The participation figures are based on three minimum requirements for sports participation at an intensity sufficient to produce a health benefit. The participation rates for all people aged 50+ are based on the following intensities: for people aged 50–69 at least 5 kcal/min; for people aged 70–79 at least 4 kcal/min; for people aged 80+ at least 4 kcal/min with some additional activities (see Appendix A). Since the age-related decline forms a continuum, the change in boundary is presented in the body of the table as an overlap. Thus for age 65–69 the left-hand figure is based on sports and exercise activities of at least 5 kcal/min and the right-hand figure is based on such activities of 4 kcal/min; for age 75–79 the left-hand figure is based on sports and exercise activities of at least 4 kcal/min and the right-hand figure is based on the same activities but with some additional sports.

Stairs

The amount of stair climbing per day was calculated from the number of flights of stairs climbed and the number of steps in the flight. Although it is always possible that the amount of stair climbing may be subject to error, the proportion who climbed no stairs at all is likely to be a more accurate figure. This proportion increased from 5% of the men in the youngest age group to 44% of the oldest men with similar figures for women (Table 6). The decrease in stair use with age was associated with an increase in the proportion of people living on one floor: 18% of men and 23% of women aged 50–69 lived on one floor, compared with 40% of men and 47% of women aged 70+.

Only 10 people aged 70+ climbed 300 or more stairs per day and were not in the frequently active category. Three of these people were classified as sedentary. Thus, although important for strengthening, the inclusion of stair climbing would have made only a very small difference to the figures for the total activity of the 70+ group.

Sports and exercise activities

Participation in sports and exercise activities did not play a large part in the overall activity levels of people aged 50+, despite the fact that many of these people have considerably more leisure time than the general population. Table 7 shows the frequency of participation in sports activities of an

Table 8 Participation in the ten most frequently mentioned sports and exercise activities (including cycling) in the past 4 weeks for men and women

Proportion participating in past 4 weeks	50–59	60–69	70–79	80+	All 50+
			Men		
Exercises	9	8	11	9	9
Cycling	11	10	4	6	9
Social dancing	8	11	5	5	8
Snooker	11	8	6	2	8
Swimming	11	7	5	1	8
Golf	9	6	4	1	6
Rambling	7	7	4	3	6
Darts	6	3	4	–	4
Bowls	2	5	4	4	4
Fishing	4	2	1	2	2
Base	*522*	*465*	*283*	*103*	*1373*
			Women		
	50–59	60–69	70–79	80+	All 50+
Exercises	14	11	10	7	11
Social dancing	15	9	6	2	9
Swimming	16	7	3	1	8
Cycling	11	10	0	2	7
Keep fit	6	4	3	3	4
Rambling	6	4	2	–	4
Yoga	4	2	0	0	2
Bowls	2	2	1	–	2
Aerobics	3	1	0	–	1
Golf	3	1	0	–	1
Base	*532*	*566*	*418*	*189*	*1705*

intensity likely to be sufficient to produce a health benefit (see Appendix A for definitions). Among those aged 50+, 13% of men and 11% of women were participating in sports and exercise activities once a week or more.

The proportion participating in such kinds of sport decreased with age among both men and women (from 18% of men and 20% of women aged 50–54 to 9% of the oldest men and 4% of the oldest women).

Few men or women aged 50+ participated more than once or twice a week and only 3% of men and 2% of women aged 50+ participated at least five times a week.

Table 8 shows the level of participation in the ten most frequently mentioned sports (of any intensity) for men and women. 'Exercises', cycling, social dancing and swimming were the four most popular activities. Of these activities, 'exercises' showed the least decline with age.

3 Past participation in physical activity

Participation in physical activity in the past is important because of the possible effect on both current health and current behaviour.

There are at least three main sources of variation in levels of participation as reported by older people:

- change within the individual as age increases;
- change in society, so that successive cohorts differ in their exercise habits;
- selective loss from the sample through death which may preferentially affect those with a particular pattern of behaviour (most probably the loss of the least active people).

In this cross-sectional study, the interaction of these different factors means that interpretation of the overall figures is difficult.

It should also be recognised that the data will be subject to recall problems since some respondents were being asked to remember back through 60 years or more.

Summaries of past participation

Part of the interview comprised questions on regular participation in physical activity throughout the respondent's life. The information was limited to regular participation in sports and exercise activities and in regular walks of 2 miles or more. Home activities and occupational activity (with the exception of walking) were not included. These exclusions will lead to a general underestimation of levels of past physical activity, and may specifically affect the estimates for the oldest women for whom home activities may well have played a large part in their exercise participation in earlier years.

Data on past participation did not involve an assessment of intensity of effort. As a result, the summary of former participation in sports and exercise activities took no account of the decline in physical ability with age, nor of whether activities were of an intensity which had made the respondent out of breath or sweaty. Similarly, the summary walking measures included all regular walks of 2 miles or more, irrespective of pace.

Data relating to the two main types of past participation (sports and exercise and walks of 2 miles or more) were summarised separately, since the exclusion of home activities from the data collection meant that an overall summary of activity was not feasible.

Details of each sport and exercise activity in which respondents had regularly participated were aggregated to form two summaries of past participation:

- whether the respondent was a regular participant in sporting activity between the ages of 16–24, 25–34 and 35–49;
- the proportion of adult life spent in regular 'sporting' activity.

Similar details were collected and aggregated for regular walks of 2 miles or more.

Variation in past participation

Sports and exercise activities

Regular participation in sports and exercise activities when aged 16–24 was reported by rather similar percentages of men and women aged 50–69 and of men aged 70+ (83%, 73% and 70% respectively), but by a lower percentage of women currently aged 70+ (45%) as shown in Table 9.

The patterns of response for regular participation when aged 25–34 (70%, 59%, 64% and 35% respectively) and when aged 35–49 (57%, 54%, 47% and 28%) were similar. In all cases it was women currently aged 70+ who least often reported previous regular participation.

Regular long walks

The percentage of all men and women aged 50+ who reported regular walks of 2 miles or more when aged 16–24, 25–34 and 35–49 were very similar (46% and 43%; 43% and 42%; 39% and 41% respectively). There were no consistent trends with respect to sex or current age in the percentages who reported regular walking between these ages (table not shown).

Just under two thirds of both men and women aged 50+ had been regular walkers at some time in

Table 9 Regular† participation in sport and exercise activities‡ in earlier years

	Men				
	Current age				
	50–59	60–69	70–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)
Some regular participation between:					
ages 16–24	83	83	69	73	80
ages 25–34	70	69	63	68	68
ages 35–49	60	54	45	52	54
Base	*522*	*465*	*283*	*103*	*1373*

	Women				
	Current age				
	50–59	60–69	70–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)
Some regular participation between:					
ages 16–24	75	72	47	40	64
ages 25–34	60	58	37	32	51
ages 35–49	60	49	29	27	45
Base	*531*	*567*	*418*	*189*	*1705*

† In the questionnaire used for respondents aged 50–69, 'regular' was defined as 'at least once a week for a few months or more'. For people aged 70+, 'regular' was not defined and the time period for eligible participation was increased to 2 years. The questionnaire for respondents aged 50–69 asked about the time since age 14. Respondents aged 70+ were asked about the time 'since they left school'.
‡ The summary measures for sports and exercise activities were based on all such activities with an average energy cost of at least 5 kcal/min, including activities such as exercises and social dancing.

Table 10 Age stopped regular† walking‡

	Men		
	Current age		
	50–69	70+	All 50+
	(%)	(%)	(%)
Still walks regularly	47	30	42
Age stopped:			
less than 25	17	10	15
25–34	14	14	14
35–49	10	11	10
50+	12	35	19
Total	100	100	100
Base (all regular walkers)	*616*	*250*	*866*
% of all 50+	*62%*	*65%*	*63%*

	Women		
	Current age		
	50–69	70+	All 50+
	(%)	(%)	(%)
Still walks regularly	47	19	37
Age stopped:			
less than 25	16	11	14
25–34	12	11	12
35–49	13	12	13
50+	12	47	24
Total	100	100	100
Base (all regular walkers)	*679*	*364*	*1043*
% of all 50+	*62%*	*60%*	*61%*

† In the questionnaire used for respondents aged 50–69, 'regular' was defined as 'at least once a week for a few months or more'. For people aged 70+, 'regular' was not defined and the time period for eligible participation was increased to 2 years.
‡ The summary walking measure was based on all regular walking of 2 miles or more irrespective of pace.

their lives. Of them, 42% and 37% of women said they still walked regularly, 39% had stopped before they were 50, and 19% of men and 24% of women had stopped walking regularly after the age of 50 (Table 10). Although it should be noted that this self-assessment of regular walking did not fully accord with the assessment based on current walking behaviour, the substantial proportion of people who reported regular walking that did not stop until after the age of 50 indicates considerable potential for increase in regular walking among older people.

Table 10 also shows these figures for the two main age groups. The major differences between the percentages are as one would expect, but it is also of interest to note that the percentage of both men and women who gave up regular walks before the age of 25 was significantly higher among people currently aged 50–69 than among those currently aged 70+ (17% and 16% compared with 10% and 11% respectively).

Past participation related to current overall levels of activity of a duration and intensity likely to produce a health benefit

Sports and exercise activities

Comparing people who were currently sedentary with those who were currently frequently active, there was little difference between them in terms of young adult participation. It was only in women that there was any notable association between past participation and current activity, and then only in past participation between the ages of 35–49 (see Table 11).

Similarly, although those who were currently frequently active were more likely to have been regular sports participants for at least three quarters of their adult life, around a fifth of currently sedentary men and women (23% and 18%) had also spent at least three quarters of their adult life in regular sports participation (Table 12). At the other end of the scale, 30% of currently frequently active men and 38% of currently frequently active women had spent less than a quarter of their adult life in regular sports participation. Comparison between age groups is not appropriate as the cessation of regular participation at a certain age would have greater impact on the figures for older respondents than younger ones (see Table A8, Appendix B)

Regular long walks

Among men and women who were currently frequently active, 34% of men and 37% of women had spent three quarters or more of their life as regular walkers compared with 15% of both men and women who were currently sedentary (Table 13).

Past participation and measures from the physical appraisal

An investigation into the relationship between past participation in sports and exercise activities, regular long walks and measures from the physical appraisal showed no distinct trends with respect to any single measure. The large number of confounding factors and the lack of information on past participation in other physical activity clearly play a part in this.

Table 11 Regular[†] participation in sports and exercise activities[‡] in earlier years by current participation in activity defined as having an intensity sufficient, at their age, to be likely to produce a health benefit[#]

	Men		Women	
	Current participation		Current participation	
	Less than once/week	At least five times/week	Less than once/week	At least five times/week
	(%)	(%)	(%)	(%)
Some regular participation between:				
ages 16–24	77	80	58	65
ages 25–34	62	72	44	58
ages 35–49	46	60	35	57
Base	*532*	*362*	*714*	*286*

[†] In the questionnaire used for respondents aged 50–69, 'regular' was defined as 'at least once a week for a few months or more'. For people aged 70+, 'regular' was not defined and the time period for eligible participation was increased to 2 years.
[‡] The summary measures for sports and exercise activities were based on all such activities with an average energy cost of at least 5 kcal/min, including activities such as exercises and social dancing.
[#] This activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit. The scale is described in detail in Appendix A.

Table 12 Proportion of adult years† spent in regular‡ participation in sports and exercise activities# by current participation in activity defined as having an intensity sufficient, at their age, to be likely to produce a health benefit§

	Men		Women	
	Current participation		Current participation	
	Less than once/week	At least five times/week	Less than once/week	At least five times/week
	(%)	(%)	(%)	(%)
Proportion of adult years in regular participation:				
Less than ¼	43	30	61	38
¼ but less than ¾	34	31	21	24
¾ or more	23	39	18	38
Total	100	100	100	100
Base	*532*	*362*	*714*	*286*

† The questionnaire for respondents aged 50–69 asked about the time since age 14. Respondents aged 70+ were asked about the time 'since they left school'. It has been assumed that all respondents aged 70+ left school at 14.
‡ In the questionnaire used for respondents aged 50–69, 'regular' was defined as 'at least once a week for a few months or more'. For people aged 70+, 'regular' was not defined and the time period for eligible participation was increased to 2 years.
# The summary measures for sports and exercise activities were based on all such activities with an average energy cost of at least 5 kcal/min, including activities such as exercises and social dancing.
§ This activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit. The scale is described in detail in Appendix A.

Table 13 Proportion of adult years† spent walking‡ regularly# by current participation in activity defined as having an intensity sufficient, at their age, to be likely to produce a health benefit§

	Men		Women	
	Current participation		Current participation	
	Less than once/week	At least five times/week	Less than once/week	At least five times/week
	(%)	(%)	(%)	(%)
Proportion of adult years spent walking regularly:				
Less than ¼	68	49	68	47
¼ but less than ¾	17	17	17	16
¾ or more	15	35	15	37
Total	100	100	100	100
Base	*530*	*362*	*713*	*286*

† The questionnaire for respondents aged 50–69 asked about the time since age 14. Respondents aged 70+ were asked about the time 'since they left school'. It has been assumed that all respondents aged 70+ left school at 14.
‡ The summary walking measure was based on all regular walking of 2 miles or more, irrespective of pace.
# In the questionnaire used for respondents aged 50–69, 'regular' was defined as 'at least once a week for a few months or more'. For people aged 70+, 'regular' was not defined and the time period for eligible participation was increased to 2 years.
§ This activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit. The scale is described in detail in Appendix A.

4 Physical activity, attitudes and lifestyle

Physical activity compared with self-assessment of exercise levels

Three questions covering self-assessment of exercise levels were asked of all respondents aged 50+:

- Do you think you get enough exercise, at present, to keep you fit (yes, no, don't know)?
- Compared to other people of your age, would you describe yourself as very physically active, fairly physically active, not very physically active or not at all physically active?
- Compared to other people of your age, would you say you are very fit, fairly fit, not very fit or not at all fit?

Two thirds of men (67%) and women (66%) aged 50+ thought they got enough exercise to keep fit (Table 14). This view became more common with increasing age. Among those aged 50–69 62% of men and women felt they did enough exercise to keep themselves fit and this increased to 78% of men and 73% of women aged 70+.

Table 14 Self-perceptions of activity, fitness and adequacy of exercise for all those aged 50+

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Enough exercise to keep fit	56	54	68	71	78	84	75	67
(Very active†)	(20)	(17)	(19)	(23)	(26)	(25)	(31)	(22)
Very/fairly active†	77	72	78	74	81	80	80	77
(Very fit†)	(19)	(17)	(22)	(25)	(29)	(28)	(35)	(23)
Very/fairly fit†	85	80	80	77	83	87	87	82
Minimum base‡	*280*	*240*	*223*	*237*	*176*	*104*	*101*	*1361*

	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Enough exercise to keep fit	55	58	68	67	76	74	67	66
(Very active†)	(19)	(18)	(24)	(23)	(28)	(20)	(22)	(22)
Very/fairly active†	78	72	82	79	84	83	69	78
(Very fit†)	(19)	(19)	(30)	(25)	(28)	(26)	(29)	(25)
Very/fairly fit†	86	84	89	83	90	85	82	86
Minimum base‡	*264*	*262*	*285*	*279*	*241*	*174*	*185*	*1690*

† These two questions both carried the qualifier '... compared to other people of your age...'.
‡ Bases for individual variables may exceed the minimum base by 1 or 2 in each age group, depending on the differing number of people answering the three questions.

Three of every four respondents (77% of men and 78% of women) thought that, compared with other people of their age, they were either very active or fairly active (Table 14). Most men and women aged 50+ (84%) also thought that, compared with other people of their age, they were either very fit or fairly fit.

Especially at the younger ages, more men and women felt they were very/fairly fit or very/fairly active than thought they were doing enough exercise to keep them fit.

Within activity groups, most of the men and women in the frequently active group thought they got enough exercise to keep fit (83% and 82% respectively), thought they were very or fairly physically active (91% for both) and thought they were very or fairly fit compared to others of their age (93% and 95%) (Table 15). But more than half of the men and women in the sedentary group also thought they got enough exercise to keep fit (52% and 57% respectively), thought they were very or fairly physically active (59% and 65% respectively) and thought they were very or fairly fit compared to others of their age (68 % and 78%) (Table 15, Figures 6, 7 and 8).

The proportion who thought they got enough exercise to keep fit increased with age for both frequently active and sedentary people (Table 15 and Figure 6).

Table 15 Self-perceptions of activity and fitness by frequency of activity defined as having an intensity likely to produce a health benefit†

	Men				Women			
Activity frequency	50–59	60–69	70+	All men aged 50+	50–59	60–69	70+	All women aged 50+
Proportion who thought they got enough exercise to keep fit (%)								
Less than once/week	40	57	62	52	43	60	60	57
At least five times/week	75	86	94	83	73	84	90	82
Proportion who thought they were very active/fairly active (%)								
Less than once/week	12/48	9/50	13/46	11/48	7/51	15/53	13/54	12/53
At least five times/week	29/61	44/47	44/50	37/54	27/61	47/44	47/37	39/52
Proportion who thought they were very fit/fairly fit (%)								
Less than once/week	12/63	13/49	17/50	14/54	13/62	19/60	15/63	16/62
At least five times/week	24/68	48/44	50/47	37/56	23/71	40/52	56/43	38/57
Minimum bases‡								
Less than once/week	*182*	*205*	*139*	*526*	*152*	*233*	*323*	*708*
At least five times/week	*166*	*85*	*106*	*356*	*113*	*88*	*81*	*283*

† The development of an age-related activity scale has been described in Appendix A. The age-related activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit.
‡ Bases for individual variables may exceed the minimum base in each age group by 1 or 2 cases, depending on the differing number of people answering the three questions.

Physical activity and other health-related behaviours

Smoking, drinking alcohol, dietary behaviour and lack of physical activity are all risk factors in the development of cardiovascular disease and contribute to the development of many other conditions. The relationship between these different health-related behaviours is complex, both in terms of the role played in the development of disease and in the interaction between them. Lack of physical activity can be viewed both as a possible outcome of other behaviours such as over-eating and as an independent factor. Tables 16 to 18 present a brief description of the relationship between physical activity and the three other behaviours identified above. Each behaviour is examined in turn, so

Figure 6 The proportion of frequently active and sedentary men and women who think they get enough exercise to keep fit

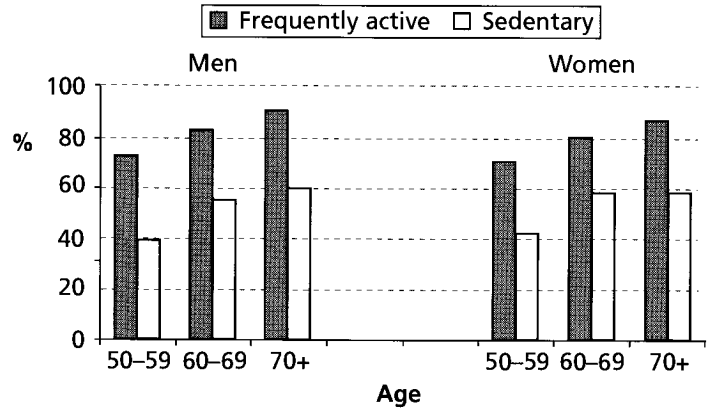


Figure 7 The proportion of frequently active and sedentary men and women who think they are very or fairly active

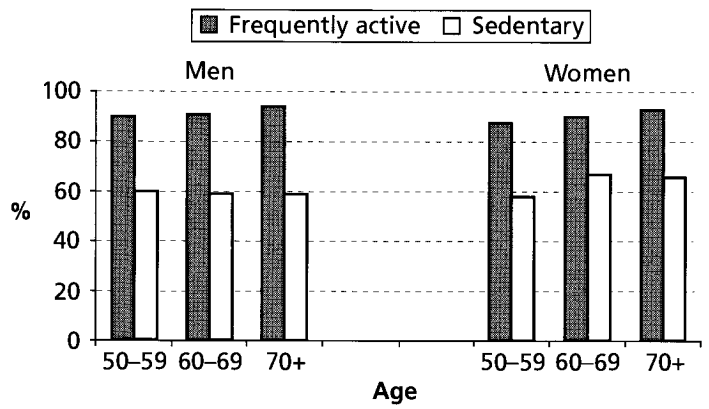


Figure 8 The proportion of frequently active and sedentary men and women who think they are very or fairly fit

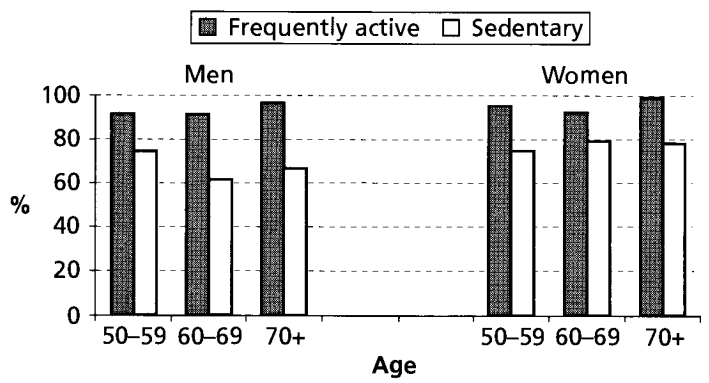


Table 16 Cigarette smoking status and participation in activity defined as having an intensity likely to produce a health benefit†

			Men			
Weekly frequency of activity	Never regularly smoked	Ex-regular smoker	Currently less than 10	Currently 10–19	Currently 20 or more	All age 50+
	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week‡	34	39	43	39	46	39
At least five times/week	26	27	17	24	29	26
Base	*318*	*718*	*62*	*110*	*147*	*1371*
			Women			
Weekly frequency of activity	Never regularly smoked	Ex-regular smoker	Currently less than 10	Currently 10–19	Currently 20 or more	All age 50+
	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week‡	42	41	46	46	39	42
At least five times/week	17	16	17	15	18	17
Base	*860*	*467*	*104*	*144*	*113*	*1705*

† The development of an age-related activity scale has been described in Appendix A. The age-related activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit.
‡ Less than four times in the past 4 weeks (includes zero).

caution is needed in the interpretation as no account has been taken of possible confounding between behaviours or with other factors not considered here.

Smoking

ADNFS reported that heavy smokers among men aged 16–74 were less likely to be frequent participants in physical activity and were more likely to be categorised as sedentary. The small number of smokers among people aged 50+ make such generalisations more difficult, but the figures indicate that men currently smoking 20 or more cigarettes a day were less likely to take any exercise of an intensity sufficient to benefit their health (46% of male heavy smokers exercised less than once a week compared to 34% of male non-smokers) (Table 16 and Appendix C). The numbers of men who smoked were too small to say if the effect of smoking on activity varied with age for those aged 50+. There was no difference between the proportions of frequently active men among heavy smokers and among other men (see Figure 9). There was no evidence of an association between physical activity and smoking among women aged 50+ (which reflects findings for women of all ages).[9]

Drinking

The relationship between drinking and activity was less clearly defined among this older age group than has been found in studies of adults of all ages (Table 17). The *Health Survey for England*[9] reported that people with higher levels of alcohol consumption were more likely to be active, but in the frequently active groups there was no obvious relationship with amount of alcohol consumed. In this current analysis, frequency of consumption has been taken as an indicator of amount consumed as the latter was not asked of the older respondents. (The two indicators are highly correlated among the younger adults.)

Table 17 Participation in activity defined as having an intensity likely to produce a health benefit† by frequency of alcohol consumption

Weekly frequency of activity	Men			Women		
	Non-drinker or less than once/week	Weekly, less than daily	Every day	Non-drinker or less than once/week	Weekly, less than daily	Every day
	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week‡	44	35	38	45	35	43
At least five times/week	25	28	26	15	20	17
Base	*458*	*681*	*228*	*999*	*542*	*164*

† The development of an age-related activity scale has been described in Appendix A. The age-related activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit.
‡ Less than four times in the past 4 weeks (includes zero).

Table 18 Participation in activity defined as having an intensity likely to produce a health benefit† by dietary behaviour‡

Weekly frequency of activity	Men		Women	
	'Healthy' diet	Not	'Healthy' diet	Not
	(%)	(%)	(%)	(%)
Less than once/week#	33	39	35	43
At least five times/week	24	27	14	17
Base	*85*	*1286*	*152*	*1553*

† The development of an age-related activity scale has been described in Appendix A. The age-related activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit.
‡ A series of questions regarding dietary habits and intake were scored to indicate 'healthy' behaviour. The questions covered fat intake, fibre intake and whether or not the respondent ate breakfast. The scores were totalled giving a minimum score of 11 and a maximum score of 33. A low score indicates a 'healthy diet'. For the purposes of analysis, a score of 14 or less was deemed to indicate a 'healthy' diet.
# Less than four times in the past 4 weeks (includes zero).

Diet

An assessment was made of dietary behaviour and people were classified into two very broad groups – those who had a 'healthy' diet and those who did not, based on fat and fibre intake. No assessment was made of total calorie intake because the necessary data were not available. The small numbers of people classified as eating a 'healthy' diet mean that none of the differences seen in Table 18 achieved statistical significance. Thus these data showed no relationship between a 'healthy' diet and activity.

Physical activity and well-being

There is some evidence that participation in physical activity enhances mood.[17] Those who were frequently active and those who were sedentary were compared using an assessment of mood, based on a validated scale.[18]

A positive mood was more common in frequently active men and women aged 50+ than in sedentary men and women (Table 19, Figure 9). In the men this effect was pronounced only in those aged 70+. Care must be taken in interpretation of the results as Bradburn's scale[18] was validated in people aged under 60.

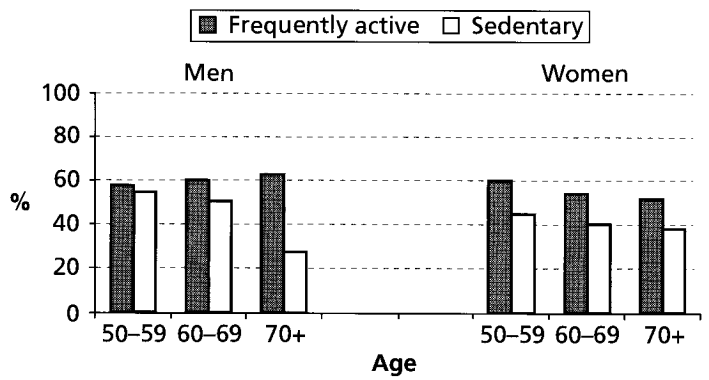
It seemed likely that these results might be confounded by health problems (that is, those in poor health are less likely to be active and also less likely to demonstrate a positive mood on the well-being scale). Nevertheless, after excluding those who considered themselves in 'poor health', there was only a slight increase in the percentage of sedentary people who scored a positive mood on the well-being scale (Table A17, Appendix E).

Table 19 Participation in activity defined as having an intensity likely to produce a health benefit† by score on well-being scale‡

	Men		Women	
	Frequency of activity		Frequency of activity	
	Less than once/week	At least five times/week	Less than once/week	At least five times/week
	(%)	(%)	(%)	(%)
Well-being score:				
10–13 (positive)	3	8	4	9
14–17	43	52	35	48
18–22	46	38	47	39
23–30 (negative)	8	2	13	4
Total	100	100	100	100
Population scoring 17 or less (positive mood)				
Age:				
50–59	54	57	46	61
60–69	52	61	39	57
70+	29	64	37	51
Base all 50+	*515*	*354*	*685*	*280*
50–59	*178*	*166*	*150*	*113*
60–69	*199*	*84*	*227*	*88*
70+	*138*	*104*	*308*	*78*

† The development of an age-related activity scale has been described in Appendix A. The age-related activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit.
‡ The maximum score on this scale is 30.[18] A high score represents a negative outlook on life and a low score, a positive outlook. Each person was asked to indicate whether, in the past few weeks, they had felt often, sometimes or never: particularly excited or interested in something, so restless you could not sit long in a chair, proud because someone complimented you on something you had done, very lonely or remote from other people, pleased about having accomplished something, bored, on top of the world, depressed or very unhappy, that things were going your way, upset because someone criticised you.

Figure 9 Proportion of frequently active and sedentary men and women who score a positive mood on the well-being scale



5 Physical appraisal

Introduction

The ADNFS included both a physical appraisal and an interview. Two different physical appraisals were designed for different age groups. For those aged under 75, it was conducted in a mobile laboratory. For those aged 75+, a simpler appraisal was conducted in the respondent's home. The oldest person tested was 96.

All respondents aged 50–74 completed a screening questionnaire for contraindications before being tested. As a result, some had a doctor present during the appraisal and some had restrictions to the tests. There was no medical supervision of the home appraisal.

Of those invited, 72% of men and 68% of women underwent physical appraisal (Table 20). There was no age difference in the response rates but men were slightly more likely to undergo testing than women.

The physical appraisals consisted of the following items, and the rationale for the choice of tests is presented in the *ADNFS technical report.*[7]

	50–74	75+
Height	✓	✓
Demi-span	(60–74 only)	✓
Weight	✓	✓
Skinfold thicknesses	✓	✓
Waist and hip circumferences	✓	
Shoulder abduction	✓	✓
Handgrip strength	✓	✓
Lower limb explosive power	✓	
Knee extensor strength	✓	
Spirometry	✓	
Cardiorespiratory variables during exercise	✓	
Chair rise ability		✓
Finger to toe		✓
Plug/socket manipulation		✓
Key/lock manipulation		✓

Data will be compared, where appropriate, with those obtained by Skelton *et al.*[16] The reason for including Skelton's data is that, although obtained from a much smaller number of subjects (10 men and 10 women per half-decade aged 65–89), they were obtained from a group of subjects selected specifically for their freedom from symptomatic or diagnosed disease. Data from subjects selected in

Table 20 Physical appraisal – the number who underwent a physical appraisal, in relation to the number interviewed (ADNFS only)

	Men								
	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+	All 50+
Number interviewed	172	147	135	129	106	59	48	16	812
Number tested	129	102	101	93	73	42	35	13	588
Number tested as % of those interviewed	75%	69%	75%	72%	69%	71%	73%	81%	72%
	Women								
	50–54	55–59	60–64	65–69	70–74	75–79	80–84	85+	All 50+
Number interviewed	168	163	171	184	137	117	83	44	1067
Number tested	120	106	122	127	91	75	57	32	730
Number tested as % of those interviewed	71%	65%	71%	69%	66%	64%	69%	73%	68%

this way might be said to reflect the effects of ageing rather than the combined effects of ageing and disease which might apply to the population as a whole.

Height, weight and body mass index

There was a progressive decline in both height and weight across the age groups (Tables 21 and 22). The difference in height was more pronounced in the women. For men and women aged 65+ the mean height values were similar to those measured in a population survey of the UK carried out in 1984[19] and for those aged 65+ the mean height values were similar to those obtained in a small, selected sample of healthy older people.[20] For men and women aged 50–64 there was a trend to be heavier than those measured in the 1984 population survey.[19] For men aged 65+ the mean weight

Table 21 Height (m)

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	174.0	173.2	172.5	172.0	169.4	169.2	168.2	171.9
(sd)	(6.6)	(7.6)	(6.2)	(6.2)	(6.0)	(7.2)	(6.4)	(6.9)
Base	*129*	*101*	*100*	*93*	*73*	*41*	*48*	*585*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	161.6	160.6	159.7	157.8	155.9	155.3	152.0	158.0
(sd)	(5.8)	(6.3)	(6.4)	(5.6)	(5.7)	(6.0)	(7.0)	(6.8)
Base	*120*	*106*	*122*	*126*	*91*	*75*	*86*	*726*

Table 22 Weight (kg)

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	79.2	79.5	77.4	76.2	73.9	73.2	70.0	76.6
(sd)	(12.0)	(12.2)	(11.2)	(10.9)	(11.5)	(10.9)	(11.1)	(11.8)
Base	*129*	*101*	*100*	*93*	*73*	*42*	*47*	*585*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	66.5	69.2	68.2	66.6	65.1	62.3	58.7	65.7
(sd)	(9.7)	(13.2)	(11.8)	(11.3)	(11.4)	(12.7)	(12.6)	(12.1)
Base	*120*	*106*	*122*	*126*	*91*	*76*	*85*	*726*

Table 23 Body mass index (kg/m^2)

	Men							
	50–54	55–59	60–64	65–69	70–74	75-79	80+	All 50+
Mean	26.2	26.4	26.0	25.7	25.7	25.6	24.6	25.9
(sd)	(3.6)	(3.4)	(3.2)	(3.2)	(3.3)	(3.1)	(3.2)	(3.3)
Base	*129*	*101*	*100*	*93*	*73*	*41*	*47*	*584*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	25.5	26.8	26.8	26.8	26.8	26.0	25.3	26.3
(sd)	(3.4)	(4.6)	(4.7)	(4.3)	(4.5)	(5.3)	(4.9)	(4.5)
Base	*120*	*106*	*122*	*126*	*91*	*74*	*84*	*723*

values were similar to those obtained in the small sample of healthy older men, but women aged 65–84 tended to be heavier than their healthy counterparts.[16]

Combining height and weight into the body mass index (BMI), shows a slight tendency for a decrease with age in the men but no change with increasing age in the women (Table 23). For men aged 65+ the mean BMI values were similar to those obtained by Skelton[16] from her strictly healthy subjects. For women aged 65+, however, Skelton's healthy women had consistently lower mean BMI values.

With younger subjects, BMI values above 25 kg/m^2 are considered overweight and above 30 kg/m^2 are considered obese.[10, 20] For all groups, except men aged 80+, the mean was greater than the cut-off value for 'overweight' (Figure 10). These cut-off values, however, cannot be assumed to be valid for

Figure 10 Body mass index in men and women aged 50+ (mean ± 2 sd)

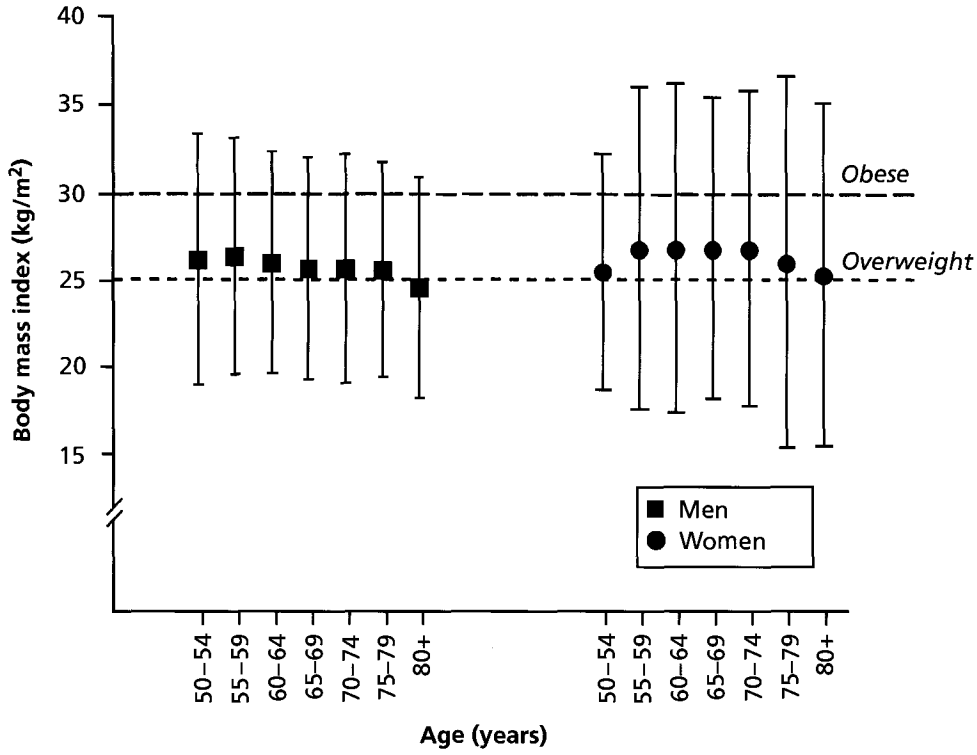


Table 24 Prevalence of being overweight† or obese‡ (figures based on measurements of BMI)

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Overweight	59	65	59	57	55	63	34	58
Obese	12	17	11	10	8	10	9	12
Base	*129*	*101*	*100*	*93*	*73*	*41*	*47*	*584*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Overweight	53	65	62	64	55	55	48	58
Obese	9	20	23	18	25	17	18	19
Base	*120*	*106*	*122*	*126*	*91*	*75*	*83*	*723*

† 'Overweight' = BMI > 25 kg/m².
‡ 'Obese' = BMI > 30 kg/m².

older subjects. If valid, they imply that being 'overweight' is almost as prevalent among those aged 70+ (men 51%, women 53%) as it is at 50–69 (men 60%, women 61%). Table 24 shows that 58% of men and women aged 50+ are overweight, and that 12% of men and 19% of women aged 50+ are obese. The significance for health of a moderate degree of 'overweight' when aged 70+ is far from

clear, although there is evidence from the USA that extreme values of BMI (either high or low) in people aged 55+ are predictive of functional impairment at follow-up ten years later.[21]

A new report from the British Regional Heart Survey[22] has suggested that, in middle-aged men, a healthy BMI is about 22 kg/m^2. At this body weight there is much lower mortality risk from cardiovascular diseases, heart attacks, strokes or diabetes mellitus. This present survey shows that the majority of middle-aged men have a BMI well above the suggested 22 kg/m^2, underlining the need for public health policies towards prevention of weight-related conditions.

Demi-span

With increasing age, height can become less reliable as an indicator of skeletal size, as a result of the increasing prevalence of kyphosis and of vertebral fracture. Demi-span can be used as a proxy for height in older people.[23, 24] The decline in mean demi-span from age 75–85+ rather suggests that the 'loss' of height with age is due more to cohort differences in skeletal size than to age-related loss of spinal height, as the differences in height with age are proportionately no greater than those in demi-span (see Table 25).

Table 25 Demi-span (cm)

	Men					
	60–64	65–69	70–74	75–79	80+	All 60+
Mean	82.3	82.3	81.6	80.1	79.3	81.5
(sd)	(3.5)	(3.2)	(3.9)	(4.3)	(4.5)	(3.9)
Base	*97*	*91*	*73*	*42*	*48*	*351*
	Women					
	60–64	65–69	70–74	75–79	80+	All 60+
Mean	75.1	74.3	73.0	73.4	71.5	73.6
(sd)	(3.3)	(3.4)	(3.5)	(3.4)	(3.6)	(3.6)
Base	*121*	*126*	*91*	*75*	*87*	*500*

Skinfold thicknesses and estimated body fat

Skinfold thicknesses were measured according to the method of Durnin and Rahaman.[25] Each fold was measured twice and the mean value recorded. The data are presented here as the sum of the skinfold thicknesses at the four sites sampled (Table 26).

Taking percentage body fat as greater than 25% in men and greater than 30% in women as the cut-off values, obesity is very common (Table 27). Indeed, all the age- and gender-specific mean values are greater than the cut-off values. As far as the older subjects are concerned, however, this conclusion must be treated with caution. The prediction equation used to estimate percentage body fat from the skinfolds was derived from subjects aged 16–72 years.[26] Consequently, its application to subjects aged 50–85+ may not be appropriate, especially above, say, 60 years of age. If the prediction equations are still correct for older subjects, they indicate a decline in mean percentage body fat with increasing age

Table 26 Skinfold thicknesses (mm) (sum of four sites)

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	62.0	62.8	58.7	57.3	53.7	56.5	48.0	58.3
(sd)	(19.1)	(21.0)	(18.9)	(19.2)	(16.0)	(15.8)	(14.1)	(18.9)
Base	*128*	*102*	*100*	*92*	*72*	*41*	*47*	*582*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	73.1	78.1	75.7	71.6	66.2	61.2	55.5	70.2
(sd)	(24.3)	(26.5)	(25.0)	(21.4)	(22.4)	(24.4)	(22.9)	(24.8)
Base	*120*	*101*	*121*	*121*	*83*	*69*	*70*	*685*

Table 27 Estimated percentage body fat (%)†

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	29.1	29.2	28.2	27.7	26.7	27.3	25.1	28.0
(sd)	(5.0)	(5.2)	(5.0)	(5.3)	(5.2)	(4.5)	(4.8)	(5.2)
Base‡	*129*	*102*	*99*	*92*	*73*	*41*	*47*	*583*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	37.6	38.5	38.1	37.6	36.3	35.2	33.7	36.9
(sd)	(5.1)	(4.8)	(4.6)	(4.3)	(4.8)	(5.8)	(5.3)	(5.1)
Base‡	*120*	*106*	*122*	*126*	*89*	*75*	*84*	*722*

† Care must be taken in interpreting these results as the method used for estimation of body fat has not been validated in over 60s.
‡ The bases for estimated body fat are higher than those for skinfolds because the equations used allow estimates of body fat to be made when fewer than four skinfolds had been measured. The sum of the four skinfolds was only calculated if all four measurements had been taken.

(see Table 26). This would be a surprising finding since the decline in lean body mass with increasing age usually results in a corresponding increase in percentage body fat.

Waist/hip ratio

Waist/hip ratio (see Table 28) may be a much better indicator of stroke risk than BMI.[27] Part of the reason for the inconsistent results of many studies trying to assess stroke risk from BMI is that strokes occur mainly in older people and as people age, although their lean body mass may decrease, their body fat remains the same or increases, so that their BMI remains stable. Estimated body fat from skinfold thicknesses often relies on prediction equations that have not been validated in an older

Table 28 Waist/hip ratio

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	0.94	0.96	0.95	0.95	0.95	0.95
(sd)	(0.06)	(0.05)	(0.06)	(0.06)	(0.06)	(0.06)
Base	*128*	*99*	*95*	*90*	*65*	*477*
	Women					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	0.81	0.83	0.84	0.84	0.86	0.83
(sd)	(0.07)	(0.07)	(0.07)	(0.07)	(0.08)	(0.07)
Base	*116*	*99*	*115*	*105*	*55*	*490*

Table 29 Prevalence of being at increased risk of stroke†

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
At increased risk of stroke	22%	33%	33%	31%	29%	29%
Base	*128*	*99*	*95*	*90*	*65*	*477*

† Predictions based on measurements of waist/hip ratio and the observation of an increased risk of stroke in men with a waist/hip ratio ≥0.98.[27]

group. Waist/hip ratio, which is an indicator of abdominal obesity, has been linked to hypertension, diabetes and other athero-sclerotic risk factors. Men with a waist/hip ratio of greater than or equal to 0.98 had at least 2.3 times the stroke risk of men with a waist/hip ratio less than 0.91.[27] It is clear that women with a high waist/hip ratio are also at a greatly increased risk of stroke and heart attack.[28] A cut-off 'danger' value, equivalent to greater than or equal to 0.98 in men, is less clearly defined for women aged 50 and over but is probably near greater than 0.80.[28]

In men there were no age-related differences in waist/hip ratio from the age of 50–74 and 29% of men had a waist/hip ratio corresponding to an increased risk of stroke (Table 29).

More than half the women had a waist/hip ratio suggestive of high cardiovascular and cerebrovascular risk. (The steady increase with increasing age in the waist/hip ratio of women aged 50 and over shown in Table 28 may be a partly misleading consequence of an increasing prevalence of osteoporotic vertebral compression.)

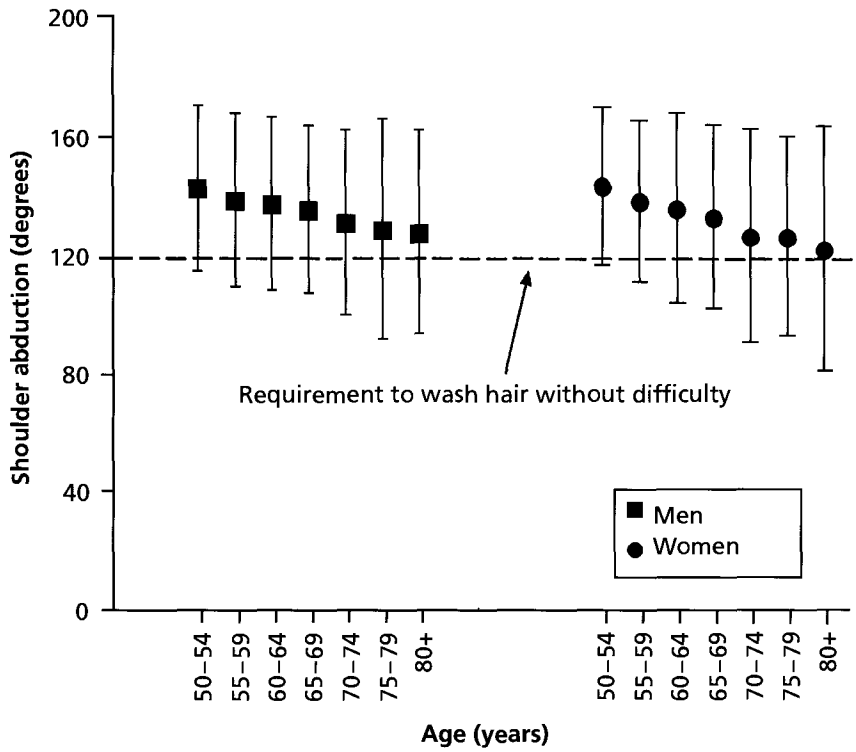
Shoulder abduction

The range of active shoulder abduction was measured as the maximal number of degrees of arc through which the dominant arm (unless injured) could move upwards in 45 degree flexion. This measurement

Table 30 Shoulder abduction (degrees)

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	143.1	139.2	137.9	136.0	131.7	129.4	128.3	136.8
(sd)	(13.7)	(14.4)	(14.5)	(14.0)	(15.5)	(18.5)	(17.1)	(15.6)
Base	*129*	*99*	*100*	*91*	*73*	*42*	*47*	*581*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	143.9	139.0	136.5	133.7	127.2	127.1	122.8	133.9
(sd)	(13.1)	(13.4)	(15.9)	(15.4)	(18.0)	(16.8)	(20.6)	(17.4)
Base	*120*	*106*	*122*	*126*	*90*	*75*	*85*	*724*

Figure 11 Shoulder abduction in men and women aged 50+ (mean ± 2 sd)†



†Assuming that washing hair requires 120° of shoulder abduction.[29]

was performed three to five times (taking the best recorded) using a gravity-operated goniometer (Myin). The measurement was taken seated, in a suitable chair, or standing against a vertical support.

There was a gradual reduction in mean range of shoulder abduction with increasing age, somewhat more pronounced in the women, having had mean values similar to those of the men when in their 50s (Table 30, Figure 11).

Table 31 Prevalence of inability to wash hair without difficulty†

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Unable to wash hair without difficulty	6%	8%	11%	15%	22%	24%	32%	14%
Base	*129*	*99*	*100*	*91*	*73*	*42*	*47*	*581*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Unable to wash hair without difficulty	5%	7%	13%	18%	39%	32%	40%	20%
Base	*120*	*106*	*122*	*126*	*90*	*74*	*86*	*724*

† Predictions based on measurements of shoulder abduction and the observation that washing hair without difficulty requires a shoulder abduction of 120°.[29]

Table 32 Handgrip strength (N/kg) (Newtons/kg)

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	6.3	5.7	5.7	5.4	5.2	5.1	4.6	5.6
(sd)	(1.3)	(1.2)	(1.1)	(1.2)	(1.0)	(1.2)	(1.4)	(1.3)
Base	*125*	*90*	*85*	*80*	*53*	*36*	*44*	*513*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Mean	4.5	4.1	4.0	3.8	3.4	3.9	3.3	3.9
(sd)	(0.9)	(1.0)	(0.9)	(0.7)	(0.9)	(1.2)	(1.0)	(1.0)
Base	*117*	*96*	*104*	*108*	*70*	*64*	*61*	*620*

Badley has shown that more than 120 degrees of shoulder abduction are necessary to wash hair without difficulty.[29] Among those aged 50+, 14% of men and 20% of women had a range of shoulder movement less than that required to wash their hair without difficulty (Table 31, Figure 11). The situation was particularly severe for the oldest respondents: 32% of men and 40% of women aged 80+ had a range of shoulder abduction less than the critical value.

Handgrip strength

The mean handgrip strength of men and women aged 80+ (standardised for body weight) was 27% less than that of those aged 50–54. Women were typically 30% weaker than men (Table 32).

The values for handgrip strength are less for the present representative survey than for subjects selected specifically for their good health.[16] From the half-decade 65–69 to those aged 85+ (not shown separately in Table 32) the fall in handgrip strength amounted to 26% for men and 29% for women, similar to Skelton's healthy subjects over the same period.

A Finnish study[30] has shown that among 75- and 80-year-olds, a low value for handgrip strength is associated with an increased risk of death during the following four to five years (see also the chapter on Knee extension strength on page 42 for comments).

Lower limb explosive power

Explosive power was included in the battery of tests because of its importance in daily life, such as for stair climbing and for the avoidance of tripping and falling. Explosive power was measured in the dominant leg. Some subjects were screened out from performing the test. Of those aged 50–74 who underwent physical appraisal, explosive power was successfully tested in 85% of men and 78% of women. The results have already been published in the main ADNFS reports but the major findings are presented again here (Table 33).

Across the five half-decades from 50–74, men and women both showed a 33% reduction in power/weight ratio. In general, women had mean power/weight ratios about two thirds of the mean values for men of the same age. Thus, men had the equivalent of a 20-year advantage over the women in respect of this functionally important characteristic. Skelton's data for healthy men and women aged 65–89 suggest that the male advantage might be greater for the oldest people.[16]

Some functionally important 'threshold' values of power/weight ratio have been identified.[31] (The threshold values are different from those used in the original ADNFS report, as the current thinking has since changed.) Thus, for example, a power/weight ratio of greater than or equal to 2.5 W/kg is required to be confident of being able to mount a 50 cm step without the use of a handrail: 32% of men and 75% of women aged 50–74 had power/weight ratios below 2.5 W/kg (Table 34, Figure 12).

Table 33 Lower limb explosive power (W/kg)

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	3.6	3.1	2.9	3.1	2.4	3.1
(sd)	(1.1)	(1.1)	(1.0)	(1.1)	(0.9)	(1.1)
Base	*116*	*84*	*85*	*82*	*58*	*425*
	Women					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	2.4	2.1	1.9	1.7	1.6	2.0
(sd)	(0.8)	(0.8)	(0.8)	(0.7)	(0.5)	(0.8)
Base	*113*	*89*	*96*	*88*	*53*	*439*

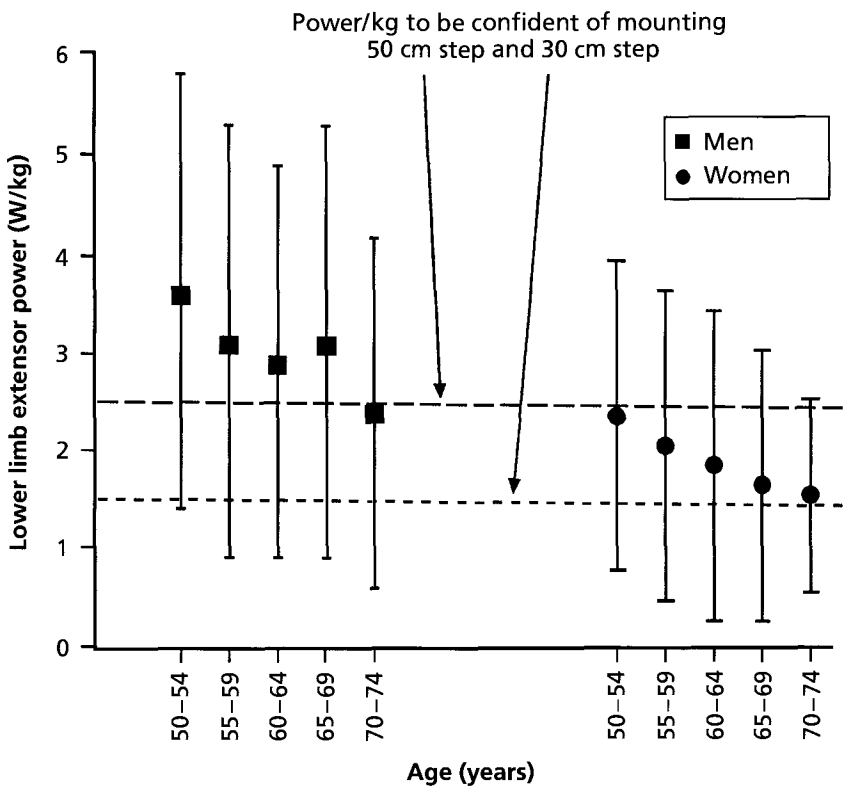
The original analysis presented in the ADNFS report omitted some values for lower limb explosive power which were subsequently included in the data set. Thus, the figures presented here differ very slightly from those in the ADNFS report.[5]

Table 34 Proportion at risk of being unable to step up 30 cm and 50 cm without difficulty†

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)
At risk of being unable to step 50 cm	16	31	37	34	57	32
At risk of being unable to step 30 cm	3	6	8	6	14	7
Base	*116*	*84*	*85*	*82*	*58*	*425*
	Women					
	50–54	55–59	60–64	65–69	70–74	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)
At risk of being unable to step 50 cm	56	72	82	86	93	75
At risk of being unable to step 30 cm	13	24	30	38	47	28
Base	*113*	*89*	*96*	*88*	*53*	*439*

† Predictions based on measurements of lower limb explosive power and the observation that to be confident of being able to step up 30 and 50 cm requires a power/weight ratio of at least 1.5 W/kg and 2.5 W/kg respectively.[31]

Figure 12 Lower limb explosive power in men and women aged 50–74 (mean ± 2 sd)



When the power/weight ratio is less than 1.5 W/kg, some people will not manage a 30 cm step and less than 30% of people will be able to manage a 50 cm step. The male advantage was even more apparent when considering the lower threshold. Only 7% of men but 28% of women aged 50–74 had a power/weight ratio below 1.5 W/kg.

Table 35 Knee extension strength (N/kg)

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	7.3	6.8	6.8	6.3	5.5	6.7
(sd)	(1.6)	(1.6)	(1.8)	(1.6)	(1.3)	(1.7)
Base	*121*	*78*	*74*	*71*	*43*	*387*
	Women					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	5.9	5.0	5.2	5.1	4.6	5.3
(sd)	(1.8)	(1.8)	(1.8)	(1.4)	(1.3)	(1.7)
Base	*114*	*87*	*88*	*79*	*44*	*412*

Knee extension strength

Quadriceps strength was measured in the dominant leg. Some subjects were screened out from performing the test. Of those aged 50–74 who underwent physical appraisal, quadriceps strength was successfully tested in 78% of men and 73% of women. Over the five half-decades from 50–74, there was a decline in mean quadriceps strength of 25% in the men and 22% in the women (Table 35). In Skelton's study of healthy men and women aged 65–89, the decline over these somewhat older five half-decades was 16% in the men and 25% in the women.[16] In general, women had mean quadriceps strength values which were 75–85% of those for men of the same age.

A Finnish study[30] has shown that among 75- and 80-year-olds, a low value for knee extension strength is associated with an increased risk of death during the following four to five years. This association is at least as strong as the equivalent association between low handgrip strength and increased risk of death. It is not clear, however, whether this merely reflects the fact that people who are unwell are weak, or whether it implies a more direct link between weakness (or muscle mass) and subsequent death. This is an important point since the latter interpretation would imply potential scope for reducing the risk of death by increasing muscle strength (or muscle mass) through physical activity and nutrition.

In the original ADNFS report,[5] a threshold value of knee extension strength of 50% of body weight (or 4.9 N/kg) was suggested as necessary for standing with both feet on the ground and the knees at 90 degrees. This would be somewhat equivalent to getting up off a low chair without using arms. This suggested threshold value was later questioned as being too high as many healthy older people had muscle strength less than this and could still manage to rise off a low chair.[32] Skelton *et al.* have been attempting to define a threshold value of knee extension strength necessary for a number of daily tasks and it seems that individuals differ in the precise value below which they lose a particular functional ability. Nevertheless, it is still possible to identify the lowest value at which people can be confident of being able to perform the task.

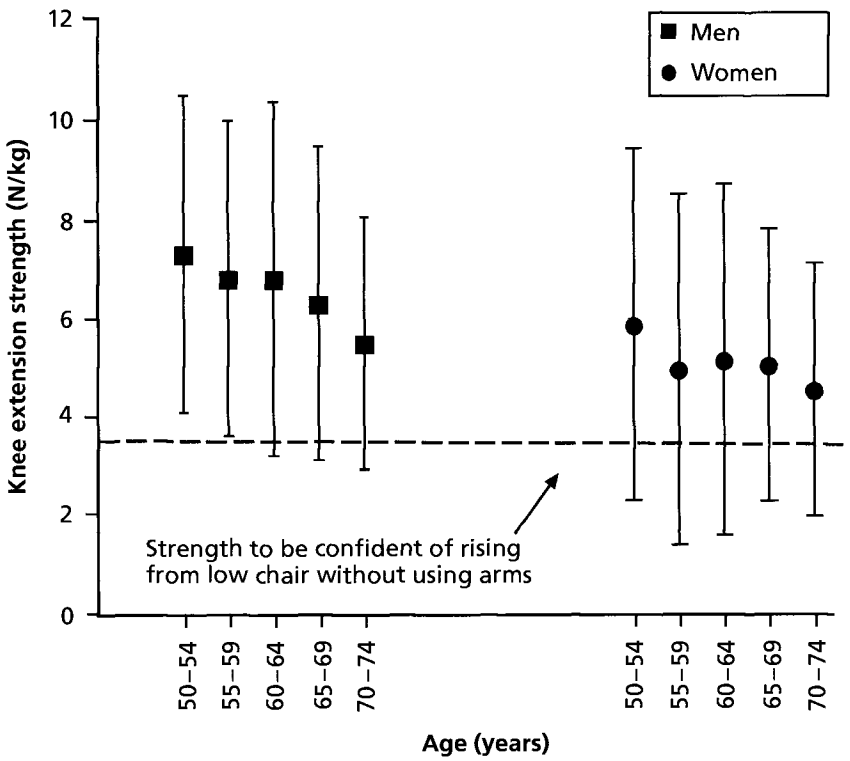
Data from the Royal Free Hospital School of Medicine[31,33] suggest that older people with knee extension strength below 3.5 N/kg (strength equal to 35% of body weight) have a less than 90% chance of being able to rise from a low chair without using their arms. Table 36 shows that, of men

Table 36 Prevalence of risk of being unable to rise out of a low chair without difficulty†

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
At risk of being unable to rise from a low chair	1%	1%	1%	1%	7%	2%
Base	*121*	*78*	*74*	*71*	*43*	*387*
	Women					
	50–54	55–59	60–64	65–69	70–74	All 50+
At risk of being unable to rise from a low chair	5%	16%	18%	15%	25%	14%
Base	*114*	*87*	*88*	*79*	*44*	*412*

† Predictions based on measurements of isometric knee extension strength and the observation that strength above 3.5 N/kg is necessary to be confident of being able to rise, without using arms.

Figure 13 Isometric knee extension strength in men and women aged 50–74 (mean ± 2 sd)



and women aged 50–74 years, 2% and 14% respectively will be at risk of being unable to rise from a low chair. There is a large age-related effect (Figure 13). Among women the numbers at risk of becoming unable to rise from a low chair (without using their arms) are 5% in the 50–54-year-olds and 25% in the 70–74-year-olds. In men the figures rise from 1% to 7%.

Table 37 Maximal oxygen consumption (ml/kg per min)

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	40.5	37.7	32.9	31.0	28.4*	35.7
(sd)	(6.9)	(7.6)	(7.3)	(7.0)	(7.6)	(8.4)
Base	*92*	*61*	*57*	*44*	*26**	*280*
	Women					
	50–54	55–59	60–64	65–69	70–74	All 50+
Mean	30.3	28.3	27.6	23.8	22.3*	27.6
(sd)	(7.3)	(5.7)	(5.8)	(5.2)	(6.3)	(6.7)
Base	*87*	*64*	*61*	*50*	*20**	*282*

* Please note small bases in the 70–74 age group.
The original analysis presented in the ADNFS report omitted some values for maximal oxygen consumption which were subsequently included in the data set. Thus the figures presented here differ very slightly from those in the ADNFS report.

Spirometry

Lung function was described in FVC (litres), FEV_1 (litres/sec) and $FEV_1/FVC \times 100$ in the main report.[5] Tables A10, A11 and A12, in Appendix D summarise the information.

Cardiorespiratory responses during exercise

Heart rate and oxygen consumption were measured during a progressive exercise test on a treadmill. The test was terminated when the heart rate reached 85% of the person's predicted maximal heart rate. Maximal oxygen consumption (in ml/kg per min) was then calculated by extrapolation to the predicted maximal heart rate.[7]

The results were published in the main report[5] but are presented here for those aged 50–74 (Table 37).

The women's values for maximal oxygen consumption averaged 77% of those for the men. Within each age/sex subgroup, the individual values varied widely. Nevertheless, there was a clear effect, with a fall in mean maximal oxygen consumption, from age group 50–54 to age group 70–74, of 30% for men and 26% for women.

In order to interpret these figures it is necessary to view them in the context of what is known about the oxygen cost (ml of oxygen per kg of body weight per minute) of an everyday activity such as walking. Durnin and Passmore[34] drew attention to the remarkable consistency of the findings of five classical international studies (Atzler & Herbert, 1927, Benedict & Munchhauser 1915, Brezina & Kolmer, 1912, Douglas & Haldane 1912, Magaria, 1938) for the relationship between oxygen consumption and walking speed in men weighing 60–75 kg. The combined data indicate a mean oxygen cost of 13 ml/kg per min for walking at 3 mph. This figure is consistent with that of 12 ml/kg per min found by Mahadeva *et al.*[35] both for ten men and for ten women aged 20–45 at 3 mph. There are very few published data for older people. Mahadeva reported a mean value of 13 ml/kg per min for four men averaging 70 years of age. A value of 11 ml/kg per min has been reported for 22 men averaging 60 years,[36] and a value of 12 ml/kg per min has

been reported for ten women averaging 71 years of age (but only 10 ml/kg per min for ten women aged 20–30).[38] McDonald re-analysed the combined data from a wide range of studies published since 1912.[39] His analysis suggested that the oxygen cost of walking was somewhat less for women (12.0–12.5 ml/kg per min) than for men (12.5–14.5 ml/kg per min), even after standardising for differences in body weight.

For the purpose of the further examination of the data in Table 37, the mean oxygen cost of walking at 3 mph will be taken as 12.5 ml/kg per min.

The other requirement for the appreciation of the everyday implications of the data reported in Table 37 is knowledge of the greatest percentage of maximal oxygen uptake at which exercise (specifically walking) will be perceived as comfortable. Durnin and Passmore[34] argue that a healthy, untrained man should be able to walk for a prolonged period at an oxygen cost of some 15.5 ml/kg per min without developing fatigue. On average, this would correspond to some 35% of maximal oxygen uptake for young adult men. Presumably, walking at a higher percentage of maximal oxygen consumption might still be considered comfortable if continued for only a few minutes at a time. There is very little published information apart from two reports from Cunningham's group: for 22 men aged 55–66 years the mean oxygen cost of self-selected 'comfortable' walking was approximately 35% of their mean maximal oxygen consumption,[36] and for 60 men aged 60–65 the corresponding value for their self-selected 'normal' walking pace was approximately 45%.[37] There are no published data for older subjects. Unpublished data from ten women and four men of mean age 77 years, studied at the Royal Free Hospital School of Medicine's human performance laboratory, indicate that their self-paced 'comfortable' walking speed (means = 2.9 and 3.2 mph, respectively) was performed with a heart rate averaging some 40–45% of their predicted heart rate reserve.

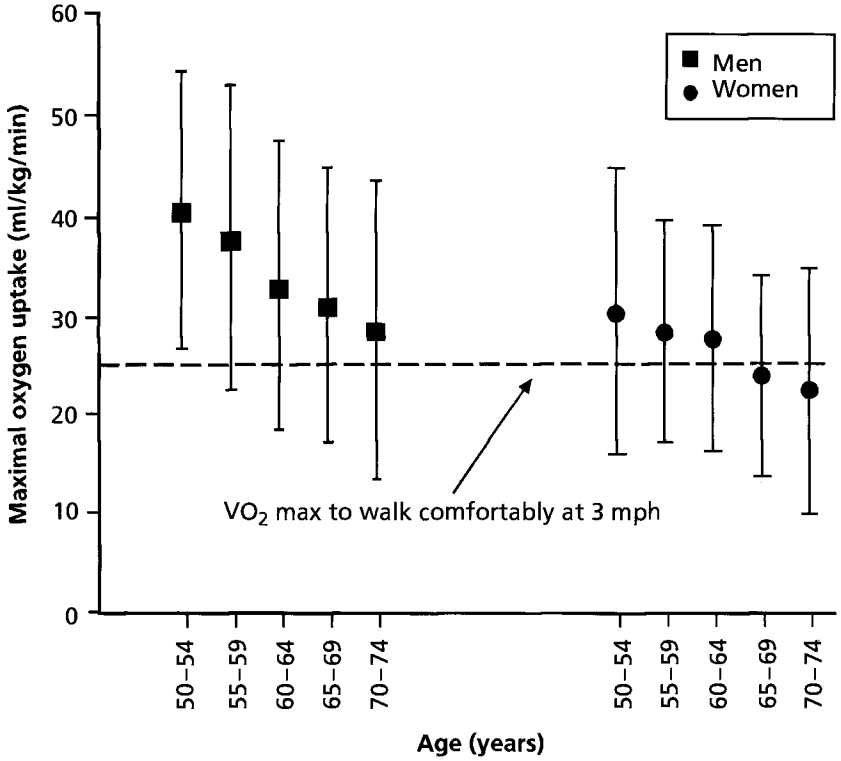
For the purpose of the present analysis, it is suggested that 'comfortable' walking requires that the oxygen cost is less than 50% of maximal oxygen consumption. Thus, the data in Table 37 will be examined on the basis that comfortable walking on the level at 3 mph requires that the maximal oxygen consumption should be more than 25 ml/kg per min. Women fall below this threshold value at least 15 years sooner than men, with nearly a quarter of those as young as 50–54 years of age below the threshold (Table 38).

Table 38 Prevalence of inability to walk comfortably at 3 mph†

	Men					
	50–54	55–59	60–64	65–69	70–74	All 50+
Unable to walk comfortably at 3 mph	1%	3%	12%	16%	35%	9%
Base	*92*	*61*	*57*	*44*	*26**	*280*
	Women					
	50–54	55–59	60–64	65–69	70–74	All 50+
Unable to walk comfortably at 3 mph	23%	33%	34%	58%	80%*	38%
Base	*87*	*64*	*61*	*50*	*20**	*282*

† Predictions based on measurements of maximal oxygen consumption (predicted from a submaximal exercise test) and assuming that comfortable walking at 3 mph requires a maximal oxygen consumption of 25 $ml.kg^{-1}.min^{-1}$.
* Please note small bases in the 70–74 age group.

Figure 14 Maximal oxygen consumption (VO_2 max) in men and women aged 50–74 (mean ± 2 sd)



Among those aged 50–74, 9% of men and 38% of women fall below the 25 ml/kg per min threshold. This has important implications for public health as a large number of older people, especially women, will find walking at 3 mph uncomfortable and may not be compliant with key health messages which do not take account of this.

Functional ability of respondents aged 75+

These tests were aimed at tasks performed in everyday life, chosen partly because of their importance for independent living and partly because of presumed relationships with some of the physical performance characteristics being measured. The ability to touch the opposite great toe (to simulate cutting toe nails), the ability to place a 15 amp plug in a socket and remove it, the ability to put a yale key into a lock and turn it, and the ability to rise from a low armless stool (42 cm high, to simulate a toilet pedestal) were all tested.

Touching toes was successfully tested in 82% of subjects aged 75+, only two of whom (both women) were unable to do it. This test had previously been used in a population survey of 70-year-olds in Gothenburg, Sweden, where 2% were unable to perform the manoeuvre.[40] Although this test was intended to simulate the cutting of toe nails, the number of people managing the task successfully differed greatly from the reported 30% of men and 50% of women aged 75+ unable to cut their own toe nails.[41] This suggests that, in most cases, it is not hip and knee mobility that limits the ability to cut toe nails.

The plug/socket manoeuvre was successfully tested in 99% of subjects, only two of whom (both women) were unable to do it. There are no published figures of ability to complete this task. (In the Gothenburg study[40] it formed part of a timed test.)

Table 39 Prevalence of inability to rise from a low chair without using their arms (age 75+)

	Men			Women			
	75–79	80+	All 75+	75–79	80–84	85+	All 75+
Unable	10%	7%	8%	8%	21%	42%*	19%
Base	*42*	*46*	*88*	*74*	*56*	*31**	*161*

* Please note small bases in the 85+ age group.

The key/lock manoeuvre was successfully tested in 99% of subjects, only three of whom (all women) were unable to do it. There are no published figures of ability to complete this task. (In the Gothenburg study[40] it formed part of a timed test.)

Among those aged 75+, 8% of men and 19% of women were unable to rise from the low stool without using their arms (Table 39). Although there was no particular age trend in ability to perform this test in men, in the women there was a clear age trend with 8% of women aged 75–79, 21% aged 80–84 and 42% aged 85+ unable to perform the rise. This contrasts with Skelton's healthy women (10 per half-decade from 65–89), all of whom were able to perform this manoeuvre, albeit slowly in some cases.[16]

For people up to age 74, as discussed on pages 42–43, the prevalence of knee extension strength below 3.5 N/kg determines the number of people with less than 90% likelihood of raising body weight to standing. For example, 7% of men and 25% of women aged 70–74 were below this functional threshold. The actual measurement of the functional task, with people aged 75+, confirms that the prevalence of inability to rise from the chair was especially high in women, reaching 42% of women aged 85+.

Among those aged 75+ both handgrip strength and the ability to rise from a low chair without using their arms have shown considerable differences between the respondents in this survey and Skelton's data for healthy older people.[16] This highlights the significant effect that health may have on physical performance in older people, that is, low values for physical performance or functional ability measures cannot be assumed to be due to ageing and/or deconditioning alone (see also comments on the association between weakness and increased risk of death, page 42).

Relationship between handgrip strength and manual functional ability

So few people were unable to perform the functional tasks of putting a key in a lock and a plug in a socket that it would be inappropriate to attempt to draw conclusions about the relative handgrip strengths of those able and unable to perform the tasks without difficulty.

Relationship between physical performance and questionnaire responses concerning everyday activities

It was originally intended that the questionnaire responses concerning ability to shop, wash up, make a cup of tea, walk a quarter of a mile on their own, and other proxy responses for functional ability in the 70+ questionnaire, would be compared with the same individuals' performance measures in the physical appraisal. However, the numbers of people who had difficulty or could not shop, wash up, make a cup of tea, etc. were so small that this was not possible.

Comparison of the self-perceived levels of fitness and activity of those who did and did not undergo the physical appraisal

Perceptions of physical activity and fitness are discussed in Chapter 4. Overall, there was no difference in perceived levels of fitness or activity between those who did undergo the appraisal and those who did not. (Large differences in the responses of the two groups would have suggested that the results of the physical appraisal, and especially their relationships to perceived fitness and activity, might not have been representative.) The small numbers who did not complete the appraisals mean that it was not possible to consider differences between responses in 5-year age bands (see Table A13, Appendix D).

There may, however, have been substantial differences in the health of those who underwent physical appraisal and those who did not (see pages 53 and 55).

The relationship between physical appraisal data and perceived levels of fitness and activity

Handgrip strength

On average, those who felt they did enough exercise to keep them fit had a slightly stronger handgrip than those who did not (Table A14, Appendix D). The relationship between measured handgrip strength and self-perceived activity (Table A15, Appendix D) or fitness (Table A16, Appendix D) was consistent. However, the inter-individual variation was large and the group mean differences were small. Therefore, little can be said about an individual's handgrip strength and their self-perceived activity or fitness.

Chair rise

As the chair rise was included only in the home appraisal, this set of comparisons is limited to those aged 75+. It is made more difficult by the small numbers of people unable to rise from a low chair. Therefore, for the purposes of this analysis, those finding difficulty rising from a low chair have been included with those unable to do so. It has also been rendered problematic by the large number of

Table 40 Chair rising ability (without using arms) and self-perceived adequacy of exercise (age 75+)

	Men		
	Able to rise without difficulty (N)	Difficult or unable to rise (N)	Total (N)
Enough exercise to keep fit	71	2	73
Not enough exercise to keep fit *or* don't know	10	5	15
Total	81	7	88
	Women		
	Able to rise without difficulty (N)	Difficult or unable to rise (N)	Total (N)
Enough exercise to keep fit	97	15	112
Not enough exercise to keep fit *or* don't know	32	16	48
Total	129	31	160

respondents rating themselves as exercising enough, as active, and as fit. Breakdown of data by age, therefore, has not been possible. These data must be interpreted with caution.

Inability to rise from the low chair without difficulty was more common among those who believed that they were not getting enough exercise to keep fit (Table 40). Inability to rise from the chair without difficulty was also more common among those who believed they were very active or fairly active (Table 41). There was no relationship between the ability to rise from the chair and self-perceived fitness (Table 42).

Table 41 Chair rising ability (without using arms) and self-perceived activity† (age 75+)

	Men		
	Able to rise without difficulty (N)	Difficult or unable to rise (N)	Total (N)
Very active *or* fairly active	71	2	73
Not very active *or* not at all active	9	5	14
Total	80	7	87
	Women		
	Able to rise without difficult (N)	Difficult or unable to rise (N)	Total (N)
Very active *or* fairly active	112	17	129
Not very active *or* not at all active	17	13	30
Total	129	30	159

† This question carried the qualifier '... compared to other people of your age ...'.

Table 42 Chair rising ability (without using arms) and self-perceived fitness† (age 75+)

	Men		
	Able to rise without difficulty (N)	Difficult or unable to rise (N)	Total (N)
Very fit *or* fairly fit	75	6	81
Not very fit *or* not at all fit	5	1	6
Total	80	7	87
	Women		
	Able to rise without difficulty (N)	Difficult or unable to rise (N)	Total (N)
Very fit *or* fairly fit	117	24	141
Not very fit *or* not at all fit	12	6	18
Total	129	30	159

† This question carried the qualifier '...compared to other people of your age...'

6 Interpretation difficulties related to the effects of disease

Typically, people less than 50 years of age are free of significant chronic disease. With increasing age, however, the likelihood of chronic disease (and its resultant medication) increases. For example, in 1993, 45% of men and women in the UK aged 45–64 self-reported long-standing (chronic) illness. This figure rose to 64% for men and 69% for women aged 75+.[42] Limiting long-standing illness affected 28% of men and 29% of women aged 45–64, but 45% of men and 52% of women aged 75+.[42] In fact, in the UK in 1991, only 40% of men and women aged 65+ felt that they were in 'good' health.[43] Many pathologies such as arthritis, chest disease, heart disease and stroke, will limit physical performance.

When considering the exercise practices of older people, it is appropriate to consider the data both including and excluding those whose potential for habitual activity is limited primarily by the presence of severe disease, rather than by the effects of physical inactivity or of ageing. When the disease is stable and controlled, but still severe, an increase in habitual physical activity can still result in a valuable improvement in the individual's physical capability, even though it cannot usually alter the underlying disease process. Although individually improved, such a person will remain more limited than their age peers and should, as far as possible, be considered separately from the rest of their age group.

The previous analysis of the ADNFS data for 16–74-year-olds used three different health classifications, based on responses to items in the questionnaire (see pages 112–114 of the main report).[5] They were used to examine inter-relationships between habitual activity and the respondents' present state of health, not to identify those with particularly severe ill health. Indeed, they identified such large proportions of respondents with current health less than satisfactory that they are unsuitable for the present purpose, especially as mild and moderate levels of chronic disease are even more common among older people.

Identifying those people whose physical ability may be affected by their health

The present analysis has attempted to identify those whose physical activity and/or ability are likely to have been limited by severe illness and/or chronic disease. This, too, has been done from the responses given to items in the questionnaire. Selected items from both the physical appraisal data and the remaining questionnaire data were then re-analysed after the exclusion of those judged 'unwell', that is those likely to have been limited by severe illness and/or chronic disease.

Several potential criteria were considered. The first was the respondents' global assessment of their state of health – whether they considered that 'compared to other people of [their] age [they were] in poor health' and/or in 'fair health' (as opposed to 'good health' or 'excellent health') (see Table 43). The percentages of people who considered that their health was only 'poor' or 'fair' were remarkably constant across the age range. It seems likely that, as the question had invited, respondents made an

Table 43 Proportion of men and women who said that, compared to other people of their age, they were in 'poor health' or 'fair health'

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Poor	4	8	9	12	10	3	8	8
Poor or fair	32	39	41	40	41	48	38	39
Base	*280*	*241*	*220*	*239*	*178*	*105*	*102*	*1365*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Poor	3	6	4	7	3	9	4	5
Poor or fair	33	36	36	38	38	49	39	38
Base	*266*	*261*	*286*	*279*	*239*	*173*	*187*	*1692*

age-adjustment to their assessment of their state of health. The resulting absence of an age-related increase in these percentages casts doubt on the validity of this question as a device to identify those likely to be limited by severe illness and/or chronic disease.

The next potential criterion examined was a question which explicitly linked health and limitation of mobility, identifying those who said that their 'present state of health [was] causing problems with getting out and about as much as [they] want to' (see Table 44). The responses to this question show the expected increase in the prevalence of mobility problems with increasing age. Despite the clear wording of the question, however, it cannot be assumed that it is identifying those who consider that their present burden of chronic disease is the *cause* of impaired mobility. It could be argued that respondents may consider that 'health' *is* the ability to 'get out and about' and, as a result, may not have answered a 'disease-related' question. The possibility exists that this question may have elicited the same response from both those whose mobility is limited by disease and those whose mobility is limited by the combined effects of ageing and detraining (but not disease). This confounding issue has not been overcome.

Each respondent's global rating of their state of health, for their age, (Table 43) was compared in Table 45 with their opinion about whether their present state of health was causing problems with getting out and about (Table 44). A potential criterion derived from the combined responses was those identifying themselves as both (a) being in 'poor health' compared to others of their own age *and* (b) having a 'present state of health [which] is causing problems with getting out and about'. It is argued here that their mobility problems were more likely to be related to the presence of severe disease than to the detraining effects of inactivity. Excluding these individuals from the overall analyses would result in the exclusion of the data from 5% of men and 4% of women aged 50–69 and from 6% of men and 5% of women aged 70+ (Table 46). While it seems likely that the exclusion of most of those identified in this way might be appropriate, the absence of an increase in exclusions with increasing age suggests that some with severe illness (especially in the older age groups) have not been identified, that is the criterion may not be sufficiently sensitive.

Table 44 Proportion of men and women who said that their present state of health is causing problems with getting out and about as much as they want to

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	7%	13%	18%	14%	17%	23%	32%	15%
Base	*278*	*238*	*221*	*238*	*176*	*102*	*103*	*1357*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	10%	11%	13%	14%	19%	26%	50%	19%
Base	*266*	*261*	*285*	*277*	*243*	*173*	*188*	*1693*

Table 45 Proportion of men and women aged 50+ who perceive that their present state of health is causing problems with getting out and about, among those with each status of self-perceived health

	Men			
	Excellent	Good	Fair	Poor
50–69	5	6	14	61
70+	8	14	27	84*
Base 50–69	*129*	*478*	*286*	*79*
Base 70+	*65*	*157*	*130*	*29**
	Women			
	Excellent	Good	Fair	Poor
50–69	2	5	17	76
70+	9	20	42	93*
Base 50–69	*136*	*560*	*333*	*54*
Base 70+	*71*	*279*	*218*	*30**

* Please note small bases in the 70+ age group.

The other potential criterion derived from the combined responses would exclude all those stating that their 'present state of health is causing problems with getting out and about' irrespective of their self-perceived health status, *and* all those perceiving their health as 'poor'. This would result in the exclusion of the data from 16% of men and 13% of women aged 50–69 and from 24% of men and 31% of women aged 70+ (Table 47). These figures show the expected age-related increase but are rather high (especially for the younger subjects); thus, the identification of those with severe illness and/or chronic disease by this criterion may not be sufficiently specific.

On the assumption that the 'true' picture might lie somewhere between the effects of the two potential exclusion criteria derived from the combination of responses, the effects of both on some of the more important findings are examined next.

Table 46 Proportion of men and women who would be excluded on the basis that they perceived both that their present state of health was causing problems with getting out and about ***and*** that their health was poor for their age

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Excluded	2%	6%	7%	6%	8%	3%	6%	5%
Base	*278*	*238*	*219*	*237*	*176*	*102*	*102*	*1352*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Excluded	2%	5%	2%	5%	3%	8%	3%	4%
Base	*264*	*259*	*285*	*276*	*239*	*171*	*186*	*1681*

Table 47 Proportion of men and women who would be excluded on the basis that they perceived both that their present state of health was causing problems with getting out and about ***and/or*** that their health was poor for their age

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Excluded	10%	15%	19%	21%	19%	23%	34%	18%
Base	*278*	*238*	*219*	*237*	*176*	*102*	*102*	*1352*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Excluded	11%	13%	14%	16%	18%	26%	51%	19%
Base	*264*	*259*	*285*	*276*	*239*	*171*	*186*	*1681*

Effect of exclusions on prevalence of physical activity

Around 40% of all men and women aged 50+ are sedentary, that is they participate less than once a week for 30 minutes in activity of an intensity sufficient to produce a health benefit (see Chapter 2). The prevalence of this degree of inactivity is still greater than 30%, among all men and women aged 50+, even after the exclusion of those whose responses suggested that their activity was limited by the severity of their disease (Table 48). It is among the older subjects that this exclusion makes the biggest reduction in the prevalence of inactivity but, even among those aged 70+, the prevalence of sedentary people still remains at least 25%.

Only one in four men and only one in six women aged 50+ participate in physical activity of the recommended intensity with the recommended frequency, that is at least five times a week. The exclusion of those whose responses suggested that their activity was limited by the severity of their disease had little effect on these figures, the prevalence of the recommended frequency of

Table 48 Proportion of people aged 50+ participating at different frequencies in activity defined as having an intensity sufficient, at their age, to be likely to produce a health benefit†: the effect of including or excluding those giving responses thought likely to indicate that their physical activity is limited by severe illness or chronic disease‡

Frequency of activity	No exclusions	After excluding those giving		Considering only those giving	
		Responses A *and* B‡	Responses A *and/or* B	Responses A *and* B	Responses A *and/or* B
	(%)	(%)	(%)	(%)	(%)
All men 50+					
Less than once/week	38	35	31	86	71
At least once/week	62	65	69	14	29
At least five times/week	27	28	30	4	9
Base	*1350*	*1278*	*1108*	*73*	*243*
Men (50–59)					
Less than once/week	34	32	31	79	61
At least once/week	66	68	69	21	39
At least five times/week	32	33	35	0	10
Base	*516*	*497*	*455*	*19**	*61*
Men (60–69)					
Less than once/week	44	42	36	76	74
At least once/week	56	58	64	24	26
At least five times/week	19	19	21	10	9
Base	*456*	*428*	*365*	*29**	*92*
Men (70+)					
Less than once/week	37	33	25	93	75
At least once/week	63	67	75	7	25
At least five times/week	29	31	35	0	7
Base	*378*	*353*	*288*	*25**	*90*

Frequency of activity	No exclusions	After excluding those giving		Considering only those giving	
		Responses A *and* B‡	Responses A *and/or* B	Responses A *and* B	Responses A *and/or* B
	(%)	(%)	(%)	(%)	(%)
All women 50+					
Less than once/week	42	40	34	87	75
At least once/week	58	60	66	13	25
At least five times/week	17	17	19	0	7
Base	*1680*	*1612*	*1355*	*70*	*325*
Women (50–59)					
Less than once/week	29	27	25	80	59
At least once/week	71	73	75	20	41
At least five times/week	22	23	24	0	10
Base	*522*	*502*	*461*	*20**	*61*
Women (60–69)					
Less than once/week	41	39	37	82	67
At least once/week	59	61	63	18	33
At least five times/week	15	16	16	0	10
Base	*561*	*540*	*479*	*22**	*82*
Women (70+)					
Less than once/week	54	52	41	96	84
At least once/week	46	48	59	4	16
At least five times/week	14	14	18	0	4
Base	*597*	*570*	*415*	*28**	*182*

† See Table 1 ‡ See Tables 46 and 47 * Please note small bases.

Response A: 'Present state of health is causing problems with getting out and about as much as I want to'.
Response B: 'Compared to other people of my age I am in poor health'.

participation rising to at most 30% of men and 19% of women aged 50+ (Table 48). Once again, this effect, while still small, is greatest among those aged 70+.

Although the exclusions had little impact on the overall picture of habitual physical activity, it should not be assumed that this means that the exclusion criteria were ineffective in identifying those rendered sedentary as a result of chronic disease. It is clear from Table 48 that inactivity was very common among those excluded by the criteria. It is just that the number of individuals excluded was not so great as to have a major impact on the overall prevalence of inactivity, especially as inactivity was quite common among those not excluded.

Effect of exclusions on prevalence of physical ability below a functionally important level

Chapter 5, pages 45–46, considers the prevalence of likely inability to walk comfortably at 3 mph: 9% of men and 38% of women aged 50–74 had a maximal oxygen consumption below that considered necessary to walk comfortably at 3 mph. However, because of the criteria used to determine which individuals were not permitted to undergo the treadmill test, only a few of those who did the test answered that their 'present state of health is causing problems with getting out and about' and/or that their health is 'poor' for their age (4% of men and 8% of women, as opposed to 16% and 14% of all 50–74-year-olds interviewed). The exclusion of their data from the analysis made no difference to the percentages of men and women aged 50–74 with a maximum oxygen consumption below that judged necessary to walk comfortably at 3 mph (9% for men, unchanged; 36% for women, compared with 38% before health exclusions). Nevertheless, the lower 'exclusion rates' among those tested on

Table 49 Proportion of people aged 50–74 with an explosive power/weight ratio below functionally important levels: the effect of including or excluding those giving responses thought likely to indicate that their physical activity is limited by severe illness or chronic disease

	Men (50–74)		
	No exclusions	After excluding those giving responses (A) *and/or* B†	Considering only those giving responses A *and/or* B
	(%)	(%)	(%)
At risk of being unable to step 50 cm‡	32	32	41
At risk of being unable to step 30 cm‡	7	6	21
Base	*421*	*392*	*29**

	Women (50–74)		
	No exclusions	After excluding those giving responses (A) *and/or* B†	Considering only those giving responses A *and/or* B
	(%)	(%)	(%)
At risk of being unable to step 50 cm‡	75	75	89
At risk of being unable to step 30 cm‡	28	27	46
Base	*437*	*411*	*26**

† 'Present state of health [was] causing problems with getting out and about as much as [they] want to' *and/or* 'compared to other people of [their] age [they were] in poor health'.
‡ Predictions based on the observation of being able to step up 30 and 50 cm a power/weight ratio of 1.5 and 2.5 W/kg respectively is needed.
* Please note small bases.

the treadmill than among those interviewed suggests that the true population picture of those finding difficulty walking comfortably at 3 mph may well be even worse than the figures above suggest.

The prevalence of the possibility of not being able to step up 30 or 50 cm is also considered in Chapter 5, Lower limb explosive power, on page 40. Again, even the more sensitive health exclusion criterion had only a negligible effect on the data (Table 49).

Effect of exclusions on the relationship between activity and the prevalence of well-being

The relationship between activity and well-being is detailed in Chapter 4, pages 29–30. Table A17, Appendix E shows the effect of removing those people excluded on health grounds (as before) and then reconsidering the relationship between activity and well-being. When considering the frequently active men and women, excluding those who perceived themselves as being in poor health did not change the percentages with a positive mood. There was, however, a noticeable effect, mainly in the men, on the number of sedentary people scoring a positive mood. In the 70+ age group the proportion of sedentary men with positive mood rose from 29% to 39% and the proportion of sedentary women, from 37% to 43%. This is to be expected, as more people in poor health will have a less positive mood and more people who are in poor health will be sedentary.

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Appendix A Measuring activity

Development of an age-related activity participation scale

Previous analyses of the ADNFS/HEANSAH data relating to the general adult population have defined 'moderate' intensity activity as having an energy cost of at least 5 kcal/min. As discussed in Chapter 1, use of this general population definition is not appropriate when investigating the activity levels of a sample of older people, among whom maximal exercise ability tends to be reduced. Thus, the use of 5 kcal/min becomes less appropriate as age increases, producing underestimates of the amount of activity performed at a beneficial level of intensity by the older people in this group. Indeed, for women aged 75+, among whom capacity is the most reduced, this would be true also for a 4 kcal/min definition.

In seeking more appropriate definitions not only did the relevant physiology have to be considered but also the methodology of the data collection.

The first possibility was to reduce the absolute threshold to a single value which was lower than 5 kcal/min, representing a possible level of intensity which could be considered 'moderate' for people aged 50+. However, the use of a single value lower than 5 kcal/min to define moderate intensity activity for *all* people age 50+ will overestimate the amount of activity at a beneficial level of intensity by those at the younger end of this age group (especially the men), for whom 5 kcal/min is a more accurate reflection of moderate intensity activity.

The literature suggests that aerobic power declines at around 10% per decade.[43] Thus, if 5 kcal/min is accepted as the minimum intensity required for a health benefit at age 50 then, by age 70, an intensity of 4 kcal/min should fulfil this requirement.

From the methodological point of view, using 4 kcal/min to define moderate intensity for those aged 70+ would mean that most activities for which frequency and duration data had been collected would be incorporated. It should be noted that changes in the method of data collection for respondents aged 70+ meant that gardening and DIY activities with intensities lighter than 4 kcal/min were probably included.

In order to reflect the continuing decline in maximal performance above the age of 70 and the particularly low abilities among the oldest women, a further intensity definition for moderate activity was devised for the oldest subjects. This was based on all activities defined with an absolute intensity of at least 4 kcal/min plus specific activities that were considered to be likely to provide a health or functional benefit although their absolute energy expenditure value might be less than 4 kcal/min. The main addition to the range of activities was the inclusion of walks of 1–2 miles (whereas the standard definition for younger people includes only walks of 2 miles or more).

The activities meeting these three age-adjusted definitions of moderate intensity activity are shown in Figure A1. Those used in the analysis for each age band are highlighted. To represent the gradual nature of the change with increasing age, these definitions were also applied to overlapping age groups, that is 50–69, 65–79, and 75+, in some analyses in the main body of this report (see Table A1 and footnotes to Figure A1).

Figure A1 Activities meeting the age-adjusted definitions of moderate intensity activity

1 Definition of at least moderate intensity – at least 5 kcal/min

Activity	Age 50–69	Age 70–79	Age 80+
Housework	Heavy	Heavy	Heavy
Gardening/DIY	Heavy	None	None
Walking	2+ miles at fast or brisk pace	2+ miles at fast or brisk pace	2+ miles at fast or brisk pace
Sport and exercise	Assigned energy cost ≥5 kcal/min (Figure A2)	Assigned energy cost ≥5 kcal/min (Figure A2)	Assigned energy cost ≥5 kcal/min (Figure A2)
Occupation	Jobs classified ≥ moderate intensity	None	None

2 Definition of at least moderate intensity – at least 4 kcal/min

Activity	Age 50–69	Age 70–79†	Age 80+
Housework	Heavy	Heavy	Heavy
Gardening/DIY	Heavy or light	Any	Any
Walking	2+ miles at any pace	2+ miles at any pace	2+ miles at any pace
Sport and exercise	Assigned energy cost ≥4 kcal/min (Figure A2)	Assigned energy cost ≥4 kcal/min (Figure A2)	Assigned energy cost ≥4 kcal/min (Figure A2)
Occupation	Jobs classified ≥ moderate intensity	None	None

3 Definition of at least moderate intensity – at least 4 kcal/min + walks of 1–2 miles + extra sports and exercise activities

Activity	Age 50–69	Age 70–79	Age 80+‡
Housework	Heavy	Heavy	Heavy
Gardening/DIY	Heavy or light	Any	Any
Walking	1+ mile at any pace	1+ mile at any pace	1+ mile at any pace
Sport and exercise	Activities defined as beneficial for people aged 80+ (Figure A2)	Activities defined as beneficial for people aged 80+ (Figure A2)	Activities defined as beneficial for people aged 80+ (Figure A2)
Occupation	Jobs classified ≥ moderate intensity	None	None

† Or 65–79 for analyses where overlapping age groups were used.
‡ Or 75+ for analyses where overlapping age groups were used.

The questionnaires

Two questionnaires were used – one for people aged less than 70 and one for people aged 70+. The activity sections in both questionnaires were almost identical, with the exceptions to this indicated where appropriate below.

Housework

All respondents were asked about their participation in 'heavy housework'. They were shown a card with the following examples:

> Walking with heavy shopping for more than 5 minutes, moving heavy furniture, spring cleaning, scrubbing floors with a scrubbing brush, cleaning windows, or other similar heavy housework.z
>
> These activities were assigned an energy score of 5 kcal/min.
>
> Frequency was defined as the number of days in the past 4 weeks on which informant spent at least 30 minutes doing 'heavy' housework.

Gardening and DIY

Aged 50–69

Respondents aged 50–69 were asked about 'light' gardening and DIY activities and 'heavy' gardening and DIY activities separately. For each type of activity they were shown a card giving examples:

- Examples of 'heavy' gardening or DIY work:
  Digging, clearing rough ground, building in stone, bricklaying, mowing large areas with a hand mower, felling trees, chopping wood, mixing/laying concrete, moving heavy loads, refitting a kitchen or bathroom or any similar heavy manual work.
- Examples of 'light' gardening or DIY work:
  Hoeing, weeding, pruning, mowing with a power mower, planting flowers/seeds, decorating, minor household repairs, car washing and polishing, car repairs and maintenance.

'Heavy' activities were assigned an energy score of 7 kcal/min, while 'light' activities were assigned an energy score of 4 kcal/min.

Frequency was defined as the number of days in the past 4 weeks on which respondent spent at least 30 minutes on 'heavy' or 'heavy' and 'light' gardening/DIY activities.

Aged 70+

Respondents aged 70+ were asked about any gardening or DIY activities. They were not shown a card with examples. This means that they may have included some activities which would not necessarily have been of an intensity likely to be of benefit to health.

In order to incorporate the information into the data set, all gardening/DIY activities of respondents aged 70+ were assigned an energy score of 4 kcal/min.

Frequency was defined as the number of days in the past 4 weeks on which the respondent spent at least 30 minutes in gardening or DIY activities.

Walking

All respondents were asked about walks of 2 miles or more during the past 4 weeks and walks of 1–2 miles in the past week. They were also asked to assess their walking pace.

Energy scores were assigned as follows:

'a fast pace (at least 4 mph)'	6 kcal/min
'a fairly brisk pace'	5 kcal/min
'a steady average pace' or 'a slow pace'	4 kcal/min

Aged 70+

For respondents aged 70+ the participation questions were preceded by two questions about their ability to walk on their own without stopping. The questions about participation were directed only to those who had said they *could* walk for the length of time required.

Sports and exercise activities

All respondents were asked the same questions on current participation in sports and exercise. The only difference between the approach for the older and younger respondents was in the use of prompt cards. Respondents aged 70+ were given a shorter list of activities but were encouraged to mention activities not listed.

Activities were assigned an energy score on the basis of published data and the respondent's response to the question on whether the activity made them 'out of breath or sweaty' (see Figure A2 and ADNFS Technical Report. pp. 15–17).[7]

Frequency was defined as the number of occasions of at least 30 minutes in the past 4 weeks.

Figure A2 Intensities assigned to different sports and exercise activities

Activities defined as 5 kcal/min or above

(a) Examples: running/jogging, squash, boxing, kick boxing, skipping, trampolining, cycling, aerobics, keep fit, gymnastics, dance for fitness, weight training, football, rugby, swimming, tennis, badminton, basketball, canoeing, fencing, field athletics, hockey, ice skating, lacrosse, netball, roller skating, rowing, skiing, volleyball.

(b) Some sports were included only if they had made the informant 'out of breath or sweaty'. These included: exercises (press-ups, sit-ups, etc.), dancing, cricket, table tennis, golf, rambling, horse riding.

Activities defined as 4 kcal/min or above

(c) All activities included in (a) and (b).

(d) Those activities listed in (b) (excluding table tennis, golf, rambling and horse riding) even if they had not made the respondent 'out of breath or sweaty'.

Activities defined as likely to provide a health or functional benefit for people aged 80+, but which may have had an absolute energy expenditure of less than 4 kcal/min

(e) All activities included in (a), (b), (c) and (d).

(f) Also table tennis, golf, rambling and horse riding, even if they had not made the respondent 'out of breath or sweaty'.

Table A1 Proportion of people participating at different frequencies in activity of different intensities†

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week‡								
at least 5 kcal/min	**30**	**41**	**43**	**46**	67	72	80	48
at least 4 kcal/min	11	18	21	**19**	**30**	**47**	42	23
at least 4 kcal/min (inc. walks of 1–2 miles)	9	18	17	14	25	**41**	**39**	19
At least once/week:								
at least 5 kcal/min	**70**	**59**	**57**	**54**	33	28	19	52
at least 4 kcal/min	89	82	79	**81**	**70**	**53**	58	77
at least 4 kcal/min (inc. walks of 1–2 miles)	91	82	83	86	75	**59**	**61**	81
At least five times/week:								
at least 5 kcal/min	**40**	**22**	**22**	**16**	3	7	5	20
at least 4 kcal/min	50	39	44	**41**	**28**	**22**	25	38
at least 4 kcal/min (inc. walks of 1–2 miles)	52	44	50	54	46	**31**	**36**	47
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week:‡								
at least 5 kcal/min	**28**	**30**	**37**	**45**	65	73	79	48
at least 4 kcal/min	15	19	24	**29**	**44**	**55**	71	34
at least 4 kcal/min (inc. walks of 1–2 miles)	12	15	20	20	33	**49**	**65**	28
At least once/week:								
at least 5 kcal/min	**72**	**70**	**63**	**54**	35	27	21	52
at least 4 kcal/min	85	81	76	**71**	**56**	**45**	29	66
at least 4 kcal/min (inc. walks of 1–2 miles)	88	85	80	80	67	**51**	**35**	72
At least five times/week:								
at least 5 kcal/min	**23**	**20**	**16**	**15**	3	4	4	13
at least 4 kcal/min	39	36	32	**30**	**12**	**14**	9	26
at least 4 kcal/min (inc. walks of 1–2 miles)	45	46	45	46	25	**22**	**15**	37
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† The bold print figures identify different intensities of activity which might be considered moderate for people of different ages (see Chapter 2). An intensity of 5 kcal/min can be described as a moderate level of activity on average for younger people but with increasing age this average declines to a point where 4 kcal/min is more likely to represent moderate activity. The specific activities can also be redefined for older people and by including walks of a mile or more (the standard definition for younger people includes walks of 2 miles or more).

‡ Less than four times in the past 4 weeks.

Table A2 Frequency of participation† in activity of an intensity of at least 5 kcal/min‡

Weekly frequency	Men							
	50–54	55–59	60–64	65–69	70–74	75–9	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once	30	41	43	46	67	72	80	48
1–2 times	23	27	26	27	24	20	11	24
3–4 times	7	10	9	11	6	1	4	8
5 or more	40	22	22	16	3	7	5	20
Total	100	100	100	100	100	100	100	100
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

Weekly frequency	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once	28	30	37	45	65	73	79	48
1–2 times	35	36	33	30	24	20	14	29
3–4 times	14	14	14	10	8	3	3	10
5 or more	23	20	16	15	3	4	4	13
Total	100	100	100	100	100	100	100	100
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† For at least 30 minutes per occasion.
‡ This will be moderate activity for the younger people but will represent increasingly strenuous activity for older people.

Occupational activity

Detailed questions on occupational activity were asked only of respondents aged less than 70. Full details of how occupational activity was classified can be found in the ADNFS report.[5,7]

Frequency was defined as the number of days spent working in jobs which were classified as of 'at least moderate' intensity.

Table A3 Frequency of participation† in activity of an intensity of at least 4 kcal/min‡

Weekly frequency	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Weekly frequency								
Less than once	11	18	21	19	30	47	42	23
1–2 times	25	26	17	20	28	19	25	23
3–4 times	14	17	18	20	14	12	8	16
5 or more	50	39	44	41	28	22	25	38
Total	100	100	100	100	100	100	100	100
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*
Weekly frequency	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Weekly frequency								
Less than once	15	19	24	29	44	55	71	34
1–2 times	29	27	27	25	32	23	16	26
3–4 times	18	18	17	16	12	8	4	14
5 or more	38	36	32	30	12	14	9	26
Total	100	100	100	100	100	100	100	100
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† For at least 30 minutes per occasion.
‡ This will be moderately activity for the younger people but will represent increasingly strenuous activity for older people.

Table A4 Proportion of people participating in different intensities of home activities in the past 4 weeks, by age and sex

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Housework								
None	24	26	23	15	23	27	30	23
Any	76	74	77	85	77	73	70	77
Some 'heavy'†	47	42	44	47	44	39	27	43
Gardening								
None	24	28	30	29	38	42	50	32
At least 'light'‡	76	72	70	71	62	58	50	68
Some 'heavy'‡	38	37	36	34	*a*	*a*	*a*	
DIY								
None	26	37	45	43	55	67	83	45
At least 'light'‡	74	63	55	57	45	33	17	55
Some 'heavy'‡	24	14	11	8	*a*	*a*	*a*	
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Housework								
None	2	1	1	4	6	13	22	6
Any	98	99	99	96	94	87	78	94
Some 'heavy'†	81	73	69	64	52	42	26	61
Gardening								
None	30	36	40	44	55	56	78	46
At least 'light'‡	70	64	60	56	45	44	22	54
Some 'heavy'‡	22	26	22	16	*a*	*a*	*a*	
DIY								
None	63	70	74	86	92	93	99	81
At least 'light'‡	37	30	26	14	8	7	1	19
Some 'heavy'‡	4	5	2	1	*a*	*a*	*a*	
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† 'Heavy' housework was coded as 5 kcal/min and above. The term was used in the questionnaire, with examples.
‡ Intensity is described as at least 'light' (4 kcal/min and above) or 'heavy' (7 kcal/min and above). These are absolute measures taking no account of the variation in capacity with age (or any other individual characteristic). These terms were used in the questionnaire with examples of activities which could be described as 'heavy' or 'light'.
a For people aged 70+ no distinction was made between light and heavy gardening or DIY.

Table A5 Frequency of walking a mile or more at any pace

Weekly frequency	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once	48	50	49	42	51	70	66	51
1–2 times	19	22	20	24	18	17	10	20
3–4 times	9	11	9	10	8	3	7	9
At least 5 times	24	17	22	24	23	10	17	20
Total	100	100	100	100	100	100	100	100
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

Weekly frequency	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once	45	44	46	43	60	69	84	54
1–2 times	23	31	21	24	21	13	4	20
3–4 times	13	7	8	13	7	8	3	9
At least 5 times	19	18	25	20	12	10	9	17
Total	100	100	100	100	100	100	100	100
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

Table A6 Self-assessed walking pace, by age and sex

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Slow	11	15	18	25	27	46	52	23
Average	52	56	57	55	60	48	43	54
Brisk/fast†	37	29	25	20	13	6	5	23
Total	100	100	100	100	100	100	100	100
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*
	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Slow	11	16	15	24	27	36	61	25
Average	56	52	54	50	57	54	34	51
Brisk/fast†	33	32	31	26	16	10	5	24
Total	100	100	100	100	100	100	100	100
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† 'Fast' was described to participants 'at least 4 mph'.

Table A7 Participation in walking by pace and distance†

	Men							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week:‡								
≥ 2 miles								
at brisk or fast pace	**88**	**93**	**91**	**89**	97	98	97	92
at any pace	76	79	76	**70**	**83**	**91**	83	78
≥ 1 mile at any pace	48	50	49	42	51	**70**	**66**	51
At least once/week:								
≥ 2 miles								
at brisk or fast pace	**12**	**7**	**9**	**11**	3	2	3	8
at any pace	24	21	24	**30**	**17**	**9**	17	22
≥ 1 mile at any pace	52	50	51	58	49	**30**	**34**	49
At least five times/week:								
≥ 2 miles								
at brisk or fast pace	**4**	**2**	**5**	**5**	1	0	1	3
at any pace	9	7	10	**12**	**5**	**3**	6	8
≥ 1 mile at any pace	24	17	22	24	23	**10**	**17**	20
Base	*280*	*242*	*225*	*240*	*178*	*105*	*103*	*1373*

	Women							
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Less than once/week:‡								
≥ 2 miles								
at brisk or fast pace	**91**	**92**	**89**	**93**	95	98	99	93
at any pace	79	78	74	**79**	**88**	**90**	98	82
≥ 1 mile at any pace	45	44	46	43	60	**69**	**84**	54
At least once/week:								
≥ 2 miles								
at brisk or fast pace	**9**	**8**	**11**	**7**	5	2	1	7
at any pace	21	22	26	**21**	**12**	**10**	2	18
≥ 1 mile at any pace	55	56	54	57	40	**31**	**16**	46
At least five times/week:								
≥ 2 miles								
at brisk or fast pace	**3**	**2**	**3**	**3**	1	1	1	2
at any pace	6	5	9	**5**	**3**	**5**	1	5
≥ 1 mile at any pace	19	18	25	20	12	**10**	**9**	17
Base	*268*	*264*	*286*	*280*	*243*	*175*	*189*	*1705*

† Three minimum requirements for walking are presented. The pace question asked whether people walked at a slow pace, a steady average pace, a fairly brisk pace, or a fast pace (defined as at least 4 mph). Pace is therefore taken as an absolute measure. Distances were related to time spent walking: '2 miles or more ... that would usually take at least 40 minutes' and '1–2 miles ... that would usually be continuous walking for about 20 to 30 minutes'. Bold print identifies the values used in the age-related activity summary scores.

‡ Less than four occasions of the type of walking specified in the past 4 weeks, including people who could not walk for the required time.

Appendix B Past participation

The following table must be interpreted with caution as its data are partly related to the fact that older people had more of their lives to fill and the cessation of regular participation at a certain age would have greater impact on the figures for older respondents than younger ones. Accordingly, comparisons of values for people of different ages would not be appropriate.

Table A8 Proportion of adult years† spent in regular‡ participation in sport and exercise#

Proportion of adult years in regular participation:	Men: Current age 50–59	60–69	70–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)
less than ¼	26	34	50	47	35
¼–½	22	20	19	23	21
½–¾	11	15	8	13	12
¾ or more	41	31	23	17	32
Base	*522*	*465*	*283*	*103*	*1373*

Proportion of adult years in regular participation:	Women: Current age 50–59	60–69	70–79	80+	All 50+
	(%)	(%)	(%)	(%)	(%)
less than ¼	35	44	67	77	50
¼–½	15	14	14	9	14
½–¾	9	9	8	4	8
¾ or more	41	33	11	10	28
Base	*531*	*567*	*418*	*189*	*1705*

† Respondents aged 70+ were asked about the time 'since they left school'. 'Adult years' were defined as the number of years since age 14 for *all* respondents.

‡ Regular was defined for people currently aged 50–69 as 'at least once a week for a few months or more'. For people aged 70+ regular was not defined but the time period for eligible participation was increased to 2 years.

The summary measures were based on all sports and exercise activities with an *average* energy cost of at least 5 kcal/min (see Fentem *et al.* p. 16[7]). This included activities such as exercises and social dancing. (For the assessment of current activity such participation was included only if it had made the respondent 'out of breath or sweaty'.)

Appendix C Attitudes and lifestyle

Table A9 Participation in activity defined as having an intensity likely to produce a health benefit† by cigarette smoking status

	Men					
Weekly frequency of activity	Never regularly smoked	Ex-regular smoker	Currently less than 10	Currently 10–19	Currently 20 or more	All age 50+
	(%)	(%)	(%)	(%)	(%)	(%)
Less than once‡	34	39	43	39	46	39
1–2 times	29	23	26	27	21	25
3–4 times	11	11	14	10	4	10
At least 5 times	26	27	17	24	29	26
Total	100	100	100	100	100	100
Base	*318*	*718*	*62*	*110*	*151*	*1371*

	Women					
Weekly frequency of activity	Never regularly smoked	Ex-regular smoker	Currently less than 10	Currently 10–19	Currently 20 or more	All age 50+
	(%)	(%)	(%)	(%)	(%)	(%)
Less than once‡	42	41	46	46	39	42
1–2 times	30	31	28	30	28	30
3–4 times	11	12	9	9	15	11
At least 5 times	17	16	17	15	18	17
Total	100	100	100	100	100	100
Base	*860*	*467*	*104*	*144*	*113*	*1705*

† The development of an age-related activity scale has been described in Appendix A. The age-related activity scale is based on occasions of activity lasting at least 30 minutes at an intensity sufficient, at that age, to produce a health benefit.
‡ Less than four times in the past 4 weeks (includes zero).

Appendix D Physical appraisal

Table A10 FEV_1 (litres)

	Men				
	50–54	55–59	60–64	65–69	70–74
Mean	3.2	2.8	2.7	2.4	2.2
(sd)	(0.6)	(0.7)	(0.7)	(0.8)	(0.7)
Base	*128*	*98*	*96*	*90*	*65*
	Women				
	50–54	55–59	60–64	65–69	70–74
Mean	2.3	2.1	1.9	1.8	1.6
(sd)	(0.5)	(0.5)	(0.5)	(0.4)	(0.5)
Base	*119*	*102*	*115*	*110*	*65*

Table A11 FVC (litres)

	Men				
	50–54	55–59	60–64	65–69	70–74
Mean	4.2	3.8	3.7	3.4	3.1
(sd)	(0.7)	(0.8)	(0.8)	(0.8)	(0.8)
Base	*128*	*98*	*96*	*90*	*65*
	Women				
	50–54	55–59	60–64	65–69	70–74
Mean	3.0	2.7	2.6	2.4	2.1
(sd)	(0.5)	(0.6)	(0.6)	(0.5)	(0.5)
Base	*119*	*102*	*115*	*110*	*65*

Table A12 FEV_1/FVC (%)

	Men				
	50–54	55–59	60–64	65–69	70–74
Mean	77.0	74.2	72.5	70.4	67.9
(sd)	(6.8)	(8.1)	(9.2)	(11.0)	(11.3)
Base	*128*	*98*	*96*	*90*	*65*
	Women				
	50–54	55–59	60–64	65–69	70–74
Mean	77.2	77.8	75.5	75.4	74.9
(sd)	(8.0)	(7.2)	(8.3)	(7.4)	(8.8)
Base	*119*	*102*	*115*	*110*	*65*

Table A13 Self-perceptions of activity and fitness – comparison of those aged 50–74 who did and did not undertake the physical appraisal after being invited to do so

	Men		Women	
Enough exercise to keep fit?	Did appraisal	Did not do appraisal	Did appraisal	Did not do appraisal
	(%)	(%)	(%)	(%)
Yes	64	66	62	67
No or don't know	36	34	38	33
Total	100	100	100	100
Base	*494*	*189*	*556*	*253*
How physically active?†	Did appraisal	Did not do appraisal	Did appraisal	Did not do appraisal
	(%)	(%)	(%)	(%)
Very active†	22	20	23	22
Fairly active†	54	48	58	50
Not very or not at all active†	24	33	19	28
Total	100	100	100	100
Base	*494*	*190*	*565*	*254*
How fit?†	Did appraisal	Did not do appraisal	Did appraisal	Did not do appraisal
	(%)	(%)	(%)	(%)
Very fit†	24	20	26	23
Fairly fit†	57	58	63	57
Not very or not at all fit†	18	23	11	20
Total	100	100	100	100
Base	*493*	*190*	*565*	*253*

† For age.

Table A14 Handgrip strength (N/kg) in those who think they do or do not get enough exercise to keep fit

		Men all 50+			Women all 50+
Yes	Mean	**5.6**	Yes	Mean	**4.0**
	(sd)	(1.3)		(sd)	(1.0)
	N	347		N	388
No	Mean	**5.6**	No	Mean	**3.8**
	(sd)	(1.4)		(sd)	(1.1)
	N	154		N	213

8 men and 18 women answered 'Don't know': these groups had mean handgrip strengths of 4.5 and 3.4 N/kg, respectively.

Table A15 Self-perceived activity and handgrip strength (N/kg)

		Men all 50+			Women all 50+
Very active†	Mean	**5.9**	Very active†	Mean	**4.2**
	(sd)	(1.2)		(sd)	(0.9)
	N	127		N	138
Fairly active†	Mean	**5.7**	Fairly active†	Mean	**4.0**
	(sd)	(1.3)		(sd)	(1.0)
	N	268		N	362
Not very active†	Mean	**5.1**	Not very active†	Mean	**3.5**
	(sd)	(1.4)		(sd)	(1.1)
	N	93		N	84
Not at all active†	Mean	**4.9**	Not at all active†	Mean	**3.4**
	(sd)	(1.7)		(sd)	(1.2)
	N	20		N	33
Base		*508*	*Base*		*617*

† For age.

Table A16 Self-perceived fitness and handgrip strength (N/kg)

		Men all 50+			Women all 50+
Very fit†	Mean	**5.8**	Very fit†	Mean	**4.1**
	(sd)	(1.3)		(sd)	(0.9)
	N	137		N	166
Fairly fit†	Mean	**5.7**	Fairly fit†	Mean	**3.9**
	(sd)	(1.3)		(sd)	(1.0)
	N	294		N	383
Not very fit†	Mean	**5.1**	Not very fit†	Mean	**3.5**
	(sd)	(1.3)		(sd)	(1.1)
	N	65		N	53
Not at all fit†	Mean	**4.7**	Not at all fit†	Mean	**3.0**
	(sd)	(1.8)		(sd)	(1.3)
	N	11		N	15
Base		*507*	*Base*		*617*

† For age.

Appendix E Health

Table A17 Participation in activity defined as having an intensity likely to produce a health benefit by score on well-being† – excluding those who perceived that their present state of health was causing problems with getting out and about and/or that their health was poor for their age‡

	Men		Women	
	Frequency of activity		Frequency of activity	
	Less than once/week	At least five times/week	Less than once/week	At least five times/week
	(%)	(%)	(%)	(%)
Well-being score – proportion scoring 17 or less (positive mood) at age:				
50–59	62	58	54	60
60–69	67	64	43	60
70+	39	64	43	54
Base 50–59	*139*	*161*	*113*	*108*
60–69	*130*	*76*	*172*	*78*
70+	*72*	*97*	*160*	*70*

† Well-being score was based on ten statements of mood – see footnote to Table 19, page 30.
‡ 'Present state of health [was] causing problems with getting out and about as much as [they] want to' and/*or* 'compared to other people of [their] age [they were] in poor health'.

Appendix F Methodology and sampling of ADNFS and HEANSAH

The Allied Dunbar National Fitness Survey (ADNFS)

The first English national survey of activity and fitness was carried out in 1990. The ADNFS was designed to provide data regarding the activity and fitness levels of English adults and to investigate the relationship between activity, fitness and health.[5]

ADNFS comprised an interview in the home with a representative sample of adults aged 16 and over, followed by a physical appraisal at a nearby mobile unit for those aged up to 74. An age-specific physical appraisal, in their own home, was designed for those aged 75 and over, and a modified questionnaire including some functional assessments was used for people aged 70 or over. A total sample of 6000 addresses was selected.

The interview collected details of physical activity and other health-related behaviour. The physical appraisal included measurements of body dimensions and composition and muscle function and joint mobility. Aerobic fitness was assessed from the responses to changes in walking pace and gradient on a treadmill. The home appraisal did not include the cardiorespiratory and muscle measures but did include some functional tests.

The HEA National Survey of Activity and Health (HEANSAH)

In order to provide an adequate base for analysis of data at regional level and to enhance the sample size for the analysis of population subgroups such as older people, the HEA commissioned a second study comprising interviews only. The HEANSAH was carried out in 1991. The survey comprised an interview in the home with a representative sample of adults aged 16 and above. In the survey 112 constituencies were selected compared to the 30 used in the ADNFS. A total sample of 4212 addresses was selected.

The samples

Both surveys provided nationally representative samples of adults aged 16 and over in England. The ADNFS sample design generated a self-weighting sample. The design of the HEANSAH sample required that the data be weighted to make it nationally representative. Full descriptions of the sampling and weighting procedures can be found in the report of the merged surveys.[6]

Both samples excluded people living in institutions. This has particular relevance for the sample of older people, a greater proportion of whom live in an institutional setting. For example, the 1991 Census found 10% of people aged 75 or more living in communal establishments. It is also likely that hospitalisation made a greater contribution to non-response among older people.

Response to the surveys

For the ADNFS 6000 addresses were selected, of which 302 were ineligible. Interviews were achieved at 4316, a response rate of 76% of the eligible addresses. Of those interviewed 72% of men and 68% of women took part in the physical appraisal. The equivalent figures for the interviews within the HEANSAH survey were 4212 selected addresses, 165 ineligible addresses, 2837 interviews and a response rate of 70%. Thus the joint response rate for the two surveys was 74%. The data do not allow an age-specific response rate to be calculated.

Calculation of sampling error for multi-stage samples

The calculation of sampling errors for multi-stage, stratified sample designs is much more complex than for a simple random sample. It is not practicable to provide such estimates for every variable and instead it is customary to provide an estimate of 'deft'. This is the factor by which the random sample error needs to be multiplied to take account of the complex sample design. It can be calculated for a range of variables in the survey to give a general guide to the likely effect of a particular sample design on the simple random errors.

Deft values for each survey have been calculated for a range of variables and the data can be found in the report of the merged surveys.[6]

Sampling errors for the merged sample of respondents aged 50+

It is not possible to calculate directly the design effects for the two surveys merged to form one data set.

The survey variables based on each of the two samples have deft values mostly from 1.1 to 1.4, with the average near 1.2. Using 1.2 to inflate the standard errors and confidence intervals for the combined sample will be stable enough. (The two samples were independent.) This will be correct for proportions based on the entire sample.

The report of the merged survey suggested that for subgroups the factor may be reduced: instead of the 1.2 suggested for estimates for the whole sample,

$$\text{deft} = 1+(n/N)(0.2)$$

can be used and n/N becomes small for most subgroups. Thus, for variables calculated for each age group, deft approximates to 1 and so sampling errors can be calculated using the formula for a simple random sample.

Comparison of sample distribution with population figures

Table A18 compares the age distribution of the men and women interviewed in the ADNFS and HEANSAH surveys with the population figures for those present on Census night in 1991 in private households.

Although there were some slight differences, none of these was found to be significant which indicates that the sample was representative of the age distribution among both men and women aged 50+.

Sample size

Table A19 shows the number of men and women in each age group who took part in the interview.

Table A18 Comparison between the population age distribution and that of the sample for men and women

	Men		Women	
Age	Survey	Population	Survey	Population
	(%)	(%)	(%)	(%)
50–59	38	39	31	33
60–69	34	35	33	32
70–79	21	21	25	25
80+	7	5	11	10
Total	100	100	100	100

Table A19 Sample size by age and sex

Number of people interviewed in the two surveys – ADNFS + HEANSAH

	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Men	280	242	225	240	178	105	103	1373
Women	268	264	286	280	243	175	189	1705

Number of physical appraisals – ADNFS only

	Appraisal in mobile unit					Home appraisal		
	50–54	55–59	60–64	65–69	70–74	75–79	80+	All 50+
Men	129	102	101	93	73	42	48	588
Women	120	106	122	127	91	75	89	730

Appendix G Home appraisal for adults aged 75 and over

Physical Appraisal Information Sheet

You have been invited to take part in a physical appraisal. The purpose of the appraisal is to assess several factors which contribute to your overall fitness. The measurements include height, weight, half body-span, skinfold thickness (to estimate how much fat you have), shoulder flexibility, handgrip strength, blood pressure and a few simple tasks. If you do not wish to take part in any of these you can decline or stop at any time, and need not give your reasons for doing so.

Do not hesitate to ask any questions that you have at this stage, then complete the consent form and relax and enjoy the appraisal.

Thank you for your co-operation.

SURVEY OF ACTIVITY AND HEALTH

Home Appraisal Consent Form

Name _____

Address _____

_____

_____

_____

The physical appraisal tests and measures have been explained to me, and I am willing to take part. I understand that I can withdraw from the tests at any time, and need not give my reasons for doing so.

I agree/do not agree* to Activity and Health Research informing my GP of my blood pressure measurement.

* Please delete as appropriate

Signed _____

Witness _____

Date _____

HOME APPRAISAL RESULTS SHEET S1310/1/90

SURVEY OF ACTIVITY AND HEALTH

Unit Area Serial no.

Appointment Details

Day _____ Date _____ Time _____

Information to be entered from screening questionnaire

Q.1. a) *Sex* Male 1
Female 2

c) *Age* in years

Q.2. Compared with other people of your age would you say you are ... very physically active 1
fairly physically active 2
not very physically active 3
or not at all physically active? 4

Q.3. a.) Do you think you could walk continuously for a mile without stopping? Yes 1
No 2
IF YES AT a)

b) Do you think you could run or jog continuously for a mile without stopping? Yes 1
No 2

Q.15 Do you have any physical disabilities of any kind? Yes 1
IF YES GIVE DETAILS No 2

Q.23. a) Do you smoke cigarettes or have you done so regularly in the past 5 years? Yes – current 1
Yes – ex-smoker 2
No 3

IF CIGARETTE SMOKER OR EX-SMOKER

b) About how much do (did) you smoke a day (or week if infrequent)? Number per day
Number per week

HOME APPRAISAL RESULTS

Day
Month
Time

Assessor Interviewer

No.

1. ANTHROPOMETRY

a) *Height* in cm
b) *Weight* in kg

Measured height		cms
subtract	0 0 0 • 7	cms
Actual height		cms

ASK ALL

2. Are you left or right handed?

Left	1
Right	2
Ambidextrous	3

3. DEMI-SPAN

a) Do you have any deformities to your (*dominant*) arm at the shoulder, elbow or wrist which prevent you from straightening the arm? If yes, check other arm

Yes	1
No	2 (measure dominant arm)

b) Do you have any deformities to your other arm at the shoulder, elbow or wrist which prevent you from straightening the arm?

Yes	1
No	2 (measure other arm)

If a problem with both sides, measure better side and note problem

Measured arm	Left	1
	Right	2

Tick highest score

c) *Demi-span* in cm

1st Measurement	
2nd Measurement	
(3rd Measurement)	

4. SKINFOLDS

Right side	Yes	1
	No	2

a) Biceps in mm

1st Measurement	
2nd Measurement	
(3rd Measurement)	

b) Triceps in mm

1st Measurement	
2nd Measurement	
(3rd Measurement)	

c) Subcapsular in mm

1st Measurement	
2nd Measurement	
(3rd Measurement)	

d) Suprailiac in mm

1st Measurement	
2nd Measurement	
(3rd Measurement)	

5. SHOULDER ABDUCTION

Dominant arm	Left	1
	Right	2
	Ambidextrous	3
a) Have you had any surgery to or dislocated your shoulder, on your (*dominant*) side within the last 6 months?	Yes	1
	No	2 (measure dominant side)
If 'yes', check other side		
b) Have you had any surgery to or dislocated your shoulder, on your other side within the last 6 months?	Yes	1
	No	2 (measure other side)
If problems on both sides, exclude from measurement		
Measured arm	Left	1
	Right	2
	Excluded from test	3

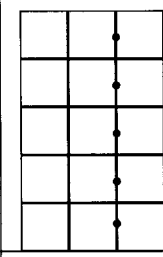
Tick highest score

c) Shoulder abduction in degrees	1st Measurement	
	2nd Measurement	
	3rd Measurement	
	(4th Measurement)	
	(5th Measurement)	

6. BLOOD PRESSURE

Tick scores with lowest diastolic

1st Measurement	Systolic in mm Hg	
	Diastolic in mm Hg	
	Heart rate in b/min	
2nd Measurement	Systolic in mm Hg	
	Diastolic in mm Hg	
	Heart rate in b/min	
3rd Measurement	Systolic in mm Hg	
	Diastolic in mm Hg	
	Heart rate in b/min	
(4th Measurement)	Systolic in mm Hg	
	Diastolic in mm Hg	
	Heart rate in b/min	

	Dominant hand	Left	1
7. HAND GRIP		Right	2
a) Do you have any swelling, inflammation, or severe pain in your (*dominant*) hand or have you injured this hand or had surgery on it within the last 6 months?		Yes	1
		No	2 (measure dominant hand)
If 'yes' check other hand			
b) Do you have any swelling, inflammation, or severe pain in your other hand or have you injured this hand or had surgery on it within the last 6 months?		Yes	1
		No	2 (measure other hand)
If 'yes' (both hands affected) exclude from test	*Measured hand*	Left	1
		Right	2
		Excluded from test	3
			Tick highest score
c) Hand grip in kg	1st Measurement		
	2nd Measurement		
	3rd Measurement		
	(4th Measurement)		
	(5th Measurement)		
8. I would like you now to show me how you perform a few everyday tasks.			
a) First, are you able to cut your own toenails?		Yes	1 (skip to c)
		No	2 (ask b)
If 'No'			
b) Are you able to touch your toes?		Yes	1
		No	2 (skip to Q.9)
c) Would you please show me how you would do that on the foot opposite to your (dominant) hand.	*1st Attempt*	Success	1
		Fail	2
UP TO THREE ATTEMPTS ALLOWED IF SUBJECT FAILS AT EARLIER ATTEMPT	*2nd Attempt*	Success	1
		Fail	2
	3rd Attempt	Success	1
		Fail	2
d) Now can you touch your toes on your other foot with your opposite hand?	*1st Attempt*	Success	1
		Fail	2
	2nd Attempt	Success	1
		Fail	2
	3rd Attempt	Success	1
		Fail	2

9. Would you please pick up this plug, put it into the socket and then take it out again. I will just show you what I mean. You may wear your glasses if you need to.

ASSESSOR TO DEMONSTRATE TEST.
SECOND ATTEMPT ALLOWED IF 'UNABLE' OR 'WITH DIFFICULTY' AT FIRST ATTEMPT

1st Attempt	No difficulty	1 (skip to Q.10)
	With difficulty	2
	Unable	3
2nd Attempt	No difficulty	1
	With difficulty	2
	Unable	3

10. Would you please pick up this key, put it into the lock, turn it around once and then take it out. I will show you what I mean.

ASSESSOR TO DEMONSTRATE TEST.
SECOND ATTEMPT ALLOWED IF 'UNABLE' OR 'WITH DIFFICULTY' AT FIRST ATTEMPT

1st Attempt	No difficulty	1 (skip to Q.11)
	With difficulty	2
	Unable	3
2nd Attempt	No difficulty	1
	With difficulty	2
	Unable	3

11. Would you please sit on the stool, fold your arms in front of you, place your feet flat on the floor slightly apart with your heels just under the stool. Then keeping your arms folded I want you to stand up. Let me show you what I mean.

ASSESSOR TO DEMONSTRATE TEST.
SECOND ATTEMPT ALLOWED IF 'UNABLE' OR 'WITH DIFFICULTY' AT FIRST ATTEMPT

1st Attempt	No difficulty	1 (End)
	With difficulty	2
	Unable	3
2nd Attempt	No difficulty	1
	With difficulty	2
	Unable	3

IF SUBJECT HAS DIFFICULTY RISING WITH ARMS FOLDED AT SECOND ATTEMPT

12. Could you try again with your arms hanging freely down by your side, but don't use your arms to help you to get up.

1st Attempt	No difficulty	1 (End)
	With difficulty	2
	Unable	3
2nd Attempt	No difficulty	1
	With difficulty	2
	Unable	3

COMMENTS

physical activity

in later life: further analysis of the Allied Dunbar National Fitness Survey and the Health Education Authority Survey of Activity and Health

This quantitative report presents data on the activity patterns and fitness levels of people over the age of 50. The data are from the well-received and respected Allied Dunbar National Fitness Survey (ADNFS) and the Health Education Authority National Survey of Activity and Health (HEANSAH).

Previous analyses of both these datasets have focused on adults aged 16–74. This report will present, for the first time, analyses for adults aged over 75 and has used an activity measure that takes into account the decline in capacity due to ageing. The report will be a valuable resource for academics and health promotion specialists and anyone with an interest in promoting physical activity.

HEALTH EDUCATION AUTHORITY
TREVELYAN HOUSE
30 GREAT PETER STREET
LONDON SW1P 2HW

ISBN 0 7521 1573 1