

# 2

## Physical activity in the community

*Trudy Thomas*

### **Introduction**

#### **The health benefits of physical activity**

There are many benefits associated with participating in physical activity:

- People who engage in regular physical activity – even of a moderate nature – generally have lower mortality rates (Blair *et al.*, 1989).
- People with existing medical conditions, such as type 2 diabetes and coronary heart disease, who exercise have lower levels of mortality than those who do not (Hardman, 1991; Eriksson, 1999).
- Physical activity can promote good mental health and is associated with decreased levels of moderate depression and anxiety (Stephoe, 1992).
- In older people, activity can
  - improve physical functioning and help maintain independence (Young and Dinan, 2000)
  - strengthen bones, thus helping to prevent osteoporosis (Fordham, 2000).
- In recent years, there has been a focus in the UK on obesity as a risk factor for health problems in both adults and children. While the aetiology of obesity is multi-factorial, the increasingly sedentary nature of the UK population is thought to play an important part (National Audit Office, 2002). A combination of diet and an increase in physical activity appears to bring about a greater weight loss than dietary control alone can achieve (National Prescribing Centre, 1998).

Health benefits from exercise are achievable regardless of the age, gender or health status of the individual. For all these reasons, the successful promotion of exercise by health care professionals is seen as an area that

could substantially benefit the health of the population (Department of Health, 1993).

### Defining physical activity

The key definitions associated with physical activity are given in Box 2.1. It is important to differentiate between physical activity and exercise:

- Physical activity is a general term referring to any bodily movement produced by the skeletal muscles resulting in energy expenditure (Health Education Authority, 1995a). This includes activities undertaken as part of day-to-day living and work. An individual's level of physical fitness relates to their ability to perform physical activity. It may be partly determined by heredity and partly acquired through physical activity and other lifestyle factors.

**Box 2.1** Definitions. Source: Caspersen *et al.* (1985)

#### **Physical activity**

This refers to all musculoskeletal movement that results in energy expenditure and therefore includes activities undertaken as part of day-to-day living and during the course of work, as well as leisure time activities such as exercise and sport.

#### **Exercise**

Defined as 'planned, structured and repetitive movement done to improve or maintain one of the components of physical fitness'. Exercise may also be thought of as physical activity undertaken in leisure time for the purpose of improving or maintaining fitness.

#### **Sport**

Defines physical activity involving structured, competitive situations governed by rules. Football and hockey, for example, are considered as sports whereas aerobics is classified as exercise.

#### **Physical fitness**

A set of attributes that people have or achieve that relates to their ability to perform physical activity. It may be partly determined by heredity and partly acquired through physical activity and other lifestyle factors. For health-related benefit, frequency, duration and intensity of activity need to be defined.

- Exercise refers to planned, structured activities involving repetitive bodily movements.

The frequency, duration and intensity of activity are factors used to determine the health benefit of exercise and are defined in Box 2.2. For health-related benefits, the frequency, duration and intensity of activity need to be defined. Examples of the kinds of activity designated as light, moderate and vigorous intensity are shown in Box 2.2.

## What amount and type of exercise is recommended for health benefit?

### UK and international guidance

The exercise guidelines recommended by the American College of Sports Medicine (ACSM), issued in 1978 and revised in 1990, were adopted as the international standards (American College of Sports Medicine, 1990). However, in 1993, new guidelines issued jointly by the ACSM and the US Center for Disease Control and Prevention recognised the mounting evidence that more frequent but moderate exercise was beneficial (Pate *et al.*, 1995). This report recommended that people should

**Box 2.2** Categorisation of physical activity intensity, with examples. Source: Health Education Authority (1995b)

**Light** – requiring little exertion and not causing a noticeable change in breathing. Long walks (2 miles+) at a slow pace, lighter DIY or gardening, e.g. decorating, weeding, fishing, darts, snooker, exercises, table tennis, golf.

**Moderate** – requiring sustained rhythmic muscular movement, at least the equivalent of brisk walking that leaves the person feeling warm and slightly out of breath.

Long walks (2 miles+) at a fast brisk pace, football, swimming, tennis, aerobics, cycling, golf, social dancing, exercises, heavy DIY or gardening (e.g. mixing cement, digging).

**Vigorous** – involves sustained rhythmic large muscle movements of at least 60–70% of maximum heart rate – makes a person sweaty and out of breath.

Playing squash, running, football, tennis, cycling, aerobics.

accumulate 30 minutes of moderate-intensity physical activity over the course of most days.

In April 1994, the Health Education Authority (HEA) recommended that to achieve health benefits relating to minimising mortality, individuals in the UK should undertake five moderate-intensity sessions per week, each lasting 30 minutes. An alternative was three vigorous-intensity sessions each lasting 20 minutes, in order to maximise aerobic fitness and minimise mortality. It was recognised that some people would combine elements of both recommended sessions (Biddle *et al.*, 1994).

### **The concept of 'active living'**

Taking the international and national guidance literally would imply that when undertaking physical activity a person must carry it out in one continuous daily bout of 20 minutes (vigorous intensity) or 30 minutes (moderate intensity) and that the activity must be at of least moderate intensity to confer any health benefits. There is, however, growing speculation as to whether undertaking several short bouts of activity throughout the day will confer similar health benefits. The premise for this is that it is the total daily energy expenditure that is the determinant for health gains. The limited data available has focused on weight reduction when continuous activity is compared to short bouts of activity. The results suggest that similar weight reductions are possible with long and short bouts of exercise (Hardman, 1999).

There is no firm consensus on the precise health benefits to be gained from light-intensity activities. While the cardiovascular benefits from such activities may be minimal, other aspects of physical fitness such as improved muscular strength, co-ordination, joint mobility and flexibility and mental health gains may be achievable. These health gains may be particularly important for people who are currently sedentary, obese, elderly or disabled. Light- to moderate-intensity activities may make realistic first-stage goals for those who do not regularly exercise but who plan to start.

There has been little research to map the benefits of different types of physical activity. Studies have tended to focus on one age group, such as children or adults. It is thought that different components of activity may be important at different stages of life (Boreham and Riddoch, 2003). Although evidence is lacking, it is proposed that vigorous, varied, intermittent exercise may be most beneficial to children and young adults. In middle age, moderate exercise that works the cardiovascular

system may prove the most appropriate. In older age, gentler exercise that focuses on flexibility and improved everyday functioning may help the person stay more 'healthy'. For example, indoor bowling has benefits for the elderly in providing both exercise and social contact (Figure 2.1). More research is needed this area.

Overall, evidence is emerging to support the concept of 'active living', whereby people are encouraged to incorporate physical activity of any kind into daily living at all stages of the lifespan. This change in focus is now reflected in the World Health Organization (WHO) recommendations for the amount of physical activity that is considered beneficial for health, which are shown in Box 2.3 (World Health Organization, 2002).

Many governments, including those of Australia, Canada, New Zealand, the UK and the Republic of Ireland, are promoting the concept of 'active living'. All have health promotion strategies that include



**Figure 2.1** Elderly bowlers enjoy exercise and social contact.

**Box 2.3** Concepts of health gain. Source: World Health Organization (2002)

**Much of the health gain is obtained through of at least 30 minutes of cumulative moderate physical activity every day.** This level of activity can be reached through a broad range of appropriate and enjoyable physical activities and body movements in people's daily lives, such as walking to work, climbing stairs, gardening, dancing, as well as a variety of leisure and recreational sports

**Additional health gains** can be obtained by relevant daily moderate to vigorous physical activities of longer duration, e.g. **children and young people** need an additional 20 minutes' vigorous physical activity three times a week. **Weight control** would require at least 60 minutes every day of moderate/vigorous physical activity.

targets to increase participation in physical activity in the general population (see end of chapter for details).

## How much exercise is being taken in the UK?

### Results from national surveys

The Allied Dunbar National Fitness Survey (ADNFS) is the most comprehensive survey available of the patterns of adult physical activity and levels of fitness in England (Sports Council and Health Education Authority, 1992). It consisted of a questionnaire sent to the homes of over 4300 participants, aged from 16 to 74. This was combined with the HEA National Survey of Activity and Health, which used the same questionnaire as the ADNFS in another 2200 people. The results of the combined survey showed that the majority (70%) of the English population were undertaking levels of physical activity that are below those required for optimum health.

This level required for optimum health was assessed by assigning a target level of activity for three specific age groups for the 4 weeks before the study. The target levels are shown in Table 2.1.

The survey assumed that anyone not achieving the target level of activity would be acquiring no health benefit, which – as already shown – is unlikely to be true. However, more recent studies by the Office for National Statistics (ONS), which looked purely at participation in sport or physical activity, showed that over half of those surveyed had not

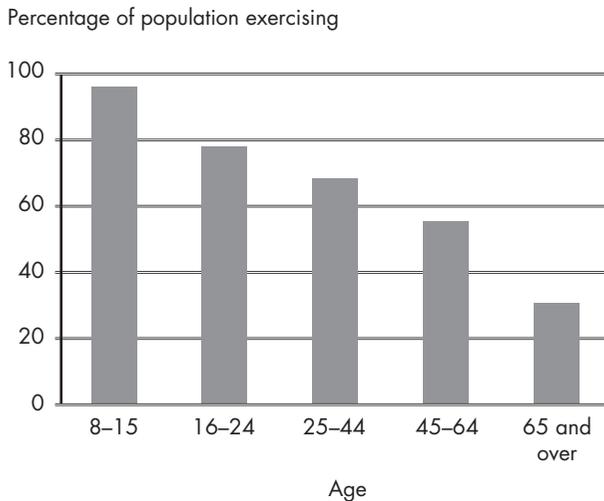
**Table 2.1** Target levels for the three age ranges studied in the Allied Dunbar National Fitness Survey. Source: Health Education Authority (1995a)

<i>Age range (years)</i>	<i>Number of weekly sessions (of 20 minutes or more) and intensity</i>
16–34	12 sessions of vigorous activity
35–54	12 sessions of moderate to vigorous activity
55–74	12 sessions of moderate activity

taken part in any form of activity in the 4 weeks before the survey (Figure 2.2) (Office for National Statistics, 2000).

Figures from the rest of the UK show a similar trend. The Scottish Health Survey, conducted in 1998, showed that 72% of women and 59% of men are not active enough for health (Scottish Executive, 2000). Only 28% of adults in Wales achieve 30 minutes of moderate-intensity activity on at least 5 days of the week (Chief Medical Officer Wales, 2005).

A sedentary lifestyle is a problem throughout the western world. It has been estimated that up to 60% of adult Americans do not exercise regularly and that some 25% are completely sedentary (US Surgeon General, 1997). A number of comparative studies show that

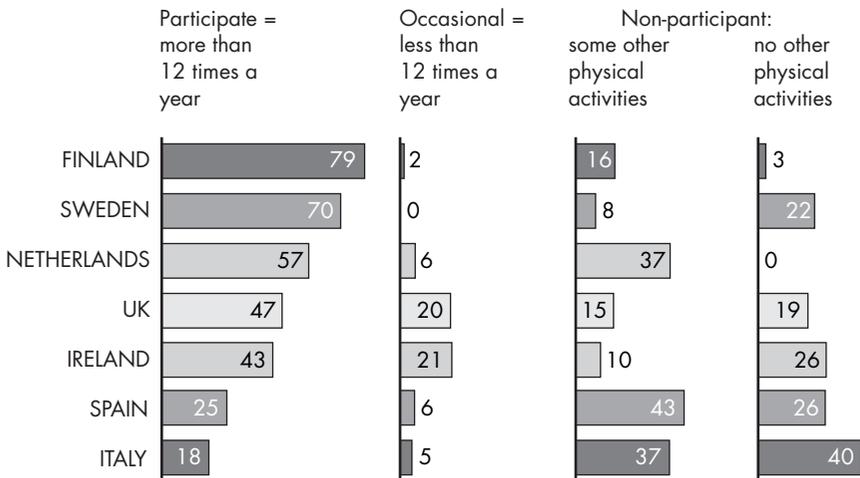


**Figure 2.2** Participation in a sport or physical activity by age in the UK 2000–01. Source: Social Trends 34; published by Office for National Statistics ([www.statistics.gov.uk](http://www.statistics.gov.uk)). Crown copyright material is reproduced with the permission of the Controller of HMSO.

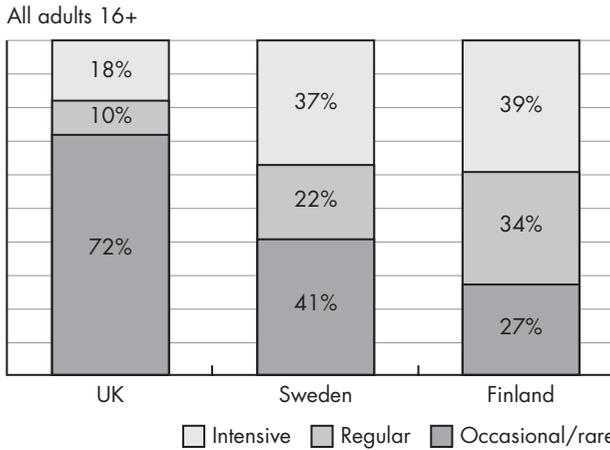
participation in physical activity in the UK is higher than that of other European countries. Direct comparisons are difficult because there is a lack of standardisation of methods, definitions, etc. However, countries most similar to the UK in terms of culture and weather generally achieve greater levels of participation (Department for Culture, Media and Sport, 2002). Compared to Scandinavian countries, participation in sports and physical activity in the UK is low (Figure 2.3).

Not only are the levels of participation in the UK lower than those in Scandinavia, but both the regularity and intensity of participation in the UK is significantly lower (Figure 2.4).

The UK still has a way to go if it is going to match the 70% of the Finnish population reported as undertaking at least 3 hours per week of exercise or physical activity during their leisure time, or the 57% of Australians who report undertaking at least 2.5 hours a week of moderate and vigorous physical activity (includes non-leisure time activity) (Department for Culture, Media and Sport, 2002). National surveys of 12 500 adult New Zealanders found that 68% enjoyed at least 2.5 hours of physical activity a week (Sport and Recreation New Zealand, 2003).



**Figure 2.3** Participation in physical activity in the UK compared to other EU countries (percentage of population). Source: Game Plan: A Strategy for Delivering Government’s Sport and Physical Activity Objectives; published by the British Government Strategy Unit, 2002. Crown copyright material is reproduced with the permission of the Controller of HMSO.



**Figure 2.4** Comparison of intensity of activity carried out by UK participants compared to Sweden and Finland. Source: Game Plan: A Strategy for Delivering Government’s Sport and Physical Activity Objectives; published by the British Government Strategy Unit, 2002. Crown copyright material is reproduced with the permission of the Controller of HMSO.

### Participation in specific population groups

#### *Effect of gender*

Overall, UK men were shown to be more active than women in the ADNFS, the 2000 Time Use Survey from the ONS and the Scottish Health Survey, particularly in relation to more vigorous activity (Biddle *et al.*, 1994; Scottish Executive, 2000). The 1998 Social Focus on Men survey from the ONS showed that one-third of all men compared to one-fifth of all women had participated in some form of vigorous activity in the 4 weeks before being interviewed (Office for National Statistics, 1998).

#### *The effect of age*

The ADNFS in the UK and the Australian Sports Commission Survey also showed that participation rates fell with increasing age, which might be expected (Sports Council and Health Education Authority, 1992; Australian Institute of Health and Welfare, 2000). However in Finland and Sweden, participation in organised and competitive sport actually increases amongst older people, because of the focus placed on this

group in these countries. There is some hope that the figures for the UK may be moving closer to its Scandinavian neighbours. Comparing the 1999 results with similar work undertaken in 1977 shows that more people are now participating in sport as they get older (Department for Culture, Media and Sport, 2002).

The ADNFS only surveyed people over the age of 16. Figure 2.5 from the ONS shows that over 95% of 8- to 15-year-olds are physically active. However, there is a significant decline in these activities by the time the person is in their mid-20s. The Australian Institute of Health and Welfare (2000) recorded participation rates of 88.8% in the 15–24 age group and only 60% in the 65+ age group.

It would appear that any benefits from an active youth are negated by reverting to a sedentary lifestyle as an adult (Paffenbarger *et al.*, 1986). One exception to this is bone density. Bone mass, which peaks in the late 20s, can be influenced by physical activity taken throughout childhood and adolescence. Maximising peak bone mass may provide some protection against osteoporosis in older life, although many other factors will also have an influence (Boreham and Riddoch, 2003).

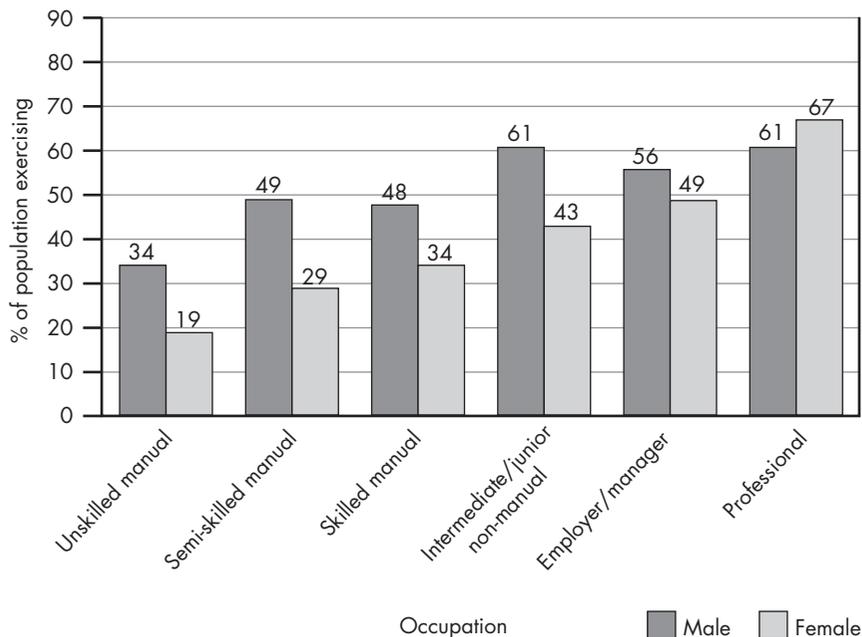
It might be supposed that individuals who are active as children take this behaviour into adult life and so will enjoy health benefits as a result. However, physical activity is a relatively unstable behaviour and subject to so many influences that this is by no means clear. As such there is a scarcity of long-term studies into this behaviour ‘tracking’, as it is called.

It is clear that inactive children are more likely to be overweight. A large study in 1992 showed that overweight in adolescence is associated with a wide range of adverse health events in adulthood that are independent of adult weight (Must *et al.*, 1992).

### *Socioeconomic influences*

Physical activity participation varies across social groups, as Figure 2.5 shows. There is an interesting link between gender and social class that warrants further investigation and may assist in targeting physical activity interventions.

The picture in Scotland is similar, with the proportion of sedentary adults (doing 30 minutes or less of physical activity on one day a week or not at all) in the lowest socioeconomic groups being double that among those from the highest socioeconomic groups (Scottish Executive, 2000).

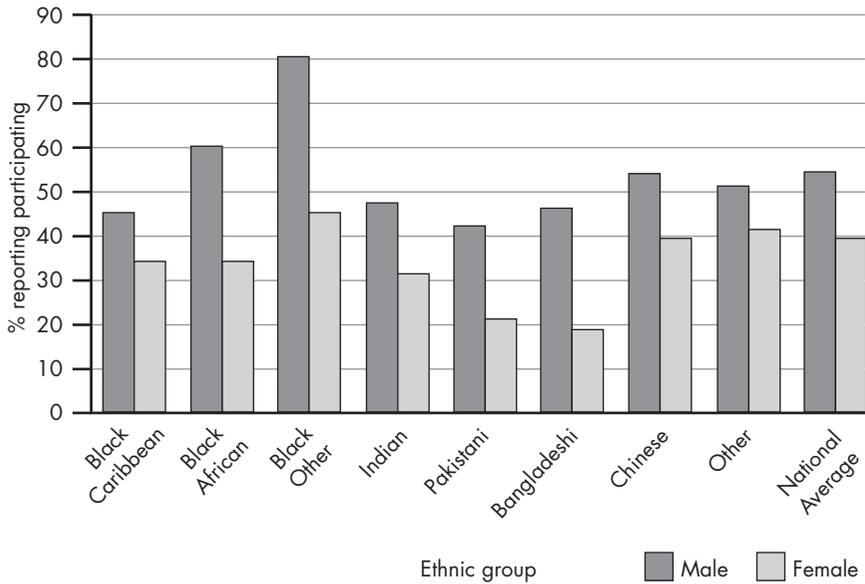


**Figure 2.5** Participation rates in physical activity in the previous 4 weeks by socio-economic group. Source: Game Plan: A Strategy for Delivering Government's Sport and Physical Activity Objectives; published by the British Government Strategy Unit, 2002. Crown copyright material is reproduced with the permission of the Controller of HMSO.

### *Effect of ethnicity*

For ethnic minority groups overall, the participation rate in physical activity is 40% compared with a national average of 46% (Sport England, 2000). This varies across both genders and there is significant variation between different ethnic groups (Figure 2.6).

Indian (31%), Pakistani (21%) and Bangladeshi (19%) women in particular have a lower involvement in sport than the UK national female average of 39%. These figures relate to sports participation and do not necessarily mean that physical activity levels per se are lower in these ethnic groups. In a survey in 1998 by the ONS, men from different ethnic minority groups were asked to record their activities. In the general population, 38% of men had participated in sports and exercise (excluding walking), at a moderate intensity level or above. The highest participation rate was for Black Caribbean men (47%), while the



**Figure 2.6** Participation in physical activity in ethnic minority groups compared to UK average. Source: Sport England (2000). Crown copyright material is reproduced with the permission of the Controller of HMSO.

lowest was for Bangladeshi men (24%) (Office for National Statistics, 1998).

This pattern is reflected in other countries where minority communities have been found to be less physically active. In a survey of 12 500 New Zealanders in 2002/3, self-reported levels of physical activity had increased by an overall 5%. However, there was a decrease in physical activity levels among Māori and Pacific communities (Sport and Recreation New Zealand, 2003).

*Participation in people-specific clinical conditions*

A national survey in 2000 by Sport England revealed lower levels of participation in sport among the young disabled compared with the rest of the population (Sport England, 2001). The most popular sports for the young disabled are horse riding and swimming, where participation levels are higher than in the overall population of younger people. However, these are sports that tend to organise events specifically for people with disabilities. Participation in other sports alongside the non-disabled is low.

Type 2 diabetics tend to be overweight and older, and in addition may have coronary heart disease, all risk factors for inactivity. It is also known that people with mental health problems exercise less than those without (Mutrie, 1999).

*Obesity*

People who are overweight are less likely to participate in physical activity. Dishman and others have established that the most consistent discriminator between adherers and drop-outs in exercise programmes is the percentage of body weight that is fat (Dishman, 1982). This may be because excess weight can cause discomfort and/or fatigue during exertion. Psychological factors also play a part, with overweight people being self-conscious and lacking confidence (Wilfley and Brownell, 1994).

Obesity occurs with a high prevalence in minority populations and in people with lower socioeconomic background. In addition there is an increase in obesity in older people, especially women (Wilfley and Brownell, 1994). Increasing physical activity participation in obese people is a particular challenge.

**What motivates people to take up physical activity?**

The ADNFS found four main motivating factors for both men and women to take exercise. These were:

- to feel in good shape physically
- to improve or maintain health
- to feel a sense of achievement
- to get outdoors.

An overwhelming majority of people surveyed believed that exercise is important to health. Generally, the benefits of exercise on mental health were less well recognised than the physical benefits of exercise. However in the HEA National Survey of Activity and Health, ‘to feel mentally alert’ was included as a potential motivating factor and actually scored highly (Health Education Authority, 1995a). If people recognise the benefits of physical activity in terms of health and their own personal beliefs, why is participation so low?

A clue comes from the ADNFS, which showed that the majority of people thought that most other people did not get enough exercise to

keep them fit, while less than half thought this was applicable to themselves (Sports Council and Health Education Authority, 1992). Most people believed that they were keeping 'fairly' fit by being 'fairly' active. Generally people overestimated their activity levels, with 4 out of 5 men and women rating themselves as very or fairly fit.

### **Barriers to participation (the adoption problem)**

The ADNFS showed that for people aged 16–69, the most commonly quoted barriers to participation in exercise were marriage, child care, domestic tasks, work pressure and lack of time. Motivational factors were also important: people said they felt they did not have the energy and needed to relax in their spare time. For women especially, emotional barriers were prominent. Reasons quoted included 'I'm not the sporty type', 'I'm too shy or embarrassed', or 'I might get injured'. In addition 18% of men and 15% of women quoted 'I have an injury or disability that stops me'. These barriers suggest that the sedentary population views physical activity, and in particular structured exercise, as requiring time and motivation. They also view participation in physical activity as a situation they will find uncomfortable and possibly dangerous (Sports Council and Health Education Authority, 1992).

Research into different types of exercise has shown specific barriers quoted for individual activities. For example concerns about road safety and air pollution were issues for those contemplating cycling (Bird *et al.*, 1998).

Some population groups may also describe specific barriers. For example, Sidney and Shepherd noticed the importance the elderly attached to programmes especially designed for seniors and accompanying safety instructions (Sidney and Shepherd, 1976). Their observation may be linked to people's age-related fear of injury while exercising (10% of men and women aged 25–44, but 15% of men and 21% of women over 65) (Shepherd, 1994).

The issue of time as the main barrier in most studies could be an area for further investigation. Perhaps people who exercise have more leisure time than those who are less active? Investigating barriers to exercise adoption may be a red herring, as people may simply assign a 'barrier' when they had no intention of taking up physical activity in the first place. However in some cases it could offer genuine insight for those working with sedentary populations. A better understanding may assist in overcoming barriers and make a particular activity more accessible.

Examples include traffic-free cycling areas, and exercise classes for people with a particular health problem, e.g. obesity.

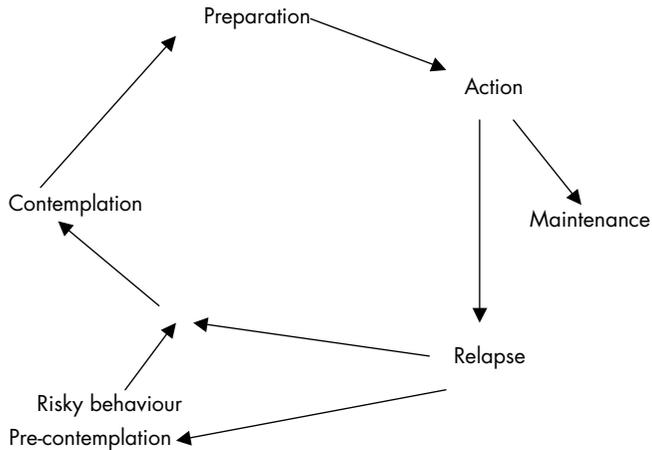
## **Exercise adherence**

### **Maintenance of exercise as a health behaviour**

Exercise as a health behaviour needs to be adopted for as long as possible to achieve any benefits but it seems this is difficult to maintain. Research has shown that approximately 50% of individuals who join an exercise programme will drop out during the first 6 months (Dishman, 1982). In order to try to better understand the reasons for this, exercise psychology has borrowed theories of behaviour change from sociocognitive, behavioural and health psychology. These models have been adapted for exercise adoption, to try to give a better insight into what happens when a person is taking up physical activity. They may also help to target interventions to facilitate the process of adoption and ultimately a perpetuation of the health behaviour. However no one model explains, in full, physical activity or exercise behaviour.

Pharmacists are most likely to be familiar with the trans-theoretical model, which incorporates the cycle of change and is illustrated in Figure 2.7. The trans-theoretical model was developed to describe and understand the processes going on when a person gives up an addictive behaviour. It has been applied widely to smoking cessation. This model of change has also been studied as a method for better understanding the processes individuals go through when introducing physical activity to their lives (Reed, 1999). Similarities have been found between the cessation of risky behaviours such as addiction and acquisition of regular physical activity as a healthy behaviour, including rates of relapse. Interventions to increase adoption of physical activity based on the current predicted stages of change have shown the model to be applicable in some aspects (Marcus *et al.*, 1992). However differences do exist. People taking up exercise may be more unstable at each stage of change than those giving up addictive behaviours.

Most people who try to introduce a lifestyle change will need to experience relapse several times before moving to a more stable state where the healthy behaviour is more habitual. Prochaska and Marcus (1994) speculate that termination of risk behaviour may never be reached with many people taking up physical activity. Relapse is a potential for all but a few, because it is easier to move in and out of the adopted behaviour than it is when quitting a risk behaviour such as smoking. The



**Figure 2.7** The cycle of change. Modified from Prochaska and DiClemente (1983).

role of injury might also play a part, where the most committed habitual exerciser has inactivity imposed because of injury. Likewise those who have an existing clinical condition may have enforced inactivity due to an exacerbation of, or treatment for, the original medical problem.

## Risks associated with physical activity

### Physical activity-related injury

Physical activity, even of a moderate nature, is not without risk of injury (see also Chapters 4 and 10). It is estimated that 10% of all accident and emergency admissions are sports-related (Kannus, 2000). This figure includes the most severe injuries only, usually as a result of vigorous exercise, and often involving contact sports such as rugby. A 1995 study estimated exercise-related morbidity in England and Wales to be in the order of 29 million incidents a year, resulting in new or recurrent injuries (Nicholl *et al.*, 1995). However this study only included people in the 16–45 age group. A survey conducted in England in 1991 found that a large proportion of injury incidents occurred in young men playing vigorous sports, and that most of these cases were new (as opposed to recurrent) injuries. Most injury incidents (70%) involve men, with almost half of these (48%) occurring in the 16–25 age group. Football was responsible for over a quarter (29%) of the incidents, and no other activity was involved in more than 10% of the incidents, although rugby

accounts for by far the highest injury rate (participants sustain almost 100 injuries per 1000 occasions of participation) (Department for Culture, Media and Sport, 2002). In the Netherlands a survey in 1992/3 looked at absolute numbers of injuries (Van Sluijs *et al.*, 2003). There were 2.9 million registered injuries in that time, of which 1.1 million required medical attention. The survey also looked at the number of injuries per 1000 hours, i.e. the injury incidence. Indoor football had the highest injury incidence, with karate, tae kwon do and outdoor football equal in second place. Accurate information regarding the extent of sports-related injury and ailment in the population as a whole is almost impossible to estimate because of the number of people who self-treat or seek alternative treatments.

### **Sudden cardiac arrest**

Physical activity, particularly if vigorous in nature, brings with it an increased risk of sudden death or myocardial infarction (see Chapter 1). The absolute risk of death is low among otherwise healthy middle-aged and older adults. The risk has been estimated to be in the region of one cardiac arrest per 20 000–45 000 exercisers a year (Siscovick *et al.*, 1984). Risk of sudden death during vigorous exercise is higher for those less accustomed to activity than those who exercise regularly (Van Sluijs *et al.*, 2003).

Deaths have occurred in young athletes, and have understandably received much publicity. It is thought that in most of these cases the cause is a congenital heart problem that is allegedly asymptomatic. In people over 35, the most common cause of sudden death during exercise is thought to be coronary artery disease.

It appears that just as the health benefits from regular physical activity increase with an increased amount and intensity of activity, so do the health risks, whether these risks be trauma injury or cardiovascular in nature.

### **Minimising risks**

Consideration of the intensity of exercise undertaken is an important factor in injury prevention. A 1998 study showed the rate of injury from walking, gardening, weightlifting, outdoor bicycling and aerobics to be small (Powell *et al.*, 1998).

The relationship between age and injury rate in relation to physical activity is unresolved. Young to middle-aged persons have a reported

injury rate of 10–50% in both novice and veteran exercisers (Pollock *et al.*, 1977; Macera *et al.*, 1989). However, comparison between two studies involving older exercisers showed an increased injury rate with increasing age. In addition there was a greatly increased injury rate (57%) in those older people taking part in a high-intensity, high-impact activity, compared with a much lower injury rate (14%) in a matched age group, taking part in a similar intensity activity but with a lower impact, i.e. jogging compared to walking (Pollock *et al.*, 1991; Carroll *et al.*, 1992).

A question remains as to whether all cases of sudden death from cardiovascular disease could be prevented if every athlete who competed was screened for cardiovascular disease. Certainly the majority of the cardiac conditions that predispose to sudden death during exercise would be detectable using endocardiography. However, this would not be economically viable, as a vast number of athletes would need to be screened in order to detect a small proportion of people at risk from sudden cardiac death. Screening for cardiovascular disease is warranted in athletes with a familial history of early (under 40 years) cardiac death. Likewise any athlete experiencing symptoms such as palpitations, chest pain, inappropriate breathlessness, dizziness or fainting should be examined by a cardiac specialist, although it should be noted that these predisposing cardiac conditions can be asymptomatic.

Recommendations for those involved in planning physical activity interventions to improve health are that the intensity of the exercise must be suitable for the target audience and that ideally this will be tailored to the particular circumstances of each individual.

## **What is being done to encourage sustained participation in physical activity?**

### **Levels of intervention**

King (1994) proposed that there are four levels of intervention that impact on physical activity uptake. These must all be addressed if a coherent and effective approach to increasing physical activity in populations is adopted:

#### **Level 1 Legislative/policy**

*Example:* An increase in the amount and type of compulsory exercise in schools, insurance incentives for those who exercise regularly.

**Level 2 Organisational/environmental**

*Example:* Safe cycling routes, buses to and from schools.

**Level 3 Inter-personal**

*Example:* Group classes, local walking schemes.

**Level 4 Individual**

*Example:* Advice and leaflets to patients/clients in primary care settings.

**National policy**

Making a positive change to the amount of physical activity taken by the population will have a dramatic influence on levels of disease and death. Getting the nation more active is not the job of one person, or even all healthcare professionals. Physical activity promotion and implementation must be led by a coordinated policy that starts with government strategy.

It is recognised that those working in primary care will only be able to make a difference to the physical activity levels of their local populations by working in partnership. Councils, schools, community youth and elders groups will all need to be explored as potential sites for physical activity provision and promotion.

Examples of UK national policies are given below:

*England*

Many government documents in recent years have highlighted the importance of physical activity in the management of the nation's health. The 2001 National Audit Office report on tackling obesity (National Audit Office, 2002) and *Game Plan: A Strategy for Delivering Government's Sport and Physical Activity Objectives* (Department for Culture, Media and Sport, 2002) both recommended the formation of a cross-government organisation to promote physical activity. The Department for Culture, Media and Sport (DCMS) and the Department of Health are jointly leading this team to develop a national delivery plan for physical activity and sport. The team is called the Activity Co-ordination Team (ACT). ACT's core target, set by *Game Plan*, is to increase participation in sport and physical activity to 70% of the population by 2020, particularly among:

- economically disadvantaged groups
- school leavers
- women
- older people.

The delivery plan intends to provide an evidence-based foundation for a long-term national physical activity and sport strategy for England. ACT aims to develop a joined-up approach to increase levels of participation in physical activity at regional and local level. This will involve incorporating strands from sport and leisure, education, the workplace, travel and the environment, as well as health care.

Local Exercise Action Pilots (LEAPs) have been set up in England to inform the work of ACT. There will be one pilot in each of the nine English regions to test different community approaches to increasing physical activity. These pilots will involve health services working with other organisations such as Sport England and the Countryside Agency, as well as local government departments.

For English health organisations the National Service Frameworks for coronary heart disease, mental health, older people and for diabetes all include recommendations about the important role played by physical activity, not just in the management of medical conditions but in their prevention (Department of Health 2000a, b; 2001a, b).

### *Scotland*

The Scottish Executive Health Department, through its Physical Activity Task Force, has set targets for 50% of the population aged 16 and over to take part in sport at least once a week by 2022 (Scottish Executive, 2003). Another target is that 80% of all people under 16 years of age will be meeting the minimum recommended levels of physical activity by 2022. The 'Let's Make Scotland more Active' campaign is targeting groups of the population identified as having low participation rates, in particular:

- parents of children under 5
- teenage girls
- men in their mid-years.

### *Wales*

The National Assembly has emphasised the importance of physical activity in policy documents (Chief Medical Officer Wales, 2005). Physical activity is a key area in the framework document for coronary heart disease prevention and treatment.

A Healthy and Active Lifestyles Task Force was set up in November 1999, its role being to investigate ways of encouraging people in Wales

to be more active and to prepare a strategy for action. The Task Force report was submitted to Ministers in 2001 and development of an implementation plan is under way.

### *Northern Ireland*

March 1996 saw publication of 'Be active – be Healthy', the Northern Ireland physical activity strategy 1996–2002 (Health Promotion Agency for Northern Ireland, 2000). The strategy aims to increase the level of health-related activity particularly among those who exercise least. A Northern Ireland physical activity action plan was drawn up based on the strategy and proposed the development of a programme of public information to persuade the public of the benefits of physical activity. In 2001, the Health Promotion Agency for Northern Ireland, which was leading this work, joined forces with the Department of Health and Children in the Republic of Ireland to launch an all-island campaign to encourage the public to be more physically active. In the Republic of Ireland in 2003 a new Physical Activity Campaign 'Let it Go, Just for 30 Minutes' was launched. This campaign has been organised by the Health Promotion Unit and is aimed at the 50% of the population that does not engage in any form of regular physical activity.

### **Health promotion activity**

Because of the multi-pronged approach needed to promote physical activity as a benefit to health, one, more or all of the following interventions may be used in a locality.

#### *Interventions by healthcare professionals*

**General practitioners** There have been a few studies that have looked at the effect of doctors giving advice about exercise adoption (Eaton and Menard, 1999). The overall opinion is that doctors who have been specially trained in giving advice on physical activity give advice more often. However, this has not been directly shown to have any significant long-term effect on physical activity adoption in the patients given advice (Harland *et al.*, 1999). These studies do contribute the knowledge that the provision of written materials and/or following up patients after the initial advice can further increase activity levels (Taylor, 2003). Because long-term benefits are notoriously difficult to achieve in exercise

adherence, some authorities view short-term adoption as a success (McMurdo, 1999; Riddoch, 1999).

A study that looked at barriers to physical activity promotion by GPs and nurses showed the main influence on a practitioner's promotion activities is their own participation in physical activity (McKenna *et al.*, 1998). GPs were three times more likely and nurses four times more likely to promote physical activity if they were in the action or maintenance stage of their own physical activity status.

**Pharmacists** A joint project between Avon Health Authority and the Avon Health Promotion Unit in 1997 used community pharmacists to promote physical activity through everyday contact with patients (Oxford and Simmons, 1997). This resulted in greater awareness of recommendations surrounding physical activity amongst the pharmacists and an increased number of interactions with patients. There was no attempt to link these results with the amount of physical activity that the recipients of the information undertook.

**Nurses** It has been suggested that nurses can make informed recommendations to patients about the ways in which appropriate exercise can bring health-related benefits (Rollo, 2004).

### *Exercise referral schemes*

These schemes involve GPs or other healthcare professionals referring selected patients to a structured exercise programme. The patient is assessed by an exercise specialist who will decide on a planned programme for that individual. This may be a series of sessions at the leisure centre or may involve a local walking scheme. The benefit of exercise referral is that the GP can identify people who would normally not be participating in physical activity and so who are likely to obtain the most health benefit from exercise intervention. These schemes have been shown to result in sustainable improvements in physical activity levels and in health indicators and they are certainly popular with healthcare professionals and providers of leisure facilities (Biddle *et al.*, 1994; Riddoch *et al.*, 1998).

A National Quality Assurance Framework for exercise referral was published in the UK in 2001 (Department of Health, 2001c). A National Framework for Developing GP Exercise Referral in Ireland was developed during 2001/2 (Health Promotion Unit for the Republic of Ireland, 2002). Such structured frameworks may further increase the

popularity of exercise referral, and also start to build a greater evidence base about its effectiveness. The current evidence base is scant because in the earlier schemes many GPs were not required to keep a record of their referrals. In addition, schemes were not standardised in any way.

### *Walking schemes*

Walking is widely promoted, because it is considered to be an ideal activity – it is acceptable to the majority of people, it is accessible and low impact/low risk. Many health promotion agencies have incorporated walking schemes within their policy documents on physical activity (see end of chapter for details, and Chapter 10). In Scotland the former captain of the British Lions rugby team, Gavin Hastings, took part in a successful television advertising campaign to promote walking exercise. In some areas the walking schemes are linked to the exercise referrals programme.

It may be that a healthy transport policy for children would do much to encourage physical activity (Roberts, 1996). The journey to school accounts for 35% of all journeys made by children and has the potential to make an important contribution to levels of physical activity. However, since 1975, the average distance walked by schoolchildren has fallen by 27%, largely because of the increasing proportion of journeys to school made by car.

To date there is little evidence on the acceptability and effectiveness of walking schemes. The question has been raised as to whether these programmes will only work for people who are already active and/or gregarious. Proper evaluation of these schemes is needed.

### *Cardiac rehabilitation*

The emphasis after myocardial infarction (MI) or other cardiac illness is for an early resumption of activity. Cardiac rehabilitation addresses the impact of major life-threatening illness and takes a holistic approach. In Britain, cardiac rehabilitation is routine following uncomplicated MI or coronary artery bypass graft surgery. Exercise can address issues of a physiological, psychological and social nature. It has been shown that physical activity as part of a rehabilitation programme will reduce the risk of death after heart attack (O'Connor *et al.*, 1989).

### *Exercise in pregnancy*

A structured training programme for the pelvic floor muscles has been shown to be associated with fewer cases of active pushing in the second stage of labour lasting longer than 60 minutes (Salvesen and Mørkved, 2004). Training of the pelvic floor muscles has also been shown to be effective in the treatment of stress incontinence (Bø *et al.*, 1999).

### *Other health promotion initiatives*

Other initiatives around the world include the Canadian SummerActive events, which provide opportunities for Canadians to walk, roll, run, swim, cycle, dance, jump and skate their way to better health. This campaign also includes initiatives on smoking cessation and healthy eating. The campaign mobilises schools, workplaces, sport or recreation clubs, health centres and other settings to create fun and stimulating environments for healthy living. More than 79 280 Albertans simultaneously walked one kilometre on 26 May 2005 to successfully set a new Guinness Book of World Records for walking. Over 300 walks were organised by Alberta schools, communities and workplaces. Together, they beat the previous world record of 77 500 walkers set by Japan in 2001. The Alberta Active Living Challenge Day is organised annually as part of its mission to encourage Albertans to be physically active and lead healthy lifestyles (Public Health Agency of Canada, 2005).

The WHO urges its members to celebrate a ‘Move for Health’ day each year to promote physical activity as an essential for health and well-being, and proposes that Member States celebrate the day on 10 May, although they do have the flexibility to choose the time and duration that best suits them for the event. The theme for 2005 was ‘supportive environments’ – physical-friendly environments that have been shown to encourage physical activity (World Health Organization, 2005).

The British government’s policy statement on sport, ‘Raising the Game’, aimed to help schools to re-establish sport as “one of the great pillars of education”, to achieve “the wider social and health benefits of sport”, and to assist children to make “informed decisions about adopting healthy and active lifestyles” (Department of National Heritage, 1995). The policy statement proposed a minimum of 2 hours of sport and physical education a week for all children aged up to 16. In 2000, the School Sport Partnerships Programme was initiated to help promote the attainment of this target for 75% of children in England by 2006. Most schools are now committed to securing an entitlement of at

least 2 hours per week of high-class physical education and sport within and beyond the curriculum for 5 to 16-year-olds and satisfactory progress is being made towards the target (Office for Standards in Education, 2004).

## Conclusion

Currently in the UK the population is not active enough to maximise the health benefits on offer from regular physical activity. Developing initiatives to promote physical activity at all stages of life will be an investment for the future. Many other countries are starting to reap rewards from initiatives that have been running for a number of years. In these countries, much effort has focused on raising awareness of the benefits of physical activity and this is an important first stage before real improvements in participation can be expected. To be successful, any local initiatives must fit with national strategy and involve healthcare professionals working with other community partners. Although the importance of healthcare professionals in these partnerships is recognised, pharmacists are as yet under-used. However the recent focus on the treatment and prevention of obesity has already highlighted the significant role pharmacists have to play in delivering the public health agenda (Anon, 2004).

## References

- American College of Sports Medicine (1990). American College of Sports Medicine position stand: the recommended quantity and quality of exercise for developing and maintaining cardiorespiratory and muscular fitness in healthy adults. *Med Sci Sports Exerc* 22: 265–274.
- Anon (2004) Obesity report prompts calls for greater pharmacy involvement. *Pharm J* 272: 695.
- Australian Institute of Health and Welfare (2000). *Physical Activity Patterns of Australian Adults*. Results of the 1999 National Physical Activity Survey (available from: <http://www.aihw.gov.au/publications/health/papaa/index.html>). Canberra: AIHW.
- Biddle S J H, Fox K R, Edmunds L (1994). *Physical Activity Promotion through Primary Health Care in England*. London: Health Education Authority.
- Bird S R, Smith A, James K (1998). Adherence and compliance to exercise and rehabilitation programmes. In: Bird S R, Smith A, James K, eds. *Exercise Benefits and Prescription*. Cheltenham: Stanley Thornes, 63–87.
- Blair S N, Kohl III H W, Paffenbarger R S, *et al.* (1989). Physical fitness and all-cause mortality. A prospective study of healthy men and women. *JAMA* 262: 2395–2401.

- Bø K, Talseth T, Holme I (1999). Single blind, randomised controlled trial of pelvic floor muscle exercises, electrical stimulation, vaginal cones and no treatment in management of stress incontinence in women. *BMJ* 318: 487–493.
- Boreham C, Riddoch C (2003). Physical activity and health through the lifespan. In: McKenna J, Riddoch C, eds. *Perspectives on Health and Exercise*. Basingstoke: Palgrave Macmillan, 11–30.
- Carroll J F, Pollock M L, Graves J E, *et al.* (1992). Incidence of injury during moderate- and high-intensity walking training in the elderly. *J Gerontol A Biol Sci Med Sci* 47: M61–M66.
- Caspersen C J, Powell K E, Christenson G M (1985). Physical activity, exercise and physical fitness: definitions and distinctions for health-related research. *Public Health Rep* 100: 126–131.
- Chief Medical Officer Wales (2005). Health Promotion Division. <http://www.cmo.wales.gov.uk/content/about-us/hpd-e.htm> (accessed 12 August 2005).
- Department for Culture, Media and Sport (2002). *Game Plan: A Strategy for Delivering Government's Sport and Physical Activity Objectives*. London: DCMS/Strategy Unit, Cabinet Office.
- Department of Health (1993). *Better Living, Better Life*. London: Knowledge House.
- Department of Health (2000a). National Service Framework for Coronary Heart Disease: Modern Standards and Service Models. London: DoH.
- Department of Health (2000b). National Service Framework for Mental Health: Modern Standards and Service Models. London: DoH.
- Department of Health (2001a). National Service Framework for Older People: Modern Standards and Service Models. London: DoH.
- Department of Health (2001b). National Service Framework for Diabetes: Standards. London: DoH.
- Department of Health (2001c). *Exercise Referral Systems: A National Quality Assurance Framework*. London: DoH.
- Department of National Heritage (1995). *Sport: Raising the Game*. London: DNH.
- Dishman R K (1982). Compliance/adherence in health-related exercise. *Health Psychol* 1: 237–267.
- Eaton C B, Menard L M (1999). A systematic review of promotion of physical activity in primary care. In: MacAuley D, ed. (1999). *Benefits and Hazards of Exercise*. London: BMJ Books, 46–64.
- Eriksson J G (1999). Exercise and the treatment of type 2 diabetes mellitus. An update. *Sports Med* 27: 381–391.
- Fordham J (2000). Treatment of established osteoporosis. *Pharm J* 264: 593–596.
- Hardman A (1991). *Exercise and the Heart. Report of a British Heart Foundation Working Group*. London: British Heart Foundation.
- Hardman A E (1999). Intermittent exercise patterns. In: MacAuley D, ed. (1999). *Benefits and Hazards of Exercise*. London: BMJ Books, 322–337.
- Harland J, White M, Drinkwater C, *et al.* (1999). The Newcastle exercise project: a randomised controlled trial of methods to promote physical activity in primary care. *BMJ* 319: 828–832.
- Health Education Authority (1995a). *Physical Activity Matters*. London: HEA.
- Health Education Authority (1995b). *Health Update: Physical Activity*. London: HEA.

- Health Promotion Agency for Northern Ireland (2000). Get a life, get active. <http://www.healthpromotionagency.org.uk/Work/Physicalactivity/campaigns1.htm> (accessed 12 August 2005).
- Health Promotion Unit for the Republic of Ireland (2002). National Framework for Developing GP Exercise Referral in Ireland.
- Kannus P (2000). Nature, prevention and management of injury. In: Harries M, McLatchie G, Williams C, *et al.* (2000). *ABC of Sports Medicine*, 2nd edn. London: BMJ Books, 1–6.
- King A C (1994). Clinical and community interventions to promote and support physical activity participation. In: Dishman R K, ed. *Advances in Exercise Adherence*. Champaign, IL: Human Kinetics, 183–212.
- Macera C A, Pate R R, Powell K E, *et al.* (1989). Predicting lower extremity injuries among habitual runners. *Arch Intern Med* 149: 2565–2568.
- McKenna J, Naylor P J, McDowell N (1998). Barriers to physical activity promotion by general practitioners and practice nurses. *Br J Sports Med* 32: 242–247.
- McMurdo M (1999). Newcastle exercise project [electronic response]. 12 October. <http://bmj.bmjournals.com/cgi/eletters/319/7213/828>
- Marcus B H, Banspach S W, Lefebvre R C, *et al.* (1992). Using the stages of change model to increase the adoption of physical activity among community participants. *Am J Health Promot* 6: 424–429.
- Must A, Jacques P F, Dallal G E, *et al.* (1992). Long term morbidity and mortality of overweight adolescents. *N Engl J Med* 327: 1350–1355.
- Mutrie N (1999). Exercise adherence and clinical populations. In: Bull S, ed. *Adherence Issues in Sport and Exercise*. Chichester: John Wiley and Sons, Chapter 4.
- National Audit Office (2002). *Tackling Obesity in England*. Report by the Comptroller and General Auditor. HC220. Session 20001–2001: 15 February 2001. Executive Summary. London: Stationery Office.
- National Prescribing Centre (1998). *Management of Obesity*. Manchester: National Prescribing Centre and UK Drug Information Pharmacists Group.
- Nicholl J P, Coleman P, Williams B T (1995). The epidemiology of sports and exercise related injury in the United Kingdom. *Br J Sports Med* 29: 232–238.
- O'Connor G T, Buring J E, Yusuf S, *et al.* (1989). An overview of randomised controlled trials of rehabilitation with exercise after myocardial infarction. *Circulation* 80: 234–244.
- Office for National Statistics (1998). *Social Focus on Men* [Maximum intensity level attained in physical activity by men: by age, available from <http://www.statistics.gov.uk/STATBASE/Product.asp?vlnk=7590&More=Y>]. London: ONS.
- Office for National Statistics (2000). *The UK 2000 Time Use Survey*. Participation in sport or physical activity: by age 2000–01. London: ONS.
- Office for Standards in Education (2004). *The School Sport Partnerships Programme. Evaluation of Phases 3 and 4 (2003–4)*. London: OFSTED.
- Oxford L, Simmonds G (1997). *Promoting Physical Activity from Community Pharmacies*. Bristol: Avon Health Authority and Health Promotion Service Avon.
- Paffenbarger R S, Hyde R T, Wing A L, *et al.* (1986). Physical activity, all-cause mortality, and longevity of college alumni. *N Engl J Med* 314: 605–613.
- Pate R R, Pratt M, Blair S N, *et al.* (1995). Physical activity and public health. A recommendation from the Centers for Disease Control and Prevention and the American College of Sports Medicine. *JAMA* 273: 402–407.

- Pollock M L, Gettman L R, Milesis C A, *et al.* (1977). Effects of frequency and duration of training on attrition and incidence of injury. *Med Sci Sports Exerc* 9: 31–36.
- Pollock M L, Carroll J F, Graves J E, *et al.* (1991). Injuries and adherence to walk/jog and resistance training programs in the elderly. *Med Sci Sports Exerc* 23: 1194–1200.
- Powell K E, Heath G W, Kresnow M-J, *et al.* (1998). Injury rates from walking, gardening, weightlifting, outdoor bicycling and aerobics. *Med Sci Sports Exerc* 30: 1246–1249.
- Prochaska J O, DiClemente C C (1983). The stages and processes of self-change in smoking: towards an integrative model of change. *J Consult Clin Psychol* 51: 390–395.
- Prochaska J O, Marcus B (1994). The trans-theoretical model: application to exercise. In: Dishman R K, ed. *Advances in Exercise Adherence*. Champaign, IL: Human Kinetics, 161–181.
- Public Health Agency of Canada (2005). SummerActive 2005 Success Stories. <http://www.summeractive.canoe.ca/SummerActiveStories/letters.html> (accessed 30 September 2005).
- Reed G R (1999). Adherence to exercise and the trans-theoretical model of behaviour change. In: Bull S, ed. *Adherence Issues in Sport and Exercise*. Chichester: John Wiley and Sons, 19–45.
- Riddoch C (1999). Conclusions drawn from the Newcastle project findings are misleading (electronic response]. 14 October. <http://bmj.bmjournals.com/cgi/eletters/319/7213/828>
- Riddoch C, Puig-Ribera A, Cooper A (1998). *Effectiveness of Physical Activity Promotion Schemes in Primary Care: A Review*. London: Heath Education Authority.
- Roberts I (1996). Walking to school has future benefits [letter]. *BMJ* 312: 1229.
- Rollo I (2004). Understanding the role of exercise in health promotion. *Nurs Times* 100: 36–38.
- Salvesen K A, Mørkved S (2004). Randomised controlled trial of pelvic floor muscle training during pregnancy. *BMJ* 329: 378–380.
- Scottish Executive (2000). The Scottish Health Survey 1998. Edinburgh Scottish Executive Department of Health. <http://www.show.scot.nhs.uk/scottishhealthsurvey> (accessed 20 June 2005).
- Scottish Executive (2003). *Let's Make Scotland More Active: A Strategy for Physical Activity*. Edinburgh: SEHD Physical Activity Task Force. <http://www.scotland.gov.uk/library5/culture/lmsa.pdf> (accessed 20 June 2005).
- Shephard R J (1994). Determinants of exercise in people aged 65 years and older. In: Dishman R K, ed. *Advances in Exercise Adherence*. Champaign, IL: Human Kinetics, 343–361.
- Sidney K H, Shepherd R J (1976). Attitudes towards health and physical activity in the elderly: Effects of a physical training program. *Med Sci Sports* 8: 246–252.
- Siscovick D S, Weiss N S, Fletcher R H, *et al.* (1984). The incidence of primary cardiac arrest during vigorous exercise. *N Engl J Med* 311: 874–877.
- Sport and Recreation New Zealand (2003). SPARC Facts '97-'01. <http://www.sparc.org.nz/research-policy/research-/sparc-facts-97-01> (accessed 12 August 2005).

- Sport England (2000). *Sports Participation and Ethnicity in England. National Survey 1999/2000. Headline Findings*. London: Sport England.
- Sport England (2001). *Disability Survey 2000 – Young People with a Disability and Sport: Headline Findings*. London: Sport England.
- Sports Council and Health Education Authority (1992). *Allied Dunbar National Fitness Survey: Main Findings*. London: Sports Council/HEA.
- Step toe A (1992). Physical activity and psychological well-being. In: Norgan N G, ed. *Physical Activity and Health*. Cambridge: Cambridge University Press, 207–229.
- Taylor A (2003). The role of primary care in promoting physical activity. In: McKenna J, Riddoch C, eds (2003). *Perspectives on Health and Exercise*. Basingstoke: Palgrave Macmillan, 153–180.
- US Surgeon General (1997). *Physical Activity and Health*. Washington, DC: US Government.
- Van Sluijs E M F, Verhagen E A L M, Van der Beek A J, *et al.* (2003). Risks of physical activity. In: McKenna J, Riddoch C, eds. *Perspectives on Health and Exercise*. Basingstoke: Palgrave Macmillan, 109–130.
- Wilfley D E, Brownell K D (1994). Physical activity and diet in weight loss. In: Dishman R K, ed. *Advances in Exercise Adherence*. Champaign, IL: Human Kinetics, 361–393.
- World Health Organization (2002). *Pan American Sanitary Bureau/Regional Office of the World Health Organization Physical Activity Sheet*. Geneva: WHO.
- World Health Organization (2005). Move for Health Day. <http://www.who.int/moveforhealth/about/en> (accessed 12 August 2005).
- Young A, Dinan S (2000). Active in later life. In: Harries M, McLatchie G, Williams C, *et al.*, eds. *ABC of Sports Medicine*, 2nd edn. London: BMJ Books, 51–56.

## Further reading

- Harries M, McLatchie G, Williams C, *et al.* (2000). *ABC of Sports Medicine*, 2nd edn. London: BMJ Books.
- Blenkinsopp A, Panton R (1999). Physical activity. In: Anderson C, ed. *Health Promotion for Pharmacists*, 2nd edn. Oxford: Oxford University Press.
- British Heart Foundation. Physical Activity and Your Heart. Health Information Series Number 1.
- Blenkinsopp A, Anderson C (2000). Current thinking on: Exercise and physical activity. *Pharm Mag* CE1, July.
- McKenna J, Riddoch C, eds (2003). *Perspectives on Health and Exercise*. Basingstoke: Palgrave Macmillan.
- MacAuley D, ed. (1999). *Benefits and Hazards of Exercise*. London: BMJ Books.

### **Useful addresses**

Sport England  
3rd Floor Victoria House  
Bloomsbury Square  
London WC1B 4SE  
Tel: +44(0) 8458 508 508  
[www.sportengland.org](http://www.sportengland.org)

sportscotland  
Caledonia House  
South Gyle  
Edinburgh EH12 9DQ  
Tel: +44(0) 131 317 7200  
[www.sportscotland.org.uk](http://www.sportscotland.org.uk)

Sports Council for Wales  
Sophia Gardens  
Cardiff CF11 9SW  
Tel: +44(0) 29 2030 0500  
[www.sports-council-wales.co.uk](http://www.sports-council-wales.co.uk)

Irish Sports Council  
Top Floor, Block A  
Westend Office Park  
Blanchardstown  
Dublin 15  
Ireland  
Tel: +353 1 8608800  
[www.irishsportscouncil.ie](http://www.irishsportscouncil.ie)

Sports Council for Northern Ireland  
House of Sport  
Upper Malone Road  
Belfast BT9 5LA  
Tel: +44(0) 28 9038 1222  
[www.sportni.org](http://www.sportni.org)

British Heart Foundation (BHF)  
14 Fitzhardinge Street  
London W1H 6DH

Tel: +44(0) 20 7935 0185  
[www.bhf.org.uk](http://www.bhf.org.uk)

BHF National Centre for Physical Activity and Health  
Loughborough University  
Loughborough  
Leicestershire LE11 3TU  
Tel: +44(0) 1509 223259  
[www.bhfactive.org.uk](http://www.bhfactive.org.uk)

British Association of Sport and Exercise Science (BASES)  
Chelsea Close  
Off Amberley Road  
Armley  
Leeds LS12 4HP  
Tel: +44(0) 113 289 1020  
[www.bases.org.uk](http://www.bases.org.uk)

Countryside Agency Head Office  
John Dower House  
Crescent Place  
Cheltenham  
Gloucestershire GL50 3RA  
Tel: +44(0) 1242 521381  
E-mail: [info@countryside.gov.uk](mailto:info@countryside.gov.uk)