THE COMPLETE GUIDE TO

Debbie Lawrence & Bob Hope

CIRCUIT TRAINING

2nd edition

THE COMPLETE GUIDE TO CIRCUIT TRAINING

Second edition

Debbie Lawrence and Bob Hope

// CONTENTS

ACKNOWLEDGEMENTS

Being able to share my knowledge and experience to inspire and encourage others has always been, and continues to be, my dream. Writing a book is always a massive challenge and I am grateful that once again I have made the effort to fulfil my dreams and manage the challenge.

On a professional level, my thanks go to co-author Bob Hope. Thanks for using your valuable time to design so many wonderful, imaginative and creative circuits. I feel they give this book a really unique quality.

Also, thanks to Keith Smith from YMCA FIT for his special input to the older adults' circuit training chapter. Thanks for sharing the wealth of your experience and designing an excellent functional circuit for the older adult.

Thanks to the team of staff at A&C Black for being fabulous to work with Charlotte Croft and Kate Wanwimolruk.

Huge thanks to the volunteer models: Louise, Tony, Mandy, Aimee and Keely.

On a personal level, my greatest thanks and appreciation must go to my friends and family: my partner Joe, and my mum Mary – thanks for encouraging me to begin my career in fitness.

Debbie Lawrence

I would like to thank the following people for their encouragement and assistance during the writing of this book:

Debbie Lawrence, without whom this book would definitely not have been written or completed. A brilliant teacher, writer, and friend. Great job, Debbie.

Alan Newman and Lee Land at the Plymouth YMCA, Steve Plant from the Isle of Wight College, and Steve Platt from Plymouth. All like-minded circuit training teachers, for allowing me to bounce ideas off them.

Jason Colgan, for his input on basketball. Paul Bedford for his knowledge, help and assistance on cycling and being a mate.

To my family, my wife and soul mate, Jan, who has been my strength and supporter for the past 35 years, who I love very much; my daughter Natasha Anne Hope Whelan who brightens mine and everyone's day; her husband Dean and Jack the best Grandson in the world. In memory of my Mum and Dad.

Thank you everyone. For all circuit trainers everywhere, this is for you. Enjoy!

Bob Hope

INTRODUCTION

Circuit training is often erroneously portrayed as an intensive and stressful form of exercise, with a drill sergeant-type in the middle of a circuit bellowing orders at weary recruits. While circuit training can be used as an advanced form of training, we aim to demonstrate that it is simply another method of training to develop fitness. Circuit training is a very versatile and adaptable mode of training that requires the performance of a series of carefully selected exercises. The exercises chosen can be used to develop a specific component of fitness, specific skills for a particular sport, or for the needs of a particular specialist population. They can also be adapted to suit a wide range of fitness levels and to build an individual's or a team's fitness level as they improve. Participants often enjoy circuit training more than other modes of training because they are able to easily monitor their progress and really see the results of their hard work. Ultimately, there are numerous ways of modifying a circuit training session, which adds variety and fun and helps to maintain interest and motivation, so that those taking part are more likely to adhere to the exercise programme and to enjoy it at the same time!

The aim of this book is to explore the benefits and techniques of circuit training. Now fully revised from the first edition with updated information and additional material, and with key exercises demonstrated by photographs, it will act as a resource for circuit training teachers and also as a reference for sports coaches who need access to creative circuit ideas designed specifically for their sport.

Part One provides a basic introduction to fitness: why fitness is important – both physical and mental; and how fitness can be improved through training – specifically through circuit training.

Part Two identifies the skills required to plan, lead and teach a circuit training session. It outlines the necessary safety considerations and explores different approaches to circuit training, discussing the advantages and disadvantages of each. The final chapters look at different programme formats and methods of progressing and adapting each to accommodate the needs of participants.

Part Three discusses and demonstrates appropriate activities for warming up and cooling down, along with appropriate activities, exercises and session structures to improve the main components of fitness.

Part Four provides detailed instructions on how to perform and instruct a range of exercises appropriate for outdoor circuit training, training for older adults, and circuits for specific sports.

1

PART **ONE**

WHY CIRCUIT TRAINING?

1 // THE BENEFITS OF CIRCUIT TRAINING

WHAT ARE THE GENERAL BENEFITS OF CIRCUIT TRAINING?

Circuit training is a safe, effective and fun approach to exercising that can be enjoyed by a variety of people; it is attractive to men and women, younger and older age groups, sports-people and the general population. It can be performed indoors and outdoors, and in water.

To fully understand the benefits of circuit training it is necessary to explore the components of physical fitness and discuss how each of these can be improved through participation in a progressive circuit training programme. The components that contribute to physical fitness are:

- cardiovascular fitness
- muscular strength
- muscular endurance
- flexibility
- motor fitness (includes agility, balance, reaction time, speed, power and co-ordination).

It is also necessary to discuss how to progress these fitness components and provide overload to the specific physiological systems. Therefore, the principles of training will also be discussed in relation to each component of fitness. Principles include:

- frequency (how often)
- intensity (how hard)
- time/duration (how long)
- type of training.

The contributions that circuit training makes to health and wellbeing will also be explored in relation to the following components, which are believed to encompass most aspects of total fitness/health:

- physical fitness
- social fitness
- mental fitness
- emotional fitness
- nutritional fitness
- medical fitness
- spiritual fitness.

This chapter therefore explores how participation in a progressive circuit training programme can contribute towards improving and developing our physical fitness and lead us towards the optimum of total fitness.

AEROBIC AND ANAEROBIC

The body has to create energy to function both during times of rest and activity. This energy comes in the form of a chemical called Adenosine Tri Phosphate (ATP). ATP cannot be stored inside a muscle in large amounts, but is continually broken down to create energy and then reproduced inside the muscle via the body's energy systems (aerobic or anaerobic).

When resting and inactive, demands for energy and ATP production are lower. During exercise and activity, the demands for energy and ATP production are greater to enable muscle contraction and all the other physiological processes required by the exercising body.

The main factors that determine the energy system used to re-synthesise ATP are the:

- intensity of the activity;
- duration of the activity;
- fitness level of the person performing the activity;
- skill level of the person performing the activity – that is, how familiar they are with performing that activity (specificity).

Generally speaking, activities which are of a **lower intensity** and can be continued for **longer durations** will use the **aerobic** energy system predominantly. This means the individual will be using oxygen to create energy. Activities that are of a **higher intensity** and can only be performed for **shorter durations** will use the **anaerobic** energy systems, which do not use oxygen to create energy. This means the individual would not be using oxygen to perform the activity and therefore would have to slow down or stop because the energy source had expired or a build-up of waste products (lactic acid, which causes the burn) would inhibit further work.

Realistically, during a circuit training session, all the energy systems will interweave to enable activities of different intensity to be performed. At different times throughout the workout, certain energy systems may be more predominant.

A basic introduction and summary of the body's energy systems is provided in Table 1.1. Readers wishing to study further are recommended to read other anatomy and physiology texts listed in the references.

Table 1.1 The body's energy systems

Energy system	Creatine phosphate	Lactic Acid/ Glycogen	Oxygen
Anaerobic/Aerobic	Anaerobic	Anaerobic	Aerobic
Fuel used	Creatine phosphate	Glycogen	Glycogen, fat (in the presence of glycogen), protein (sparingly). The latter is not ideal as a main fuel and would only be used in conditions where other fuels were unavailable.

Table 1.1 The body's energy systems cont.			
Fuel stored	Muscles	Muscles and liver	Glycogen stored in muscle Fat stored as adipose tissue Protein not stored in same way. Excess protein intake stored as fat
Amounts of fuel	Limited – only a few available	Moderate supply – from a few seconds up to two to three minutes When broken down without oxygen, waste product lactic acid is produced	Moderate supply of glycogen, more plentiful supply of fat System can sustain activity for as long as fuel available
Intensity, duration and type of activity	High intensity Short duration 100m sprint Throwing and jumpIng events Strength training	Moderate to high intensity 400m sprint Anaerobic endurance – eight to 25 repetitions approximately	Low to moderate intensity Longer duration Marathon running Long distance swimming and cycling Circuit weight training
Waste products	Creatine – no harmful side effects. Cannot be used until resynthesised	Lactic acid – inhibits muscle contraction Burning sensation – intensity of activity needs to lower for work to continue	Heat generated produces water. The body sweats to main a comfortable temperature Carbon dioxide – transported to lungs and exhaled

WHAT IS CARDIOVASCULAR FITNESS?

Cardiovascular fitness is the ability of the heart, lungs and circulatory system to transport and utilise oxygen efficiently. It is sometimes referred to as cardio-respiratory fitness, stamina, or aerobic fitness.

WHY DO WE NEED CARDIO-VASCULAR FITNESS?

We need a strong and efficient heart, respiratory and circulatory system to maintain our quality of life, to participate in sporting and recreational activities and to prevent the onset of circulatory diseases linked with inactivity (coronary heart disease and high blood pressure).

The long-term benefits of cardovascular training

- Stronger heart muscle
- Increased stroke volume (amount of blood pumped in each contraction of the heart)
- Increased capillarisation (more blood vessels delivering blood and oxygen to the muscles)
- Increased mitochondria (cells in which aerobic energy is produced)
- Increased metabolic rate (rate at which we burn calories)
- More effective weight management
- More effective stress management
- Decreased body fat
- Decreased cholesterol levels
- Decreased blood pressure
- Decreased risk of coronary heart disease

HOW CAN WE IMPROVE OUR CARDIOVASCULAR FITNESS?

To improve the fitness of the heart, respiratory and circulatory system, we need to perform rhythmic activities which use the large muscles of the body. These should be performed on a regular basis, at a moderate intensity and for a prolonged duration. Adherence to this type of exercise programme will induce the necessary long-term health related improvements to the cardiovascular system. The recommended training requirements for improvements of cardiovascular fitness are outlined in Table 1.2.

WHAT TYPES OF ACTIVITY ARE APPROPRIATE IN A CIRCUIT TRAINING SESSION?

The most effective exercises for bringing about the desired training benefits and improving cardiovascular fitness in a circuit training session are those that require us to use the large muscles of the lower body. Any movement which shifts our body weight against the force of gravity in the following ways is effective:

- upwards (jumping and stepping)
- downwards (squatting and lunging)
- travel across (shuttle runs and gallops).

These are illustrated in Figure 1.1 on page 15.

Jumping activities require plenty of muscular effort to move our centre of gravity upwards, away from the ground. They also create greater momentum and demand that our muscles work harder to maintain correct alignment. A disadvantage of too many jumping (high-impact) movements is that greater stress will be placed on the

Table 1.2	Recommended training guidelines for cardiovascular fitness
Frequency How often should we perform these activities?	Three to five times a week Three times a week at vigorous intensity. Five times a week at moderate intensity, or a combination of moderate and vigorous intensity, three to five times a week Rest days and vigorous training days should be alternated. Vary the activities and alter the impact to avoid injury to the muscles and joints NB: People with low fitness may follow Department of Health activity guidelines (see Table 1.3)
Intensity How hard should we be working?	55–90 per cent of MHR A range of 70–85 per cent MHR is sufficient for most individuals to improve cardiovascular fitness when combined with appropriate frequency and duration Lower levels of intensity are more appropriate for the less active. However, duration may need to be increased
Time/Duration How long should we sustain these activities for?	Training from between 20–60 minutes of continuous or intermittent activity e.g. accumulating 10-minute bouts throughout the day (see Department of Health guidelines in Table 1.3) Minimum duration to improve cardiovascular fitness in apparently healthy adults is 20–30 minutes. All durations exclude necessary time for warm up and cool down Less fit groups will need to progress gradually to increased durations
Type/Mode/Specificity What types of activities are most effective?	Rhythmical, continuous activities that use large muscle groups e.g. walking, swimming, running, cycling, dancing, rowing, stepping

Adapted using ACSM Guidelines (2005)

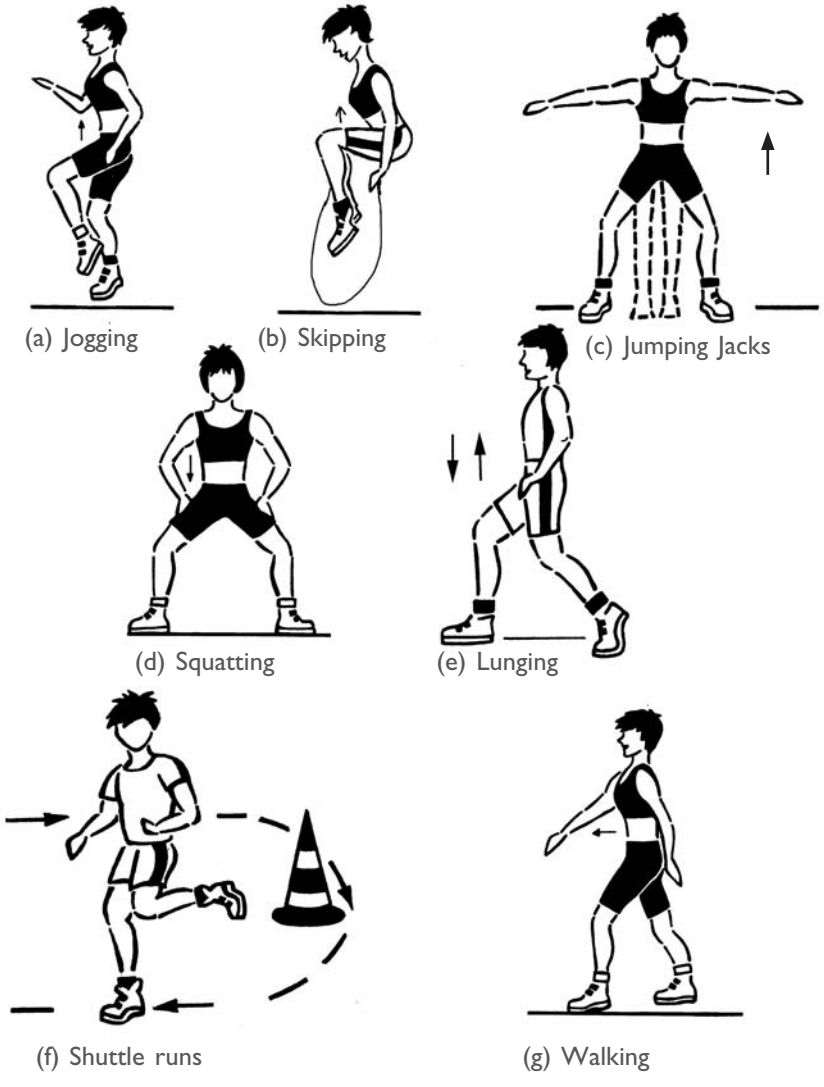

Figure 1.1 Movements of the centre of gravity during jumping, bending and travelling. Jogging, skipping or jumping movements lift the weight of the body and the centre of gravity upwards through a larger range of motion; squatting, lunging and other bending movements require the body weight and centre of gravity to be shifted downwards and then upwards against the force of gravity; travelling movements involve the work of more muscles and increase the range of motion through which the centre of gravity travels.

joints. They should therefore be combined with other lower-impact activities to avoid causing injury. Lower-impact activities that elevate the centre of gravity upwards include exercises using a step or bench.

Other lower-impact moves include deep bending exercises such as squats and lunges. These utilise the larger muscles of the legs to bend and straighten the knee and hip joints, and transfer the weight of our body against the force of gravity. It is worth noting that excessive repetition of either stepping or deep bending movements can be equally stressful for the body if they are not alternated with other activities. Travelling movements shift the resistance of our body across the force of gravity. They require greater muscular effort and the recruitment of a larger number of muscles. Travelling movements which require us to move in many different directions are excellent for varying the stress placed on the weight-bearing joints, provided the direction and type of movements are varied. Movements of the upper body are comparatively less effective because the muscles in this region are smaller and make a relatively insignificant demand for oxygen. Arm movements above the head will elevate the heart rate because the heart has to work harder to pump blood upwards against gravity, though this may have an adverse affect on blood pressure.

Ultimately, a variety of movements for the larger leg muscles are safer and more effective. A variety of cardiovascular exercises are illustrated and explained in Chapter 9.

Individuals who are less fit can work towards developing their cardiovascular fitness by following the Department of Health (2005) recommendations for physical activity to maintain general health. These targets are outlined in Table 1.3. NB: These recommendations were established by the Department of Health (1996) and have been reiterated throughout all subsequent white papers produced by the Department of Health (2004 and 2005).

WHAT IS MUSCULAR STRENGTH AND ENDURANCE (MSE)?

Muscular strength is the ability of our muscles to exert a near maximal force to lift a resistance. This is traditionally achieved by performing exercises that require us to lift heavy resistances for a short period of time (high resistance and low repetitions).

Muscular endurance requires a less maximal force to be exerted, but for the muscle contraction to be maintained for a longer duration. This requires a lighter resistance to be lifted for an extended period of time (low resistance and high repetitions).

The long-term benefits of muscular and endurance training:

- Increased bone density (more calcium laid down)
- Decreased risk of osteoporosis
- Improved posture and alignment
- Improved performance of sporting and recreational activities
- Efficient performance of daily tasks
- Improved body shape and tone
- Improved self-image
- Improved self-confidence
- Stronger muscles, ligaments and tendons which are more supportive to movement

WHY DO WE NEED MUSCULAR STRENGTH AND ENDURANCE?

Our muscles need to have strength and endurance for a number of reasons.

Our muscles work in pairs. If one of the pair is contracted or worked too frequently and becomes too strong, and the other is not worked sufficiently or is allowed to become weaker, then our joints will be pulled out of the correct alignment. This may cause injury or create postural defects such as rounded shoulders or excessive curvature of the spine. These defects are illustrated in Figure 1.2 on page 20.

Our muscles should therefore be kept sufficiently strong to maintain a correct posture. However, it may be that we have to specifically target certain muscles to compensate for the imbalances caused by our work and daily activities. For the majority of people with a sedentary lifestyle, it is worthwhile strengthening the abdominal muscles, the muscles between the shoulder blades (trapezius and rhomboids), and possibly the muscles of the back (erector spinae).

Table 1.3	Targets for physical activity
Frequency	Work towards building activity into daily routine on five days of the week (minimum)
Intensity	Work at a moderate level where you feel mildly breathless, warm but comfortable (Level 3–4 on the adapted RPE intensity scale)
Time	Work towards performing the chosen activities for a total of **30 minutes**. This can be broken down and accumulated, for example: **3 x 10-minute** slots of activity each day **2 x 15-minute** slots of activity each day
Type	Any activity that fits well into your daily lifestyle! For example: • Walking to the station • Walking the kids to school • Vigorous housework • Cleaning the car • Walking up and down stairs more frequently • Dancing to a piece of music at home • Active hobbies • Structured exercise and sporting activities • A combination of activity, exercise and sport
	This recommendation can be tailored specifically to the lifestyle, preference and needs of the individual and is particularly relevant for people who find it easier and more acceptable to increase physical activity by incorporating it into their everyday life.

From *Fitness Professionals – GP Referral Schemes*. Lawrence and Barnett (A&C Black: 2006)

Table 1.4 Recommended guidelines for training muscular strength and endurance	
Frequency How often should we perform these activities?	Two to three times per week (same muscle groups) for muscular fitness Alternate rest and training days (not consecutive days)
Intensity How hard should we be working?	To the point of near fatigue, while maintaining good technique For strength gains, lifting a weight equivalent to 75 per cent or above of one repetition maximum (most that can be lifted for one repetition) For endurance, lifting below 75 per cent of one repetition maximum
Time/Duration How long should we sustain these activities for?	For strength gains, lower repetitions with heavier resistance (up to eight repetitions) For endurance, higher repetitions with lower resistance (above 12 repetitions) For muscular fitness, work with a moderate resistance that can be lifted (8–12 repetitions) One set of 10–15 (moderate intensity) is recommended for older adults Training time will vary depending on the level of fitness, number of exercises, muscle groups and fitness goals
Type/Mode/Specificity What type of activities are most effective?	8–10 exercises targeting the main muscle groups Choose activities that are comfortable throughout the range of movement: • Free weights • Resistance machines • Body weight exercises • Body bars • Exercise bands

HOW CAN WE IMPROVE OUR MUSCULAR STRENGTH AND ENDURANCE?

Isolated exercises that focus on specific muscles/muscle groups are most effective. Weight training is a typical training mode, although callisthenic exercises, such as press-ups, sit-ups and squats, that require us to lift our body weight against gravity and manipulate the length of the body's leverage, can be equally effective. These activities need to be performed approximately two to three times a week for sufficient improvement to be made. The resistance lifted should promote a fatigued feeling in the muscle after anything between seven and 25 repetitions. The gains achieved by an individual will be determined by the number of repetitions they are able to perform. The recommended training requirements for improving muscular strength and muscular endurance are outlined in Table 1.4. A variety of MSE exercises are illustrated and explained in Chapter 10.

WHAT IS FLEXIBILITY?

Flexibility is the ability of our joints and muscles to move through their full potential range of motion. It is sometimes referred to as suppleness or mobility.

WHY DO WE NEED FLEXIBILITY?

The ability of the joints and muscles to move through their full potential range of motion is essential for a number of reasons.

It should be recognised that if we participate in sporting activities we may require a little extra flexibility work for specific muscles. A needs analysis and flexibility focus for specific sports is outlined in Chapter 16. However, for everyday purposes we should ensure that we are flexible enough to meet the demands placed on our body.

The long-term benefits of flexibility training

- Improved range of motion in the joints and muscles
- Improved posture and joint alignment giving the body a more slimline poise
- More economical movements and reduced unnecessary energy expenditure
- Enhanced performance of sporting and everyday activities
- Reduced tension in the muscles
- Reduced risk of injury when performing movements that require us to move quickly into extended positions, such as bending down, reaching up and away, and twisting around.

HOW CAN WE IMPROVE OUR FLEXIBILITY?

Flexibility can be maintained or improved (developed) by the frequent (daily) performance of activities which require our muscles and joints to move through their full range of motion. Since most lifestyles do not naturally provide these opportunities, stretching activities are incorporated into most fitness programmes. Stretching activities are those which require:

- the two ends of the muscle, the origin and insertion, to move further apart in a controlled manner
- the muscle to lengthen and relax.

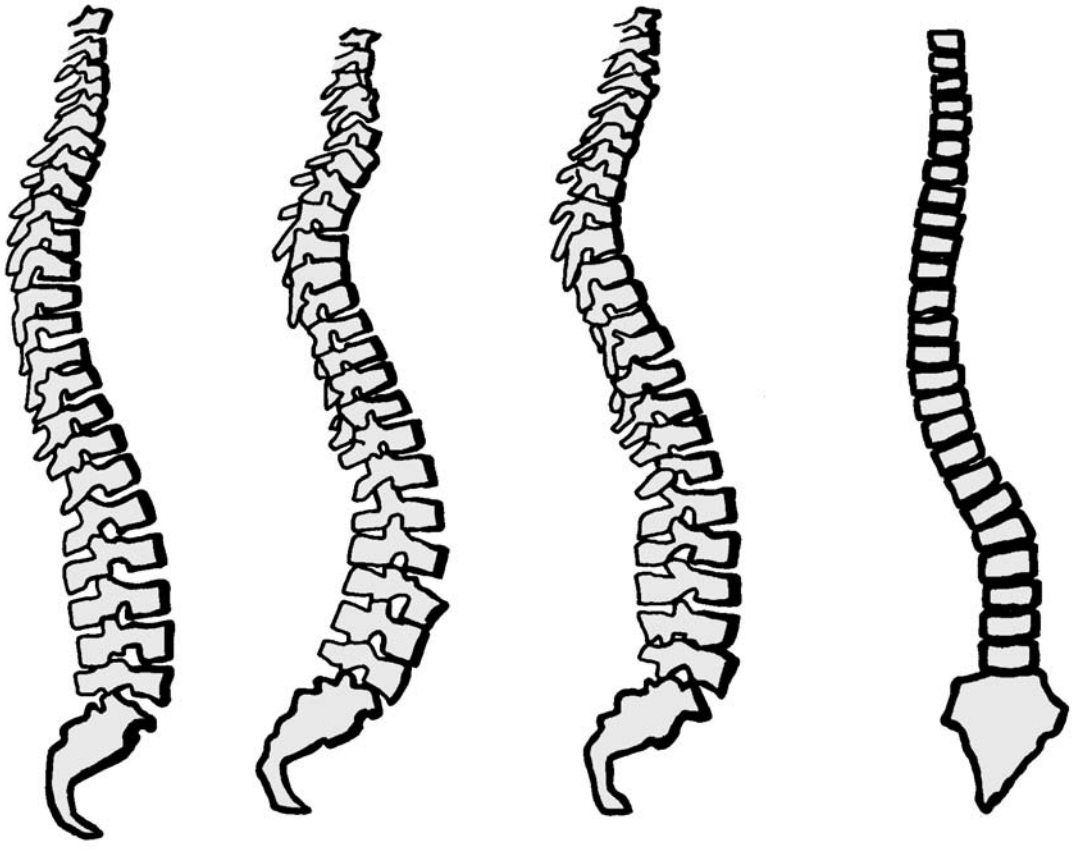

Figure 1.2 Curvature of the spine

Important

Lordosis can be exaggerated during pregnancy when the abdominal muscles weaken and the weight of the baby can create a forward tilt of the pelvis.

Kyphosis can be caused by slumping over a desk all day, and also possibly by driving. The pectoral muscles become shorter and tighter and the trapezius and rhomboid muscles lengthen and weaken.

Scoliosis can be exaggerated by continuously carrying a bag of shopping using the same side of the body. The muscles on one side of the body would be stronger than those on the opposite side of the body.

Static stretch positions are generally advocated as safer. These require comfortable, supportive positions to be adopted and held for an appropriate duration. They enable the tension initially felt in the muscle (the stretch reflex) to dissipate (desensitisation) and allow the muscle to relax.

Ballistic stretches, or those which move too quickly or too far into the stretch position, may cause us to exceed our range of motion (overstretch), in which case the muscle will not relax. This is the main disadvantage of ballistic, bouncy movements. A further disadvantage is that they may potentially create muscle tearing and damage to the ligaments and other tissues which surround the joint. In the long term this may reduce the stability of the joints and create hypermobility (laxity or looseness of the ligaments around the joints). Dynamic stretches, where the muscle is progressively moved to an extended range of motion, can be inducted for participants with higher levels of body awareness. Dynamic stretching involves controlled movement (not ballistic) that moves the muscle to the end of the range of motion and then back to the starting length/position. A few repetitions of the movement are performed to enable the muscle to lengthen progressively. For example, leg curls/hamstring curls (a knee mobility exercise) could be

Table 1.5 Recommended guidelines for training flexibility

Frequency How often should we perform these activities?	A minimum of two to three times per week; ideally five to seven days a week The body must be warm prior to stretching to prevent muscle tearing and to enhance the range of motion
Intensity How hard should we be working?	Stretch positions should be taken to a point of mild tension, not discomfort, and held for an extended period of time Two to four repetitions can be performed for each stretch using the same or different stretch positions
Time/Duration How long should we sustain these activities for?	Hold static for 15 to 30 seconds
Type/Mode/Specificity What types of activity are most effective?	Static stretches are recommended for the general population

Adapted using ACSM Guidelines (2005)

used as a dynamic lengthening for the quadriceps muscle. The hamstrings contract to raise the heel to the buttocks and the quadriceps (antagonist muscle) lengthens to allow the movement.

The recommended training requirements for improving our flexibility are outlined in Table 1.5. A variety of stretching exercises are illustrated and explained in Chapter 7.

WHEN SHOULD WE STRETCH IN A CIRCUIT TRAINING SESSION?

It is important to stretch the muscles at the end of the warm-up to prepare them for the main workout. Static stretches are appropriate for persons with low motor skills/body awareness. Dynamic stretches are appropriate for persons with higher levels of body awareness. It is also important to stretch the muscles after they have finished working to maintain their range of motion.

To improve flexibility, static developmental stretches must be included at the end of the programme. Developmental stretches involve the muscle being lengthened to the end of the range of motion, where a mild tension is felt (stretch reflex). When the tension in the muscle eases (desensitises), the stretch can then be taken further. At this point, the tension will reoccur in the muscle to prevent over-stretching. The tension should be allowed to ease off, and when it does the stretch can be held for a longer period of time. This process can be repeated a number of times, if desired. Once an appropriate and extended range of motion is achieved, the stretch should be held still for as long as is comfortable.

WHAT IS MOTOR FITNESS?

Motor fitness is a skill-related component of fitness and refers to a number of inter-related factors, including agility, balance, speed, co-ordination, reaction time and power.

WHY DO WE NEED MOTOR FITNESS?

Motor fitness requires the effective transmission and management of messages and responses between the central nervous system (the brain and spinal cord) and the peripheral nervous system (sensory and motor). The peripheral nervous system collects information via the sensory system; the central nervous system receives and processes this information and sends an appropriate response via the motor system, which initiates the appropriate response.

Motor fitness is perhaps more applicable to the sportsperson, but it can have an indirect effect on the improvement of our fitness in the other health-related fitness components. For example, learning to perform movements such as squats with correct posture and alignment will make them more effective and efficient. If we move skilfully and accurately we can improve the effectiveness of the activities we perform. In addition, by learning to perform exercises with the correct technique, we will reduce the risk of injury that can be caused by moving with our body in poor alignment. Therefore, improved motor fitness will maximise both the safety and effectiveness of our performance.

HOW DO WE IMPROVE OUR MOTOR FITNESS?

Managing our body weight, manoeuvring our centre of gravity, coordinating our body movements, moving at different speeds, in different directions and at different intensities, will all contribute to improving our motor fitness in the long term. If we want to improve our motor fitness, we must specifically and repeatedly train the aspect we wish to improve. The use of explosive movements may emphasise the development of power, while shuttle runs may develop speed. In addition, the use of a number or whistle blow to dictate a specific movement to be performed may develop reaction time in addition to other skill-related components.

If we want to perform a quick, coordinated sequence of movements (a golf swing, a dance routine, a discus or javelin throw), then we need to perform the specific movements that make up that sequence. However, we may need to train ourselves to develop the necessary skills, which in these examples are speed, power and accurate co-ordination. Therefore, we should break down the sequence into smaller components and perform each component in isolation and at a slower pace. By progressively linking one component to another, and moving at a quicker pace, we will, in time, develop the necessary skills to perform the whole sequence at the appropriate speed. We will have therefore improved our motor fitness.

However, if we then wish to learn to walk the tightrope, we need to develop different skills in a different way. Balance will be a very important skill for this activity. But performing our coordinated sequence of movements will not assist our balance on the tightrope. Training to improve our motor fitness must therefore specifically relate to the activities we need or want to perform. However, we must ensure that we are not put off if we cannot initially do something. In time, we can all learn the necessary skills to perform any activity. The key is to break down the skill and allow ourselves the time to develop it slowly. A good teacher will break down the skill for us, and encourage us as we practise and develop.

If the development of motor fitness is a specific intention of the workout, the requirements and needs of the participants should be analysed. Chapters 9 and 16 are devoted to discussing, illustrating and outlining a needs analysis with example plans for different sporting activities.

SUMMARY OF THE BENEFITS OF PHYSICAL FITNESS

Regular performance of each of the activities described will significantly improve physical fitness and bring about the improvements specified throughout. By improving our physical fitness we are making endless contributions to enhancing our quality of life and improving our overall health.

FACTORS AFFECTING PHYSICAL FITNESS

A number of factors will affect and contribute to an individual's physical fitness, and sometimes fitness potential. Sports coaches and teachers need to be aware of these and recognise how they will affect an individual's participation in a circuit training session. Sports coaches also need to be able to adapt exercises and make recommendations to their clients regarding some of these factors.

HEREDITY

The genetic make-up of an individual will to some extent determine how his or her body responds to a programme of activities: 75 per cent of our potential is inherited, while 25 per cent is changeable. It could therefore be assumed that if an individual's birth parents were athletic, they too would share those genes, and thus have greater potential to develop their athletic ability.

BODY TYPE

A further consideration is the individual's body type. This is closely linked to heredity and is determined genetically. Their 'morphic' type will also influence their physical capability. The characteristics of the three main body types are illustrated in Figure 1.3.

Ectomorphs tend to be leaner, with a lower proportion of body fat and muscle. They also have narrower shoulders and hips and tend to appear taller. They will generally favour long-distance running events. Their low muscle mass and longer levers will affect their ability to lift heavier weights.

Endomorphs tend to have a more rounded appearance. They have a higher proportion of body fat, which tends to be stored around the middle of the body (around the abdomen for men, and around the hips for women). The extra weight will mean that they find long-distance events tough. In addition, running events and impact exercises will be more stressful to their joints, which are already carrying more weight. The higher proportion of body fat will mean that they float with more ease. They may therefore find water-based activities easier than either an ectomorph or mesomorph would. This is because body fat assists floatation and maintains a comfortable body temperature.

Mesomorphs tend to have a more athletic appearance. They have broader shoulders, narrower hips and a higher proportion of muscle mass. This body type lends itself to strength training and bodybuilding.

AGE

Our potential to improve fitness declines with age. However, the speed of decline can be reduced through regular exercise and activity. Specific considerations need to be made when working with older adults (Chapter 14), and also younger children and teenagers, because specific changes occur to the body's anatomy and physiology throughout the life span.

LIFESTYLE

The lifestyle of an individual will also affect their fitness. The fitness and health of a person with a sedentary occupation and lifestyle will be greatly diminished, while a person who engages in sporting activities or a person who has a more active lifestyle (housework, DIY, gardening) and regularly undertakes activities that require a moderate degree of physical effort will maintain a reasonable level of fitness.

HEALTH

A person's state of health will affect their fitness and their participation in physical activities. Injuries, hypertension, asthma and diabetes are but a few of the conditions that need to be identified. Coaches and teachers should undertake a thorough health screening of all individuals prior to their participation in a circuit training programme. Participants will then need to be either referred to their GP or have their needs accommodated within the programme. Further

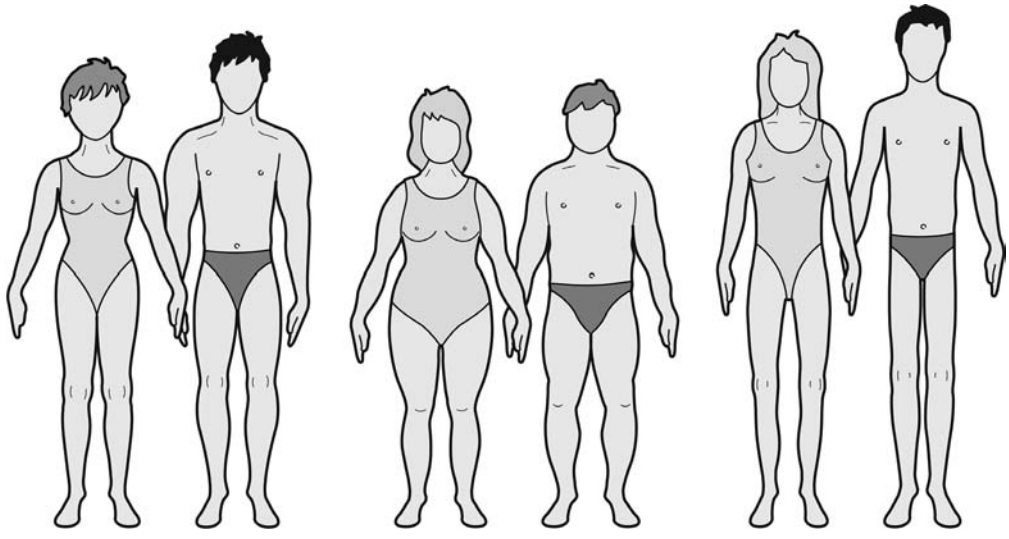

Figure 1.3 Different body types: mesomorph (left), endomorph (centre), ectomorph (right)

information on health screening is provided in Chapter 3. Those who wish to know more about specific medical conditions are advised to refer to a family health encyclopaedia or visit their GP. Information regarding working with clients referred to exercise by their GP is provided in *Fitness Professionals – GP Referral Schemes*. Lawrence and Barnett (A&C Black: 2006).

INDIVIDUALS' GOALS

This is not so much a factor affecting fitness as a further consideration for circuit training teachers. Some information regarding what the client(s) want to achieve will influence the design, structure and choice of exercises selected for performance within the circuit. For example, a person who is attending to improve their general health and fitness will have different wants and needs than a sports person or an older adult. Guidelines for working with different needs are provided in Part Four.

WHAT IS TOTAL FITNESS?

Total fitness requires us to be socially, mentally, emotionally, nutritionally and medically fit, as well as physically fit. It demands that we pay attention to our lifestyle, our diet, our stress levels, our emotions, our ability to communicate, our need to relax and recuperate, as well as our physical fitness. Circuit training is one of many effective modes of improving the components of total fitness.

WHAT IS SOCIAL FITNESS AND HOW CAN IT BE IMPROVED?

Social fitness involves interaction and communication with people. Circuit training is a group activity and often involves some partner work, team activities and other group activities, which lighten the atmosphere, encourage interaction and potentially enhance social fitness.

WHAT IS MENTAL AND EMOTIONAL FITNESS, AND HOW CAN IT BE IMPROVED?

Mental and emotional fitness refers to our psychological wellbeing. The pressures of daily life can have a negative effect on our mental and emotional fitness, causing us to feel tired, anxious and stressed. Stress is a contributory factor to coronary heart disease. It therefore needs to be managed and any negative effects reduced.

There are a number of reasons why regular circuit training can help with stress management. Firstly, the physical exertion necessary to perform exercises provides us with an excellent way of releasing the pressure and tension that builds up. Secondly, when we take part in aerobic exercise, we increase the circulation of endorphins, a hormone which gives us an enhanced feeling of wellbeing. This feeling can last for much longer than the duration of the actual exercise session. Thirdly, the socialisation process can affirm our self-worth and sense of belonging. Finally, the long-term improvements to our body shape and physical appearance can enhance self-esteem, self-image and self-confidence.

The stretching exercises at the end of the session can also have a relaxing effect on the mind and body. As the body slows down, the mind can also be encouraged to slow down, providing a great relief from the ever-increasing pace of daily living.

WHAT IS NUTRITIONAL FITNESS AND HOW CAN WE IMPROVE IT?

Nutritional fitness requires us to eat a balanced diet that sustains our energy levels and promotes improved health. It is therefore essential that we eat a balanced diet from the main food groups:

- carbohydrates (pasta, potatoes, bread)
- fats (cheese, milk, butter)
- proteins (beans, pulses, meat)
- vitamins and minerals (vegetables and fruit)
- water.

We should also ensure that the quantity of food we consume is appropriate to meet our requirements.

Some general guidelines for improving our diet include:

- eat less saturated fat
- eat less sugar
- eat less salt
- eat more complex carbohydrates*
- eat more fruit and vegetables ('five a day')
- eat sufficient fibre
- maintain a sufficient calorie intake
- drink more water.

*i.e. bread, rice, pasta etc., which are slower to digest, serve as a more effective energy source and assist with regulating blood sugar levels. The 'eat well plate' provides guidance on healthy eating (Department of Health).

WHAT IS MEDICAL FITNESS AND HOW CAN WE IMPROVE IT?

Medical fitness is our state of health and requires the body to be in an optimal working order. Most recent government white papers report on the declining health of the nation and the role that exercise and activity can play in managing and preventing some conditions, such as osteoporosis, stress and depression, high blood cholesterol, high blood pressure, obesity, coronary heart disease and so on.

Regular exercise, activity and improved fitness can encourage us to eat more healthily, maintain a healthy body composition and manage stress more effectively. It can also build social networks and relationships, which in turn may encourage us to cut down or remove habits that have an adverse affect on our health, such as smoking, drinking excessive alcohol or eating too much of the less nutritious foods, all of which contribute to increasing health risk.

A well-structured and effectively taught circuit training programme has the potential to bring about all the necessary improvements in physical and total fitness. Later chapters in this book discuss how to structure the session to maximise these benefits for the variety of individuals who might attend.

WHAT IS SPIRITUAL FITNESS AND HOW CAN WE IMPROVE IT?

Spiritual fitness reflects our view and vision of the world (inner and outer), which can be influenced by belief systems, attitudes and values passed down through generations within families, schools, societies, cultures and religions.

From a spiritual perspective, each of us is a unique individual with our own life journey and our own life lessons. We each make choices to follow a different life path and we each have the potential to choose how we respond and grow from life's challenges, whether they be:

- medical (our health)
- physical (our fitness and appearance)
- nutritional (eating behaviour and diet)
- social (our relationships, our habits, the prejudices we may experience or hold)
- mental (whether our outlook is positive or negative)
- emotional – how we respond to life events which all contribute to the person we become.

Spiritual growth is a lifelong journey! It is about awareness, mindfulness, responsiveness and wholeness. Yoga and tai chi are specific methods of exercise which emphasise a more spiritual connection. They aim to unite the mind, body and spirit by focusing attention on breathing, performance of specific movements and postures, awareness of the flow of energy and the personal experience the individual has within the session. However, other forms of exercise are equally accessible and can offer an equally valid method for focusing this awareness back to the self and the body and away from external triggers which can create disharmony and imbalance in all the areas listed above. For some a quiet walk in the park provides them with this access; for others a more active circuit session offers that focus.

Summary of the benefits of circuit training

Circuit training will potentially:

- Improve all components of physical fitness
- Assist improvement of skill-related components of fitness essential for participation in sport
- Assist with weight management
- Promote social interaction
- Encourage a healthier lifestyle
- Assist with stress management
- Improve self-esteem and confidence in physical appearance
- Enhance feelings of wellbeing
- Improve overall health.

2

PART **TWO**

PLANNING AND TEACHING A CIRCUIT TRAINING PROGRAMME

Circuit training involves far more than linking together a sequence of exercises and shouting directions at a group of people. It requires an awareness of:

- the necessary teaching skills and qualities to deliver a safe and effective session
- the health and safety considerations that need to be thought through in the planning stage, prior to delivering the circuit
- individual abilities and needs and knowledge of how to accommodate these throughout the session (see also Part Four)
- how to progress and adapt specific exercises (see also Part Three)
- how to vary the programme to maintain creativity and participant interest.

This section of the book explores each of these aspects in the following chapters.