



OPTION 4

IMPROVING PERFORMANCE



SAMPLE PAGES



CHAPTER 1

HOW DO ATHLETES TRAIN FOR IMPROVED PERFORMANCE?

To improve athletic performance it is vital that training programs are appropriate and specific to the athlete, whether they be individual or part of team sports. The exceptional achievement of today's athletes is a result of an integration of many factors, such as genetics, training, physiology, psychology, biomechanics and skills. Some of these factors cannot be manipulated, but it is important to understand which can be and how manipulation can improve an athlete's performance.

Athletic results can indicate the performance of an individual or team; so when planning for improvement it is essential to monitor and measure adaptation indicators from specific programs to analyse improvements.

In constructing performance evaluations it is important to make sure that they measure the factors required to be tested. Tests should be:

- specific—designed to assess an athlete's fitness for the activity in question
- valid—test what they propose to test
- reliable—produce a consistent result irrespective of the tester.

This chapter will focus on extending and applying the information presented in Core 2: Factors affecting performance.



STRENGTH
TRAINING
EXERCISES
FOR SPECIFIC
MUSCLE
GROUPS

- **strength training**
- **analyse TWO of the training types by drawing on current and reliable sources of information to:**
 - examine the types of training methods and how they best suit specific performance requirements
 - design a training program
 - describe how training adaptations can be measured and monitored
 - identify safe and potentially harmful training procedures

The basic principles of **strength training** consist of an overload manipulation of the number of repetitions, tempo, sets, force applied and exercise types. The manipulation and control of the routines are important in order to achieve effective improvement in endurance, strength and size (hypertrophy), or shape of the muscles.

The combinations of repetitions, exercises, sets, force, and resistance depends on the goals of the athlete performing the strength training and the specific activity. Strength training can be either isotonic or isometric.

Strength phases for a x-country skier											
May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr
Preparation period						Competition			Transition		
Basic strength	Max strength	Convert to muscular endurance	Max strength	Convert to muscular endurance	Maintain muscular endurance				Active recovery/ basic strength		

FIGURE 1.1 Outline of a strength training program for a cross-country skier

SOURCE: WWW.SPORT-FITNESS-ADVISOR.COM

The classifications of strength are:

- maximum (absolute) strength—the greatest force that is possible in a single maximum contraction
- elastic strength (power)—the ability to overcome a resistance with a fast contraction
- strength endurance—the ability to express force many times over.

– resistance training, eg elastic, hydraulic

The goal of resistance training is to gradually and progressively overload the muscles so that they get stronger. Regular resistance training will not only strengthen muscles, but also strengthens bones.

Resistance training can be achieved through the use of hydraulic or elastic resistance. Elastic resistance (resistance bands) gives the greatest resistance towards the end of the movement; while hydraulic resistance gives a fixed amount of resistance throughout the entire exercise depending on the speed of the movement.

Resistance bands

Elastic resistance bands are inexpensive and convenient because they can be used in limited spaces. They are extremely adaptable and a large number of resistance band exercises can be developed with very little additional equipment. Smaller muscle groups that are hard to train with more traditional free-weight exercises can be targeted with resistance bands. This makes it particularly appealing to athletic conditioning.

Sports-specific conditioning involves training movements rather than individual muscle groups. The versatility of resistance band exercises allows the athlete to mirror very closely the movement patterns in sport with varying degrees of resistance.

Resistance bands are available in a range of colours that relate to their stiffness or resistance. Colour-coding varies between the brands but it typically as follows:

- **Yellow** (thin)
- **Red** (medium)
- **Green** (heavy)
- **Blue** (extra heavy)
- **Black** (special heavy)
- **Silver** (super heavy)



- VIDEOS
- 1 BICEP
- 2 SQUAT
- 3 CHOP
- 4 TRICEP
- 5 CHEST



ACTIVITY 1

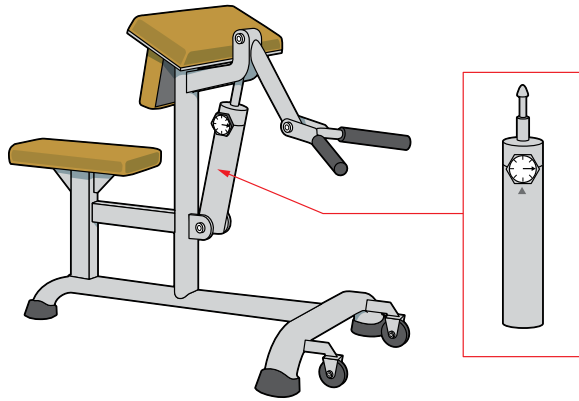
TABLE 1.1 Resistance training regimes

PURPOSE	LOAD	% OF RM	REPS	SETS	SPEED	REST
Strength endurance	Light/medium	40–60	12–30	15+	Fast	Minimal
Body mass	Medium/heavy	70–90	6–12	3–10	Slow	2–4 min
Strength	Heavy/very heavy	90–100	1–5	3–5	Slow/medium	30 sec–2 min
Power	Medium/heavy	80–90	2–6	3–5	Fast	30 sec–2 min

SAMPLE PAGES

FIGURE 1.2 ►

Hydraulic resistance—bicep curls (hydraulic cylinder and pressure indicator)



Examples of resistance band exercises

- Bicep curl
- Squat
- Diagonal woodchop
- Tricep extension
- Chest press

Hydraulic resistance

Using **hydraulic resistance** equipment (isokinetic machines) makes it possible for an athlete to perform strength training and cardiovascular training at the same time. Hydraulic resistance can involve exercising in water, where each effort is opposed by the density of the water; or utilising cylinders or equipment where resistance is a function of speed, that is, the faster the movement, the greater the resistance.

Unlike stack weights, gravity neither helps nor hinders the workout. Each effort is performed against a specific opposing force, pushing forward with one group of muscles and pulling back with the opposing muscle group.

– weight training, eg plates, dumbbells



ACTIVITY 2

Weight training is a form of isotonic resistance training involving a manipulation of the number of repetitions (reps), sets, tempo, exercise types and weight used to help increase desired strength, endurance, size and shape. The duration of the resting period and the weight used determines the specific energy system that is utilised by the body. The types of equipment used in weight training include barbells, free weights, dumbbells, pulleys and stacks in the form of weight machines, and the body's own weight in the case of chin-ups and push-ups.

Weight training can be one of the safest forms of exercise, especially when the movements are slow, controlled and carefully defined. However, as with any form of exercise, improper execution in the use of weights can result in injury.

When the exercise becomes difficult towards the end of a set, an individual may find a temptation to cheat, that is, use poor form to recruit other muscle groups to assist the effort. This may shift the effort to weaker muscles that cannot handle the weight. For example, the squat is used to exercise the largest muscles in the body, the leg and buttock, so they require substantial weight. Beginners are tempted to round their back while performing this exercise, and this causes the weaker lower back muscles to support much of the weight. This poor form can result in serious lower back injuries. To avoid potential injury, weight training exercises must be performed with correct technique.

The use of free weights target a particular muscle group and engage other muscles to assist in the work. Once the muscles are conditioned, the assisting muscles help to increase the weight used in training the target muscles in order to stimulate the most growth in muscle fibres.

This is why weight machines (stack or pin-loaded weights) are usually preferred over free weights because there is often uncertainty about the appropriate range of motion (ROM) and risk of over-extending or under-extending with free weights. Injuries are much more likely to occur when the joints go out of the body's preferred range of motion, and weight machines help to ensure that this doesn't happen.

FIGURE 1.3 ▼

Stack/pin-loaded weight machine



Weight training systems

- *Simple sets*: For example, 3×8 with 70%: Three sets of eight repetitions with a weight of 70% of maximum for 1 repetition. All novice lifters should work on this set because the high number of repetitions enables the lifter to learn correct technique and thereby reduce the risk of injury using this system.
- *Pyramid system*: The load here is increased and the repetitions are reduced. For example: $100 \text{ kg} \times 10$, $120 \text{ kg} \times 5$, $130 \text{ kg} \times 4$, $140 \text{ kg} \times 3$, $150 \text{ kg} \times 2$, $160 \text{ kg} \times 1$. Pyramid lifting is only for experienced lifters who have an established good technique.
- *Super setting*: This consists of performing 2 or 3 exercises continuously without rest in between sets, until all exercises have been performed. The normal 'between sets' rest is taken before the next circuit of exercises is commenced.
- *Blitz program*: This program involves training only **1 body part per session**. This session would consist of high intensity and high volume workloads. The body part would then be allowed to rest for up to 6 days before being trained again. When using this technique, divide the body into legs, arms, shoulders, chest, back and trunk.

SOURCE: WWW.BRIANMAC.CO.UK/WEIGHT.HTM

Weight training versus resistance training

As mentioned earlier, resistance training involves the application of elastic or hydraulic resistance to muscle contraction rather than gravity. Weight training provides the majority of the resistance at the beginning, initiating joint angle of the movement, when the muscle must overcome the inertia of the weight's mass. After this point the overall resistance alters depending on the angle of the joint.

In comparison, hydraulic resistance provides a fixed amount of resistance throughout the range of motion, depending on the speed of the movement. Elastic resistance provides the greatest resistance at the end of the motion, when the elastic element is stretched to the greatest extent.

– isometric training

The primary objective of isometric training is to increase strength in selected muscle groups, and can be used in addition to basic training. Isometric training involves the static contraction of muscles, and is the maximum tension of the muscles without changing their length while providing no movements in the joints. There will be an increase in the use of force by more motor units in the exercise and increase muscle tension.

Isometric training has many advantages, including:

- the ability to focus
- efficient use of time and energy
- the simplicity of required equipment
- the ability of applying it at home (no gym equipment necessary)
- the rapid increase in muscle mass and strength.

Isometric training, however, is not sufficient on its own and needs to be combined with isotonic training.



▲ FIGURE 1.4
Flye exercise using
free weights
(dumbbells)

The best strength development can be achieved when an isometric contraction is held for 5–10 seconds. Some exercises are even held for 3 minutes or longer. For short contractions it's recommended to do 15 sets of different exercises and hold each exercise for 5–10 seconds, resting 1–3 minutes between sets and exercises. It is not recommended to do isometric strength training more than 3 times per week.

Weight training versus isometric training

Isometric exercise provides a fixed amount of resistance based on the force output of the muscle. This strengthens the muscle at the specific joint angle at which the isometric exercise occurs, with some lesser gains in strength also occurring at proximal joint angles.

In comparison, weight training strengthens the muscle throughout the range of motion the joint is trained in, causing an increase in physical strength from the initiating through to terminating joint angle.

■ aerobic training

Aerobic training is often performed on equipment such as a treadmill, stair master, stationary bicycle and elliptical machine. However, there are various other means to maintain a weekly training program, including jogging, swimming, brisk walking and playing a range of sports.

– continuous/uniform

Continuous training (aerobic endurance training)

involves sustained, low-intensity exercise at a steady rate. It places stress on the aerobic energy system and develops the endurance of the cardiovascular and respiratory systems rather than speed. Some examples of this form of training are jogging, cycling and swimming.

The sub-divisions of exercise intensity given in Table 1.2 have slightly different effects upon the energy pathways.

TABLE 1.2 ▼
Exercise intensity for aerobic endurance training

INTENSITY	ENERGY SYSTEM	EFFECTS	DURATION	EVENT
50–60% of maximum heart rate or 20 to 36% of VO_2 Max Very easy pace	aerobic	metabolises fat	60 minutes plus	joggers and ultra-distance runners
60–70% of maximum heart rate or 36 to 52% of VO_2 Max Slightly faster pace	aerobic	burns glycogen and fat; improves cardiovascular system—capillarisation	45–90 minutes	marathon runners
70–80% of maximum heart rate or 52 to 68% of VO_2 Max 10 km pace	aerobic	improves cardiovascular system—capillarisation—glycogen burning	30–45 minutes	10 km and marathon runners
80–90% of maximum heart rate or 68 to 83% of VO_2 Max 5 km pace	lactic/aerobic	improves cardiovascular system—capillarisation—glycogen burning—lactate tolerance and removal	15–20 minutes	5 km to marathon
90–100% of maximum heart rate or 83 to 99% of VO_2 Max 800/1500 m pace	anaerobic/lactic	improves glycogen burning—lactate tolerance and removal	1–5 minutes	800 m to 5 km

Plank bridge



Example of an isometric exercise

1. Start by lying face down on the ground. Place elbows and forearms underneath chest.
2. Prop up to form a bridge using toes and forearms.
3. Maintain a flat back and do not allow hips to sag towards the ground.
4. Hold for 10–30 seconds or until the body can no longer maintain a flat bridge. Repeat 2–3 times.

– Fartlek

Fartlek was developed in the 1930s and is a Swedish word meaning ‘speed play’. Fartlek is traditionally an unstructured type of training performed over natural terrain. Used as continuous and interval, Fartlek allows the athlete to run selected distances and speeds varying the intensity, and occasionally running at high intensity levels. This type of training stresses both the aerobic and anaerobic energy pathways.

Long distance runners (anything from 1500 metres to 10 kilometres) would benefit from more structured sessions. For example, running hard for 5 minutes (above race pace), then jog slowly for 1 minute to recover, and repeat that five or six times.

Multisprint sports, which include continual stopping and starting, could benefit from a program such as the following:

- warm-up with a steady jog for 10 minutes
- run hard (three-quarter pace) for 90 seconds
- jog for 60 seconds
- sprint for 15 seconds
- jog for 45 seconds
- run backwards for 30 seconds
- walk for 30 seconds
- run hard for 60 seconds
- repeat 3–4 times
- cool down at a steady pace for 10 minutes.

Fartlek training is valuable in the early pre-season phase of a sport. It’s an ideal session to re-introduce athletes to more demanding endurance work after the off-season. During this time, one or two sessions per week of Fartlek training combined with interval training is recommended.

– long interval

Aerobic interval training is beneficial for rapidly improving aerobic conditioning, and will build endurance faster than long-duration cardio work. Interval training can be performed on almost any cardiovascular machine, such as the treadmill, stair machine, stationary bike, and elliptical trainer. It is also suited to any type of cardiovascular exercise, such as running, cycling or swimming.

Interval training involves relatively long workout periods and shorter rest periods. Workout periods are generally 2–5 minutes long in this type of training. The idea is not to take it easy for that workout time, but to work at a speed that is challenging. Intensity will depend on the distance covered, for example, a 2-minute interval pace is going to be significantly faster than a 5-minute interval pace.

The rest interval for this type of training could be up to 2 minutes. Naturally, the shorter the rest period, the tougher the training will be. Too much rest will allow the body to recover too much, reducing the overall training effect of the exercise.

● anaerobic training (power and speed)

Anaerobic training is shorter than aerobic training in duration (less than two minutes), in which oxygen is not a limiting factor in performance, and requires energy from anaerobic sources (ATP and lactic acid systems). Anaerobic training is all about shorter explosive movements and will help build power and speed.



▲ FIGURE 1.5
Elliptical trainer works both arms and legs during endurance training



SAMPLE
STUDENT
ANSWER

– developing power through resistance/weight training

Power training enables an athlete to apply the greatest amount of their maximal strength in the shortest period of time. The type of power training employed should be sport specific. Olympic lifts, such as power cleans, may be suitable for sports like football and rugby. Some plyometric exercises are suitable for soccer and hockey. Dynamic exercises with medicine balls benefit basketball and volleyball. However, most sports benefit from a combination of anaerobic training types.

$$\text{Power} = \frac{\text{Force} \times \text{Distance}}{\text{Time}}$$

Power can be developed by overloading any of the three variables—force, distance or time—while keeping the other two constant.

The main factors to consider when training for power is determining which aspect of power—either strength or speed—is optimally required and determining when (during competition) this aspect is required.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

FIGURE 1.6 ▼
Resistance belt improves power and speed



Speed is the quickness of movement of a limb, whether this is the legs of a runner or the arm of the shot putter. Speed is an integral part of most sports and

can be expressed as any one of, or combination of, the following: maximum speed, elastic strength (power) and speed endurance.

For many sports acceleration and speed over a short distance, say 10–50 metres, is very important, in particular sports such as rugby league, basketball, baseball, cricket, field hockey and soccer.

Some examples of training methods used in developing power and speed include plyometrics, resistance training, sports loading, over speed training and sprint training. These methods are designed to enhance fast-twitch fibres and improve explosive strength involved in the athlete's chosen sport. It is important that reps are performed fast to develop the fast-twitch fibres essential to improve power and speed; otherwise slow-twitch fibres will be recruited and the desired adaptation will not occur.

Examples of long interval training

Example 1

Distance: 400 m

Pace: 70–75% pace, (approx 75–95s)

Repetitions: 9

Sets: 3 sets of 3 reps

Recovery between reps: 2 mins (walk 100 m slowly)

Recovery between sets: 4 min

Example 2

Start at corner of a soccer pitch

Jog to half way, 80% pace to goal line, sprint across pitch width

Jog to half way, 80% pace to goal line, sprint across pitch width = 1 lap

Repeat 10–12 times

Intensity can be increased by running more intervals or by reducing the length of the rest interval.



EXAMPLE OF
PLYOMETRIC
EXERCISES



ACTIVITY 3

– plyometrics

Many athletes use plyometric exercises to build power and speed, improve coordination and agility and effectively improve sports performance. However, it is important to recognise that these are high-risk exercises, and if they are performed incorrectly these exercises can increase the risk of injury.

Plyometric exercises are specialised training techniques used to develop athletic power—strength and speed. Plyometric training involves high-intensity, explosive muscular contractions that invoke the stretch reflex, which is stretching the muscle before it contracts so that it contracts with greater force. The most common plyometric exercises include hops, jumps and bounding movements. One popular plyometric exercise is jumping off a box and rebounding off the ground and onto another higher box.

The most important aspects of a safe and effective plyometric program is to ensure a safe landing area and develop a safe landing technique. This means that the athlete lands softly on the toes and rolls to their heels. By using the whole foot (and a larger surface area) for landing it helps spread the impact on the joints. The other key to proper landing is to avoid any twisting or sideways motion at the knee.

– short interval

Interval running is an example of **short interval training**, enabling the athlete to improve the workload by combining heavy bouts of fast running with recovery periods of slower jogging. During the heavy fast run, lactic acid is produced and a state of **oxygen debt** is reached. During the interval (recovery), the heart and lungs are still stimulated as they try to pay back the debt by supplying oxygen to help break down the lactates. The stresses put on the body cause an adaptation including:

- capillarisation
- strengthening of the heart muscles
- improved oxygen uptake
- improved buffers to lactates.

All the above lead to improved performance, in particular within the cardiovascular system. This type of method is extremely effective when training for sports that require all-out repeated efforts, such as football, soccer and hockey, as it promotes increased pace and recovery.

Before undertaking interval training, it is important to consider a few simple rules:

- Ensure an adequate warm-up is done.
- Ensure the various elements of the session are suitable for the athlete, such as:
 - the length of the work interval—the longer it is, the better the effect
 - the pace should be comfortable raising the athlete's heart rate to the required percentage of MHR
 - the number of repetitions should reflect the age and condition of the athlete
 - the rest interval should enable the athlete to jog and bring the heart rate down to near 100–110 bpm.
- Variables can be gradually altered as improvements are made to increase intensity.
- Ensure the running surface is suitable and safe.

Circuit training is another common method of interval training, and is an excellent way to improve mobility, strength and endurance. The circuit training format utilises a group of 6–10 strength exercises that are completed one after the other, each separated by a brief timed rest interval. Each exercise is performed for a specified number of repetitions or for a prescribed time before moving on to the next exercise. The total number of circuits performed during a training session may vary from two to six depending on whether the training level is beginner, intermediate, or advanced, whether it is preparation or competition period of training, and the training objective.

Circuit training is an approach to training that can be used to develop several aspects of fitness and circuits can be designed to include many types of activities and equipment that may be specific to a certain activity or sport.



ACTIVITY 4



VARIOUS FLEXIBILITY EXERCISES

● flexibility training

Flexibility training involves maximising the range of motion (ROM) and stability of the muscles by performing a series of exercises. The benefits are improved blood flow in the athlete's muscles and a lower risk of injury when training or competing.

Flexibility requires that the muscles lengthen and is directly related to the number of muscle fibres engaged. The more fibres stretched, the more length will be developed in the muscle. All stretching movements need to be safe, even though the 'stretch reflex' mechanism will try to stop the muscles from over stretching and tearing. There are three main types of stretching exercises that help accomplish these goals: static, dynamic or ballistic and PNF.

– static

Static flexibility is the range of possible movement about a joint and its surrounding muscles during a passive movement. This type of flexibility requires no voluntary muscular activity. Static stretching is moving a limb to the end of its ROM and holding it in the stretched position for 15–60 seconds. Depending on the comfort and fitness level of the athlete the stretch may need to be held for shorter or longer durations.

Static stretches are often combined with dynamic stretches at the beginning of an activity. This will give every major muscle group a gentle pull, hold and relax routine. It will help improve circulation and prepare the muscles in readiness for more vigorous activity, decreasing the chances for tearing or tendon stretching.

Static stretches are usually used in the cool-down phase of an exercise session to decrease the onset of muscular soreness (DOMS), by ridding the body of the lactic acid build up from exercise.

– dynamic

Dynamic flexibility is the opposite of static in that it does require voluntary muscle actions. Dynamic flexibility is about movement and the available ROM during active movements. Dynamic stretches are achieved by performing functional-based exercises, which use sport or traditional movement patterns to help the athlete prepare the body for the movements that will be executed at training or during competition. An example of dynamic stretching is controlled leg and arm swings that take the joints gently to the limits of the athlete's range of motion.

– ballistic

Ballistic stretching uses the momentum of a moving body or a limb in an attempt to force it beyond its normal range of motion through a bouncing motion. Ballistic stretches force the limb into an extended range of motion when the muscle has not relaxed enough to enter it. It involves fast, 'jerky' movements where a double bounce is performed at the end range of movement. Ballistic stretching should only be used by elite athletes with supervision by a trainer.

This form of stretching has been found to be questionable and hazardous towards the body because of the possible damage to the muscle reflex. A major concern is that it can injure vital muscles and nerves by applying sharp jerking movements. It is even possible for tissue to be torn off the bone. It is important not to confuse dynamic stretching with ballistic stretching.

Proprioceptive neuromuscular facilitation (PNF)

PNF is a form of stretching which involves a combination of passive and isometric exercise. It can help to maximise the range of movement to best prepare the athlete's body for the most strenuous exercise of a session.

Several PNF exercises are done with a partner. The muscle group is stretched under tension, then contracted for several seconds. A partner applies resistance to inhibit movement, making the stretch that much more effective. PNF exercises should only be attempted after receiving proper, hands-on training. Performing PNF incorrectly can lead to muscle sprains or joint damage.



● skill training

Skill is an athlete's ability to choose and perform the right techniques at the right time, successfully, regularly, and with a minimum of effort. Athletes use skill to achieve athletic objectives, for example, sprinting a 10 seconds in 100 metres or scoring a penalty goal in football.

As skill is acquired, it has to be learned. There are three broad domains of learning a skill:

- Cognitive skill (knowing)—involves the thought process of knowing and understanding the vital aspects of the sport.
- Perceptual skill (feeling)—where success at the sport depends on mental attitude and developing psychological skills to cope with stress.
- Psychomotor skill (doing)—where excellence in sport requires the execution of precise, fluent and effective movement patterns which require the combination of perceptual and motor skills.

The reason for engaging in games is not to perform a skill or to display physical prowess, but to use the skills developed to play against the structures of the game and the challenges set by an opponent.

– drills practice

Drills are specific activities that replicate the skills used in a sport. The idea is to start with a basic drill or activity and as the athlete begins to gain a certain level of success, the coach adds or loads more components or requirements needed to complete the drill. This is to increase the challenge and thereby the level of development. The use of visual aids and demonstrations are important to show the correct skill technique before it is practised.

Drills can become repetitive and athletes, especially young athletes, can start to lose interest by continually doing drills during practices. In this instance, it is essential to provide continual feedback to the athlete to ensure that the correct technique is practised.

Drills are a vital part of the warm-up session to prepare the muscle movements for training or competition.

– modified and small-sided games

Modified games are practices that focus on different aspects of team play through games. They are often undertaken in a defined space, such as a grid. In football, many variations may be used depending on the objective of the game, for example, 2 v 1, or 2 v 2.

Conditioned games can be used to develop the ability to retain possession (passing sequences), to create or reduce space (3 v 2 etc), or to develop contact or reaction skills. Modified scoring systems, such as target scores or time limits, and modified playing rules, such as one touch or two touches and have to pass, can be used to focus on particular techniques or aspects of decision making.

Modified games apply the skills learned to team situations. Players must make decisions on where and when to move, to combine as an effective unit as in a real game situation. Such games encourage awareness of time and space but also help develop specific characteristics of team play, including supporting play and communication. By not limiting players to particular positions the coach allows each player to develop greater decision-making skills and tactical appreciation for different aspects of play.



Small-sided games are an extension of fun and grid games, but are basically smaller versions of full games. Smaller numbers are used to ensure that there is plenty of ball contact for all athletes. Positions may be used, but it is advisable to allow individual players to play in as many different positions as possible over time. As competition becomes more developed, coaches will prefer to play athletes in certain positions.

– games for specific outcomes, eg decision making, tactical awareness

Tactical awareness applies to individual and team sports. In a game situation, analysing tactics is based on five components of play, and these can be broken into two groups—initial and advanced components. The initial components contain three aspects:

- Space—where an object should be placed in the area of play and where a player should go in the area of play.
- Time—when to execute a skill within a game, when to create time to play the object.
- Force—how much and where to apply force on an object for height, directional control and distance.

The spatial component is the foundation to tactical awareness. Once players have learnt how and why to manipulate the use of ‘space’; then ‘time’ and ‘force’ components become a natural progression to growing tactical awareness. The advanced components add the relationship aspect of tactical play.

Opponents use space, force and time to affect play, to create an unpredictability that keeps the outcome of play uncertain and tests the ability of opponents. This relationship focus is fundamental to making a game play. The advanced components that focus on the relationships between opponents are:

- Self—in relation to what the player is able to do with the initial components, and what should be done to gain a tactical advantage over an opponent.
- Other—in relation to what another player is doing with the initial components, and what should be done to gain a tactical advantage.

For instance, during a game of soccer both teams will be continuously in one of the three phases of play:

1. In possession (offensive play)
2. Not in possession (defensive play)
3. About to gain/lose possession (turn-over).

Small-sided games can promote decision-making and tactical awareness skills associated with each of these phases. The progression from practising the technique through drills, to applying it in a game situation should be a gradual one and promote success and confidence in the player.

Small-sided game

Retaining possession / Support play

1. Mark out a 10 m × 10 m square.
2. This is a drill for four players—3 vs 1—with the aim of keeping the ball from the defender.
3. 5 passes = ‘goal’.
4. Change defender when 5 passes are reached.
5. Vary touches on the ball (one touch, two touch).

Teaches:

- attacking triangle support, that is, don’t stand in line with the defender, but open up angles for passing when supporting player is on the ball
- using the outside of the foot to control the ball and open up angles for passing
- timing the pass well in order to retain possession
- early movement to support the player with the ball and provide options for passing



VIDEO SMALL-SIDED GAME

Activities

Activity 1 (Page 265)

If possible, visit a fitness centre and participate in a beginner training session for one of the following: elastic resistance, hydraulic resistance, weight session (machine or free weights), or isometric session.

Activity 2 (Page 266)


Analyse the potential dangers of weight training and **recommend** preventative measures.

Activity 3 (Page 271)

In small groups, choose a power or speed event and devise three plyometric exercises for a novice athlete. Participate in each exercise, after completing an adequate warm-up.

Activity 4 (Page 272)

Participate in a variety of flexibility tests, **record** and **evaluate** results. Access the 'various flexibility exercises' link below and **design** a flexibility program to improve weaknesses and maintain flexibility.

 www.brianmac.co.uk

Activity 5 (Page 273)

Analyse potentially harmful training procedures when training for improved skill in young athletes, and **recommend** preventative measures.

Activity 6 (Page 273)

There are many factors involved in the preparation of an athlete for optimum performance. Select either a power athlete or an endurance athlete. **Design** a training program for this athlete, justifying the key features that would need to be included.

Review Questions

1. **Compare** the benefits of isotonic, isometric, and isokinetic exercises in the design of resistance training programs.
2. **Compare** resistance training for strength with resistance training for endurance.
3. **Explain** how the results of a test for aerobic capacity can be analysed and used by a coach to plan for endurance training.
4. **Discuss** how athletes could use plyometric training techniques to power and speed.
5. **Outline** the differences between static and dynamic stretching techniques.
6. **Describe** how a coach could evaluate the effectiveness of the skill instruction element of a training session.