

# Chapter 10: Development and maturation

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Most coaches will encounter issues related to growth, development and maturation at some stage during their coaching career. Whether they are working with young children, adolescents, female athletes or masters athletes, coaches should be aware of the implications of growth and development on sporting performance. By being aware of these issues, coaches can individualise their coaching to suit the developmental needs of the athletes in their care.

## Stages of growth and development

All children grow and mature at different rates, which in turn leads to varying rates of skill development. Childhood growth and development can be classified into three main phases — early childhood (0–6 years), late childhood (6–12 years) and adolescence (12+ years).

### Early childhood

The early childhood years are characterised by moderate growth and rapid development of motor skills. As well as enjoying a wide variety of play during this time, children learn to:

- . crawl, walk and run (body locomotion)
- . hold and manipulate objects, throw and kick (object manipulation)
- . balance, roll, twist and turn (body management).

Socially children at this stage are very focused on themselves. They tend to feel their ability matches their effort. They can also be very creative and imaginative, and thrive on opportunities to show their initiative as well as their steadily growing independence. Coaches need to maximise opportunities for gross-motor play that includes a wide variety of activities for all the large muscle groups as well as for both sides of the body.

### Late childhood

From the ages of 6–12 years, growth slows before the child reaches puberty and motor skills are consolidated. By the age of 12 years children are 80–90 per cent proficient in complex skills. This pre-adolescent period of late childhood is often described as the ‘golden years’ of skill development.

It is crucial that during this time children are able to develop fundamental movement skills through play, sport and physical activity.

Limited exposure to movement skills at these ages may not be reversible. Social and peer group pressures can also conspire to prevent motor development in adolescent years.

During these years it is vital that children have many opportunities to develop skills in their chosen sport, and are encouraged to participate in a variety of modified sports and activities. Physiological adaptations such as endurance and anaerobic threshold are not important at this stage and should be left until later in their development. Children who are physically active and enjoying their various activities will naturally improve their endurance capacity over time. The focus in training for the 6–12 years age group should be on teaching the skills well to all participants.

Children's social skills at this stage have improved from the early years and they are now generally happy to comply and participate well in small groups to begin with, moving to larger groups as they get older. They are now also more willing to share and have an increased awareness of rules and fair play.

## **Adolescence**

Around the age of 9–13 years in girls and 11–15 years in boys, children undergo a growth spurt with a rapid increase in size. The timing and duration of this growth spurt varies greatly among individuals and between genders. Females typically begin this phase around two years before their male counterparts. This rapid growth also indicates the transition of a child through puberty to an adolescent. At this time hormones begin to run wild, and size and strength differences become more noticeable, as maturity levels can differ greatly among children.

During this time the focus shifts socially to the peer group and away from family and other adults. Adolescents also now become keenly aware that their effort may not match their ability, and this may increasingly affect their willingness to participate. During this time, competition may not be as important to many athletes, who may have joined in primarily to belong to a group and to have fun. Learning and mastering new skills can be a key motivator at this stage.

Coaches need to offer a balance between cooperation and competition, and be prepared to provide constructive feedback for individuals' contributions, keeping in mind the differing physical and social maturity levels of participants. It is also important during this time to consider matching heights and weights in some sports during training and drills. Social opportunities

should be a primary focus during adolescence. Training should be fun and athletes should be offered some choices in what they do. For athletes who show interest, this can be extended to involvement in developing their program as a whole.

## **Long-term growth considerations versus early specialisation**

How old a child is does not tell the coach a lot about their level of maturity. Consider the range of sizes in any under-14 basketball team — children at this age could be anywhere between 130 and 180 centimetres tall. Some children will have their growth spurt earlier than others of the same age. There could be as much as six years difference in age between the earliest maturing girl and the latest maturing boy. This wide variation poses a real challenge to coaches in junior sport. Throughout life different body parts also grow at different times. In the early part of life, for example, brain development is very rapid, then during adolescence the reproductive system starts to grow and develop more quickly.

As a coach of growing children it is very important to recognise that they are not simply little adults. Physical growth, mental development, hormonal changes, sexual maturation and social understanding vary immensely during the early years of life. Children differ greatly in strength, concentration and coordination, as well as in their body's ability to control their temperature compared to a mature adult.

As a coach it can be tempting to choose an athlete for certain positions based on their size. The short-term gains for the team can be significant, but in the long term the decision can lead to a real loss for the individual athlete. The early maturers are normally more successful at sport in the early years as they tend to be bigger and stronger. Late developers, however, eventually catch up. It is the responsibility of the coach to challenge all athletes to continually develop their skills so that when they have reached maturity they will have the same skill sets as their friends, no matter what their size.

For children, skill development in all areas of a sport or activity is far more important than early specialisation. For example, if coaching Australian football to a group of 13-year-old boys it could be beneficial to the team to play the taller, stronger child in the ruck. However, specialising a 13-year-old as a ruckman will not allow for their development in other areas of the game, such as leading as a forward or learning to rove the packs. In five years time they may be just as tall and as strong as their peers, but lack the necessary skills to enjoy different positions. Treat children as individuals and when looking for improvements, compare to their own previous results, not those of the group.

## **Impact of puberty**

Perhaps the most challenging time in a young person's life occurs during the transformation from the body of a child into that of young adult. This period follows the same growth rules just discussed. Specifically, it is a continuous process, with individuals growing at different times and rates. Until the age of nine, males and females are similar in physical size and mental development; however, from this age, gender differences start to become more obvious.

Both genders go through a growth spurt. In females this is usually from 9–13 years, with males following two years later at 11–15 years. This rapid growth period can create a number of issues for the child. At this time, for example, body proportions change dramatically, and arms and legs grow very quickly. This leads to periods of poor coordination and reduction in strength. In general the skeletal system (bones) grows first, followed by the growth of muscles (strength), and finally the nervous system (coordination) catches up.

During this time males and females begin to develop secondary sex characteristics such as:

- . body hair
- . deeper voice (male)
- . growth of penis, testes and scrotum (male)
- . development of breasts and uterus (female)
- . commencement of menstruation (female).

Around this time gender differences become more noticeable as well. These differences are not limited to physical characteristics such as size, shape and strength, but also include those related to social and psychological wellbeing, such as changes in body image.

## **Puberty in girls**

As girls tend to reach puberty first they often become self-conscious about their new bodies. Girls start to notice that they are different to boys, particularly in the case of early female developers. The body composition of females begins to change with an increase in the percentage of body fat due to hormone changes. This change in body composition often leads to poorer physical performance due to a decreased power-to-weight ratio. These girls may be challenged when participating in activities against gravity, such as running and jumping; however, they may have an advantage in weight-supported sports such as swimming and water polo due to their increased buoyancy. In girls, late maturation can also be an advantage in

sports such as gymnastics and distance running, where low body weight and narrow hips assist movement.

## **Puberty in boys**

Late developing boys, on the other hand, tend to be more self-conscious about their lack of secondary sex characteristics, such as a deeper voice or a larger Adam's apple. Late developing boys will see all the girls change dramatically and their male friends get bigger and stronger while they are still in their childhood body. For some boys this can leave them embarrassed and discouraged, and if not supported through this phase they may drop out of sport altogether. To avoid this it is important to have a stronger focus on the social aspects of sport during this time. Late developers will then be encouraged to stay with their sport while their body matures. In males this phase can be very intense, and there can also be a plateau or drop off in performance due to a mismatch of body size when compared with earlier developing players, before strength catches up. Early developers, on the other hand, can experience significant early success due to their size and strength advantage, but may need to be reassured and encouraged to continue once others begin to catch up and competition again becomes more equal.

### **Case study**

James coaches an under-13 football team. Toby is one of the players he has coached for a number of years, but recently things seem to have changed. Toby has started turning up late to training and games and seems slow to join in once he gets there. When he started watching him more closely, James noticed that Toby was often the odd one out when players paired up for drill practice.

James realises that Toby is a lot smaller than most of his team-mates and has not yet begun to mature. His body will mature when it is ready, but this is little comfort to Toby right now.

To draw him back into the team James considers some different options. As Toby is not as strong as the other members of his team he cannot kick the ball as far or as hard, so needs to continue to practise this to maintain his skill and confidence with the ball, but at the same time, because he is smaller he is quicker and more agile.

James knows that Toby is very good at weaving between cones due to his smaller size, so he invites Toby to demonstrate this skill to the rest of the team before they all practise it. In this case James is hoping to highlight Toby's strengths to the rest of the team. He also speaks

privately to Derek, the team captain, who is a very skilful player. He asks Derek to have Toby as his partner for kicking drills during training sessions so Toby does not feel left out, and at the same time is able to work on his kicking skills along with the rest of the players. The other boys look up to Derek and so his pairing with Toby during skill work draws him back into the group again, making him feel both valued and included.

## **Overuse injuries in young athletes**

Injuries can be classified into two categories: chronic, which are those caused by doing too much, or acute, which are short term and usually the result of an accident. Children can be affected by both forms of injuries; however, this text focuses on overuse injuries.

Overuse injuries are common in both children and adults but may be increased in children during rapid periods of growth. These types of injuries can occur as the result of not following the basic principles of training.

Problems of overuse can arise from:

- . repeating an activity too often
- . increasing the training load too quickly
- . not having enough recovery time between training sessions.

It is very important as a coach to monitor younger athletes for signs of overtraining or overuse injuries, as the longer-term consequences can be far more serious than for adults.

One of the greatest concerns is for injuries to the growth plates. The growth plates are areas at the end of the long bones in the legs and arms of children that have not fully calcified. It is in this area that a bone becomes longer and a child will continue to grow until the growth plates close over. These growth plates can prematurely close through overtraining or training on hard surfaces. The result might be different leg lengths and stunted growth, so full height potential may not be reached.

As discussed previously, during growth a child's body proportions, size and composition can change dramatically and it may take time for muscle strength and coordination to catch up. With a change in body composition and size (for example, increased weight) there may be greater forces placed on the body without any increase in training load prescribed by the coach.

Training loads can be managed during growth periods by:

- . reducing the training load and/or volume

- . reducing the training session length
- . reducing the amount of weight-bearing activity
- . reducing the number of repetitions of an activity
- . conducting an activity on softer surfaces (for example, grass rather than a netball court).

With rapid growth and changes in proportion, sufficient strength may not be available to continue to perform skills. In this case, technique may need to be altered to reduce the load placed on the muscle and joints, or equipment might need to be modified, such as increasing the seat height on a bicycle.

## **Overtraining**

Overtraining is the result of not enough recovery time between sessions. Children and their parents frequently want to do many different sports and activities. In some cases children may swim before school then participate after school in football training, dance classes or basketball practice. Each coach or teacher tries to get the most out of every session they have with their athletes and may forget to take into account the energy that these children may be expending elsewhere. Coaches must try to communicate with both the children and the parents to identify what other activities and commitments the child has, to ensure that they do not become overtrained.

### **Case study**

Sophie is an experienced coach of junior swimmers. The majority of her training program consists of technique development. She has been coaching 14-year-old Ben for nearly five years and is very pleased with his technique. Ben tells Sophie that he is getting a sore shoulder while swimming freestyle and is suffering quite a lot of discomfort during freestyle drills.

Sophie knows that Ben has grown about ten centimetres in the last two months. With her understanding of the process of growth and development in children and that the skeletal system is the first to grow, she knows that the soreness may be a result of the growth in arm length, without any corresponding increase in muscle strength around the shoulder. The longer arms place greater force on the joints without Ben having the necessary strength in the shoulders to propel him through the water.

Sophie talks to Ben about these changes and suggests he alters his freestyle technique by bending his arm a little more during the underwater phase of the stroke, thus reducing the force

placed on the shoulder and easing the discomfort while swimming. Sophie then makes a note to continue to watch Ben's technique and monitor his growth and strength changes over the next few months.

Coaching junior athletes offers many opportunities and challenges. It is essential throughout these sometimes turbulent years to remember to manage every athlete as an individual, each with their own needs and aspirations as well as unique growth patterns and associated skill strengths.

## **Considerations for the female athlete**

Although most principles of training apply to both males and females, the female athlete faces unique challenges, particularly due to the physiological changes associated with the menstrual cycle and other issues relating to reproduction, including pregnancy and menopause.

### **The menstrual cycle**

A normal menstrual cycle involves a series of events occurring over a 28-day period in which the lining of the uterus (the womb) undergoes changes because of hormone levels in the body. This 28-day cycle is often divided into two phases: days 1–14 are called the follicular phase and start with approximately five days of menstrual bleeding, while days 14–28 are called the luteal phase. It is important to remember that cycle length can vary from person to person, and even from one cycle to the next within the same person. A normal cycle can be as short as 21 days or as long as 40 days.

The main hormones that change during the menstrual cycle are called oestrogen and progesterone. The levels of these hormones (and so the phase of the menstrual cycle) may affect certain types of athletic performance. However, it is important to remember that each woman's experience with the menstrual cycle will be different and while exercise performance may be impaired in some females, in others there may be little or no effect.

### ***Volume of blood loss***

One of the key factors that varies greatly between females is the amount of blood lost through menstruation and symptoms associated with this monthly bleeding. Firstly, the volume of blood lost during menstruation is approximately 40 millilitres (or two tablespoons); however, in some females this can exceed 200 millilitres (or more than  $\frac{3}{4}$  of a cup). Regular heavy blood loss may lead to anaemia (low red blood cells) and decreased ability to carry oxygen around in the blood,

which can affect endurance performance. If this is the case, the athlete's iron levels should be closely monitored and attention paid to getting enough iron in the diet.

### ***Physical discomfort***

Some athletes may experience painful abdominal cramps or a slight increase in body weight in the days just before menstruation due to the body's tendency to store extra fluid at this time. Increased body weight may in turn affect performance in sports in which body weight plays an important role, such as those involving weight categories (for example, judo or rowing) or those involving jumping or moving the body weight against gravity (for example, high jump or gymnastics).

### ***Mental state***

For some females their mental state may be affected more than others by the phase of the menstrual cycle. Some women may experience more negative moods in the days just before and during menstruation

### ***Body temperature***

Coaches also need to be aware that body temperature increases by 0.5°C after ovulation (about day 14 of the cycle). This rise in body temperature stays throughout the luteal phase. When the body temperature is higher, it means that the body may not start to sweat until it reaches a higher temperature during exercise, which can place extra strain on the heart and blood vessels. As a result, endurance athletes competing in hot, humid environments may find it beneficial to coordinate the menstrual cycle to avoid important competitions in the luteal phase. On the other hand, there is some research that this same luteal phase may be better for longer (more than 90 minutes) endurance performance because high levels of the hormone called progesterone at this time can help to burn more fat during exercise and save carbohydrate (making carbohydrate stores in the body last longer, which may help performance).

### ***Factors not affected***

Generally, athletic performances involving muscular strength do not seem to be affected by the phases of the menstrual cycle. Similarly, maximal aerobic capacity (the maximum volume of oxygen that can be consumed by the muscles during exercise) does not seem to be better or worse at any time of the cycle. This means that females involved in strength-specific (for

example, weightlifting) or intense aerobic events (for example, middle-distance track events) do not need to be worry about coordinating the menstrual cycle with major competitions.

### ***Using oral contraceptives to regulate the cycle***

To prevent some of the possible negative effects of the menstrual cycle on performance, some athletes might decide to use oral contraceptives to regulate their cycle (that is, to coordinate their cycle with important competitions). Although this can be useful, there is some debate about using oral contraception and its affect on training and performance. One possible negative concern is that some women may experience weight gain.

#### **Case study**

Peter is an experienced coach of a group of endurance runners. In his squad he has both male and female athletes and a range of ability levels. His two best female runners, Olivia and Keira, are highly competitive at state level. He is currently preparing the women for the state marathon and is aware that the phase of menstrual cycle may affect their performance in an endurance race such as this. Olivia experiences heavy menstrual bleeding and abdominal cramps, while Keira does not seem to be affected at all. Based on this, Peter suggests that Olivia visit her doctor (months before the race) to discuss the use of an oral contraceptive pill to help alleviate her severe symptoms, as well as have the option to manage her menstrual cycle to avoid her period falling at the time of the race. In contrast, he and Keira agree that it is not an issue to worry about in preparing for her race, as her menstrual cycle appears to have little impact on her performance.

### ***Effect of training on the menstrual cycle***

As well as considering the effect of the menstrual cycle on athletic performance, it is important to consider the opposite effect of intense training itself on the normal menstrual cycle.

The average age of the onset of menstruation is 11–13 years. However, this age can often be delayed to around 15 years in girls training strenuously from a young age. Other factors that can increase the age of the first menstruation are low body weight and fat levels. If menstruation is delayed beyond 16 years of age, it is called primary amenorrhea.

It is also important to note that some athletes may not have a normal menstrual cycle **because** of their training. This common menstrual disturbance is called secondary amenorrhea. This is when the regular menstrual cycle has started as expected and then stopped and menstruation has been absent for a long period of time. Amenorrhea affects around 20 per cent of female

athletes, but the risk is much higher in endurance runners. Although high training load (overall energy expenditure) is a common cause of amenorrhea in athletes, there are also other possible causes, including abnormal hormone levels or emotional stress. If intense training is identified as a factor causing amenorrhea, normal menstruation can be restored by a reduction in training load (by approximately 10 per cent) and an increase in body fat (around two kilograms in weight).

### **Female athlete triad**

The coach should also be aware that amenorrhea is commonly linked with two other conditions — disordered eating and osteoporosis. Together, these three conditions are called the ‘female athlete triad’ and are often found in females participating in sports where there is pressure to have a thin physique or low levels of body fat (that is, endurance sports, sports using weight categories, sports involving revealing clothing, or scoring based on athletic appearance). This pressure contributes to disordered eating, which includes a broad range between the extremes of anorexia (excessive restriction of food intake) and bulimia (repeated binge eating followed by purging by vomiting or use of laxatives). The prevalence of disordered eating may be as high as 60 per cent in some sports. This is of concern, as disordered eating and low levels of body fat can impair performance, increase the risk of injury, as well as lead to amenorrhea and reduced bone density, possibly causing osteoporosis (increasingly fragile bones) and fractures in later life.

For these reasons, coaches of sports at risk of the female athlete triad should be alert to possible signs such as tiredness related to an inadequate diet or anaemia, poor body self-image, a high heart rate or history of fainting (low blood pressure). Keep in mind that the affected female may not always be abnormally thin. In addition to seeking medical advice, the coach’s role should be to help educate and encourage sensible nutritional intake through open discussion of food habits and weight, as well as to decrease exercise intensity and the frequency of competition as necessary to restore menstruation. Ensuring adequate calcium intake is also important and oral contraceptives may be useful in restoring menstruation and hormone levels to reduce loss of bone density.

### **Pregnancy, training and performance**

Pregnancy is the most stressful physiological event in a healthy woman’s life, with major changes occurring in several body systems and functions, including changes in the heart, blood flow, breathing, metabolism, and regulation of heat, hormones and the musculoskeletal system.

Pregnant women in the past have been discouraged from participating in exercise due to concerns that it may harm the growing baby or increase the risk of early labour. These days, however, it is well known that the benefits of keeping physically active far outweigh any negative risks in healthy pregnancies.

Current recommendations are for all women with healthy pregnancies to continue with aerobic exercise and strength conditioning. The aim generally should be to maintain good fitness without trying to reach peak condition or train for athletic competition. This is because overall fitness levels will decline slightly in most pregnant athletes.

### ***Considerations for pregnant athletes***

- . A 10–15 beats per minute **increase in heart rate** both at rest and during moderate exercise can occur. This will affect heart rate training zones, with less effort required to reach higher heart rates.
- . **Decreased blood pressure** may occur, which can increase the risk of dizziness or fainting. For this reason, athletes must take care when stopping exercise suddenly, or any activities involving rapid changes in position/posture (that is, from upright to lying down).
- . **Decreased joint stability** (due to changing hormone levels), increased body weight (by around 12 kilograms) and a change in the body's centre of gravity (moves forward and up) all mean that care should be taken with weight-bearing exercise (due to increased loading at joints) or sports involving frequent changes in direction, jumping or impact/contact (due to increased risk of injury and possible difficulties with balance).
- . **Temperature regulation** should be given close attention, since high body temperatures (greater than 39°C) have been linked to problems in a baby's development. Athletes should avoid exercise in hot, humid environments, ensure adequate hydration by drinking plenty of fluids, and dress in cool clothing for exercise.
- . Athletes should **avoid exercise** lying on the back after the first trimester of pregnancy, since the enlarged uterus can put pressure on major blood vessels.
- . Athletes should ensure that **food intake** is enough to fuel both the exercise and the growing baby. After week 13 of pregnancy, an extra 1200 kilojoules (equivalent to roughly four slices of white bread) are needed for the growing baby. Low-carbohydrate diets should be avoided, since an increased amount of carbohydrate is burnt for energy during pregnancy. Adequate iron and calcium intake are also important.

### ***Pregnancy and high intensity training***

For women wanting to continue high intensity training, medical supervision is required since there is still debate about intense and prolonged exercise, with no set upper limit. Warning signs to immediately stop training and seek medical advice include:

- . vaginal bleeding or leakage of amniotic fluid
- . difficulty breathing before exercise
- . dizziness or headache
- . chest pain
- . muscle weakness
- . calf pain or swelling
- . abdominal pain, especially in the back or pubic area (this includes painful uterine contractions)
- . decreased movement of the baby.

### ***Returning to training after birth***

After birth, the return to training will depend on how the baby was delivered. Delivery by caesarean will necessitate a longer recovery period. For breastfeeding mothers, exercise does not seem to have any negative effects on the amount or quality of breast milk; however, maximal exercise may increase the concentration of lactic acid in the milk, making it less appealing to the newborn. To prevent this (plus the discomfort of exercising with heavy breasts), it may be desirable to either feed or express milk before training.

### **Menopause, training and performance**

Menopause typically occurs at around 50 years of age, but can occur as early as 35 or as late as 59. At this time changes in hormone levels cause menstruation to stop permanently. Other effects of these hormonal changes (mainly decreased oestrogen) include decreased muscular strength and loss of muscle mass. There is also an increased risk of osteoporosis or bone fracture, so care should be taken with activities that are high impact or carry a high risk of falling.

Every woman's experience of menopause will be different and this can vary with the influences around her and her overall lifestyle. Some women may suffer from physical and emotional

symptoms during menopause that should be treated. These symptoms may include hot flushes, loss of libido, mood changes, irritability, forgetfulness, fatigue and loss of strength.

### ***Coaching tips for managing menopause***

Coaches should:

- . find out as much as they can about hormone changes and the impact it has on training and performance
- . be sympathetic and supportive, as this phase of life can last between five and ten years
- . recognise symptoms associated with hormonal changes as just outlined
- . encourage the athlete to maintain a training diary so that changes can be made. Options could be to train less and at a lower intensity, add more frequent and longer recovery periods, remove the stress of competition and consider cross training as an alternative
- . work as a team — athlete, coach and doctor.

(Source: Sports Medicine Australia Women in Sport Fact Sheet No. 4)

#### **Case study**

Angus is the long-time coach of a masters triathlon squad. Most of his athletes joined the squad some time ago to participate in ironman events together and he knows them all very well.

Lately, one of his stronger athletes, Lucy, has seemed unsettled and has become very upset with some of her fellow squad members over a matter which usually would not have bothered her. Angus knows this is out of character and watches Lucy more closely during training. He notes that she is struggling to maintain her usual efforts in the gym and also seems more tired than he would have expected at the end of sets in the pool.

Angus reviews Lucy's training diary, which is regularly maintained with information regarding diet and personal wellbeing, as well as specific details of her training in each discipline.

Together they go through the last few weeks looking for anything that does not seem quite right.

First Angus checks Lucy's food intake. This looks fine, as does her rest and sleep patterns.

Lucy seems to be getting plenty of rest; if anything she seems to be sleeping more than Angus would have expected. Finally he looks at her training program and also her other commitments outside sport. Again all looked balanced, and on past performance should not result in overtraining. Angus does notice, however, that Lucy's feelings recorded with smiley faces along the bottom of the page were regularly frowning and some even show tears.

Having eliminated other possible problem areas, Angus concludes that at age 45 Lucy may be just beginning menopause. He raises this with Lucy. They decide to continue to maintain her diary to keep track of changes and her responses to them. Angus will also reduce her training loads in both volume and intensity. He knows that Lucy will benefit from more-frequent and longer rest periods both in training and in the program generally. He also suggests that she meet with her doctor and reassures her that symptoms of menopause can be treated and eased significantly. He offers to meet with Lucy's doctor as well, so together they can plan for and manage her training over what could be a 5–10 year phase.

The successful management of female athletes throughout their sporting careers is fundamental to their physical wellbeing, enjoyment and continued participation in sport. Coaches must take the time to listen and learn how to manage each athlete as an individual, remembering that every woman's experiences of menstruation, pregnancy and menopause are entirely unique. There are many resources available to assist coaches with the most up-to-date information on issues specific to women in sport and it is the coach's responsibility to locate and access these, as well as to seek further assistance from a doctor or nutritionist as required.

## **Summary**

Coaches need to take into consideration the stage of growth and development of the athletes that they work with. Each athlete will have individual needs, and may experience various aspects of development and maturation differently. By taking these individual differences into account, coaches can ensure that they develop training programs that are appropriate for all the athletes. The coach can play an important role in supporting athletes at the various stages of development and maturation. For example, supporting an athlete going through an adolescent growth spurt who seems to lose their coordination and experiences a drop in skill level. Coaches should aim to understand the development and maturation process, and ensure that their program takes this into consideration.

## **References and further reading**

Australian Sports Commission 2002, *Pregnancy in sport: guidelines for the Australian sporting industry*, Australian Sports Commission, Canberra.

Sports Medicine Australia, *Women, Menopause and Sport*, Women in Sport Fact Sheet No. 4.