How does the lifestyle and training of a sportsperson such as Mo Farrah help improve their performance?

Health, training and exercise

Chapter 1

To answer the big question you will need to be able to complete the following tasks:

1. Assess the relationship between health, fitness and exercise (AO3).

2. Analyse the components of fitness and how these components could be measured (AO3).

3. Assess how the principles of training are used when an athlete develops fitness (AO3).

4. Analyse the different methods of training that could be used (AO3).

5. Discuss the nutritional requirements of people in different sports (AO3).

Assess the relationship between health, fitness and exercise (AO3).

Health can be defined as a sense of physical, mental and social well-being. Health is more than being fit – it involves feelings of satisfaction, energy and mental well-being which often come through the social aspects of participating in sport and exercise.

Being healthy involves three main factors that can be improved through regularly participating in sport and physical activity

1. Physical – strength, flexibility, cardiovascular fitness
2. Social – interact with team members, make friends
3. Mental – sense of belonging, feelings of satisfaction, high self esteem

Positive lifestyle choices which will help improve health include:

- taking part regularly in physical activity
- eating a balanced diet
- getting sufficient sleep
- enjoying leisure time
- avoiding risks such as smoking, drinking alcohol and taking drugs

Exercise is important as it can improve all the aspects of health. A lack of exercise, leading to a sedentary lifestyle will have a hugely negative effect on an individual's health.

A sedentary lifestyle can increase the risk of acquiring many conditions including

- Coronary heart disease
- Type 2 diabetes
- High blood pressure
- Narrowing of the arteries

Summary

There are close relationships between health, fitness and exercise

- Positive relationship – active lifestyle = increased exercise = increased fitness = increased social and mental well-being = BETTER HEALTH!
- Negative relationship – sedentary lifestyle = decreased exercise = decreased fitness = decreased social and mental well-being = POOR HEALTH!

Exercise is therefore the key to health and fitness.

For further discussion:

What behaviours can lead to a sedentary/unhealthy lifestyle?

What are the possible solutions?

Components of fitness

Analyse the components of fitness and how these components could be measured (AO3)

As can be seen from above it is important to exercise to obtain fitness but there is more than one type of fitness. Fitness is often broken down into the following different types or components:

- Muscular strength
- Muscular endurance
- Cardiovascular endurance
- Flexibility
- Agility
- Co-ordination
- Reaction time
- Balance
- Power
- Speed

Understanding the different components can help athletes understand the fitness requirements for their particular sport. For example Mo Farah as a long distance runner would require cardiovascular endurance but reaction time would be less important whereas Usain Bolt would need speed but cardiovascular endurance would be less important.

Can you complete the following table?

Component of fitness	Definition	Example
Muscular strength		
Cardiovascular endurance		
Flexibility		
Agility		
Balance		
Power		
Speed		

What components of fitness do you need to develop to help improve your sport? Link this to your personal fitness programme.

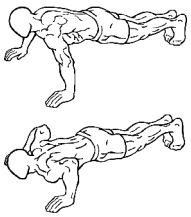
Measuring fitness

If we want to improve our fitness how do we know whether it is improving or if we just think it is? We have to measure our fitness at the start and the end of a period of training, using fitness tests. There are different recognised tests for each component of fitness.

Fitness tests for different components of fitness

All tests need to follow certain methods or protocols. The following briefly shows the protocols for some well-known tests for different fitness components





Agility – Illinois agility test

- Mark out the course
- Participant starts in a face-down, lying position at the start line
- Time runner

Coordination – Alternate hand wall toss test

- Stand two metres from a smooth-surfaced wall
- Throws the ball with one hand, catch it with the other hand and repeats the action
- Count the number of successful catches in 30 seconds

Balance – Standing stork test

- Place hands on hips and one foot on the inside knee of the opposite leg
- Raise heel and hold balance for as long as possible
- The score is the time the participant successfully holds balance

Power – standing jump test

- Stand sideways near a wall and measure height with an upstretched arm
- Jump and put mark on the wall at highest point
- The distance between the standing and jumping height is taken as the score

Strength - Handgrip dynamometer

- Grip with dominant hand.
- Apply maximum force while arm is straight in front of the body.
- Repeat three times.

Cardiovascular endurance – Multi-stage fitness test

- Mark out a 20 m course.
- Run back and for over 20m course to arrive at the line on the beep or wait for the beep before running back.
- Run until total exhaustion prevents completion of two to three shuttles.

Speed – 30 metre sprint test

- Mark out a 30 m distance on an even surface.
- With a running start run at full speed for 30m
- Time the speed

Muscular endurance – 60 second press-up test

- On a cushioned surface, perform as many full press-ups as possible in 60 seconds.
- Elbows moving from the locked, straight position to 90 degrees of flexion.

By following the same protocols every time you test you can ensure that there is validity and reliability of testing.

Validity ensures that test measures what it claims to measure.

Reliability is achieved by carrying out each test in the same way and in the same conditions to ensure any results can be trusted as being accurate (reliable).

Normative data

After every test you measure not only against your own previous scores but also against national normative data to see how you compare on a larger scale and whether or not you are improving.

Summary

- It is vital to exercise to obtain fitness
- Relevant components of fitness should be identified
- Relevant components should be measured before a period of exercise using a recognised test for that particular component
- They should be measured after a training period to assess whether there has been any progress made
- All tests should be valid and reliable

For further discussion:

What other fitness measures or health screening methods could be used to assess fitness or health levels?

Principles of training

Assess how the principles of training are used when an athlete develops fitness (AO3).

From the previous section you know that you have to train to improve components of fitness. In order to train properly to develop the required fitness component you need to know and apply the principles of training.

Efficient training will ensure that there are long term physical changes or **adaptations** to the body systems.

There are four main principles of training: Specificity, overload (intensity, frequency, duration), progression, and variance.

Specificity

Training must be specific for that sport e.g. Mo Farah would train by running long distances to improve his cardiovascular endurance while a netballer might focus on speed or agility.

Overload

Over a period of time the body must be put under stress for the effects of the training to be felt. This is known as overload and it can be achieved by increasing one or more of frequency of training, intensity or length of training sessions.

- Frequency – how often you train e.g. you might increase your training from 3 to 4 times a week

- Intensity - this might be thought of as how hard you train e.g. you might do a session of 8 x400m which has increased from 6x400m the previous week
- Duration – this might be achieved by for example running 40 minutes up from 30 minutes in the previous session

Progression

As a result of good use of the overload principle there should be evidence of progression i.e. your fitness components are improving!

Variance

Training must be varied; this will help to avoid a plateau in performance and also reduce boredom and therefore help an individual stay motivated. This is likely to help with progression.

And don't forget reversibility – training effects are lost quickly if training is not maintained.

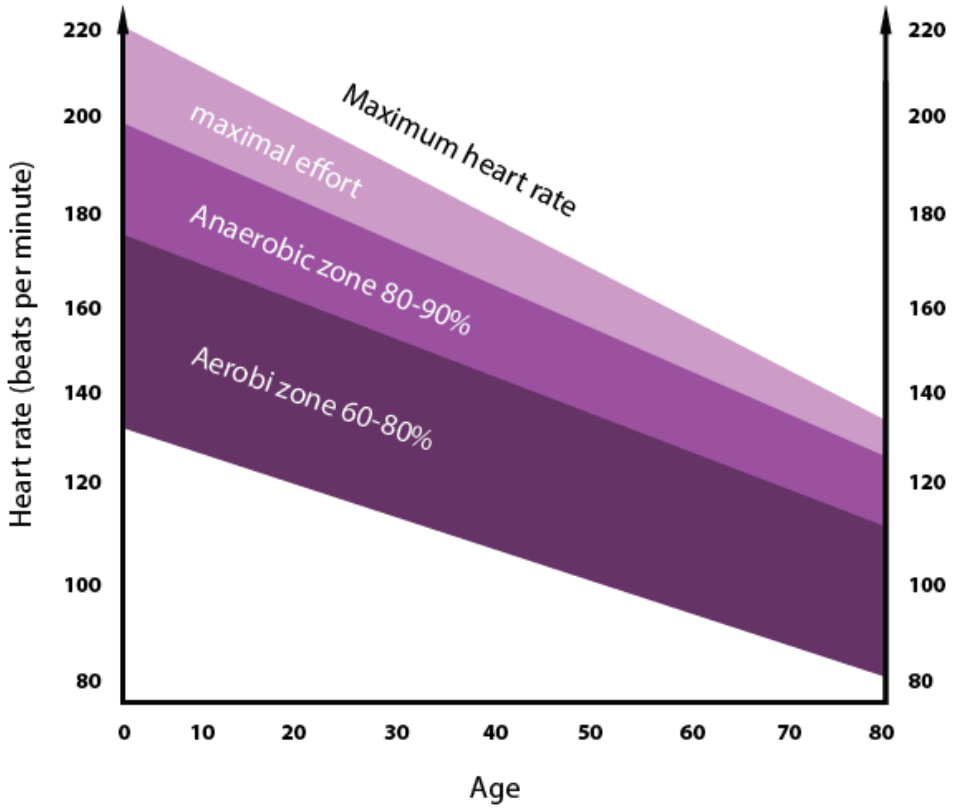
Training thresholds

A way of training effectively to ensure there is overload and therefore progression is to target the most relevant training threshold. This involves calculating a specific **working heart rate:**

- **Maximum heart rate = 220 – age**

A 15-year-old athlete might want to calculate their maximum heart rate in order to accurately calculate their training threshold:

- **Maximum heart rate = 220 – 15**
- **Maximum heart rate = 205 beats per minute (bpm)**



Elite athletes such as Mo Farah will train nearer the upper limit of the training threshold to gain maximum benefit i.e. very intense training.

Case study

An 18 year old UK junior champion is training for the European championships. Complete the following table for this cyclist.

Principle of training	Example
Specificity	
Overload	
Progression	
Variance	

Summary

- Efficient training will ensure that there are long term physical changes or adaptations to the body systems.
- There are four main principles of training: Specificity, overload (intensity, frequency, and duration), progression and variance.

For further discussion:

Why is knowledge of aerobic and anaerobic threshold important for athletes?

Methods and effects of training

Analyse the different methods of training that could be used (AO3).

There are a number of different ways of exercising to apply the principles of training. Whichever method is chosen, warming up and cooling down are essential.

Warm up

Although warm ups may vary from activity to activity there are three main principles that should be followed:

- Raise pulse rate
- Mobility and stretching exercises
- Activity specific activities

Cool down

As for the warm up the cool down may vary from activity to activity but there are three main principles that should be followed:

1. Light jog
2. Stretching
3. Refuelling/ice baths/massage

Methods of training

There are various methods of training that can be used but they should be specific to the performer, component of fitness to be trained and the activity.

Continuous training

- develops cardiovascular fitness
- minimum of 20 minutes sub-maximal work
- target **heart rate** range between 60–80% maxhr (aerobic)
- E.g. swimming, running, cycling, walking

Interval training

- develops strength, speed and muscular endurance
- periods of intense work with timed rest periods
- a wide variety of **fitness** types can be developed
- structured in reps and sets
- intensity is measured by % maxhr. (usually anaerobic – 80% max hr)

Fartlek

- a form of interval training (speed play)
- develops a range of components
- changes in speed, incline and terrain are used to provide changes in exercise intensity
- aerobic and anaerobic work can be done in the quantities that suit the performer

Plyometric

- develops speed, coordination and power
- high intensity exercise involving explosive movements.
- the muscle is lengthened and then rapidly shortened to develop power
- suitable for well-trained athletes

Weight training

- develops strength
- A form of interval training
- Intensity is measured in % 1 REP MAX
- structured in reps and sets

Summary

- a warm up and cool down should happen before and after every training session
- The chosen method of training should depend on fitness component being trained and should apply the principles of training

For further discussion:

Discuss the advantages and disadvantages of the methods of training above.

Diet and nutrition

Discuss the nutritional requirements of people in different sports (AO3).

Everyone should be aware of the foods that they eat whether it is part of a healthy lifestyle or as part of a training programme for a sport.

Energy balance equation

The energy balance equation is the relationship between the energy **consumed** and the energy **used** –measured in calories.

- more energy in compared to energy used = excess energy being stored as fat.
- less energy in compared to energy used = weight loss.
- energy in = energy out = healthy weight

Nutrients

The body needs a balance of different nutrients to stay healthy. There are five main groups of nutrients:

Proteins – for tissue growth and repair – from meat, fish and milk

Carbohydrates - for energy – from sugar (simple carbohydrates), bread, pasta, potatoes (complex carbohydrates)

Fats – source of energy – from olive oil (monounsaturated fats), oily fish (polyunsaturated), red meats, dairy (saturated fats), cakes, biscuits (trans fats). In general trans fats should be avoided as they have few benefits and can have negative health effects.

Minerals – essential for health of many processes on the body – milk and fish (calcium), red meat, brown rice (iron), bananas, white meat (potassium).

Vitamins and water should also be consumed as part of a healthy diet.

Diet and physical activity

On average, men need around 2,000 - 2,500 calories a day while women need approximately 1500-2000 calories. The exact amount will depend on the amount of training being undertaken by an athlete: for some endurance athletes this can rise to over 5,000 calories/day.

Carbohydrate loading

- Complex carbohydrates – starches – are stored in the body as glycogen and converted into glucose when the body needs more energy.

- Glycogen is a slow-release form of energy, meaning that the energy consumed in the form of rice/pasta can last a long time. This is particularly useful for endurance athletes in the last stages of a performance.
- In the week before a race, marathon runners usually eat lots of starchy foods (complex carbohydrates), such as pasta. This helps them to keep going towards the end of the race.

Summary

- Maintaining the energy balance is important
- The 5 main nutrient groups should be part of a balanced diet
- Athletes in certain sports may consume many more calories because of the demands of the activity

For further discussion:

Assess the energy demands of your main sport. Compare this with other sports.

Acknowledgements

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