SECTION

4 TRAINING PRINCIPLE FOR SPORTS PERFORMANCE

PHYSICAL EDUCATION

Training Principles for Sports Performance

INTRODUCTION

Congratulations on your incredible progress through Sections 1, 2, and 3! You have gained a solid understanding of health and wellness, explored the complexities of human diseases, and embraced the significance of physical activity in maintaining a healthy lifestyle. As we embark on Section 4, our focus will shift to the principles of sports training, a crucial element in achieving peak sports performance. Building on your knowledge of physical activity, we will look at how structured training can uplift athletic abilities and overall fitness. In this section, we will begin by exploring the fundamental principles of sports training, including overload and specificity. You will learn how these principles guide the design of effective training programs. Later, we will move from theory to practice, examining how to apply these training principles in real-life scenarios. Discover how to tailor training programs to individual needs and goals, ensuring optimal performance and progression. Throughout this section, we will have interactive discussions, practical exercises, and real-life examples to bring these training principles to life. You will have the opportunity to design your own training plans, share your progress, and support each other in your fitness journeys. Your journey so far has been remarkable, and I am excited to see you apply your knowledge to enhance your sports performance. Are you ready to take your fitness to the next level? Let's dive into the world of sports training and discover how to unlock your full potential!

At the end of this section, you will be able to:

- Explain the training principles for sports performance
- Apply the training principles for sports performance

Key Ideas

- **Training** is the process of preparing athletes to improve and maintain higher performance in various sports activities through structured and scientific methods.
- **Training principles**: Are the fundamental guidelines and methods used in sports training to optimise performance and ensure effective and safe training.
- **Sports performance**: Is the level of skill, efficiency, and effectiveness an athlete exhibits in their chosen sport, often measured by physical ability, technical skills, and competitive results.
- **Aerobic activity**: These are exercises that increase the heart and breathing rates over a sustained period, improving cardiovascular endurance.
- **Anaerobic activity:** These are short bursts of high-intensity physical activity that use energy stored in the muscles, enhancing muscular strength and power.

- **Load:** Refers to the amount of stress placed on the body during exercise.
- **Overload:** The process of increasing the load beyond what the body can contain.
- **Progression:** A systematic increase of load or intensity of exercise over time.
- **Fitness:** The overall health and physical condition of an individual.

IDENTIFY AND ANALYSE THE CONCEPT OF SPORT TRAINING PRINCIPLES FOR SPORTS PERFORMANCE

a. Concept of sports training principles

Sports training is the process of preparing athletes to improve and maintain higher performance in various sports activities. This preparation is based on scientific principles to help athletes perform better.

Training Principles For Sports Performance

b. Types of sports training

i. **Aerobic training:** This type of training strengthens the heart and lungs and improves muscle function. It involves exercises that increase the heart and breathing rate over a sustained period, such as jogging, cycling, and swimming.

ii. **Anaerobic training:** This training involves short, intense bursts of high-intensity physical activity, which use energy stored in the muscles. Examples include jumping, sprinting, and heavy weightlifting.

iii. **Strength training:** This training aims to improve an athlete's strength. Activities include push-ups, sit-ups, and weightlifting.

iv. **Flexibility training:** This training aims to increase the range of motion (ROM) of joints through stretching exercises like the figure-of-four stretch and sit-and-reach. Four methods of stretching used to develop flexibility are:

- **Static Stretching:** This involves stretching a muscle to its farthest point and holding the position for a period of time, usually around 15-30 seconds. This type of stretching is done slowly and gently, helping to increase the length of the muscles and improve overall flexibility. It is a safe and effective way to stretch and is often recommended after physical activity to help muscles relax and recover.

  Example: Sitting down with your legs straight out in front of you and reaching forward to touch your toes, holding the stretch without bouncing.
- **Ballistic Stretching:** This type of stretching uses the momentum of a moving body or a limb to help it move beyond its normal range of motion. It involves bouncing or jerking movements to stretch the muscles further. Ballistic stretching can be risky if not done correctly, as the rapid, bouncing movements can lead to muscle strain or injury. It is generally not recommended for beginners or those with less flexibility.

Example: Swinging your leg up high repeatedly, trying to touch your toes with each swing.

- **Proprioceptive Neuromuscular Facilitation (PNF) Stretching:** PNF stretching is a more advanced form of flexibility training that involves both stretching and contracting the muscle group being targeted. It typically requires a partner to help with the stretching process. The method usually involves stretching the muscle, contracting it against resistance, and then stretching it further.

  Example: Lying on your back with one leg extended up, a partner pushes the leg further back while you resist the push by contracting the muscle, then relax and stretch further.

- **Dynamic Stretching:** Dynamic stretching involves moving parts of your body and gradually increasing reach, speed of movement, or both. Unlike static stretching, dynamic stretching uses controlled movements to improve flexibility, strength, and coordination. It is often used as part of a warm-up routine to prepare the muscles and joints for physical activity.

  Example: Walking lunges or arm circles, where you move your limbs through their full range of motion in a controlled manner.

Fig. 4.1: Dynamic stretching

c. Methods of Sports Training

i. **Continuous training:** This training increases endurance by completing a set number of repetitions at low intensity with little or no rest between repetitions.

ii. **Circuit training:** This involves body conditioning with endurance training, resistance training, high-intensity aerobics, and exercises performed in a circuit.

iii. **Interval training:** This training alternates between high and low-intensity exercises.

iv. **Plyometric training:** A high-intensity training used to improve an athlete's explosiveness. It involves a series of rapid and repetitive movements that help to increase the power and speed of the athlete.

v. **Flexibility training:** A planned set of exercises that can gradually help expand the range of motions of a joint or set of joints.

vi. **Weight training:** This involves using weights to strengthen and tone muscle mass and improve strength.

d. Sports training principles

To get the best out of training the trainee must apply the basic principles of training. These include overload, reversibility, progression, individualisation, periodisation and specificity.

i. **Overload:** To progress and improve fitness, the trainee must put their body under additional stress. Applying this training principle will cause long-term adaptations, enabling the body to work more efficiently to cope with the higher level of performance.

Note: Overloading can be achieved using the FITT principle:

- **F** -Frequency: How often you train.

- **I** -Intensity: How hard you train.

- **T** -Time: How long you train.

- **T** -Type: The type of training.

ii. **Specificity:** Relates to the type of training that is specific to the individual and their chosen sport. The athlete predominantly trains the energy system which they use. e.g. A long distance runner would not train on weightlifting but extensive running, skipping, stairs climbing etc. which will improve the cardiorespiratory endurance.

Fig. 4.2: The principle of specificity (for long distance running)

iii. **Reversibility:** If training is not maintained the trainees can lose what they have gained. If they stop training, then the improvements made will be reversed. So, if they do not train for a period, or reduce the amount they train, they may not be able to resume training to the same level as before.

iv. **Individualisation:** All individuals are unique in their exercise programming needs. Personal, environmental and behavioral factors should be considered and assessed when planning to engage in a physical sports training regimen (American College of Sports Medicine, 2013).

v. **Progression:** With this principle, a greater than normal stress or load on the body is required for training adaptation to take place. The body will adapt to this stimulus. Once the body has adapted then a higher stimulus is required to continue the change. For a muscle to increase strength, it must be gradually stressed by working against a load greater than it is used to.

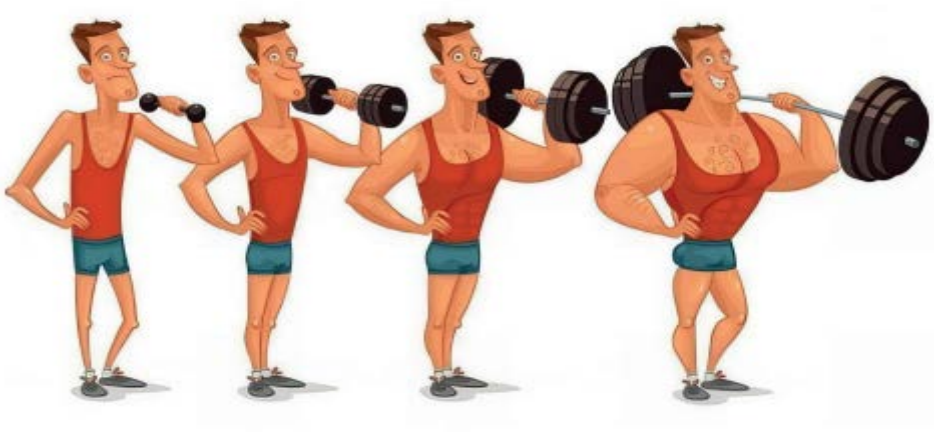

Fig. 4.3: The principle of progression

vi. **Adaptation:** How the body 'programmes' muscles to remember particular activities, movements, or skills. By repeating that skill or exercise, the body adapts to the stress and the skill becomes easier to perform.

Activity 4.1

With a partner, think and reflect on any sports training you or an athlete from your school has engaged in and write them down.

Sport training:

Describe at least two of these exercises orally or written.

With your partner, perform one of the exercises described above and relate it to the concept of sports training.

Activity 4.2

- Form a group, perform the activities identified above in your group. Following your performance, explain to your group the training principles applied.
- With your group ballot for one of the themes from the table below and carryout the following activities:
  i. Research on the selected theme and write down your findings.
  ii. Prepare and make a presentation of your work to the class.

Method of training	Principle of exercise
Flexibility	Specificity
Weight training	Individualisation
Circuit training	Overload
Plyometric training	Reversibility

Let's now take a deeper dive into how you can apply these training principles to improve your sports performance in a practical way. We'll look at how to adjust your training routines using the FITT approach.

You will create and follow your own training programme. This will allow you to apply the overload principle and track your progress towards your fitness and sports performance goals.

APPLICATION OF TRAINING PRINCIPLES

Overload

The principle of overload is necessary to make gains in fitness and athletic performance. It increases muscle hypertrophy (muscle growth) and boosts the growth of lean muscle mass, which helps athletes obtain results from their workout. This means you can achieve better results from your workouts.

Fig. 4.4: *Principle of Overload*

c. Applying the FITT Approach to Overload

The FITT (Frequency, Intensity, Time and Type) approach is applied to address the overload principle in sports performance:

i. **Frequency (how often):** Increasing the number of times you train per week (aim for 3 to 5 days per week) or increase the number of repetitions you perform.

ii. **Intensity (how hard/difficult):** Challenge yourself by increasing the difficulty or intensity of your exercises by varying between light, moderate and vigorous intensity activities. For example, try running a kilometre faster (in 5 minutes instead of 10 or 15 minutes) or increasing the load of an object you are working with.

This is where you really start to see progress.

iii. **Time (duration or how long):** Increasing or extending the length of time of your training sessions. For example, instead of cycling for 30 minutes, try extending it to 60 minutes.

iv. **Type (what activity):** Increase the difficulty of your training activities to make them more challenging. For example, if you are working on cardiorespiratory endurance, progress from walking to jogging and then to running. For muscular strength, progress from push-ups to free weights.

Great job so far! Let's dig a little deeper into the types of training overload.

Variables of Training Overload

Understanding the different ways to apply overload can help you fine-tune your training.

1. **External Load:** This involves increasing the intensity or difficulty of your training by using factors or devices that are not from the body. External load is achieved through various methods that involve additional equipment or environmental changes.

   This is determined by the organisation, quality and quantity of exercise. For instance, external load in resistance training is the amount of weight lifted. Total work done, distance covered or the achieved velocity are other examples. This is about using the world around you to enhance your training.

2. **Internal Load:** This refers to responses within the body resulting from physical activity, exercise or stress. It determines how the body reacts to external stressors or loads and can provide insights into the intensity and impact of training sessions. In simple terms, it refers to how your body reacts to an exercise from within. Specific external load creates a specific internal load in the body (termed as psychophysiological response). Heart rate, skin colour, sweating, genetics, nutrition, lactate threshold, hydration, and sleep are some examples of internal load.

Pay attention to these signs, they are your body's way of telling you how well you are doing!

Applications of Training Overload

Now, let's see how you can apply these principles in practical ways:

i. **Overload through weight increases:** This refers to gradually increasing the stress placed on your muscles by adding more weight or resistance to exercises. For instance, if you are doing triceps extensions with a weight of 60 pounds. To help in your progression, increase the weight to 65 pounds for a few weeks. Once that feels easy to you, increase the weight to 70 pounds. Continue increasing the weight in 5-pound increments, making this increases every 3-4 weeks.

ii. **Overload through increase in repetition (rep):** This is a training method where the number of times (reps) you perform in a given exercise is progressively increased. If you are doing squats, do 8 to 10 squats. Increase the repetition range from 10 to 12. Next, increase it from 12 to 15. Once you are doing the desired number of repetitions, you could start to increase your number of sets.

iii. **Progression through training session increases:** This refers to gradually increasing the overall volume, intensity or duration of individual training sessions over time to promote fitness improvements. If athletes hit their plateau, increase the duration of the training session. Instead of working out for 45 minutes, exercise for 50 minutes. Then increase this amount to 55 minutes, followed by an hour, etc.

You are almost there! These strategies will help you see real improvements in your fitness and performance.

Benefits of applying the FITT approach to overload in Training for fitness/sports performance

Can you think of any benefits you will gain from applying the FITT approach to overload training? Note your thoughts in the space below.

Here are a few additional benefits:

1. Improves aerobic and anaerobic fitness

2. Enhances motor coordination and balance

3. Increases strength in the knee extensors, plantar flexors, and ankle dorsi-flexors

4. Gives greater functional strength in the lower extremities

5. Enhances manual dexterity

The knowledge you have gained so far will be a powerful tool in your training journey, especially as you move on to the upcoming activities and review questions. Keep up the great work, stay focused, and watch how these principles can transform your performance.

Activity 4.3

In your group, discuss how the FITT approach is used in the preparation of athletes for a competition. Before starting the discussion share your chosen competition with your teacher.

Summarise your points below and be ready to share these with your classmates.

Activity 4.4

Design a training programme

Based on your understanding of the FITT Principles in relation to the concept of overload, follow the following guidelines/steps to create your training programme:

Step 1: Set personal fitness goal:

Write down two personal fitness goals. Your goals could be related to different fitness components such as cardiovascular endurance (e.g., "Improve my 1mile run time by 1 minute"), muscular strength (e.g., "Increase the number of push-ups I can do from 10 to 20"), or flexibility (e.g., "Be able to touch my toes after stretching for 10 minutes"), Speed (e.g., Improve sprint time over 100 meters) etc.

Step 2: Design your training programme: use the FITT principles to design a four-week training program that aligns with your goals by outlining;

- **Frequency**: How many days per week you plan to train. For example, 4 days per week.

- **Intensity**: The difficulty level of each session. For example, starting with moderate intensity and progressing to vigorous intensity.

- **Time**: The duration of each session. For example, 30 minutes per session in Week 1, increasing to 45 minutes by Week 2.

- **Type**: The activity you intend to perform (e.g., running, strength training, flexibility exercises). Choose activities that directly contribute to achieving your set goals.

Note: Remember to incorporate an overload strategy, such as increasing the weight you lift, the number of repetitions, or the time spent on a particular activity each week.

Step 3: Implementation and tracking

Daily log: Follow your training programme for two weeks keeping a daily log of your activities, noting how you felt during each workout, any improvements in performance, and any challenges faced.

Weekly reflection: Each week, reflect on your progress. To do this, ask yourself: "Is the training too easy or too difficult? Should I increase the intensity or time?" Based on these reflections, you can make the necessary adjustments to your programme.

Step 4: Final reflection and presentation

Review your training logs: At the end of the two weeks, review your training logs and assess how well you met your goals. Prepare a short presentation or written report that covers:

- **Application of Overload**: How you applied the principles of overload in your training.

- **Progress**: The progress you made toward your goals.

- **Challenges**: Any challenges you faced and how you overcame them.

- **Lessons learned**: What you learned about your fitness and the importance of structured training.

- **Benefits**: What have you benefited from your training plan?

Class Discussion:

Your teacher will hold a class discussion where you will share your experiences. You will be expected to talk about what worked well, what didn't, and what you may do differently in the future.

Review Questions

REVIEW QUESTIONS 4.1

1. Discuss the importance of the principle of overload in sports training. In your discussion, include how the FITT principle can be applied to ensure effective overload and the potential consequences of not applying this principle correctly.

2. State the differences between aerobic and anaerobic training, including their definitions, examples, and benefits.

Aspect	Aerobic Training	Anaerobic Training
Definition		
Examples	Jogging, cycling, swimming	Sprinting, jumping, heavy weightlifting
Benefits		

3. Complete the table below to compare the four methods of flexibility training (static stretching, ballistic stretching, proprioceptive neuromuscular facilitation (PNF), and dynamic stretching). Include the definition, method, and an example of each type.

Type	Definition	Method	Example
Static stretching			
Ballistic stretching			
Proprioceptive Neuromuscular Facilitation (PNF) stretching			
Dynamic stretching			

4. Consider an athlete who has taken a break from training due to injury. Apply the principle of reversibility to explain what might happen to their fitness levels during the break and what steps they should take to regain their previous fitness levels upon returning to training.

5. Evaluate the impact of not incorporating flexibility training into a sports training program. Use examples to illustrate how neglecting flexibility training can affect overall sports performance and risk of injury.

6. **Case study:**

Leila is a 15-year-old high school student preparing for the upcoming Regional Track and Field Championships. She specialises in the 800-meter race and has been training for several months. Leila's coach has designed a training program that incorporates various training principles and methods to help her perform her best.

Training Program Details:

Aerobic Training: Leila does long-distance runs twice a week to build cardiovascular endurance.

Anaerobic Training: Leila includes interval sprints in her training regimen to improve her speed and power.

Strength Training: Twice a week, Leila engages in weightlifting and bodyweight exercises like push-ups and sit-ups to increase muscle strength.

Flexibility Training: Leila practices static and dynamic stretches before and after her workouts to maintain flexibility.

Specificity: Leila's training focuses on running techniques, speed work, and endurance to specifically prepare for the 800-meter race.

Progression: Leila's coach gradually increases the intensity and duration of her workouts to ensure continuous improvement.

R**ecovery:** Leila takes rest days and engages in light activities like swimming to help her muscles recover.

Questions:

i. Explain how the principle of overload is applied in Leila's training program. Provide specific examples from the training details.

ii. Discuss the importance of specificity in Leila's training regimen. How does focusing on the 800-meter race specifically help her improve?

iii. If Leila were to take a two-week break from training due to illness, how would the principle of reversibility affect her performance? What steps should she take to regain his fitness upon returning?

iv. Describe how the principle of individualisation might be applied if Leila's coach had multiple athletes with different specialisations and fitness levels. Provide an example of how training might differ for another athlete who is a sprinter.

v. Evaluate the potential impact on Leila's performance if she neglected flexibility training. Use examples to illustrate how this could affect her overall performance and risk of injury.

REVIEW QUESTIONS 4.2

1. Complete the table below by comparing the effects of increasing frequency, intensity, time, and type in an athlete's training programme.

Parameter	Description	Effect on Training
Frequency		
Intensity	Difficulty or level of exertion in training	Higher intensity can improve strength and speed.
Time		
Type		

2. Explain how varying the intensity and time of training sessions can impact an athlete's performance.
3. Explain the relationship between external and internal loads and their significance in sports performance training.
4. Imagine an athlete recovering from a minor injury. How would you adjust their training programme using the FITT approach to safely regain their fitness?
5. Describe a scenario where increasing the type of activity might be beneficial for an athlete looking to enhance their overall fitness.

Answers to Review Questions

ANSWERS TO REVIEW QUESTIONS 4.1

1. **1.** The principle of overload is fundamental in sports training because it ensures that the body is subjected to greater stress than it is accustomed to, prompting physiological adaptations that enhance performance. Without sufficient overload, the body does not experience the necessary stress to drive improvements in strength, endurance, or other fitness components.

   The FITT principle, which stands for Frequency, Intensity, Time, and Type, provides a structured approach to applying overload effectively:

   Frequency: Increasing the number of training sessions per week can help apply overload. For example, an athlete might increase from three to four training sessions per week.

   Intensity: Elevating the intensity of training sessions, such as running at a faster pace or lifting heavier weights, ensures that the body is working harder than usual.

   Time: Extending the duration of training sessions can also create overload. For instance, a runner might increase their run from 30 to 45 minutes.

   Type: Changing the type of exercise can challenge the body in new ways. For example, switching from steady-state running to interval training can provide a new stimulus for adaptation.

   Failure to apply the principle of overload correctly can lead to stagnation, where the athlete's performance plateaus because the body is not sufficiently challenged. Conversely, excessive overload without adequate recovery can lead to overtraining, increasing the risk of injury and burnout. Thus, finding a balance and progressively increasing the training load is crucial for safe and effective improvements.

2.

Aspect	Aerobic Training	Anaerobic Training
Definition	Training that strengthens the heart and lungs by improving the efficiency of the cardiovascular system to deliver oxygen to the muscles.	Training that involves short bursts of high-intensity activity where the body's demand for oxygen exceeds the oxygen supply available.
Examples	Jogging, cycling, swimming	Sprinting, jumping, heavy weightlifting
Benefits	Improves cardiovascular health, increases stamina, aids in weight management.	Increases muscle strength and mass, enhances power and speed, improves anaerobic endurance.

3.

Type	Definition	Method	Example
Static stretching	Involves stretching a muscle to its farthest point and holding the position.	Stretch a muscle and hold for 15-30 seconds without bouncing.	Sitting down with legs straight, reaching forward to touch toes.
Ballistic stretching	Uses the momentum of a moving body or a limb to force it beyond its normal range.	Perform bouncing or jerking movements to stretch the muscles further.	Swinging leg up high repeatedly.
Proprioceptive Neuromuscular Facilitation (PNF)	Combines stretching and contracting the muscle group being targeted.	Stretch the muscle, contract it against resistance, then stretch further.	Partner-assisted hamstring stretch.
Dynamic stretching	Involves moving parts of your body gradually increasing reach, speed of movement, or both.	Use controlled movements to improve flexibility, strength, and coordination.	Walking lunges or arm circles.

4.

During a break from training due to injury, the principle of reversibility suggests that the athlete's fitness levels will decline. This means that their cardiovascular endurance, muscle strength, and flexibility will decrease over time. The longer the break, the more significant the loss of fitness will be. To regain their previous fitness levels upon returning to training, the athlete should:

1. Start Gradually: Begin with low-intensity activities to avoid re-injury and allow the body to adapt. For example, starting with walking or light jogging before progressing to more intense workouts.
2. Progressive Overload: Gradually increase the intensity, duration, and frequency of training sessions. This could mean adding more miles to runs each week or increasing the weight lifted in strength training sessions.
3. Incorporate Cross-Training: Engage in different types of exercises to build overall fitness without overloading the injured area. Swimming or cycling can be good alternatives.
4. Focus on Recovery: Ensure adequate rest and recovery between sessions to allow the body to heal and adapt. This includes proper nutrition, hydration, and sleep.

5. Listen to the Body: Pay attention to any signs of pain or discomfort and adjust the training plan accordingly to prevent further injury.

5. Neglecting flexibility training in a sports training program can have several negative impacts on overall sports performance and increase the risk of injury:

i. Reduced Range of Motion: Without regular flexibility training, muscles and joints can become tight, reducing the range of motion. This limitation can affect performance in sports that require agility and fluid movements. For example, a gymnast with poor flexibility may struggle with complex routines, and a soccer player may find it difficult to execute certain kicks or maneuvers.

ii. Increased Risk of Injury: Tight muscles are more prone to strains and tears. Athletes who do not engage in flexibility training are at a higher risk of injuries such as hamstring strains, calf strains, and lower back pain. For instance, a sprinter with tight hamstrings is more likely to experience a muscle pull during a race.

iii. Impaired Performance: Flexibility contributes to better biomechanics and efficiency in movements. Athletes with poor flexibility may not perform optimally, leading to decreased speed, power, and agility. For example, a swimmer with limited shoulder flexibility may have a less effective stroke, resulting in slower swim times.

6.

i. The principle of overload is applied in Leila's training program by progressively increasing the demands on her body to enhance his performance. Specific examples include:

- Aerobic Training: Increasing the distance or duration of her long-distance runs over time.

- Anaerobic Training: Incorporating more intense interval sprints with shorter rest periods between them.

- Strength Training: Gradually adding more weight or increasing the number of repetitions in her weightlifting and bodyweight exercises.

- Flexibility Training: Progressing from basic to more advanced stretching exercises and holding stretches for longer periods.

ii. Specificity is crucial because it ensures that Leila's training is directly relevant to the demands of the 800-meter race. Focusing on running techniques, speed work, and endurance helps her develop the specific muscle groups and energy systems required for her event. For example, extensive running and interval sprints mimic the physical demands of the race, improving her cardiovascular endurance and speed, which are essential for performing well in the 800-meter race.

iii. The principle of reversibility suggests that Leila would lose some of the fitness gains she had made if she stopped training for two weeks. She might experience decreased cardiovascular endurance, muscle strength, and

overall performance. To regain her fitness, Leila should start with lower-intensity workouts and gradually increase the intensity and volume of her training. This approach allows her body to readjust and rebuild the lost fitness levels without risking injury.

iv. The principle of individualisation requires tailoring training programs to each athlete's specific needs, goals, and fitness levels. For example, a sprinter would focus more on short, high-intensity drills, explosive strength training, and technique refinement for quick bursts of speed. Their training might include shorter, more intense interval sprints, plyometric exercises, and weight training aimed at improving explosive power, unlike Leila's endurance-focused regimen.

v. Neglecting flexibility training could lead to decreased range of motion, muscle stiffness, and a higher risk of injury for Leila. For instance, tight hamstrings and hip flexors could impair her running form, reducing efficiency and speed. Without proper flexibility, she might be more prone to muscle strains or joint injuries during intense workouts or races. Regular flexibility training helps maintain muscle elasticity and joint health, crucial for optimal performance and injury prevention.

ANSWERS TO REVIEW QUESTIONS 4.2

1. The following are suggested answers to the review questions:

Parameter	Description	Effect on Training
Frequency	Number of training sessions per week	Increased frequency can enhance skill acquisition and endurance.
Intensity	Difficulty or level of exertion in training	Higher intensity can improve strength and speed.
Time	Duration of each training session	Longer sessions can increase endurance and stamina.
Type	Kind of exercises or activities performed	Varying types can target different muscle groups and energy systems.

2. **Impact of varying intensity and time:**

Varying intensity can target different fitness components; for example, higher intensity increases power, while moderate intensity enhances endurance. Adjusting time allows for a focus on either short, high-intensity efforts (anaerobic) or longer, moderate efforts (aerobic).

3. **Relationship between external and internal loads:**

   External load refers to the quantifiable elements of training, like weights or running speed. Internal load is the physiological response, such as heart rate or perceived exertion. Understanding both helps tailor training to individual capacities and optimise performance.

4. **Adjusting training for an injured athlete:**

   Reduce intensity and frequency, focus on low-impact activities (e.g., swimming), gradually increase load as the athlete recovers, and monitor internal responses like pain and fatigue.

5. **Increasing type of activity:**

   Introducing cross-training (e.g., a cyclist adding running and swimming) can enhance overall fitness, prevent overuse injuries, and improve different physical attributes.

Extended Reading

1. Concept of sports training principles:
   Watch this video on Sports Training Principles.

   - https://www.youtube.com/watch?v=YEQpnTGD4gk

2. 2. This video shows the various methods of sports training.

   - https://www.youtube.com/watch?v=fntJ85U-7Fs

3. Click on the links below to watch a video on the Overload Principle in Fitness:

   - https://iascfitness.org

- https://www.youtube.com/watch?v=eO1JZFSOunE

- https://www.youtube.com/watch?v=RFP0hjsuLaQ

- www.youtube.com/watch?v=qFKThY7PwfA

4. The links below are articles to help you further understand the principle of overload.

- https://www.elitefts.com/education/training-principles-the-science-behind-improving-athletic-performance

- https://www.verywellfit.com/principle-of-specificity-in-athletic-training-3120301

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