

## Training Load

### Definition of Training Load

Sports scientists have defined training load from different perspectives based on their fields of expertise. Some of these definitions include:

- **Hara:** Training load is the **physical and neurological stress** imposed on an individual's various systems (nervous, muscular, endocrine, and cardiovascular) due to **physical activity**.
- **Ania Svesky:** Training load is **the impact of various physical exercises and their execution systems on an athlete's biological state**.
- **Hara:** Training load consists of **regulated motor stimuli that contribute to the development and maintenance of sports performance**.
- **Farkhushansky:** From a **physiological perspective**, training load refers to **the amount of stress applied to the body's organs and systems due to a specific physical effort**, resulting in **functional responses**. Repeated exposure to these responses leads to **gradual physiological adaptation** (Hasnawi, Ahmed Youssef, 2014, p. 24).

### Understanding Training Load

Based on these definitions, training load can be summarized as:

1. The use of **specific, organized exercises**.
2. Exercises performed **to induce fatigue**.
3. Fatigue leading to **recovery processes** that eliminate exhaustion.
4. **Supercompensation**, where the body improves **beyond its original state**, leading to performance enhancement.

### Key Aspects of Training Load

- **All physical activities performed by an athlete** during training and competition.

- **The impact of these activities** on the athlete's body.

## **Types of Training Load**

Training load is classified based on different criteria:

### **1. Based on Goal**

- **Training load:** Applied during regular training sessions.
- **Competition load:** Occurs during actual sporting events.

### **2. Based on Specialization**

- **General load:** Includes general fitness training.
- **Specific load:** Focuses on sport-specific training.

### **3. Based on Volume**

- **Low volume**
- **Medium volume**
- **High volume**

### **4. Based on Direction**

- Load directed towards improving a **single physical attribute** (e.g., speed, strength, endurance, flexibility).
- Load targeting **multiple physical attributes** simultaneously (e.g., anaerobic and phosphagen system development).

### **5. Based on Duration**

- Load within a **single training session**.
- Load within a **microcycle (weekly training program)**.
- Load within a **mesocycle (monthly training phase)**.
- Load within a **macrocycle (annual training plan)**.

### **6. Based on Effect**

- **External load:** The amount of **work performed during training**.
- **Internal load:** The **physiological impact** on the athlete's body.
- **Competition load:** The stress and adaptation that occur during actual competitive events.

## **Forms of Training Load**

### **1. External Load**

Refers to the **amount of work** performed in a training session, including the **intensity and duration of exercises**.

#### **Factors Determining External Load**

- **Intensity (Stimulus Strength)**
  - Measured by **speed of execution** (e.g., sprint time).
  - **Repetitions and sets** in resistance training.
  - **Weight lifted** in strength training.
  - **Distance covered** in endurance activities.
- **Training Duration**
  - The total **time spent on exercises**.
  - Distance covered within a specific time.

### **2. Internal Load**

Represents the **body's response** to training, including **heart rate, oxygen consumption, and muscle fatigue**.

### **3. Psychological Load**

The mental and emotional stress associated with training and competition, influenced by:

- **Competition pressure**
- **Fear of failure**
- **Performance expectations**

## Determining Training Load

### Measuring Intensity

- **Karvonen Method:** Uses **heart rate reserve (HRR)** to determine training intensity.
- **Maximum Heart Rate Method:** Calculates training intensity as a **percentage of the athlete's maximum heart rate.**

Example:

1. Maximum heart rate = **190 bpm**
2. Resting heart rate = **60 bpm**
3. Heart rate reserve = **190 - 60 = 130 bpm**
4. Target heart rate at **75% intensity** = **60 + (130 × 0.75) = 157 bpm**

### Measuring Volume

- **Total repetitions performed** in a training session.
- **Total training duration.**
- **Total distance covered** in endurance training.
- **Total weight lifted** in strength training.

## Principles of Increasing Training Load

1. **Gradual Increase**
  - Training volume should increase **year by year.**
  - **Matveev** suggests an **annual increase of 10-20%** in training volume.
2. **Optimal Load for Age and Ability**
  - Training load should match the **athlete's age and physical capacity.**
  - Overloading beyond capacity leads to **fatigue, injury, and decreased performance.**

## Signs of Overtraining

- **Decreased performance in training**
- **Longer recovery time**
- **Increased risk of injury**
- **Reduced motivation and mental focus**

## **Training Load Density (Training Density)**

Training density refers to **the ratio of work-to-rest periods within a training session**. It determines:

- **How frequently exercises are performed.**
- **How quickly the athlete recovers between exercises.**

## **Types of Rest Periods**

1. **Full Recovery Rest:** Ensures complete recovery before repeating the exercise.
2. **Partial Recovery Rest:** Shortens rest periods to **maintain training intensity**.
3. **Minimal Rest:** Used to develop endurance and simulate competition fatigue.

## **Training Load Levels**

Training load is divided into five levels:

1. **Maximum Load**
  - The highest intensity an athlete can endure.
  - Used for **elite-level performance improvements**.
  - Requires **long recovery periods** (12-18 minutes).
2. **Sub-Maximal Load**
  - Slightly lower than maximum load.
  - Improves endurance and performance stability.
  - Requires **moderate recovery periods** (8-12 minutes).
3. **Moderate Load**
  - Used for **maintaining fitness**.
  - Ideal for **technical and tactical training**.

- Requires **short recovery periods** (6-10 minutes).
- 4. **Light Load**
  - Used for **warm-ups, cooldowns, and recovery training**.
  - Helps **reduce muscle tension and mental stress**.
  - Requires **minimal recovery periods** (2-5 minutes).
- 5. **Active Recovery Load**
  - Includes **low-intensity activities like jogging or relaxation exercises**.
  - Helps **speed up recovery** and prevent overtraining.

## **Factors Influencing Training Load**

1. **Neuromuscular Coordination**
  - Complex skills (e.g., gymnastics) require **greater effort and precision**.
2. **Psychological Stress**
  - Sports like **boxing, gymnastics, and diving** involve **high psychological pressure**.
3. **Training Adjustments**
  - Coaches **modify training intensity, volume, and rest periods** based on performance and recovery.

## **Methods for Controlling Training Load**

1. **Adjusting Intensity**
  - Increasing **speed, resistance, or complexity** of exercises.
2. **Modifying Volume**
  - Changing **exercise duration or repetitions**.
3. **Regulating Rest Periods**
  - Adjusting **work-to-rest ratios** for optimal recovery.

By balancing **intensity, volume, and recovery**, athletes can achieve **maximum performance improvements while minimizing injury risks**.