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Monitoring training load

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Introduction

Accurate monitoring of the training load can help coaches improve the preparation of their athletes for competition. In this article, we focus on the importance of monitoring training load and we also examine a simple method for the monitoring of training loads of your athletes. We start by providing a general overview of the important training variables that a coach manipulates to control training stress (that is, training volume, training intensity and training load) and we will then discuss some practical applications of monitoring training load.

Basic training variables

Training volume

Training volume usually refers to the duration of training. Generally coaches report training volume in terms of time (that is, minutes per day, hour per week), however, it can also be reported in terms of distance covered (that is, 80 kilometres per week for a runner or 300 kilometres per week for a cyclist).

Training intensity

Training intensity refers to how hard you are training. There are many different methods that can be used to measure intensity. Some of the more common methods are heart rate, oxygen consumption, weight lifted, power output, blood lactate concentration or the athlete's perception of effort during training.

Most coaches manipulate both training intensity and volume in their training programs. Therefore, taking measures of volume and intensity independently to measure training may not truly reflect the training stress imposed on the athlete. It is suggested that the training stress be measured using the training load calculation.

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Calculating training load

Training load is simply the function of training volume and training intensity and it can be expressed by the following formula:

Training load = training volume x training intensity

Fortunately for the coach, a simple method for quantifying training loads from a variety of different training modalities into one simple arbitrary number has been developed (Foster et al. 1996; Foster 1998; Foster et al. 2001). This method is commonly known as the session-rating of perceived exertion (RPE) method. Although the session-RPE method for assessing training load has previously been presented in *Sports Coach* (Coutts 2001), this article will discuss more practical ways in which coaches can use this information to improve their coaching.

This method of monitoring training load requires each athlete to provide an RPE for each exercise session (see Table 1in the related links below) along with a measure of training time (Foster et al. 2001). To calculate a measure of session intensity, athletes are asked within 30-minutes of finishing their workout a simple question such as 'How was your workout?' A single number representing the magnitude of training load for each session is then calculated by the multiplication of training intensity (RPE from Table 1) by the training session duration (minutes).

Training load = session RPE x duration (minutes)

For example, to calculate the training load for a 30-minute training session with the athlete's RPE being 5 (HARD), the following calculation would be made:

Training load = 5 x 30 = 150 units.

The major advantage of the session-RPE method over other reported methods of quantifying training load is that it is simple to measure and relatively easy to interpret. Recent studies have reported that the session-RPE method compares favourably with the more complicated methods of quantifying training loads in both endurance sports (Foster et al. 2001), team sports (Coutts et al. 2003; Impellizzeri et al. 2004) and resistance training (Day et al. 2003; Sweet et al. 2003). These recent findings allow us to conclude that the session-RPE is both a valid and reliable method for monitoring training in most sports. In addition, these results also show that the session-RPE method may be useful for comparing training loads from different types of activities.

Using the session-RPE method to your advantage

The most value a coach can get from accurately monitoring the training load is a better understanding of each individual athlete's tolerance to training. This is of particular importance as previous research and anecdotal evidence have shown that each athlete has a different tolerance to training load. For example, if two athletes complete the same training program, one may be able to tolerate the training load, resulting in an improved performance, while the other may not tolerate the training load, leading to an impaired performance. This is evident when comparing our recent findings showing that experienced triathletes are able to tolerate training loads up to 7200 AU per week (that is approximately 24 hours of 'hard' training) whereas other trained triathletes show signs of over-training when their training load is increased to approximately 6000 AU per week (that is approximately 20 hours of 'hard' training). It is most likely that factors such as fitness levels, training experience, age, environmental influences, athlete size, nutritional factors and recovery practices will influence an individual's training load tolerance. Therefore we recommend that coaches prescribe training loads according to an individual's tolerance level.

Another benefit of accurately monitoring the training load is that coaches can determine if athletes are implementing training stress according to their plan. An example of how measuring training load can be used by a coach to assess if the athlete has implemented training according to the training plan is shown in Figure 1. You will notice how the training load for this team was quite high during the pre-season when the focus on improving

general fitness capacity was high. Conversely, the training loads completed during the in-season were relatively lower as greater recovery periods were required between the stressful games. This trend of reduced training loads in the in-season is also apparent in Figure 2, which shows the average training loads completed by an Australian Football League team at different stages during the training year.

Other practical uses

For a coach, the real value of monitoring training loads in athletes comes with tracking individual rather than group or team scores. Close monitoring of an individual's training load may provide a greater understanding of their tolerance to training, allowing coaches to modify future loads that best suit individual athletes. Listed below are a number of ways in which the session-RPE method can be used to improve the training of athletes:

- monitoring player loads compared to intended loads — this is a simple way to check that you are implementing your training as planned (see Figure 1 in the related links below)
- ensuring that you have appropriate periodisation — it is well reported that alternating hard and easy reduces training monotony and may assist in the prevention of over-training and illness (Foster 1998). By monitoring daily training loads, you can keep a close eye on the actual periodisation of training
- detecting athletes who are not coping with training — experience has shown that younger 'rookies', older and heavier athletes tend to report higher RPE scores for similar sessions during periods of arduous training. By closely monitoring these athletes, you may be able to detect if your athletes are not coping with their training
- monitoring loads of different groups within a team/squad — in some sports, different playing positions/types of players can tolerate, or are required to complete, different training loads. This method can allow you to accurately monitor training loads of different groups within a team
- monitoring training loads during rehabilitation after an injury — you can use this to ensure loads are not progressed too quickly and/or appropriate training has been completed prior to return to sport.

Summary

Training load is influenced by both training volume and training intensity. A precise understanding of training loads completed during training can be beneficial for both the coach and the athlete. The coach can use feedback from training to systematically modify future training so that performances can be improved. Athletes can use this feedback for motivation for future training. Training load can be monitored in many different ways, however, we recommend the session-RPE method for quantifying training load because it is simple to use, easy to understand and relatively easy to implement. From a sports science perspective, a valid and reliable record of training load allows the effectiveness of different training to be assessed. It can be used to ensure that both sufficient training loads are implemented and that excessive loads are not. Finally, over time and with some practice, accurate monitoring of training load will enable the coach to better understand the best training methods for individual athletes. Ultimately, this may lead to improved performance in competition.

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Rating	Descriptor
0	Rest
1	Very, Very Easy
2	Easy
3	Moderate
4	Somewhat Hard
5	Hard
6	
7	Very Hard
8	
9	
10	Maximal

Table 1: The modified rating of perceived exertion (RPE) scale used for athletes to classify their perceived intensity of each training session.

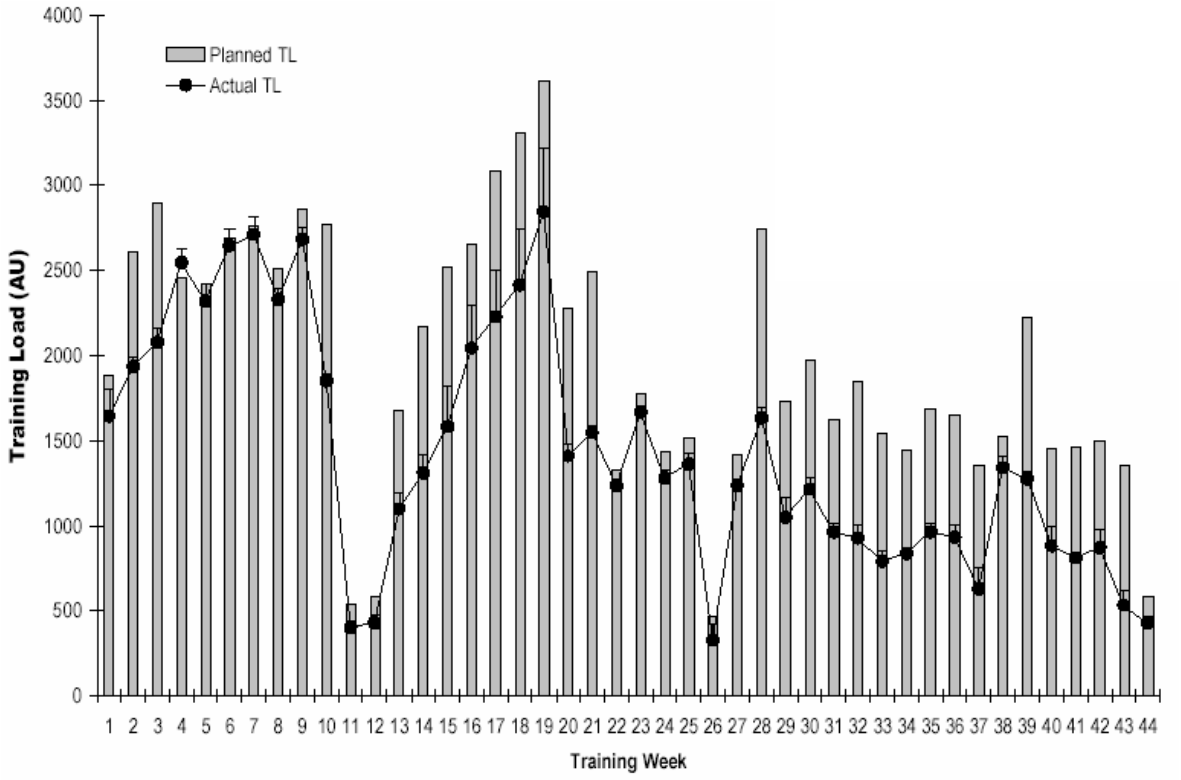

Figure 1: The actual training compared with the planned training during a training year in a rugby league team. Notice how the actual implemented training load accurately reflects the planned loads.

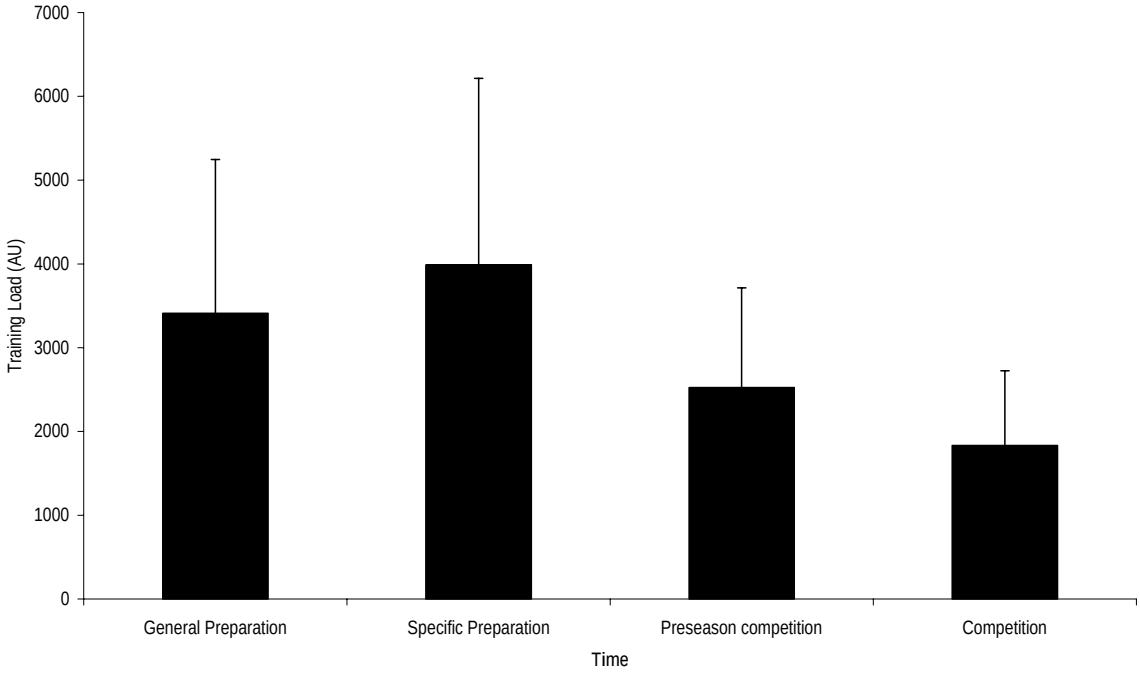

Figure 2: The average training loads completed by Australian Football players during different training phases.