

The Role of Sports Medicine in Elite Sports

Evert Verhagen

*Amsterdam Collaboration for Health and Safety in Sports,
 Department of Public and Occupational Health,
 Amsterdam Movement Sciences, VU University Medical Center,
 Van der Boechorststraat 7, 1081 BT Amsterdam, The Netherlands
 UCT/MRC Research Unit for Exercise Science and Sports Medicine (ESSM),
 Department of Human Biology, Faculty of Health Sciences,
 University of Cape Town,
 Cape Town, South Africa*

Abstract—When it concerns performance enhancement a lot of funds and effort are being put in – amongst others – the development of new training methods, training materials, and equipment. All with the aim to make our athletes stronger, faster and better. What is generally neglected is that in order for athletes to (fully) benefit from newly developed and improved training methods they have to remain in full health. Developments in the continuous registration of injuries have shown that injuries are a constant and performance limiting problem in sports, and it has become apparent that athletes compete while injured. This results in inefficient training and suboptimal performance. Here lies a clear and immediate task for sports medicine professionals. This manuscript outlines a holistic approach towards healthy and optimal performance. An approach that can be used by professionals and scientists in sports alike, working jointly towards optimization of athletes' performance.

Keywords—*sports medicine, elite sports, performance enhancement, role of sports medicine*

I. PERFORMANCE IN FULL HEALTH

When it concerns performance enhancement a lot of funds and effort are being put in – amongst others – the development of new training methods, training materials, and equipment. All with the aim to make our athletes stronger, faster and better. Over the past decades the budget of such developments has grown exponentially and the overall idea was that one could buy Olympic gold medals by investing performance enhancement. Yet, what is generally neglected is that in order for athletes to (fully) benefit from newly developed and improved training methods they have to remain in full health. Recent studies in for instance football, have shown that there is a direct relationship between player availability and match and league results. Simply put, the teams with their main players available are the teams that have a better chance of winning.

II. TRAIN SMARTER NOT HARDER

Developments in the registration of overuse injuries [1] have shown that overuse injuries are a serious problem in sports. A plethora of athletes suffer from overuse injuries and compete while injured. Hampering their performance levels throughout training and competition. Added to this high prevalence of overuse injuries, we shockingly found in one of our previous studies (a qualitative report on overuse injuries) that coaches and players have a shifted view of what causes overuse injuries [2]. We sports medicine professionals would say that an overuse injury is caused by a loading to high for system, while players and coaches state that overuse injuries

are the result of a system being too weak for the load. In other words they are not saying the load is too high, but their body is not strong enough to deal with the load. A subtle yet important difference. With this view they taken two steps forward in performance and one step back in case of injury. While it may be wiser to take one step back in training load to take three forward.

What is happening here is a system error. There is simply too much emphasis on performance enhancement based upon the Australian Institute of Sports model, by which injury prevention as a performance enhancing tool is neglected. A few research groups have dedicated projects on exactly this issue. Yet, there remains a lot of ground to cover. Not only research-wise but also in terms of educating athletes, coaches, and policy makers. A task we sports medicine professionals should pick up. After all, the relationships between load, load capacity, performance and health is a topic of contemporary interest in both sports science and sports medicine. With what intensity should an athlete train to achieve the best physiological response? How much (or little) can an athlete train without detrimentally affecting health?

III. HOW THIS COULD WORK IN PRACTICE

This approach outlines that the modifiable factors of load and load capacity, and the outcomes of performance and health are interlinked. Any change in one component of the model will affect the others. Consequently, the various components must be considered together; adaptations in load alone will be insufficient to optimize performance while protecting athletes' health. As an example, Møller et al.[7] showed that handball players with reduced external rotational strength or scapular dyskinesis could withstand a lower increase in weekly handball load, as compared to players without such shoulder deficits. One could either adapt the load to the capacity of each player or improve the shoulder function of affected players; or preferably both. Another example is given by Gabbett [8] who described for rugby league players how the relationship between training load and injury risk fluctuates throughout the various phases of a competition season. This study illustrated the need to adapt training session content and intensity to the capacity of the players, which vary over the stages of a season.

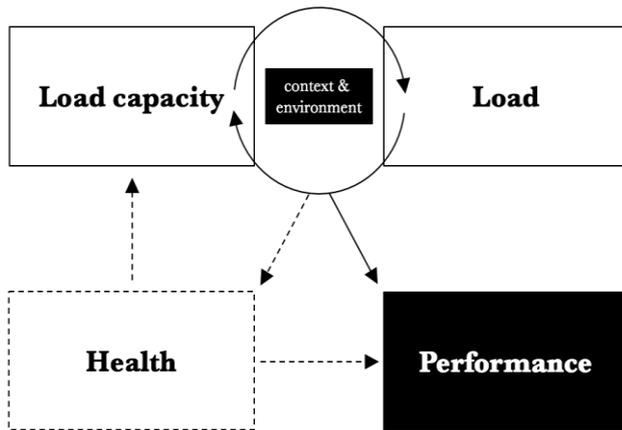


Fig. 1. An integrated view on load capacity, load, performance and health in sports. Dotted lines represent negative relationships. Adapted from Verhagen and Gabbett [4].

IV. WHERE TO NEXT?

In order to better understand the relationships between components and their strength and temporality, continuous and prospective monitoring is needed on each aspect. Such monitoring should not focus solely on objective physiological measures, but should also take into account subjective (athlete reported) outcomes (e.g. RPE), psychological measures (e.g. stress, coping mechanisms), and lifestyle related factors such as diet, sleep, etc. This implies that many stakeholders within a sports context are involved in each of the model's components and should register necessary parts of information; load could be measured by one practitioner (e.g. sport scientist), performance by another (e.g. strength coach), capacity by another (e.g. physical therapist/athletic trainer). In current practice – to a certain extent – such parts of information are already registered. However, each stakeholder records “their” results in their own system where it does not connect to other available information. As such, we need to

move to an integrated approach that holistically encapsulates various load, capacity, performance and health aspects. Such an approach was previously envisioned by Verhagen and Bolling [9] who proposed athletes, coaches and medical staff to feed information into a monitoring system. Information is then aggregated and made available for each stakeholder, tailored to their need. Research, in turn, can access the aggregated (big) data for analysis aimed at optimizing performance while protecting the athlete's health. To have an edge on our competitors we have to keep our athletes healthy ... healthy athletes win medals.

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