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### The use of sports science in preparation for Olympic competition

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## EDITORIAL

# The use of sports science in preparation for Olympic competition

The Olympic Games represents the pinnacle of most athletes' careers and as the memories of Beijing 2008 fade, the focus now is very clearly on Vancouver 2010 and London 2012 and the preparation programmes that will lead to optimal performance.

Over the last 25 years, there has been a significant growth in the importance of sports science in assisting, improving, and monitoring athlete preparation for the Olympic Games. Most individual athletes and teams will have several sport scientists who are integral to both the preparation phase and at the Olympic Games themselves. In this special issue, we have brought together a number of review papers from several disciplines with a coherent focus on optimizing preparation for Olympic competition. More specifically, the papers in this issue cover fatigue management, the influence of technology, skill acquisition, physiological monitoring, talent identification and development, and psychological preparation. What is clear from the literature is that despite the increased involvement from the sport sciences, there is still a considerable lack of information on Olympic athletes with most of the literature describing good, but not Olympic, athletes. The gathering of detailed information on Olympic athletes is difficult due to the risk of disrupting preparation programmes, the very small number of participants, and the statistical difficulties in assessing worthwhile change at this elite standard of competition. In particular, these difficulties make the evaluation of different preparation strategies and the associated advice given to athletes and coaches extremely problematic.

The starting point on the path to Olympic success is a talent identification programme and despite the proliferation in national talent identification programmes across the globe, the accurate identification of suitable Olympic talent is difficult. Nonetheless, these programmes have become more sophisticated, changing their focus towards slightly older athletes and developing the concept of talent "recycling" from other sports. In this special issue, Vaeyens and colleagues demonstrate that the literature does not support the concept of talent identification and sport specialization at a very early age. While there may be

some differences between sports, the general finding is that most successful Olympic athletes have not been produced through a long-term, early specialization, talent development programme. It would appear that exposure to good instruction/coaching at a young age in a range of sporting disciplines with specialisation and exposure to international competition at a later age may prove a more optimal route to Olympic success. Vaeyens and colleagues also explore the concepts of talent recycling as a method of extracting further value from national talent identification and development programmes. Clearly, some sports are more suited to talent recycling and it would seem to be efficient for such clusters to develop to enhance the transfer process. However, there is limited research to underpin the optimal strategies for talent transfer and development in that new sport, thus further work is required.

Williams and Ford argue that there are clear perceptual-cognitive differences between some "donor" and "target" sports and that further work on skill acquisition is required to better understand the chances of success in any "talent swap" programme. Regardless of the route to Olympic competition, all athletes will have spent a considerable amount of time, thought to be at least 10 years, perfecting their skill to compete at that level. Coaches and athletes will often comment on the importance of practice, yet Williams and Ford argue that the use of a "skill-acquisition specialist" is not as well acknowledged as some of the more traditional sport science disciplines. In their paper, they state that "not all forms of practice are of equal value in developing the skills needed to compete at the highest level of competition", thus there is a need for detailed analysis that determines the most effective strategies to develop expertise. The authors use examples to demonstrate the important role that may be played by a skill-acquisition specialist in conjunction with the coach in optimizing preparation for Olympic competition. Improvements in measurement techniques has led to a better understanding of the components of expertise in areas like visual search behaviours, which can then be used to design suitable intervention strategies. Williams and Ford also highlight that the skill-acquisition specialist

not only can help the athlete but can also assist the coach to improve his or her coaching style and methodology so that it is more specifically targeted towards the elite Olympic performer. This would, for example, include optimizing strategies to best convey information to athletes, structure practice, and provide feedback. In addition, an analysis of participation development models adopted by many governing bodies highlights that these models may not be fully supported by recent empirical evidence from the skill-acquisition literature.

Gould and Maynard (2009) review key elements of psychological preparation and recognize that there is considerable information in the literature on Olympic athletes and teams. However, much of this information is gained through descriptive and retrospective data collection methods and, consequently, suffers from some of the recognized shortcomings associated with such methods. The authors suggest that more information is required to examine how best to use this information in conjunction with theoretical frameworks on how to effectively achieve an optimal preparation strategy and performance from a psychological perspective. They also note that “successful Olympic performance is a complex, multivariate, long-term and fragile process that requires extensive planning and painstaking implementation . . . Attention to detail is important, but it must also be accompanied by flexibility to deal with unexpected events” (Gould et al., 1998, pp. 10–11).

In addition, there is a clear need for athletes to develop a range of suitable psychological skills specifically to deal with the Olympic environment while competing at the Games themselves. A key component is the planning element, which, in most cases, involves a very detailed evaluation of the unique differences of the Olympic experience compared with other more established competition preparation routines. An example of this was highlighted by Gould and Maynard when referring to the work of Hung et al. (2009), who recommended the use of bouts of sleep deprivation to learn how to deal with the debilitating effect of insomnia on performance in the Olympic environment.

Fatigue is a feeling often experienced by athletes and is a necessary component to stimulate appropriate adaptation to reach peak physical performance but, “when athletes are in optimal condition they are ‘fragile’ and can easily become ill or overtrain; and because of Olympic pressure to perform, there is a tendency to prepare too much in an effort to get the ‘edge’ and in doing so not take enough mental and physical breaks” (Gould and Maynard, this issue). Thus the balance between an appropriate amount of fatigue and overtraining and over-reaching is a delicate and fragile one, particularly for athletes who compete at Olympic level. The monitoring and

subsequent management of this should be crucial to any athlete programme in preparation for the Olympics. In this special issue, Robson-Ansley and colleagues provide examples and critique a range of tools that can be used to monitor fatigue effectively throughout a preparation programme. As each athlete responds differently to training loads, it is vital to incorporate tools to monitor fatigue into the programme to minimize the risk of excessive fatigue. However, even with a monitoring programme it is still possible that athletes will experience excessive fatigue and Robson-Ansley and colleagues provide a review of the strategies to manage both short-term and general fatigue.

Technology plays an increasing part in elite sporting performance with probably the most notable being the “fastskin” swimsuit, which has had a noticeable impact on swimming world records. Haake and colleagues (2009) examine specific examples from the 100-m sprint, pole vault, javelin, and cycling to demonstrate the impact that technological advances have had from the 1890s to the present day. In their paper, they explore the development of a performance improvement index as a tool to evaluate the potential impact of technology on the improvement of World record and Olympic winning performance over time.

Sports physiology probably has one of the longest associations with athlete preparation for Olympic competition and most governing bodies have well-established physiological testing methodologies. However, Davison and colleagues (2009) rightly point out that most of the testing methodologies were developed using good but not Olympic standard athletes, and thus many tests may not be sensitive enough to measure the very small differences that exist between Olympic competitors. It is recognized that the difference between finalist and gold medallist probably only represents a performance difference of about 1%, and therefore it is vital that the physiologist involved in monitoring Olympic athletes has a very detailed understanding of the error in any of the physiological tests they undertake. Davison and colleagues consider the most common physiological tests of aerobic and anaerobic fitness, flexibility, body composition, and strength, highlighting their individual strengths and weaknesses. In addition, they stress the importance of careful selection of the physiological support package to suit the needs of the individual athlete so as to provide the critical information at the appropriate stage of the preparation cycle.

Overall, the eclectic mix of papers from the different sports science disciplines presented in this special issue provide a good overview of how science can impact on the selection, training, and preparation of Olympic athletes. In light of the ever-decreasing margins between success and failure, it is likely that science will play an increased role in

ensuring that athletes are prepared optimally for the demands of Olympic competition.

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## References

- Gould, D., Guinan, D., Greenleaf, C., Medbery, R., Strickland, M., Lauer, L., et al. (1998). *Positive and negative factors influencing U.S. Olympic athletes and coaches: Atlanta Games assessment*. Colorado Springs, CO: US Olympic Committee Sport Science and Technology Final Grant Report.
- Hung, T.-M., Lin, T.-C., Lee, C.-L., & Chen, L.-C. (2008). Provision of sport psychology services to Taiwan archery team for the 2004 Athens Olympic Games. *International Journal of Sport and Exercise Psychology*, 6, 308-318.