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Optimizing Visual Performance for Sport

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Keywords

• Visual performance evaluation • Refractive options • Sport filters • Carotenoids
• Sports vision training • Component skill training • Naturalistic training

Key points

- To optimize visual performance in an athlete, a reliable and ecologically valid evaluation of relevant visual performance abilities should be performed.
- Optimal refractive compensation is predicated on a careful evaluation of refraction, with consideration for sport demands and method of refractive compensation.
- Filters and nutritional guidance can benefit the athlete by reducing glare disability, and enhancing photostress recovery and contrast sensitivity.
- Sports vision training programs can enhance vision and visual performance factors through component skill and naturalistic training options.

INTRODUCTION

In the world of sports, pursuit of optimal performance is pervasive. Most of the focus is on development of requisite physical abilities, such as strength, speed, agility, and endurance. The other major focus is on skill development for specific sport applications, often requiring significant repetition with feedback about optimal biomechanics. Depending on the sport, athletes also may work on the psychological issues that can impede or enhance performance. The role of visual performance factors in sports has received a fair amount of attention over the years; however, many athletes still have limited access to evaluation and enhancement approaches.

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Vision and visual processing are recognized as important components for successful athletic performance. Former football coach Blanton Collier is credited with the quote, "The eyes lead the body." This quote, along with many others, highlights the importance of vision in guiding performance. The process of optimizing vision and visual processing skills begins with a reliable evaluation of those factors that are identified as valuable for relevant sport tasks. Because the visual demands critical to success in sports can vary tremendously, a thorough visual task analysis should be conducted for each sport and sport position. An effective visual performance evaluation helps to identify what visual factors would provide the most benefit from enhancement.

The most common options considered for optimizing visual performance include refractive compensation, filters, nutrition, and sports vision training (SVT). The goal of these interventions is to remediate any vision conditions, such as refractive error, and to enhance the athlete's visual performance factors that may be less developed than those of their peers. SVT approaches often isolate visual factors to allow repetitive practice with increasing levels of demand and integration, so that sport performance has the potential to benefit from better vision and visual processing.

With advancements in digital and virtual reality (VR) technologies in recent years, there has been a surge of innovation in instrumentation to evaluate and train visual performance factors for sports. Because these technological innovations are relatively new, there often is limited research available to determine the validity and efficacy of these tools. Although this article is not a critical review of the evidence-based research in this area, a summary of the existing published research is provided to support the effectiveness of the instruments discussed. Ultimately, the goal is to help the athlete to see their sport better; and there are several key aspects to consider for achieving that goal.

ASSESSMENT OPTIONS

The professional literature is rich with studies that demonstrate that high-achieving athletes perform better than nonathletes or lower-performing athletes on various measures of visual, perceptual, cognitive, and motor abilities. Two separate meta-analyses of the sports expertise literature have concluded that higher-achieving athletes are better able to detect perceptual cues, make more efficient eye movements, and perform better on measures of processing speed and attention compared with less accomplished athletes or nonathletes [1,2].

Development of visual and cognitive expertise depends on the demands of the sports experience of each athlete because these demands can be quite variable across the vast array of sports. For example, stereopsis is an important vision factor for performance in many sports but may have limited relevance for shooting sports in which the athlete sights monocularly. Furthermore, stereopsis is commonly assessed at a near distance but the stereopsis demands in most sporting situations are at relatively far distances. This example highlights the importance of a careful visual task analysis of the sport demands, and need