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## **Research & Evidence for Sports Vision**

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At a primary care level, optometric sports vision involves comprehensive assessment of a sports participant's vision function and ocular health, in relation to their visual activities in everyday life, at work or in study, and involvement in sport. In relation to sport, the visual demands of the particular sport are analysed, and firstly prescriptive aids (spectacles and contact lenses) are prescribed to ideally meet the sport's visual demands, for example in shooting, archery and snooker.

As well, it is incumbent on an optometrist to provide eye protection where indicated, for participation in sports which are eye safety hazardous, particularly squash, cricket and indoor cricket, hockey and basketball.

At the next level, an optometrist can detect visual dysfunctions which potentially can interfere with a person's ability to use their vision to perform in sport to their potential. This may include deficiencies in binocular vision, such as high exophoria or esophoria, and even subtle or overt strabismus, which can interfere with spatial localisation of a target or ball, decrease depth perception, and cause delays in changing accommodation-vergence from near to far to near, as in tennis, squash, cricket and baseball. These visual dysfunctions can be treated, as detailed above, to remove visual dysfunctional impediments to using vision optimally for sports performance.

At another level, a number of practitioners (non-behavioural and behavioural) in Australia and overseas provide assessment of visual-spatial- motor abilities, (including visual reaction times, eye hand coordination and speed, depth perception and tracking



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eye movements), which can potentially impact on sports performance and an athlete's potential at an elite level. Deficient visual abilities which are correlated by the optometrist, player and coach may be improved using vision therapy.

Kundson and Kluka reviewed how visual abilities affect sport performance and the acquisition of motor skills, and can be improved with training. They summarize important vision information related to performance in sport and show how vision training improves performance <sup>1</sup>.

In Germany, Schwab and Memmert conducted research demonstrating that certain visual abilities of youth field hockey players, such as the peripheral perception or the choice reaction time are trainable and can be improved by means of an appropriate visual training <sup>2</sup>.

Erickson authored a textbook on sports vision, applying an evidence-based approach to assessment and treatment procedures as well as outcome expectations <sup>3</sup>.

Maman, Gaurang, and Sandhu studied the effects of vision training on performance of collegiate tennis players. This was a prospective, randomized clinical trial that included a placebo and control group. The experimental group underwent eight weeks of vision training three days a week for 30 minutes each. The placebo group was instructed to watch televised tennis matches, while the control group was not given any training. At the end of eight weeks' training, the pre-training evaluation protocol was repeated. Pre- and post-test results were obtained for reaction time, depth perception, accommodation, saccadic eye movements and tennis performance. The statistical analysis indicated significant improvement in all mentioned visual variables in the experimental group ( $p < 0.001$ ) and the placebo group ( $p < 0.01$ ), and non-significant results in the control group <sup>4</sup>.



Clark and colleagues published research indicating that vision training can improve batting performance as well as depth judgement of baseball players at the collegiate level<sup>5 6</sup>.

There is a significant body of work in the specific sports vision literature over the last 30 years, and there are studies suggesting additional work is justified, and considerable work is being done by Professor Paul Harris at the Southern College of Optometry in the USA.

Zwierko T (2015)<sup>7</sup> in a study testing how binocular vision was influenced by an eye training program that may be used to improve individual's oculomotor function, showed that results of the retention testing conducted four weeks after the experiment confirmed the effectiveness of the vision training program. The results of the study suggest that binocular functions are trainable and can be improved by means of appropriate visual training.

In summary, sports vision care is an integral part of everyday optometric care, involving assessment of visual dysfunctions, and prescription of spectacles, contact lenses and protective eyewear, where indicated. Deficient visual abilities may have an effect on sports performance, and can be treated with vision therapy.

## References

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<sup>6</sup> Clark JF, Graman P, Ellis JK. Depth perception improvement in collegiate baseball players with vision training. Optom Vis Perf 2015;3(2):106-15.

<sup>7</sup>Zwierko T, Puchalska-Niedbał L, Krzepota J, Markiewicz M, Woźniak J, Lubiński W. The Effects of Sports Vision Training on Binocular Vision Function in Female University Athletes. J Hum Kinet. 2015 Dec 30;49:287-96. doi: 10.1515/hukin-2015-0131. eCollection 2015.