



Attitudes towards visual correction in sport: What coaches, physical education teachers and sports physicians think

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ABSTRACT

Purpose: To evaluate sport professionals' attitudes towards visual correction in sport.

Method: A questionnaire was handed out in schools, gyms, sports centres and universities, to coaches, physical education teachers and final year students of motor science. The questionnaire was given to one group of sport physicians prior to a 1-day scientific update course on the benefits of contact lenses (CLs) in sport. At the end of the course, certain questions from the questionnaire were given out again in order to evaluate the effect of the update on their opinions.

Results: A total of 245 questionnaires were collected. The interviewees stated that correcting a vision defect during sports practice was important, but their propensity to suggest CLs for sport, though still rather high in value, showed a statistically significant drop. This drop did not occur if the CLs were recommended for competitive sports. This trend remained unchanged if a specific judgement was requested for the adolescent category. The tendency to suggest CLs was higher in CL wearers as compared to non-wearers. The sport with the lowest recommendation of CLs was swimming. In the sample of sports physicians, a specific education on the subject of CLs increased the propensity to adopt CLs in sports.

Conclusions: The main "actors" in the sports sector regard correcting a vision defect during sport to be important. Nevertheless, their tendency to suggest CLs is significantly lower. Works that make these categories aware of the benefits of CLs in sport can certainly help to fill this gap.

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1. Introduction

Motor responses are mainly driven by the visual system and this is the reason why an uncorrected refractive error can impair visual information processing. The development of contact lenses (CLs) was welcomed as a miracle by many athletes and sportsmen [1]. The reasons for this are certainly the greater freedom in motor actions and the visual benefits that CLs provide during motor activity with respect to glasses [1,2].

The incidence of refractive error among athletes is similar to that found in the general population, which means that those who practice sport do not necessarily have a lower incidence of refractive error or vision problems [3]. Moreover, the practice of sport is quite widespread: in 2004, 38% of European Union citizens stated that they practised sport at least once a week [4]. These points may well explain why sport is the second most important reason that prompts initial application of CLs [5].

An extremely important role in the use of CLs may also be played by vision specialists and other potential categories, such as sport professionals: trainers, physical education teachers, sports doctors, particularly if they are aware of the benefits of sight correction using CLs when taking part in sports.

For instance, following the Health Belief Model [6], specialised professionals could highlight the advantages of the use of CLs when practising sports.

On the other hand there might be some resistance to recommending the use of CLs during water activities, due to problems of safety and efficacy that have been stressed in the literature [7–10].

The aim of this work is to evaluate the attitude towards visual correction in sport among professionals in the sports sector.

2. Method

Sport professionals' attitudes towards visual correction in sport were evaluated using a questionnaire that was anonymously completed. The questionnaire was made up of three different questions (items):

1. the importance of visual correction in sport;

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Table 1
Mean scores and standard deviation of the items used to measure the attitudes towards visual correction in sport in the “age-independent” condition and in the “teens” condition for the overall sample (first row), CLs use (second and third row), and in the four professional categories.

| | Number of subjects | Attitudes towards visual correction in sport in the “age-independent” condition | | | | Attitudes towards visual correction in sport in the “teens” condition | | | | |
|-----------------------------|--------------------|---|---|---|--|---|---|--|---|-------------|
| | | Importance of visual correction in sport | Recommendation of CLs for sporting activity | Recommendation of CLs for competitive sporting activity | Importance of visual correction in sport | Recommendation of CLs for sporting activity | Recommendation of CLs for competitive sporting activity | Importance of visual correction in sport | Recommendation of CLs for competitive sporting activity | |
| Overall | 245 | 4.96 ± 0.87 | 4.66 ± 1.05 | 5.00 ± 1.08 | 4.95 ± 0.90 | 4.59 ± 1.07 | 4.85 ± 1.05 | 4.95 ± 0.90 | 4.59 ± 1.07 | 4.85 ± 1.05 |
| Overall CL Wearers | 71 | 5.23 ± 0.83 | 5.03 ± 0.81 | 5.44 ± 0.72 | 5.03 ± 0.97 | 4.84 ± 0.86 | 5.15 ± 0.86 | 5.03 ± 0.97 | 4.84 ± 0.86 | 5.15 ± 0.86 |
| Overall non-CL Wearers | 174 | 4.86 ± 0.87 | 4.52 ± 1.11 | 4.80 ± 1.16 | 4.91 ± 0.88 | 4.48 ± 1.14 | 4.71 ± 1.11 | 4.91 ± 0.88 | 4.48 ± 1.14 | 4.71 ± 1.11 |
| Coaches | 94 | 5.01 ± 0.90 | 4.62 ± 1.11 | 4.93 ± 1.16 | 4.94 ± 0.98 | 4.50 ± 1.13 | 4.77 ± 1.15 | 4.94 ± 0.98 | 4.50 ± 1.13 | 4.77 ± 1.15 |
| Physical education teachers | 32 | 5.09 ± 0.78 | 4.94 ± 0.95 | 5.39 ± 0.80 | 5.34 ± 0.60 | 4.87 ± 1.02 | 5.19 ± 0.95 | 5.34 ± 0.60 | 4.87 ± 1.02 | 5.19 ± 0.95 |
| Sport physicians | 54 | 5.19 ± 0.65 | 4.87 ± 0.88 | 5.10 ± 0.88 | 5.21 ± 0.63 | 4.85 ± 0.84 | 5.02 ± 0.80 | 5.21 ± 0.63 | 4.85 ± 0.84 | 5.02 ± 0.80 |
| Motor science students | 65 | 4.63 ± 0.96 | 4.42 ± 1.10 | 4.80 ± 1.18 | 4.57 ± 0.95 | 4.38 ± 1.13 | 4.65 ± 1.09 | 4.57 ± 0.95 | 4.38 ± 1.13 | 4.65 ± 1.09 |

- the recommendation of CLs for sport activities;
- the recommendation of CLs for competitive sport activities.

The above three items were then repeated for each of the three different conditions listed below, giving a total of 9 items:

- sports regardless of age;
- teenage sports;
- the single principal sport of the interviewee, regardless of age.

For each item, respondents rated their answers on a 6-point Likert scale that ranged from 1 (disagree completely) to 6 (agree completely).

The questionnaire was distributed to coaches, physical education teachers, final year students of Motor Science at schools, gyms, sport centres and University faculties in two Italian regions.

In order to see how education in CLs altered the attitudes of respondents, the questionnaire was also distributed to a group of sports physicians during a meeting that discussed the benefits of CLs in sport. At the end of the meeting two items were re-tested using an electronic voting system. All demographic data was collected in the initial section of the questionnaire.

3. Statistical analyses

Analyses of responses are presented descriptively. Specific matched pair comparisons of responses were undertaken using the Mann–Whitney *U* and Wilcoxon Signed Ranks. A General Linear Model (GLM) with repeated measurements was performed to analyse the relationship between professional categories and the attitudes towards visual correction in sport. Again, GLM for repeated measurements was performed in order to test the relationship between the principal sport of interviewees and their attitudes towards visual correction in sport. Statistical significance was accepted at $p < 0.05$ level.

4. Results

A total of 245 completed questionnaires were returned (out of approximately 400 distributed). The sample (mean age 33.4 ± 11.7 years; 77 females and 168 males) was made up of:

- 94 coaches;
- 65 final year motor science students;
- 54 sports physicians;
- 32 physical education teachers.

Among those interviewed, 126 (51.4%) stated that they had a sight problem and 71 (29%) that they used CLs (approximately 1 in 2 of those with vision defects). With regard to the specific principal sport for each of those interviewed, a total of 21 different sport disciplines were indicated. Those with the highest number of preferences were football ($n = 41$), swimming ($n = 41$), volleyball ($n = 27$) and basketball ($n = 18$).

4.1. Overall attitudes towards visual correction in sport

Table 1 shows the averages and the standard deviation of the variables examined for the age-independent condition and for the teenage range condition, respectively.

The results for the overall sample show that interviewees consider the correction of a vision defect when taking part in sports (regardless of age) to be of significance (4.96 ± 0.87) but the tendency to suggest CLs for use during sport, although fairly high (4.66 ± 1.05), shows a statistically significant drop ($p < 0.05$;

Table 2

Mean scores and standard deviation of the items used to measure the attitudes towards visual correction in sport in the “age-independent” condition as a function of the interviewee’s principal sport. Only the four sports most frequently mentioned by interviewees have been taken into consideration.

| | Number of subjects | Attitudes towards visual correction in the interviewee’s principal sport for the “age-independent” condition | | |
|------------|--------------------|--|---|---|
| | | Importance of visual correction in sport | Recommendation of CLs for sporting activity | Recommendation of CLs for competitive sporting activity |
| Basketball | 18 | 5.22 ± 0.65 | 4.61 ± 0.92 | 5.11 ± 0.96 |
| Football | 41 | 4.78 ± 0.96 | 4.59 ± 1.12 | 4.85 ± 1.01 |
| Swimming | 41 | 4.49 ± 1.14 | 3.83 ± 1.55 | 4.07 ± 1.51 |
| Volleyball | 27 | 5.48 ± 0.75 | 5.32 ± 0.85 | 5.32 ± 0.69 |

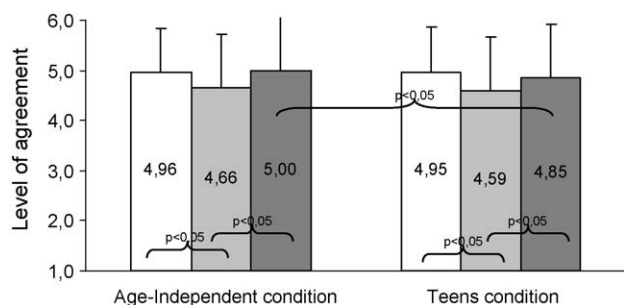


Fig. 1. Mean level of agreement (height of histogram) ± SD (bar) of the overall sample beliefs about importance of visual correction in sport (white), the recommendation of CLs for sporting activities (light grey) and the recommendation of CLs for competitive sporting activities (dark grey) respectively. The findings requiring an opinion regardless of age are shown in the left, while the findings for the three items requiring the opinion about the teens are shown in the right. Only significant Wilcoxon matched pair comparisons ($p < 0.05$) are indicated in the graph.

Wilcoxon matched pair test) (Fig. 1). This drop is not seen if CLs have to be prescribed for competitive activities (5.00 ± 1.08). This trend in the attitude of the interviewees remains unchanged when a specific opinion is requested for the teens category (Fig. 1).

With regards to the comparison between the two different conditions reported in Fig. 1 (age-independent condition and teens condition) only the matched pair comparison between the recommendation of CLs in competitive sports was found to be significantly different (higher in age-independent condition) ($p < 0.001$; Wilcoxon matched pair test).

4.2. Relationship between the professional category of the interviewees and the attitudes towards visual correction in sport

The last four rows of Table 1 report the averages and the standard deviation of the variables examined for the 4 professional categories (in the case of the age-independent condition and the teenage range condition).

In order to analyse the relationship between professional categories and attitudes towards visual correction in sport for the age-independent condition, a General Linear Model (GLM) for repeated measurement was performed.¹ Results show that both main effects were significant, with the attitudes towards visual correction in sport as within factor ($F(2, 450) = 15.2$; $p < 0.001$) and Professional category as between factor ($F(3, 225) = 4.26$; $p < 0.01$), while interaction resulted non-significant ($F(6, 450) = 0.89$; $p = 0.49$) (see Fig. 2). Matched pair comparisons of the main effects on attitudes to visual correction in sport show that the mean difference between the importance of visual correction, and the recommendation of CLs during competitive sporting activi-

ties were not significant, while both the negative mean difference in recommendation of CLs during sport activity with the importance of visual correction (-0.29 , S.E. = 0.08; $p < 0.001$) and recommendation of CLs during sporting activities with recommendation of CLs during competitive sporting activities (-0.37 , S.E. = 0.05; $p < 0.001$) were significant. Matched pair comparisons of professional category once again showed that the final year students of motor science consider visual correction in sport less important than do sports physicians (-0.51 , S.E. = 0.17; $p < 0.01$) and physical education teachers (-0.48 , S.E. = 0.16; $p < 0.01$).

The same analyses was repeated for teen sports condition, with similar results: both main effects were significant, with the attitudes towards visual correction in sport as within factor ($F(2, 448) = 14.9$; $p < 0.001$) and Professional category as between factor ($F(3, 224) = 5.07$; $p < 0.01$), while interaction resulted non-significant ($F(6, 448) = 0.54$; $p = 0.78$). Matched pair comparisons of adolescents return a similar picture compared to the previous analysis: again only the mean difference in recommendation of CLs during sports activities with the importance of visual correction (-0.36 , S.E. = 0.08; $p < 0.001$) and recommendation of CLs during sports activities with recommendation of CLs during competitive sporting activities (-0.26 , S.E. = 0.05; $p < 0.001$) were significant. Slightly more complex are the matched pair comparisons of professional category: again the final year students of motor science consider the importance of visual correction in sport for teens less important than do sports physicians (-0.52 , S.E. = 0.17; $p < 0.01$) and physical education teachers (-0.59 , S.E. = 0.18; $p < 0.01$). Interestingly, also coaches consider the importance of visual correction in sport for teens less important compared to sports physicians (-0.32 , S.E. = 0.15; $p < 0.05$) and physical education teachers (-0.39 , S.E. = 0.17; $p < 0.05$).

4.3. Relationship between the single principal sport of the interviewees and the attitudes towards visual correction in sport

Table 2 shows the results according to the interviewee’s principal sport (the data only refers to the 4 sports most widely represented in the sample) for the age-independent condition.

Again, GLM for repeated measurement was performed in order to test the relationship between the principal sport of interviewees and their attitudes towards visual correction in sport. Results show significant main effects for the attitudes towards visual correction in sport ($F(2, 236) = 9.26$; $p < 0.001$) and sport ($F(3, 118) = 9.16$; $p < 0.001$) and non-significant effect for the interaction term ($F(6, 236) = 1.38$; $p = 0.22$) (Fig. 3). Matched pair comparisons of significant main effects for attitudes towards visual correction in sport once again show a significant effect only for average difference in the recommendation of CLs during sports activities, with the importance of visual correction in sport (-0.42 ; S.E. = 0.11; $p < 0.001$) and with the recommendation of CLs during competitive sporting activities (-0.29 ; S.E. = 0.06; $p < 0.001$), and no significance in average difference between the importance of visual correction in sport and recommendation of CLs during competitive sport-

¹ Analysis was performed using listwise deletion of participants. Thus, only 229 subjects were processed as 16 have missing values on at least one variable.

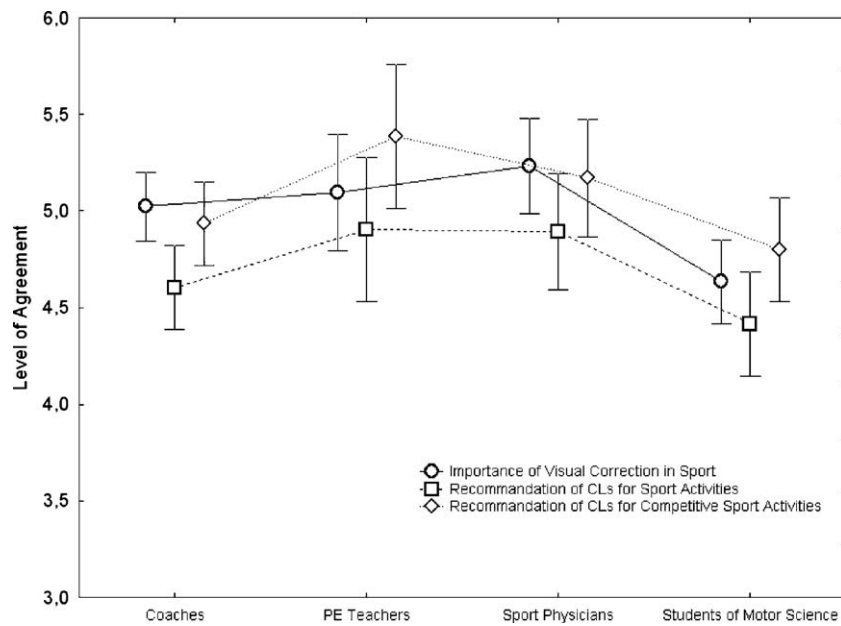


Fig. 2. Relationship between the attitudes towards visual correction in sport (three items) and the professional categories in the condition of age-independent sporting activity. Both main effects were significant while interaction was not.

ing activities as reported for the general sample. Principal sport comparisons of the main effects show that swimming has a significant negative difference from all other sports: basketball (-0.89 ; S.E. = 0.28 ; $p < 0.01$), football (-0.60 ; S.E. = 0.21 ; $p < 0.01$) and volleyball (-1.20 ; S.E. = 0.24 ; $p < 0.001$). Moreover, in volleyball CLs are suggested more than in football (average difference = 0.61 ; S.E. = 0.25 ; $p < 0.05$).

4.4. Knowledge about CLs and attitudes towards visual correction in sport

If the interviewees are divided according to whether or not they use CLs (Table 1 and Fig. 4) it can be seen that, while within the group of non-wearers the relations between variables are similar

to those in the general situation (see Fig. 1), for CLs wearers the difference between the importance of visual correction in sport and CLs recommendation during sports activity disappears, and only the difference between CLs recommendation during sports activity and CLs recommendation during competitive sports activity remains significant ($p < 0.001$; Wilcoxon matched pair test). Similarly, comparison of the two groups shows that all the variables are significantly higher in the group of CL wearers as compared with non-wearers ($p < 0.01$; Mann-Whitney *U*-test).

Fig. 5 shows the comparison between two of the research variables, tested in a group of sports physicians before and immediately after a training day on the benefits of optical correction and CLs in sport. While the opinion on the importance of correction in sport does not change, the recommendation to use CLs undergoes a sig-

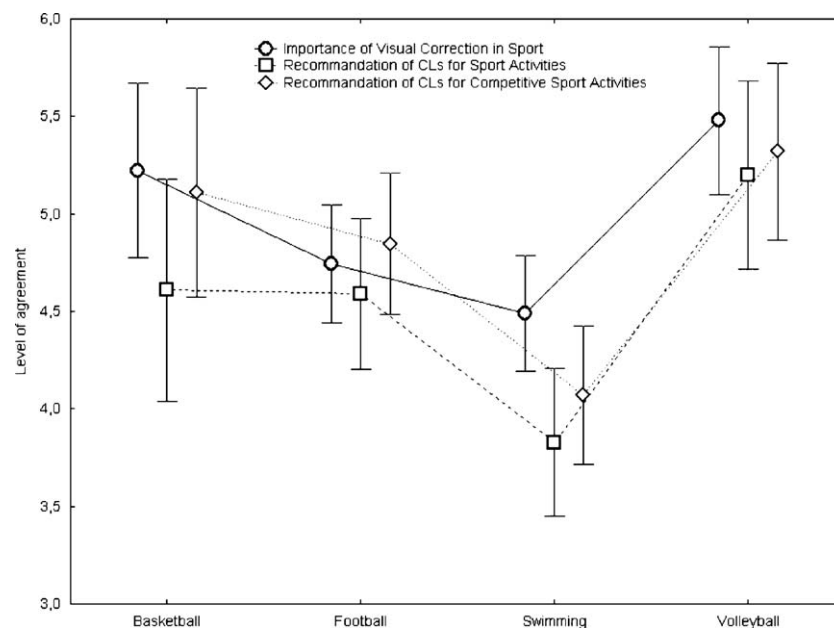


Fig. 3. Relationship between the attitudes towards visual correction in sport (three items) and the principal sport of interviewees in the age-independent sporting activity condition. Both main effects were significant while interaction was not.

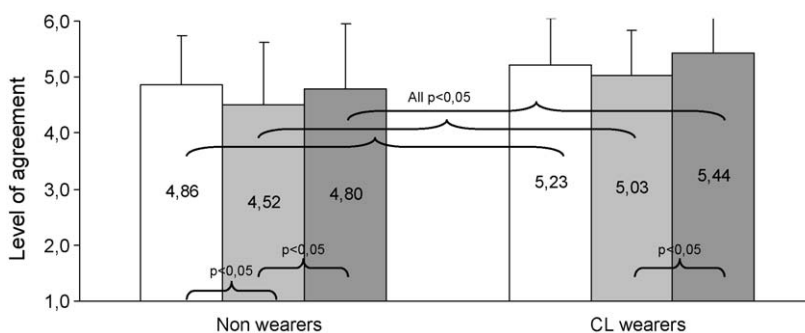


Fig. 4. Mean level of agreement (height of histogram) \pm SD (bar) of beliefs about importance of visual correction in sport (white), recommendation of CLs for sporting activities (light grey) and recommendation of CLs for competitive sporting activities (dark grey), respectively. The findings from the non-wearers are shown in the left. The findings from CL wearers are shown in the right. Only significant Wilcoxon matched pair comparisons ($p < 0.05$) are indicated in the graph.

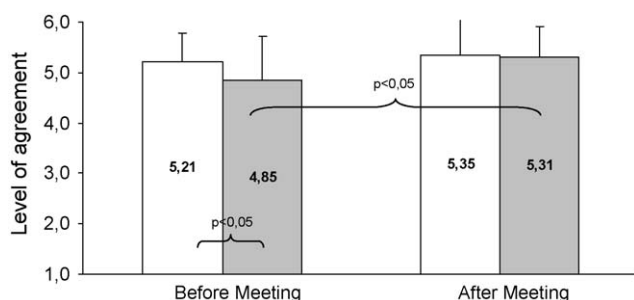


Fig. 5. Mean level of agreement (height of histogram) \pm SD (bar) of the sports physicians sample beliefs about importance of visual correction in sport (white), recommendation of CLs for sporting activities (light grey). The findings before the update meeting on the benefits of CLs in sport are shown in the left. The findings after the meeting are shown in the right. Only significant Wilcoxon matched pair comparisons ($p < 0.05$) are indicated in the graph.

nificant change after taking part in the training event ($p < 0.01$; Mann–Whitney U -test).

5. Discussion

The results of the investigation show that, although the “actors” in the sports sector (coaches, physical education teachers, final year motor science students and sports physicians) consider visual correction during sporting activities important, their tendency to recommend CLs for this purpose is less significant. This difference might represent an indication of persistent prejudice towards CLs connected to a lack of knowledge about them. The results relating to the effect of an educational update on the significance of vision in sporting activities and the specific advantages of CLs appears to support this hypothesis: the difference between conviction of the importance of optical correction in sport and the tendency to recommend CLs for sport disappears completely. Further confirmation of this is also given by the fact that CL-wearing interviewees had a much higher tendency to recommend CLs (both for normal and competitive use) than did non-wearers.

Another interesting point that emerged in the study is that the results described do not differ even if interviewees are requested to express an opinion specifically relating to adolescents. It is obvious that for the sample under examination the fact of being an adolescent does not modify the general attitude to CLs, something that, on the contrary, was highlighted recently for the parents of adolescents [11]. However, it is necessary to consider that the sample analysed in this study is over 10 years younger than that considered in the paper by Zeri et al. [11], and is not made up of the parents of adolescents. Sport professionals appear to be basically aware of the importance of CLs in sport for young people, as confirmed for adolescents and pre-adolescents in recent studies [12,13].

Also, an effect based on professional category was seen for the overall attitude towards vision correction in sport: students of motor science considered it less important than other categories. This effect might be connected to their more limited direct experience, or to a lesser knowledge of the benefits that vision correction has in sport.

The results also highlight the effect of the sport itself on the variables under examination. Swimming was found to be the sport that is most likely to contrast the favourable tendency towards vision correction and in particular the use of CLs. This result confirms the initial suggestion that the problems of CL safety and efficacy in aquatic sports, emphasised in literature [7–10] might also have been picked up by professionals in the sports sector, resulting in a certain resistance to their use.

In conclusion, the main “actors” in the sports sector consider the correction of a vision defect when taking part in sports to be important. Their tendency to recommend CLs, however, is significantly lower. Actions to make these categories aware of the benefits that may be provided by CLs in sport may without doubt help to reduce this gap.

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