



Understanding Sports Eyewear to Enhance Performance and Ensure Safety



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Disclosures



- The content of this course was developed independently without commercial bias or influence
- Consulting
 - Essilor Instruments, USA
 - Visionix USA
 - Topcon Healthcare
 - Quest Vision Care Specialty Lab

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Kareem Abdul-Jabbar
Height 7'2"

H/O multiple corneal abrasions


- Starting in 1968 UCLA vs Cal
- Most notably 1974 Game 7 Celtics vs Bucks

Wore goggles until he retired in 1989



"MY HEIGHT IS MY GREATEST DISADVANTAGE
THAT'S WHY I WEAR GLASSES"

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Ato Boldon

- 2000 Olympics in Sydney, Australia
 - Silver Medal-100M race
- Oakley "Overthetop"

Weekend warrior to professional athlete

Modern sports eyewear

- High demand
- Difference b/t good & great
- Preventing a career ending eye injury

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Learning Journey Objectives

- Vision and Sports
- Sports Related Eye Injuries (SREIs)
- Sports Eyewear
 - Protection
 - Performance Enhancing Ophthalmic

Please use this presentation for staff training and review

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Vision and Sports



Everyone should be considered a potential athlete.

Sports Vision = field of vision care concerned with improving visual abilities related to the performance of a sport.



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Role of a Vision Care Specialist in Sports

- Comprehensive examinations
- Visual rehabilitation vs. vision therapy
- Coordination of care with other healthcare providers
- Safety & prevention
- Patient education

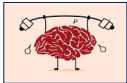
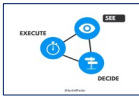



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Facts and Statistics

Fun Facts:

- 70% of the body's sensory receptors are in the eyes
- For athletes 80% of decision information is visual
- 90% of the brain is involved in vision-related tasks
- Elite athletes have superior visuomotor skills

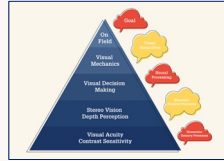


Contributions of Visuomotor Abilities to Interceptive Skills in Sports

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Sports and Performance Vision (SPV) Exam

- **Depth perception:** the ability to estimate visual distance
- **Dynamic visual acuity:** the ability to track objects in motion
- **Eye-hand coordination:** the ability to respond quickly and accurately to visual stimuli
- **Eye tracking:** the eye's ability to follow moving objects without moving the head
- **Eye focusing:** the ability to shift focus quickly among objects at different distances
- **Peripheral vision:** the ability to "see out of the corner of your eye"
- **Visual concentration:** ability to maintain focus on an object or target
- **Visual reaction time:** Speed of response to another's actions






The Sports Vision Pyramid
Developed by Dr. Daniel Laby

The Eye in Team










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Visual Demands

Similar visual skills for different sports

	Focus and tracking ●	Eye-foot coordination
	Timing	Peripheral vision and consciousness
	Anticipation	Visual reaction speed
	Split vision	Visualization
	Depth perception	Eye dominance
	Eye-hand-body coordination	Visualization
	Focus ●	Concentration
	Fixation	Peripetral sensation
	Focus and tracking ●	Eye-hand coordination
	Timing	Peripheral vision
	Anticipation	Consciousness
	Concentration	Visual reaction speed

Different visual skills for different sports

Cricket	Anticipation (batting) Hand-eye coordination (batting)	
Football	Foot-eye reflex time Peripheral awareness	
Archery	Visual acuity Gaze	
Sailing	Gaze recovery Ocular Mobility	
Table Tennis	Peripheral awareness Mobility Hand-eye response	
Snooker	Depth perception Vertebral facility	
Nethali	Stereopsis Peripheral vision	
Shooting	Contrast sensitivity Dynamic visual acuity	
Hockey	Dynamic visual acuity Hand-eye co-ordination	

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Sports-related Eye Injuries (SREIs)



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Sports-related Eye Injuries



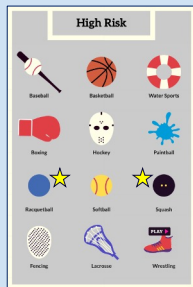
Not So Fun Facts:

- 43,300 sport related eye injuries treated in US EDs in 2024 (33% increase)
- 40% of all eye injuries are sports/recreational related
- 90 % of were preventable with protective eyewear
- 10% of TBI are sports related
- 35%-62% concussions are unreported in high school and college athletes

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9987204/>

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Risky Business: Risk Rating by NEI



IMO: Any racket sport should be considered a high risk sport

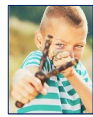
The National Eye Institute (NEI) was established by Congress in 1968 to protect and prolong the vision of the American people.
<https://www.nei.nih.gov/learn-about-eye-health/nei-for-kids/sports-and-your-eyes>

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Sports Related Eye Injuries (SREI)



Polo & Water Sports



Non-powder guns, Darts, Arrows, Slingshots



Basketball



Soccer

POP QUIZ Prevent Blindness				
Which sport has the highest number of SREIs by age group - 2023				
Activity	Age 0-4	Age 5-9	Age 10-14	Age 15+
Cricket & Water Sports	1,000	1,000	1,000	1,000
Non-powder guns, Darts, Arrows, Slingshots	4,000	1,000	1,000	1,000
Baseball	3,000	15	600	1,000
Soccer	2,700	200	800	1,000
Tennis, Weight Lifting	2,600	40	100	1,000
Football	2,500	30	800	1,000
Field Hockey	1,900	200	500	1,000
Handball	1,800	140	100	1,000
Other Sports & Recreational Activities	1,400	140	100	1,000
Playground Equipment	1,300	800	100	10
Recreational Activities	1,000	40	100	1,000
Boxing, Martial Arts, Wrestling	900	17	20	1,000
Golf	700	8	100	1,000
Other Ball Games	600	70	100	1,000
Swimming	500	100	100	10
All Terrain Vehicles (ATVs)	400	10	100	1,000
Fishing	400	10	10	1,000
Sports & Recreational Activity (All Other Categories)	300	8	200	10
Shooting, Gun Games	100	0	10	1,000
Other Sports	100	0	10	1,000
Total	20,400	2,000	2,000	12,000

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Pickleball

Invented 1965
Bainbridge Island, WA





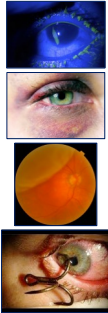
65-year-old actress
Michelle Pfeiffer
Hit by Pickleball

42% Of Players Are Over 65
Overall while the sport is trending upwards, the overall core player base is still rooted in the older demographics.



- Fastest growing racquet sport in US (158% increase participation)
- Fast-paced, close proximity
- Ball Speed 25-40 mph

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Most Commonly Treated SREIs By Age & Type of Injury

57,826 ECPs surveyed

Ranking by age of patients reporting with SREI

1st (53%)	2nd	3rd	4th	5th
13 - 19 yo	20 - 29 yo	≤ 12 yo	30 - 50 yo	≥ 50 yo

Most commonly treated SREIs

Corneal Abrasions	Blunt Trauma	Detached Retina	Penetrating Eye Injuries
72%	22%	3%	3%



2022 Jobson Optical Research Survey

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What about UV Exposure?

UV Surface reflectance

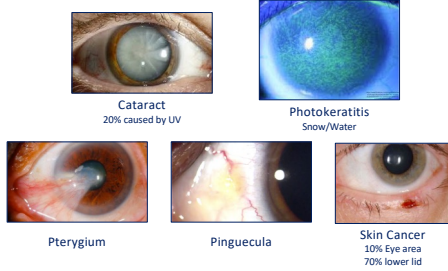
- Grass, Concrete, Soil 15%
- Sand 17%, wet sand doubles 34%
- Window/Windshields 20%
- Water 25-50%
- Snow 85%

- Kids spend 3X more time in the sun than adults.
- 70% of children do not wear sunglasses.
- 80% of UV exposure occurs by age 18.
- Lighter iris colors = higher risk of UV damage

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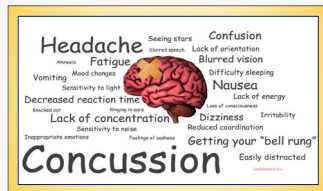
Consequences of UV Exposure



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Sports Related Concussions

- 380,000 sports related TBI/yr
- 300,000 from football
- 5 out of 10 unreported or detected
- 2 in 10 high school athletes
- 68,665 TBI deaths in 2023
- Concussion = Traumatic Brain Injury
- 90% will have visual symptoms



[Concussions: Vision and Your Eye Doctor](#)

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Severity of TBIs

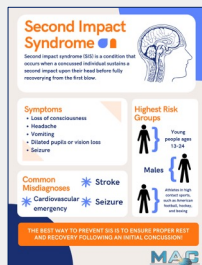
- | | |
|----------|---|
| Mild | • Often a concussion with temporary effects on brain cells. |
| Moderate | • Involves more serious, longer-lasting symptoms that may require intensive medical attention and rehabilitation. |
| Severe | • Can result in death or long-term complications and impairments. |

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Second Impact Syndrome (SIS)

# of Concussions	Likelihood of having another
1	1-2x
2	2-4x
3	3-9x

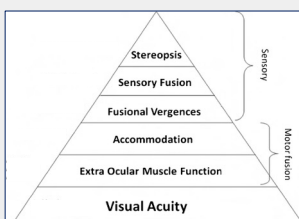
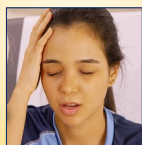
- Loss of brain function to self regulate cranial pressure
- Rapid severe brain swelling
- 50% mortality
- ~100% permanent damage
- 95% under 18 yo



Second Impact Syndrome: the Dangerous Effect of Multiple Concussions

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Post Concussion Vision Evaluation



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Types of Glasses for Post Concussion Therapy



Tinted
Photophobia/headaches



Blue Blocker
Decrease cortical overstimulation



Prism
Shift VF
Reduce HAs, dizziness
Improve balance




Binocular Occlusion
Reduce bilateral visual motion



Pinhole
Post Concussion VT-
Reduce eye strain

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Tinted Lenses

Yellow = Support pattern recognition
Red = Promotes relaxation
Blue = Increase alertness/decrease brain fog
Green = Reduce light triggered H/As

CAUTION: Everyone is different and may not respond the same way.

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Blue Blocking Lenses

- Post Concussion brains are hyper-activated
- Blue light increases brain activity
- Blue blockers help calm brain activity

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Prism Glasses

Fresnel prism = temporary during recovery for vergence dysfunction

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Binasal Occlusion Lenses



- TBI brainstem nerve fibers are disrupted
- Balance and orientation can be affected
- Helps with spatial orientation



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Pinhole glasses

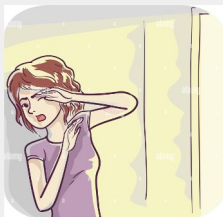


- Full exposure to light rays can be overwhelming
- Pinhole glasses reduce entering light

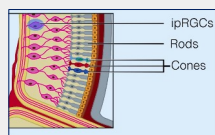
Caution: Reduce visual quality, no driving, heavy equipment, sports, etc.

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Headaches & Light Sensitivity



≥ 90% of TBI pts report HAs and Light Sensitivity



ipRGCs

Intrinsic Photosensitive Retinal Ganglion Cells (1927)

- Third class of photoreceptor cells in the retina
- Type of neuron, 1% of retinal ganglion cells
- Contain Melanopsin, light sensitive protein
- Sensitive to blue light wavelengths
- Fxn = circadian rhythm, pupil size, Mesopic vision

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Light Management Lenses

FL-41: Filters out blue light
FL-42: Filters out blue light and reduces glare
FL-43: Filters out blue light and reduces glare
FL-44: Filters out blue light and reduces glare
FL-45: Filters out blue light and reduces glare
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FL-95: Filters out blue light and reduces glare
FL-96: Filters out blue light and reduces glare
FL-97: Filters out blue light and reduces glare
FL-98: Filters out blue light and reduces glare
FL-99: Filters out blue light and reduces glare
FL-100: Filters out blue light and reduces glare

FL-41

- Filters out blue light
- Decreases brain activity

Avulux

- Filters out blue, amber and red light
- Transmits green light
- Decreases HA frequency/intensity

Theraspecs

- Light management lenses
- Diff. tint/diff lighting problems

Discontinuation Reduces Light Sensitivity

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Transmission Guidelines for Light Management

Light Transmission	Category	Use	Limitations
80%-100% (clear)	0	indoors / overcast day	none
43%-80% (light tint)	1	low sunlight	not for night driving
18%-43% (medium tint)	2	medium sunlight	not for night driving
8%-18% (dark)	3	bright sunlight	not for night driving
3%-8% (very dark)	4	exceptionally bright sunlight	not for day or night driving

Based on ANSI Z80.3-2018

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Just in case you haven't taken a vow of poverty.

2023 U.S. Market Share
[U.S. Protective Eyewear Market](#)
[Global Sports Market Overview](#)
[Statistica Sunglasses-United States](#)

Non-Rx Sunglasses
\$5.22 Billion

Sports Eyewear
\$3.58 Million

Protective Eyewear
\$823.6 Million

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Sports and Recreation Eyewear for Every Generation

Rank	Gen Z	Millennials	Gen X	Baby Boomers
1	Walking 79%	Walking 79%	Walking 85%	Walking 88%
2	Strength Training 49%	Strength Training 50%	Strength Training 41%	Strength Training 27%
3	Running 37%	Running 38%	Cycling 19%	Cycling 17%

Rank	Gen Z	Millennials	Gen X	Baby Boomers
1	Rock Climbing 12%	Paddle boarding 27%	Paddle boarding 24%	Paddle boarding 29%
2	Paddle boarding 27%	Rock Climbing 23%	Disc Golf 13%	Disc Golf 5%
3	Obstacle Course 22%	Disc Golf 19%	Rock Climbing 15%	Hiking 5%

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Get to know the visual needs

Start the conversation:

- “What do you like to do when you’re not working?”
- “How do you like to spend your vacation time?”
- “What are you doing these days for fitness?”
- “Have you started any new activities, or sports, since I saw you last year?”

Do a deep dive into their visual needs:

- So you’re an avid bike rider.
- Are you more of a cyclist in wooded areas, or do you prefer to stick to city roads?
- What time of day do you most often find yourself riding?



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ANSI vs ASTM

Why do you need safety glasses?

Work Sports

How are the lenses tested?

ANSI ASTM

High Impact High Velocity

Low-Frame Markings

ANSI standard ASTM standard

The Right Protection

American Society for Testing and Materials (ASTM)

- Established in 1898
- Impact resistance, cleanability, clarity, peripheral vision
- Markings

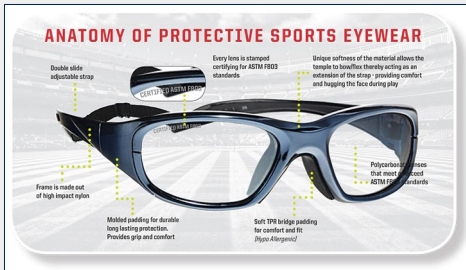
American National Standards Institute (ANSI)

- Founded in 1918
- 10 different ophthalmic standards
- Z80.1 ophthalmic lenses
- Z87.1 occupational lenses



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What Makes it a Sports Frame?



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ASTM Frames



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The Right Protection for the Right Sport

ASTM F803

- Baseball/Softball
- Basketball
- Field Hockey
- Lacrosse
- Racquet sports
- Soccer



ASTM F513: Face Mask on Helmet

- Ice Hockey
- Street Hockey
- Swim mask

ASTM F659 - ski goggles


ASTM F803 - sports goggles

ASTM F3077 - lacrosse goggles

ASTM F2713 - field hockey eye protectors

ASTM F2812 - motor sports goggles

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Which Lens Material?

Safety First

Table of Lens Characteristics


Lens Material	Index	Abbe	Specific Gravity	Impact Resistance	UV Protection
Glass	1.523	59	2.54	poor	No
CR-39	1.498	58	1.32	good(3mm)	No
Trivex	1.530	46	1.11	pretty good(2mm)	Yes
Polycarbonate	1.586	30	1.20	excellent(2mm)	Yes

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Duty to Warn (OLA 1987)

An Advisory Bulletin to Doctors & Opticians to have this conversation:

- Standard glass and plastic lenses can shatter in a high impact situation and cause damage to your eyes and face.
- If you are involved in any activity that could pose a risk to your eyes you should consider ordering lenses made of the most impact resistant material.
- Two examples of these are Trivex and polycarbonate.



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Educate the Patient and Protect Yourself





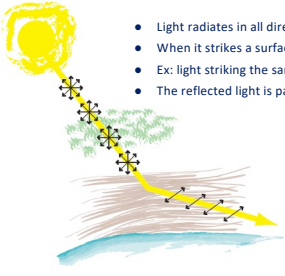
"If you are involved in any activity that could pose a risk to your eyewear, you should consider ordering lenses made of the most impact-resistant lenses available,, such as Polycarbonate or Trivex."

They don't have to buy it but you should to cover your sweet okole.

Protective Kids (and others) through 'Duty to Warn'.

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Polarized Lenses



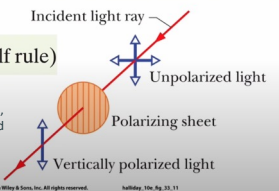
- Light radiates in all directions.
- When it strikes a surface it can be completely or partially polarized.
- Ex: light striking the sand is **partially polarized** and **vibrates horizontally**.
- The reflected light is parallel to the surface resulting in **glare**.

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How Polarizing Sheets Work

$I = \frac{1}{2}I_0$ (one-half rule)

Horizontal light is absorbed, therefore intensity is halved



Incident light ray

Unpolarized light

Polarizing sheet

Vertically polarized light

The sheet's polarizing axis is vertical, so only vertically polarized light emerges.

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Benefits and Limitations to Polarized Lenses

Benefits

- Reduces surface glare
 - Driving, water, snow activities
- Increases VA, contrast, comfort, safety
- Improves color perception
- Provides UV protection

Limitations

- May rotate in round frames
- Tempering on other surfaces is visible
- Impacts visibility of LCD screens
- More \$\$\$ than GW SG






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Who could benefit from polarized lenses?

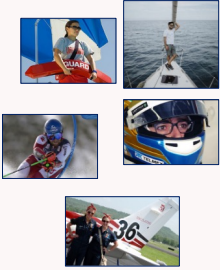
- Sailing, Lifeguarding, Fishing
- Driving, Cycling
- Snow activities
- Hiking

Contraindications:

- Skiers - head tilt, mask ice patches
- Golfers - hard to read the greens
- Pilots - instruments, poly windshields, misjudge approach
- Any activity that require LED screens

Alternatives to Polarized Lenses to reduce intensity

- ARC on clear and SG
- Mirrored SG, decrease light
- Photochromics, light adaptive



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Swim Goggles and Masks




- Protection from pool chemicals
- Swimmer Eye and other infections
 - bacteria, viruses
- UV Exposure
- Better visibility and depth perception

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Performance Enhancing Tints



Yellow or Orange: increases contrast in overcast and haze, filters blue light, outdoors or indoors

- Outdoors - Cycling, hunting, shooting, snow sports, tennis
- Indoor basketball, handball, racquetball

Amber, Rose, or Red: increases contrast in partly cloudy/sunny skies, may cause color imbalance

- Outdoors - Cycling, hunting, shooting, snow sports, tennis
- Indoor basketball, handball, racquetball

Dark amber, Copper, or Brown: filters out blue, Increases contrast and acuity

- Baseball, cycling, fishing (especially in waters with grassy bottoms), golf, hunting, skiing and water sports

Green: increases contrast and preserves color balance




- Baseball/Golf

Gray: neutral density filter, preserves 100 normal color perception, good for bright light conditions

- All bright light sports

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Photochromatic Lenses



2006 Performance study:

- n= 50 children ages 10-15 y.o.
- Compared clear lenses to photochromic lenses
- Photochromatic better for outdoor activities
- Clear = Photochromic indoor activities
- 88% chose to continue to wear photochromic

Evaluation of the performance of photochromic spectacle lenses in children and adolescents aged 10 to 15 years: Clin Exp Optom

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People are more active and demand better eyewear



ENGO 2

- 3 styles, 2 sizes
- \$300

ENGO 2 Photochromics

- 1 style, 2 sizes, Grey
- \$350

Heads Up display, instant feedback in real-time performance metrics
Compatible with running watch or cycling computer (Garmin, Apple Watch, iPhone, Antdroid, Suunto)

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Educate with “Why Specialty Eyewear”

Focus on benefits not features

Benefits of a custom visual solution:

- Improve visual experience
- increase performance
- Provide protection

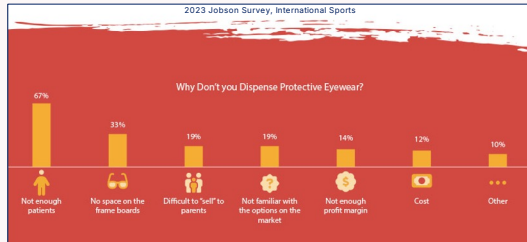


Ex: Customized baseball glasses

- ❖ Correcting vision or eye coordination issues will improve performance skills like depth perception and eye hand coordination, as well as protect against eye injuries.
- ❖ Can be a second pair in case the general wear glasses break.

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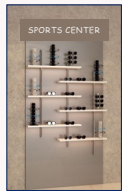
Reasons Protective Sports Eyewear Isn't Displayed



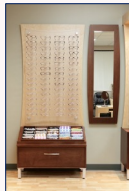
Which column do you fall under?

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Show It Off!



- Display it prominently
- Use Vendor marketing materials
 - Counter cards, posters, Displays
- Change displays regularly,
 - highlight different sport seasons or events
- Use large mirrors to see full length image



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Set Yourself Apart

- Educate yourself about Sports Eyewear (this lecture is the 1st step)
- Be proactive in initiating the conversation
- Increase profitability w/ personalized visual solutions
 - 5-10% RX Sunglasses
 - 10-15% Specialty & Protective Sports Eyewear
- Chose recognizable brands that cater to specific sports
 - Baseball, Basketball,
 - Racquet sports
 - Biking, Hiking, Golf
 - Water sports
- Display and Market
 - Dedicated area
 - Internal and external promotions



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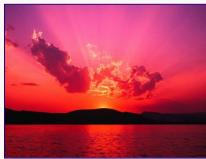
Summary Notes



- As a Vision Care Specialist, know your role wrt Sports
 - Understand SREIs and how to educate and protect
 - Become familiar with sports ophthalmics
 - Educate Sports enthusiasts about how to improve their abilities and protect their eyes
 - Recommend customized sports eyewear to enhance performance and ensure safety
 - Display and market sports eyewear
- = Patient satisfaction and increased profits**

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At the End of the Day



- ❖ Did I address the chief concern with the appropriate recommendations?
- ❖ Is it an improvement over what they are used to?
- ❖ Continue to develop your skills in the art and science of vision care
- ❖ Practice with compassion

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On behalf of Vision Expo, I sincerely thank you for being here this year.



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Vision Expo Has Gone Green!

We have eliminated all paper session evaluation forms.
Please be sure to complete your electronic session evaluations online when you login to request your CE Letter for each course you attended!
Your feedback is important to us as our Education Planning Committee considers content and speakers for future meetings to provide you with the best education possible.



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