PROTECTION FOR THE NAKED EYE: Sunglasses as a Health Necessity

2015 UV PROTECTION REPORT

THE VISION COUNCIL
The dangers of unprotected UV exposure are underrecognized

- Sunburned eyes (58% don’t identify connection)
- Cataracts (65% don’t identify connection)
- Age-related macular degeneration (65% don’t identify connection)

1 in 4 Americans rarely or never wear sunglasses, leaving eyes at risk

2 in 3 Americans leave eyes unguarded on cloudy or rainy days

3 in 10 Americans don’t protect their eyes in the winter, when UV rays are still present

33.7% of parents of children under 13 said their kids rarely or never wear shades. This is dangerous since children receive 3X the annual adult dose of UV and eyes are at risk with larger pupils and clearer lenses setting the stage for serious vision damage later in life.

58% of Americans spend the most time outdoors from 2PM-6PM, a peak UV time for eyes. Eyes are most at risk from 8AM-10AM and 2PM-4PM.

Most Adults are Outside when UV is Harshest on Eyes

Most Often:
- Driving
- Walking
- Going to the Beach or Pool

Least Often:
- Running and Biking
- Gardening
- Team Sports

Most people choose shades for comfort over protection

Source: Harris Poll on behalf of The Vision Council
When going out for a run, grabbing your headphones and a hat seems second nature. Or when spending the
day gardening, the essentials typically include a pair of shears and sunscreen. While these everyday items may
help us in our daily routines, one crucial element is missing: a pair of sunglasses.

While 65 percent of American adults see a pair of shades as a fashion accessory when out on the town,
sunglasses are also a critical health necessity. A significant number of Americans are still not aware of the
health risk they take when going outside without protecting their eyes against ultraviolet (UV) radiation. In fact,
one in four adults (26 percent) rarely or never wear sunglasses when going outside.

And it’s not just the bright summertime sun that puts us at risk. Every day, whether it’s sunny or cloudy, spring or winter, UV rays
can damage eyes in profound ways, making protective eyewear, such as sunglasses, all the more important.

Short-term UV exposure can leave eyes bloodshot, swollen or
hyper-sensitive to light. But over a longer term, this exposure
can accelerate serious eye health problems, including cataracts,
macular degeneration, abnormal growths on the eye’s surface and
even cancer of the eye and surrounding skin.

It is estimated that nearly seven in 10 adults (65 percent) are unaware of the link between
UV exposure and serious eye diseases, such as cataracts and macular degeneration.

While preventing UV exposure is important at any age, damage is cumulative and can never be reversed, so it
is vital to start preventing this harmful radiation exposure when young through the use of protective eyewear. Children are especially vulnerable to the sun’s damaging rays because the lenses of young eyes are clearer
than those in mature eyes, allowing for more UV to penetrate and reach the back of the eyes. Even with this
increased risk, more than one-third of parents (34 percent) report that children younger than 13 rarely or never
wear shades.

This report reveals that while UV awareness is growing, a significant percentage of the public fails to recognize
and act upon the needless risks and potential damage that UV exposure poses to their precious sight.

Additional key findings of The Vision Council’s research:

- 63% don’t wear sunglasses on cloudy or rainy
days, although UV rays can be quite damaging
in these conditions.

- 31% don’t consider wearing sunglasses in
winter, although reflective UV glare off of snow
and asphalt is harsh and damaging.

- 58% of Americans spend the most time
outdoors from 2PM-6PM, a peak UV time for
eyes. Eyes are most at risk from 8AM-10AM
and 2PM-4PM.
Sunglass use is highest among women 65 or over (63%) and lowest among Millennial men ages 18 to 34 (37%).

Other habits among the various generations highlight marked differences among Millennials, Generation X, Baby Boomers, and the Beyond Boomer cohort.

These trends highlight the need for individuals to be much more aware of the full scope of hazards when it comes to UV exposure and eye health. The report aims to educate consumers on being proactive in their health by wearing UV protective eyewear regularly.

“Sunglasses are a great way to establish a fashion identity – whether the look is sporty, retro, or chic. However, the most important aspect of those shades isn’t what they look like, but the lenses that protect eyes.

The Vision Council’s research over the past several years shows that most people understand the danger that comes with the sun’s ultraviolet rays, but tend to underestimate the risks to eye health. This miscalculation can have serious side effects when the proper precautions are not taken to keep eyes safe. Medical evidence shows that eye exposure to UV rays can have short-and long-term consequences ranging from a painful sunburn of the eye to increased risk for degenerative vision conditions like cataracts and age-related macular degeneration.

Since there are still many people who do not understand the risks of UV exposure and the impact it can have on long-term eye health, education and awareness of UV eye protection are key. Sunglasses are just as much a health necessity as they are a fashion accessory – helping people look good and see great.”

Robert Grow
Chair, Sunglass and Reader Division
The Vision Council
PROTECTION FOR THE NAKED EYE: SUNGLASSES AS A HEALTH NECESSITY

UV 101: Reviewing The Risks

Nearly 90% of U.S. adults are concerned about the health effects of eye exposure to UV, but many remain uncommitted in their sunglass use. To fully underscore why sunglasses and other UV-protective eyewear are an important health necessity, here are the facts:

What is UV Radiation?

The sun emits three kinds of radiation: UVA, UVB, and UVC. While UVC gets absorbed by the Earth’s atmosphere, UVB radiation is only partially blocked and is able to burn the skin and the eyes, causing everything from bad sunburns to cancer. UVA rays are not filtered and cause the most damage to vision health. Moreover, recent studies have linked the thinning of the Earth’s ozone layer to a potential dangerous rise in UV exposure.

Direct sunlight is not the only source of danger from UVA and UVB radiation: both types of rays reflect off of surfaces such as water, snow, sand, and even buildings. Reflected UV increases exposure levels and can double UV risk to the eyes in certain conditions, particularly with water and snow. To visualize how UV radiation can be reflected from all directions outdoors, a London skyscraper known as the “Walkie-Talkie” melted parts of a nearby car from sunlight reflected off the building.

While the eyelid is designed to limit the amount of UV radiation entering the eye, the thin, delicate tissue is not entirely effective at protecting the cornea, the clear surface of the eye. Over time, cumulative UV exposure can yellow both the lens and the cornea, making it more difficult to see contrast.

How Does UV Radiation Impact the Eye?

UV radiation is a known culprit for painful sunburns and melanoma, yet few adults associate it with serious vision problems, both temporary and long-term. In fact, nearly 50% of Americans are more concerned with the potential for skin cancer, cancer of the eye or eyelid, or wrinkles than the potential vision loss implications of unprotected UV exposure. With UV damage being cumulative, daily sun exposure adds up over a lifetime and may lead to serious medical issues and vision impairment.

Limiting time outdoors can reduce that risk, but that’s often not a feasible—or healthy—option.
If the average U.S. adult spent just 30 minutes wearing a pair of sunglasses during the day with adequate UV protection, their eyes would gain nearly 15,000 hours of UV-free time.

**Temporary UV-Related Eye Problems**

Although short-term effects of UV eye damage don’t last forever, the conditions associated with too much exposure to UV can be debilitating and uncomfortable. After a long day on a boat or on a ski slope, people frequently notice their eyes are bloodshot, swollen or hyper-sensitive to light. Even just several hours of intense, unprotected exposure to UV radiation can cause a variety of short-term problems, ranging from irritating to painful.

**Photokeratitis** is sunburn of the eye. While the damage is not permanent, the pain can be severe. The condition is also known as “snow blindness,” a reminder that snow has been found to reflect up to 80 percent of the sun’s rays and that UV danger is not limited to summertime at the beach.

**Pterygium**, sometimes called “surfer’s eye,” is an abnormal but usually benign growth on the surface of the eye, most often originating in the corner near the nose. Pterygium is linked to excessive exposure to sun, wind or sand. It may cause irritation, swelling and itchiness as well as corneal problems that can affect vision. Sunglasses and other UV eye protection help with prevention, and while the issue may be resolved through surgery, cataracts also can recur. Childhood UV exposure increases the risk of pterygium, and the growth usually emerges long before skin conditions, so it may be an early indicator of serious UV damage.

**Long-Term UV Eye Damage**

While unfiltered UV radiation exposure to the eye may not affect us right away, the hidden danger lies in how much UV we receive over a lifetime. Cumulative exposure can accelerate serious eye disorders and pose risks to eye health later in life. The most common complications of prolonged UV exposure include:

**Cataracts**, the most common cause of vision loss in people 40 and older, are the progressive clouding of the lenses of the eyes. Untreated, cataracts are globally ranked as one of the main causes of reversible blindness. The World Health Organization (WHO) estimates that up to 20 percent of all cataract cases are attributable to UV radiation and are preventable. A study in the Journal of Biological Chemistry found that chemical changes activated by years of cumulative sunlight exposure affect the proteins in the lens of the eye. UV radiation causes oxidation of vitamin C in the lens, and the products of that oxidation chemically react with lens proteins to cause cataracts. Approximately three million surgeries to remove cataracts are performed in the United States annually, and more than 20 million Americans have cataracts, according to Prevent Blindness America. Researchers also contend that depletion of the ozone layer may result in millions more cases.
Age-related macular degeneration (AMD) is another major cause of vision loss in older people and the leading cause of blindness in adults 60 and older. Higher UV exposure has been documented to cause “significantly increased” risk of AMD. Epidemiological studies suggest that exposure to UV early in life, rather than in later years, is a stronger predictive factor for developing AMD. The macula, an overtly yellow spot, sits at the back of the eye, in the middle of the retina, where it focuses central vision, making it sharp and clear. Damage to nerve cells within the macula causes the blurring of fine detail and dulls colors in the center of the field of vision. In addition to prolonged UV exposure, smoking, obesity and other factors are also associated with increased risk for AMD. Vision loss from this disease is irreversible, though early detection and treatment can slow further loss.

Cancer of the eye, eyelid and surrounding skin. Although cancer of the eyeball itself is relatively rare, skin cancers of the area surrounding the eye are not. According to The Skin Cancer Foundation, one-tenth of all skin cancers are found on the eyelid. Most are diagnosed as basal cell carcinoma, which can spread to the eye and adjacent tissue, but is not malignant. While intraocular cancer is rare, nearly 3,000 cases are diagnosed in the U.S. annually. Melanoma is the most frequent malignancy of the eye and often requires surgical removal. Comprehensive annual exams with an eye care provider can help diagnose these disorders when they are most treatable.

“People often associate too much sunlight exposure with sunburns, wrinkles and skin cancer. Yet, many don’t realize this same radiation is also damaging our ocular health until it’s too late. In my practice, I ask patients about their exposure to the sun and sunglass-wearing habits growing up and they often admit to spending a large portion of their youth outdoors without proper UV eye protection.

Because UV damage is cumulative and not necessarily visible, protecting our eyes is often “out of sight and out of mind.” The Vision Council’s research exposes the misconceptions and lack of awareness of the link between excessive UV exposure and the negative impact on eye health.

Millennials in particular, who have already been exposed to at least a quarter of their lifetime UV exposure, are least likely to protect their eyes and are more likely to think of sunglasses as a fashion accessory rather than an important health precaution. Sunglasses and other forms of UV protective eyewear are crucial for everyone, young and old, in protecting our health and preserving our vision.”

Justin Bazan, OD, medical adviser to The Vision Council and owner of Park Slope Eye in Brooklyn, NY.
History of Sunglasses

- **Prehistoric**: Tribes in the Arctic regions invented a basic form of snow goggles, made of ivory, wood, or hooves to prevent snow blindness. The slits cut through the objects protected eyes while allowing the individual to see.

- **54-68 A.D.**: Roman Emperor Nero watched gladiator matches at the Coliseum through a flattened emerald in an effort to reduce glare.

- **1200s**: Earliest documented use of sunglasses, a practice in which Chinese judges would use smoky quartz glasses to hide their facial expressions.

- **1800s**: Various tinted glasses were used to alleviate health conditions which made eyes sensitive to light.

- **1929**: Sam Foster sold the first pair of sunglasses on the Atlantic City boardwalk.

- **1930**: Bausch & Lomb developed aviator sunglasses for the United States military. General Douglas MacArthur was an early adopter of the sunglass style.

- **1950s**: The Wayfarer – a plastic frame with trapezoidal lenses that are wider at the top than the bottom – is made popular. Famous musicians and movie stars quickly took a liking to the signature frame and it still remains in fashion today.

- **1960s**: Public figures like Jacqueline Onassis Kennedy and Audrey Hepburn established oversized sunglasses as a fashion staple.

- **1970s**: The damaging effects of UV on eye health are supported by medical research.

- **1980s**: New plastic materials expanded the design and shape of the sunglasses

- **1990s**: Rhinestones and aviators made big statements in sunglass style.

- **2000s**: Increase in UV awareness and sunglass use became more of a health necessity.
Children

Solar penetration in the eyes of young children can set the stage for serious vision damage later in life. By the time an individual turns 18, he or she will already have acquired nearly 25 percent of their lifetime UV exposure. This fact dramatizes the need for parents to be more aggressive in protecting their children’s eyes.

Kids generally receive three times the annual sun exposure of adults, and research has shown that their young eyes are especially susceptible to UV-related harm. Unlike the mature lens of an adult eye, a child’s ocular lens cannot effectively filter out UV rays and so more radiation reaches the retina. In fact, early signs of pterygia may be seen in young children.

While donning a hat or putting on sunscreen to protect the skin around a child’s eyes is important to block UV radiation, nearly 40 percent of parents don’t use sunglasses to protect the area around their children’s eyes. It is important to do research before making a purchase and if possible, involve the child so that he or she can become a part of the experience. While UV protection is a must, finding sunglasses that your child feels comfortable in and likes will ensure that they are actually worn.

Some tips for parents when choosing their child’s sunglasses:

- Look for a UVA/UVB sticker or label when purchasing quality sunglasses.
- Make your purchase from a reputable retailer. Inexpensive party favors or holiday-themed shades are not UV-protective.
- Check out sunglasses with large frames or adjustable straps (e.g., Velcro or elastic) which are more likely to stay in place.
- Consider shades without hinges so that children can put on their own sunglasses without pinching their fingers.
- Increase protection with wraparound sunglasses that can protect the side of the eyes and eyelids.
- Purchase plastic sunglasses for children who are prone to losing or breaking them; they’re inexpensive and easily replaceable.

As eyes age, decades of sun exposure make them much more prone to visual problems and disease from the cumulative damage of UV radiation. Decreased concentrations of protective molecules in the eye, also related to age, may be implicated, too.
# UV Risk Factors

Beyond the hazards posed by years of UV exposure, there are risk factors that can impact each individual:

<table>
<thead>
<tr>
<th><strong>Eye color.</strong> Eye color appears to be implicated with increased risk, with studies suggesting that blue eyes are more vulnerable to UV damage than brown eyes. The protective pigment melanin may be the key reason, with blue irises having less of it. Research has also shown a link to higher incidence of age-related macular degeneration and uveal melanoma.</th>
</tr>
</thead>
</table>

**Geography** influences UV levels in sometimes complicated ways.

- In the United States, people who live in Southern states tend to receive more intense solar rays because they are closer to the equator – and therefore closer to the sun – than people in Northern states. But elevation also makes a difference, since the thinner atmosphere at higher altitudes does not absorb as much radiation. *(See Page 11 for a nationwide look at UV intensity in specific locations across the country.)*

- Be cognizant of your surroundings. At the beach, sand can reflect up to 25 percent of UV and water reflects nearly 100 percent of the radiation; on a snow-covered surface, as much as 80 percent of UV may be reflected, adding to the direct exposure from the sun.

**The season and time of day** affects UV intensity in virtually any area. In the United States, UV levels are highest during summer months, especially between 10 a.m. and 4 p.m. However, the level of UV entering the eye in the early morning (8AM–10AM) and late afternoon (2PM–4PM) is nearly double that of midday hours (10AM–2PM) at most times of the year because of the more direct angle of the sun’s rays at those times.

**Occupational hazards.** Career choice can also pose extra risk in terms of harmful UV exposure, sometimes in unexpected ways. A person who works outdoors may receive three times the UV radiation than people who work indoors. Some job-related exposures seem pretty obvious: for landscapers, construction workers, fishermen or farmers, lifeguards or golf caddies, these individuals will need to wear sunglasses and other forms of UV-protective eyewear regularly on the job to protect vision from UV damage. But for countless truckers and drivers, the risk to the eyes from sun through the windshield can be substantial—and most of all for airline pilots, who are exposed to particularly high levels. With depletion of the ozone layer, pilots and air crews are exposed to UV in excess of 170% at cruising altitudes compared to sea level.
2015 UV Report: National Survey Findings

During the spring of 2015, The Vision Council set out to understand what Americans know about UV-related eye damage and how they are protecting their eyes. A nationally representative sample of 2,000 adults participated in The Vision Council’s 2015 survey. The results reveal a dire need to increase educational efforts about UV damage and to change current habits that offer little protection from the sun.

While most Americans report wearing sunglasses, more than 25% rarely or never wear shades, leaving eyes at risk. Generationally, the use of sunglasses varies substantially among the four major age groups:

- **Millenials** (born 1981-1996): They are the least likely to report wearing shades always or often (43%), and while they are the least likely to cite UV protection as a reason to wear them (55%), they are most likely to report wearing shades to look good (36%).

- **Generation X** (born 1965-1980): They are much more likely than their younger counterparts to wear sunglasses always or often (56%), and to cite UV as a reason (65%). Fewer are concerned about looks (26%).

- **Baby Boomers** (born 1946-1964): 53% say they protect their eyes always or often with sunglasses, while 27% rarely or never do. They are highly aware of UV danger (61%) but don’t care much about how they look in sunglasses (9%).

- **Beyond Boomers** (born 1945 or earlier): They are the most likely to wear sunglasses most of the time (58%) and the least likely to say rarely or never (20%). They also have the greatest knowledge of UV danger (70%) and the least concern about looks (7%).

When going for a drive, nearly three-quarters of adults say they wear their shades, but adherence to this health precaution is hit-or-miss, based on activity.

While most people are aware of skin cancer and sunburn as health effects of unprotected ultraviolet (UV) exposure, the immediate and long-term risks to eyes are lesser-known dangers.
UV radiation can be harmful to eyes anywhere, in any season, on sunny days and cloudy ones, too. But the exposure level varies greatly depending on location, and two factors are most significant: proximity to the equator, which translates to proximity to the sun, and high altitude, where thinner atmosphere means less filtering of the sun’s radiation.

The Vision Council analyzed national UV index levels in 2014 and tabulated data of the 25 cities with the most days of extreme and very high UV risk, based on data from the U.S. Environmental Protection Agency and the National Oceanic and Atmospheric Association.
Which Sunglasses Are Right For You?

3 Top Myths about Sunglasses

**Myth #1: All sunglasses have UVA and UVB protection**

Despite the health risks of UV exposure, not all sunglasses have sufficient protection. Since UV protection is crucial to shielding eyes from damaging radiation, it is imperative to look for a label, sticker or tag indicating UV protection before purchasing a pair of sunglasses.

**Myth #2: Sunglasses with UV protection are expensive**

You do not have to pay a premium to get proper UV protection. This should be part of any pair of sunglasses sold by a reputable retailer, regardless of price or retail location. Where price may play a factor is in sunglass frames, lens quality and/or a specific lens material.

**Myth #3: The darker the lens is, the better the protection**

UV protection has nothing to do with the darkness or color of a lens. Dark lenses without adequate UV protection can actually be worse than no sunglasses at all because they cause the eye’s pupil to dilate, which then increases retinal exposure to the unfiltered UV. Even though this may make eyes feel comfortable, it’s putting them at greater risk for damage.

When choosing a pair of sunglasses, nearly 90% of Americans look for comfort of fit in a pair of shades**, but it is also important for consumers to make sure their shades provide the right amount of protection from UV radiation.

Over the past decade, designers and manufacturers have been constantly researching, testing and innovating new ways to advance the effectiveness and versatility of sunglasses. Talk with your eye care provider to learn more about the lenses and tints that work best for individual lifestyle needs.

**Here are a few tips:**

✔ Buy from a reputable retailer, such as a store or online site. Unlike shades purchased from thrift stores or street vendors, sunglasses sold at trusted retailers meet frame and lens safety criteria set by industry standards.

✔ Insist on protection from UVA/UVB rays. If you are unsure if a pair of sunglasses adequately blocks UV, many eye care providers can test the level of protection.

✔ Think about your activities. Endurance athletes and outdoors enthusiasts who are constantly exposed to UV are especially susceptible to eye damage. Someone who plays a sport or cycles might want to use a different pair of shades during their daily activities for both comfort and safety.

✔ Select a lens color that improves clarity and reduces glare. Different colors and tints work in different ways.

✔ Pick a design that works best for you. Wraparound glasses or glasses with larger temple pieces help block the sun from side angles.
Types of Sunglass Lenses

**Photochromic** lenses automatically darken and lighten to provide the best level of protection and comfort over a wide range of light conditions.

**Anti-reflective** lenses dramatically reduce distracting reflections while improving contrast, visual acuity, and comfort in difficult lighting situations.

**Mirror-coated** lenses reflect light across a wide spectrum, including infrared or heat rays.

**Polarized** lenses are highly recommended to filter out reflected glare from shiny surfaces like water, pavement and dashboards, while improving contrast and visibility and reducing squinting.

**Impact-resistant** lenses are a must for high-impact or competitive sport use.

**Magnetic** lenses can be easily popped out and switched for a different lens. This is particularly useful for adults who want different colors or performance lenses for activities like driving, golfing or running.

Varieties of Lens Tinting

**Solid tinted** lenses are evenly tinted across the entire lens to cut glare from all directions.

**Gradient-tinted** lenses are darker at the top and lighter at the bottom to cut overhead glare and provide clearer vision when looking straight ahead or down.

**Double-gradient** lenses are darker at the top and bottom and lighter in the center to cut overhead and reflected glare from the ground while providing clearer vision straight ahead.

**Brown/amber/copper** lenses reduce glare and improve contrast and visibility for selectively filtering blue light—great for golfing, water and snow sports.

**Gray/green-gray** lenses are general-purpose tints that reduce glare while maintaining natural colors, making them the most popular for driving because the eyes won’t tire as much.

**Yellow/rose** lenses enhance contrast and definition, especially in lower-light conditions such as fog and haze.
Conclusion

Moderation is key when it comes to UV radiation exposure to the eye. However, many Americans still do not heed the warning to protect their vision. With a knowledge gap persisting on the link between UV exposure and serious eye disorders, combined with a lack of awareness about how sunglasses are actually a health necessity, The Vision Council is committed to continuing to educate consumers on the need to protect long-term vision health through using UV-protective eye wear.

Consumers have more options than ever to help sustain healthy vision. The eyewear industry is constantly evolving and expanding to provide more useful, durable, and flexible products.

But while sunglass technology continues to advance, some adults choose to neglect their eyes because sunglasses seem inconvenient or unimportant, or are simply forgotten. It’s never too late to start good habits and make UV-protective eyewear a part of the daily routine.

For more information and to access the report, visit www.thevisioncouncil.org/UV.

2015 Harris Poll Conducted on Behalf of The Vision Council.

Eye & Contact Lens, July 2011


2015 Harris Poll Conducted on Behalf of The Vision Council.


British Journals of Ophthalmology Nov, 2012

Clinical and Experimental Optometry, Aug, 2010

Skin Cancer Foundation. The Eyelids: Highly Susceptible to Skin Cancer (Accessed online)


Prevent Blindness America. Children’s Eyes More Susceptible to Long-term Damage from UV Rays, April 2010


Civilian Pilot Exposure to UV & Blue Light, and Pilot Use of Sunglasses. Aviation, Space & Environmental Medicine, Sept. 2011

2015 Harris Poll Conducted on Behalf of The Vision Council.
About The Vision Council: Serving as the global voice for vision care products and services, The Vision Council represents the manufacturers and suppliers of the optical industry through education, advocacy and consumer outreach. By sharing the latest in eyewear trends, advances in technology and advice from eyewear experts, The Vision Council serves as a resource to the public looking to learn more about options in eyeglasses and sunglasses.