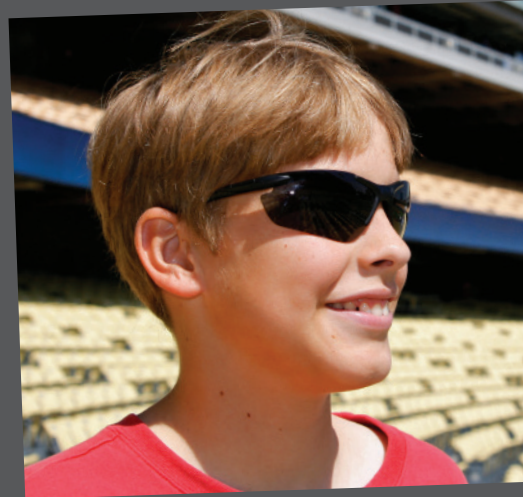




THE **VISION**COUNCIL

PICTURE THIS:
A LIFETIME OF UV EYE PROTECTION



Report At-a-Glance

Specific information in this year’s report includes:

- The short and long-term consequences of UV exposure to unprotected eyes and the growing burden of low vision issues linked to UV radiation. (pages 6-9)
- Age-related impact of UV radiation on the eyes and the unique problems facing infants, children, teenagers, and young and mature adults. (page 10)
- Findings from The Vision Council’s 2014 Sun Protection Survey, including sunglass use and care, awareness of UV protection offered with sunglasses, and knowledge of UV-related eye diseases. (pages 11-12)
- 2013 national UV index rankings from the U.S. Environmental Protection Agency and the National Weather Service. (page 13)
- Sunglass use in key regional markets as found in the Sun Protection Survey. (page 13)
- UV-protective eyewear options and the lens and tint considerations for sunglasses and prescription glasses. (pages 14-15)
- Recommendations for sunglass options based on age-related vulnerability, lifestyle and eye disease burden. (pages 16-17)

UV Protection Trends and Gaps in Awareness

Every day—whether it’s sunny or cloudy, summer or winter—millions of Americans make the conscious decision not to wear sunglasses or other UV-protective eyewear. While seemingly harmless, this habit carries several serious vision risks, many of which are not known or understood by those who fail to wear protective eyewear.

The problem originates with the sun’s unfiltered ultraviolet (UV) rays. Just as these rays can burn and damage skin cells, they can also harm unprotected eyes. A full day outside without protection can cause immediate, temporary issues such as swollen or red eyes and hypersensitivity to light. Years of cumulative exposure can cause cancer of the eye or eyelid and accelerate cataracts, which affect nearly 22 million Americans age 40 and older¹.

The solution to such problems is the constant and consistent use of sunglasses or other UV-protective eyewear when outdoors. Unfortunately, the majority of Americans don’t heed this important recommendation.



The Vision Council’s 2014 Sun Protection Survey found that 27 percent of adults rarely or never wear sunglasses when outside. An equal percentage report that they always wear sunglasses outdoors. In the middle are 46 percent who said they wear sunglasses only when it’s sunny out—thus exposing their eyes to strong UV rays on cloudy or partially cloudy days. In 2013, The Vision Council also found that less than half of parents (48%) enforce sunglass use among their children, which exposes young eyes to damaging UV rays.

Among those who were wearing sunglasses during the 2014 survey, 35 percent did not know if their shades provided UV protection. Nearly ten percent said that their glasses did not filter out UV rays.

When it comes to taking care of eyewear, Americans again are found lacking. Only 27 percent of survey respondents who wear sunglasses store them in a case; the rest throw them loosely into handbags or on car consoles or countertops. The resulting scratches and scrapes can obstruct UV protection and warp lenses and frames.

The bottom line is that adults aren’t doing enough to protect their eyes from UV damage, and as parents, they aren’t providing their children with the knowledge and eyewear needed to prevent their own long-term vision impairment.

The Vision Council, working in tandem with medical advisors and lens experts, developed this report to highlight the consequences of UV rays and provide recommendations and guidelines for purchasing using sunglasses for people of all ages.

Preparation today can help sustain healthy vision for the future.

How UV Radiation Damages the Eye

The sun emits three types of UV radiation: UVA, UVB and UVC. These rays are neither seen nor felt by humans. UVC rays are completely absorbed by the Earth’s atmosphere; UVB rays are partially absorbed. The rest, including all UVA rays, pass through the atmosphere, ultimately reaching the Earth’s surface.

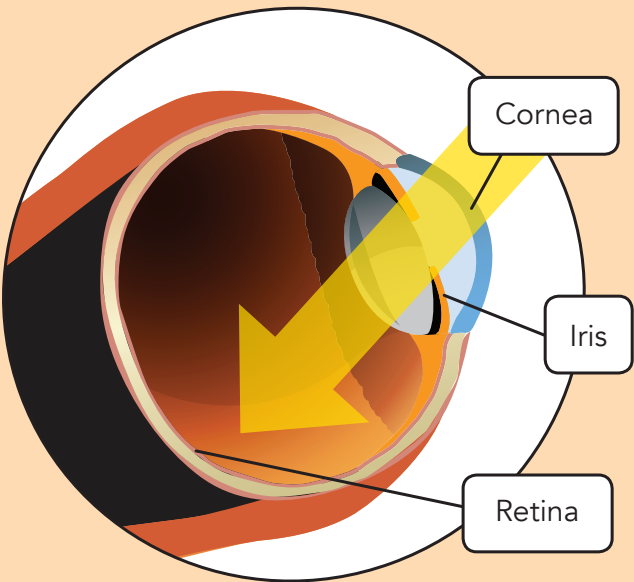
UVA rays, which account for the majority of UV exposure, pierce the outer and middle layer of the skin and can damage the retina of the eye. UVB rays damage the skin’s outer layer. UVB is a culprit for sunburns, pterygium (an abnormal growth on the surface of the eye) and photokeratitis (sunburn of the eye). UVB rays have also been shown to accelerate cataract development and age-related macular degeneration, and to cause squamous cell carcinoma of the eye (a form of cancer).

UVA and UVB rays can reflect off surfaces such as water, sand, snow and even buildings. Reflected UV increases exposure levels and can double UV risk to the eyes in certain conditions, such as with snow.

While the eyelid is designed to limit the amount of UV radiation that enters the eye, the thin, delicate tissue is not entirely effective at protecting the cornea, which is 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.

UV Infiltration to Unprotected Eyes

- 1. UVA and UVB radiation enter the eye and penetrate through the cornea.
- 2. Light passes through the cornea to the pupil and moves to the iris where light intensity is controlled.
- 3. Unfiltered UV light causes damage to the retina over time.



Short-Term UV-Related Eye Damage

Brief but intense doses of UV radiation can cause short-term ocular problems ranging from discomfort or pain to temporary blindness. Issues often appear after a long day spent outdoors without UV-protective eyewear. Symptoms, which can appear up to 24 hours after exposure, include redness, swollen eyes, blurred vision and sensitivity to light. If the sun is strong enough, reflective rays can actually burn the cornea—a condition called photokeratitis.

Individuals with photokeratitis experience extremely swollen eyelids, uncontrollable watering of the eyes and a feeling of grit lodged inside their eyelids. Most cases of photokeratitis last just one day but pain can persist for several days. For some people, corneal burns can cause temporary blindness.

These instances are reversible and do not result in permanent damage. But not all conditions are so easily remedied.



UV Damage from an Unsuspecting Source

“Your eye-care provider can tell you what I learned the hard way: UV protection is available if you ask for it. It was a painful lesson to discover. You can not only get UVA/UVB protection on sunglasses, but also on prescription glasses and even contacts.”

“Everyone has hazards on the job, but I never expected to be temporarily blinded. As a TV reporter, I am accustomed to long days on the set and in the field. After a marathon day of live shots from 7:30 a.m. to 5:30 p.m. reporting on a hot-button court case, the HMI (Hydrargyrum Medium-arc Iodide) lights used to broadcast malfunctioned, causing unfiltered UV rays to burn my corneas. Although the slight irritation to my eyes was a bit annoying at first, I didn’t think much of it.

“It wasn’t until later that night I felt the pain increase and suspected this issue was more serious than I previously thought. By 2 a.m., I was in agony. My eyes were swollen shut and felt like I had two hot coals smoldering in my sockets. The darkness lasted for 36 hours. Little did I know at the time, I had experienced an extreme case of photokeratitis, or sunburn for the eyes.

“My eyes and vision finally feel normal, although it definitely took time. I hope my story is a warning to others who may find themselves in front of the cameras and lights or, as I now know, for those who spend a significant amount of time outside. From my experience, you should never underestimate the danger of UV radiation to your eyes. Your eye-care provider can tell you what I learned the hard way: UV protection is available if you ask for it. It was a painful lesson to discover. You can not only get UVA/UVB protection on sunglasses, but also on prescription glasses and even contacts.”

Kerry Sanders
NBC News Correspondent

Long-Term UV-Related Eye Damage

- **49%** of U.S. adults don't know that UV exposure increases the likelihood of cataract formation
- **43%** don't know that UV exposure can cause cancer of the eye or eyelid
- **36%** don't know that eyes can be sunburned

Source: The Vision Council, 2014 Sun Protection Survey

Over time, accumulated UV damage can result in the development of **pterygia** and **pinguecula**. A pterygium is a thin, noncancerous growth of tissue that surfaces on the conjunctiva (the thin, transparent membrane that covers the white part of the eye) and cornea. In addition to being unsightly, these growths are painful and irritating. Surgery may be required in cases where pterygia grow large enough to interfere with vision; however, growths may reappear after surgical removal. Similarly, a pinguecula is a yellow protein deposit on the conjunctiva. Unlike pterygia, pinguecula do not grow on the cornea and therefore don't interfere with sight. Surgical removal is rare but available on a case-by-case basis.

Long-term exposure to the sun is also a risk factor for **cataracts**, a clouding of the eye's lens. Over time, even low levels of UVB exposure can cause changes in the lens, including pigment changes, which contribute to cataract development.ⁱⁱ The World Health Organization estimates that up to 20 percent of all cataract cases may be attributable to UV radiation, and are therefore avoidable.ⁱⁱⁱ

Given UVB's correlation with cataract development, a depleting ozone layer could result in heightened exposure and increased incidence of cataracts. Just a 10 percent decrease in the ozone layer can lead to an increase of 1.6 million to 1.75 million cataract cases.^{iv}

Age-related macular degeneration (AMD) is characterized by the deterioration of the eye's macula. This condition limits central visual acuity, making it hard to perceive detail. AMD is the leading cause of blindness in the western world; there is currently no cure.

Studies suggest that prolonged exposure to UVA radiation can lead to AMD; however, the relationship between UV rays and AMD is not well understood. Emerging research reveals that exposure to high-energy visible (HEV) light can induce oxidative stress on the retina, resulting in AMD.^v

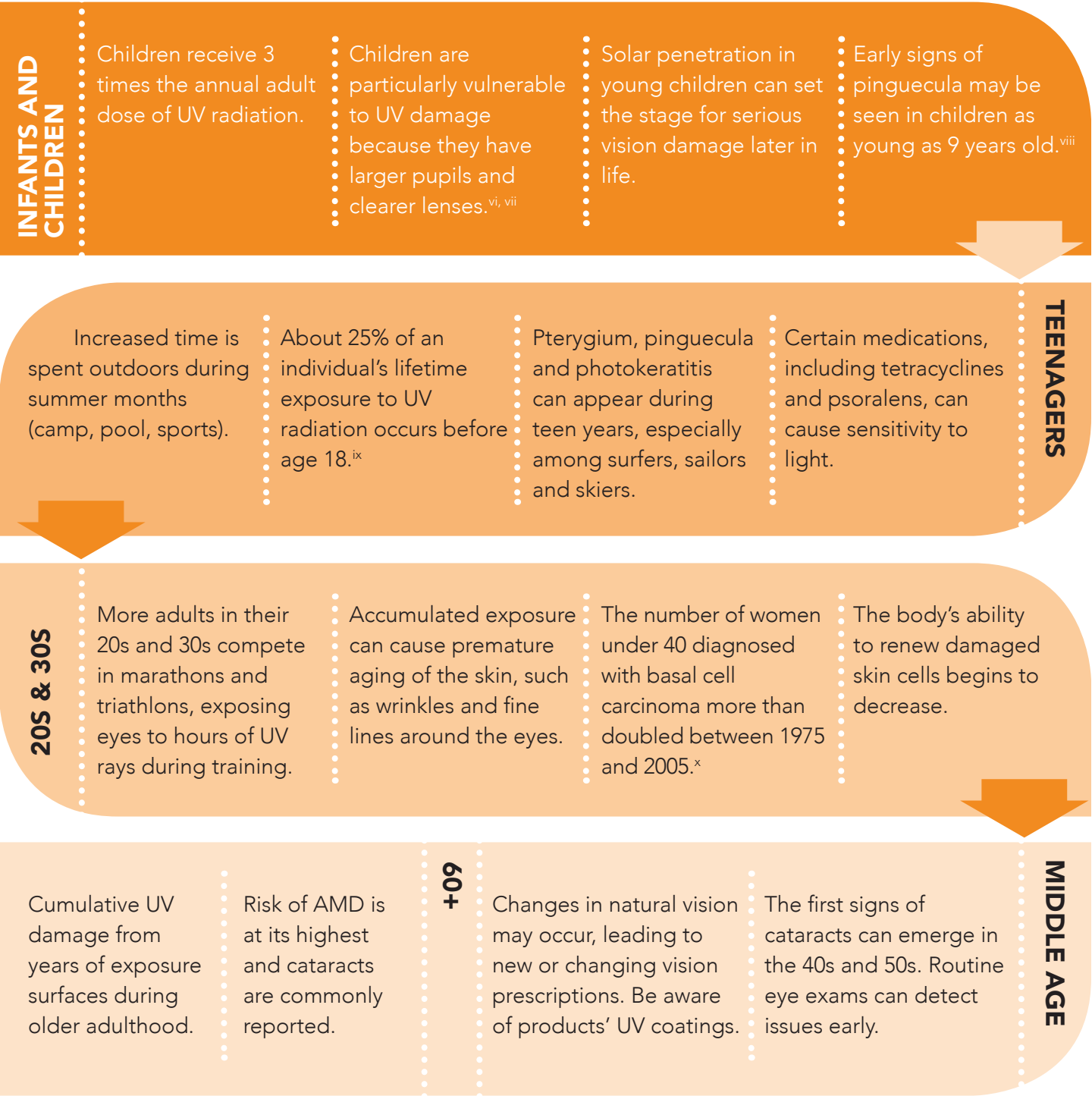
UV radiation can also cause different forms of **cancer**—both in the eye and the delicate skin surrounding the eye. Melanoma is the most frequent malignant cancer of the eye and often requires surgical removal. Basal cell carcinoma, a nonmelanoma type of cancer, is a small, fleshy bump or nodule that can form on the eyelid. In addition to being the most common form of skin cancer, basal cell carcinoma accounts for 90 percent of all eyelid cancers.

!

20% of all cataract cases may be attributable to UV radiation
—World Health Organization

Impact Throughout a Lifetime

The most detrimental thing about UV is that it's cumulative and damage occurs over a lifetime of exposure. The effects of UV rays differ across age groups, with the most serious effects showing up later in life, after years of accumulated damage. Use of UV-protective eyewear during childhood – and into teen and adult years – can mitigate serious vision problems and help adults maintain healthy eyes well into their senior years.

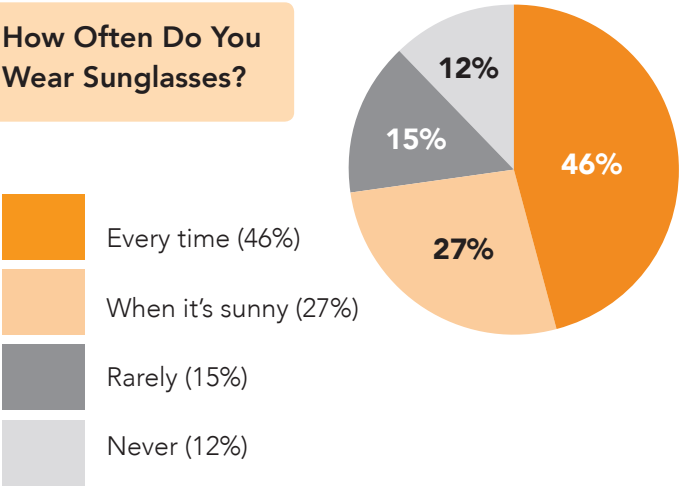


Study: Americans Are Unprotected in the Battle Against UV Exposure

During the spring of 2014, The Vision Council set out to understand what Americans know about UV-related eye damage and how they are protecting their eyes from exposure. More than 10,000 adults nationwide participated in the Sun Protection Survey; additional observational studies were also completed. The results revealed a dire need to increase educational efforts about UV damage and to change current habits that offer no protection from the sun.

Key Findings:

How Often Do You Wear Sunglasses?



46% of adults report that they wear sunglasses only when it's sunny outside; 12% report that they never wear sunglasses.

UV rays are not limited to sunny days. Exposure on cloudy days can be very dangerous to unprotected eyes. To best protect vision, individuals should not think of sunglasses as just a sunny-summer-day's necessity—they should be worn throughout the year, including overcast days. That's why it's just as important for everyday glasses to have anti-UV treatments. Many glasses come standard with UV protection but it's best to check with an eye care provider to be sure.

Compared with the rest of the population, a higher percentage of adults ages 20-29 and age 60 or older do not wear sunglasses.

Young adults need to protect their eyes now to prevent long-term issues that can present after years of UV exposure. For older adults, UV exposure can progress age-related degenerative eye diseases such as cataracts and macular degeneration.

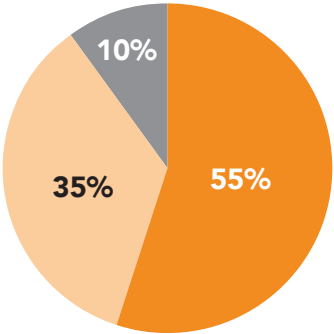
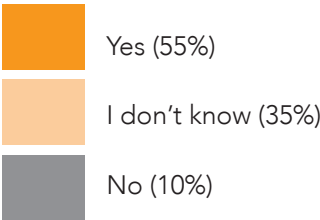
In an observational study, nearly half of adults (46%) were not wearing sunglasses.

To prevent UV-related eye damage, sunglasses should become part of each day's "out-the-door" routine.

Only 27% of adults store their sunglasses in a case; 30% of women keep them loose in their handbags.

When not in use, sunglasses should be kept in their cases. Keeping them protected is the only way to keep eyes protected. Scratches and scrapes to the lens can damage UV coatings on sunglasses and/or prescription eyeglasses, leaving the eyes exposed to UV damage.

Are Your Sunglasses UV-Protective?



35% of adults report that they do not know if their sunglasses have UV protection.

Sunglasses can't shield your eyes from the sun if they don't have UV protection. Dark lenses do not indicate protection. When purchasing sunglasses, look for a label, sticker or tag that promises UVA and UVB protection. Eye-care providers can measure UV protection in sunglasses and prescription glasses using a UV meter.

Nearly half of adults do not know that UV exposure can lead to long-term vision diseases such as age-related macular degeneration (53% of respondents were unaware of the connection), cataracts (49%) and cancer of the eye and/or eyelid (43%).

UV-protective sunglasses and other eyewear can prevent or mitigate UV-related vision problems. Adults over 40 should schedule annual eye exams to detect early signs of age-related vision diseases.

Only 21% of runners observed during marathons/half marathons were wearing sunglasses.

Endurance runners spend considerable time outdoors, subjecting their eyes to UV exposure. Research has found that the eye receives nearly double the amount of UV radiation during peak running times (from 8-10 a.m. and 2-4 p.m.).^{xi} UV eye protection is essential for runners, and sports-specific sunglasses provide optimal protection in a lightweight, flexible and sweat-resistant form.



UV Levels Across the United States

UV radiation can penetrate the Earth’s atmosphere at any time and place, but certain regions have heightened radiation levels.

UV rays are particularly strong near the equator, since they travel a shorter distance to reach the Earth’s surface. Cities at high altitudes also share higher UV levels because the sun’s rays can easily penetrate the thin atmosphere.

To determine areas of high risk, The Vision Council analyzed national UV index levels from the U.S. Environmental Protection Agency (EPA) and the National Weather Service (NWS). More than 50 cities were evaluated for solar radiation strength, season, climatic conditions, ozone concentration, cloudiness and elevation. Additional data from The Vision Council’s Sun Protection Survey underscores sunglass use in particular cities.

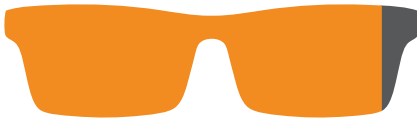
Sunglass use percentages by city:



Miami: 61%



Salt Lake City: 23%



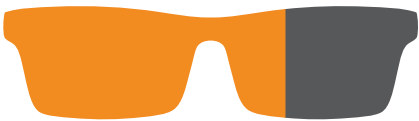
Phoenix: 91%



Atlanta: 60%



San Francisco: 58%



Raleigh/Charlotte: 60%

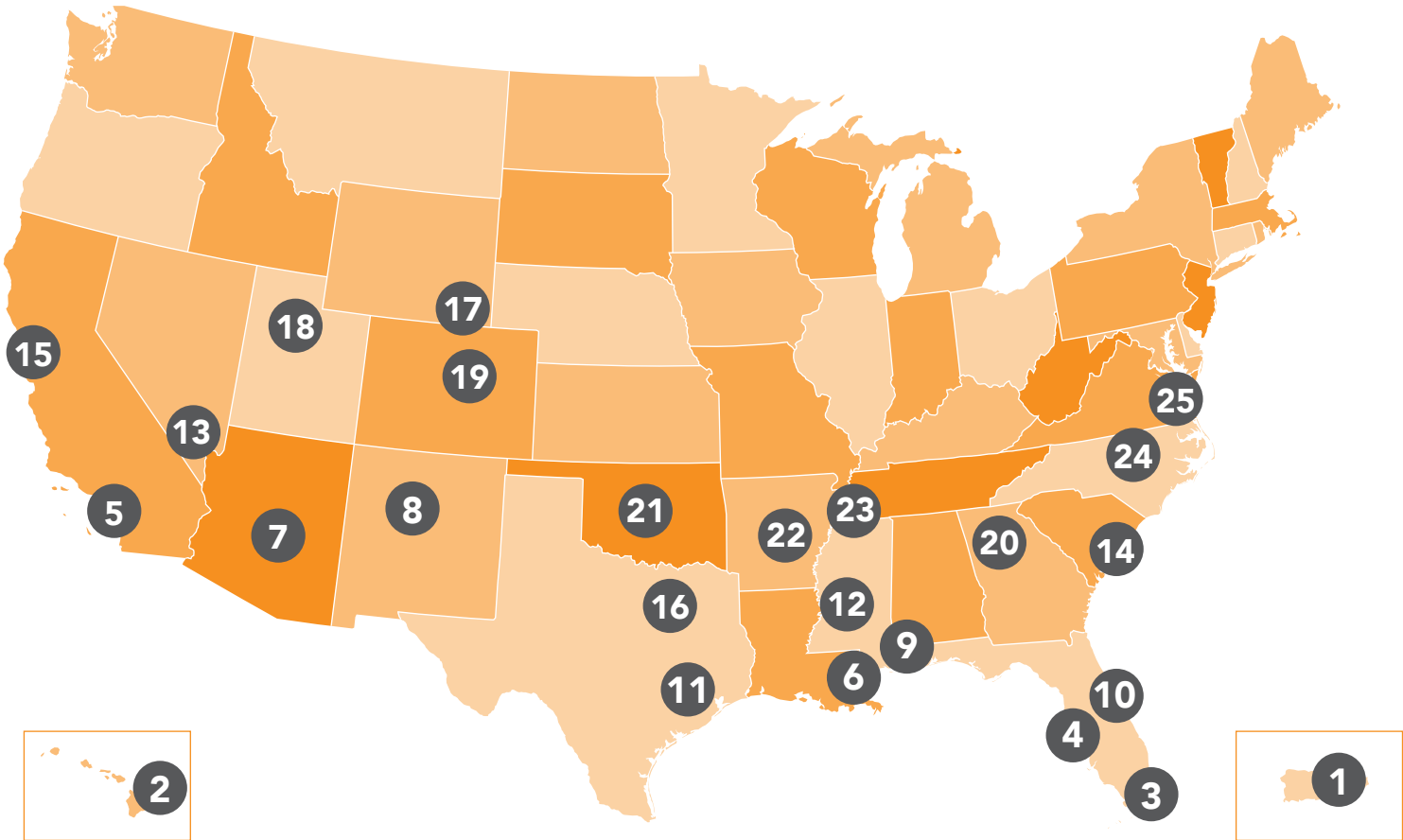


Dallas: 53%



New York City: Highest percentage of survey respondents who say their sunglasses do not have UV protection.

Raleigh/Charlotte: 76% of residents don’t know if their sunglasses have UV protection



Rank	City	Total Days of Extreme and Very High Risk	% Annually
1	San Juan	297	81.8%
2	Honolulu	264	72.7%
3	Miami	221	60.9%
4	Tampa Bay	187	51.5%
5	Los Angeles	168	46.3%
6	New Orleans	165	45.5%
7	Phoenix	165	45.5%
8	Albuquerque	164	45.2%
9	Mobile	164	45.2%
10	Jacksonville	160	44.1%
11	Houston	157	43.3%
12	Jackson	137	37.7%
13	Las Vegas	133	36.6%

Rank	City	Total Days of Extreme and Very High Risk	% Annually
14	Charleston	127	35.0%
15	San Francisco	125	34.4%
16	Dallas	124	34.2%
17	Cheyenne	120	33.1%
18	Salt Lake City	119	32.8%
19	Denver	117	32.2%
20	Atlanta	116	32.0%
21	Oklahoma City	106	29.2%
22	Little Rock	105	28.9%
23	Memphis	104	28.7%
24	Raleigh	96	26.4%
25	Norfolk	91	25.1%

Note: Sunglass statistics were provided through The Vision Council’s 2014 Sun Protection Survey. The percentages noted represent adults who were wearing sunglasses during the time of their interview. Actual sunglass use may be higher.

Sunglasses and UV Exposure

Given the harm that the sun’s rays can do to our eyes, it is essential that adults and children wear proper eye protection while outside—regardless of the season or time of day. Sunglasses continue to be the most effective tool at preventing immediate and long-term UV damage. The right pair of glasses will block UVA and UVB light—as indicated by a sticker or label on the glasses verifying UV protection.

Consumers today have several options when it comes to eyewear. Anti-reflective coatings and UV treatments can be added to both sides of prescription lenses for daily protection, and a wide range of prescription sunglasses are available.

Nonprescription sunglasses come in a variety of lens and frame options. Different lenses can enhance visual contrast during particular activities such as driving, golfing, skiing and boating.

Lens Options

- **Anti-Reflective:** Dramatically reduce distracting reflections, improving contrast, visual acuity and comfort in difficult lighting situations
- **Impact Resistant:** Lenses sold in the U.S. must be capable of withstanding impact testing.
- **Mirror Coated:** Reflect light across a wide spectrum, including infrared or heat rays
- **Photochromic:** Automatically darken and lighten to provide the proper level of protection and comfort in varied lighting conditions
- **Polarized:** Filter out reflected glare from shiny surfaces (water, pavement, dashboards) and improve contrast and visibility while reducing squinting and eyestrain
- **Wraparound:** Shaped to keep light from entering the eye at all angles, including the side
- **Scratch Resistant:** Significantly durable and minimize abrasions

Other eyewear options can help maximize UV protection. Most swim goggles, for instance, have UV coatings that protect against exposure from water-reflected sunlight. Certain brands of contacts may also offer UV protection, though contacts alone are not sufficient. Contacts should be worn in combination with sunglasses to shield all parts of the eyeball from UV rays.

The most important considerations when making eyewear purchases are UV protection, fit and comfort. Sunglasses that aren’t comfortable or don’t look good won’t be worn. And without UV protection, shades aren’t effective. The best advice is to spend time researching your options and talk with an eye-care professional to learn more about the lenses and tints that will be most conducive to your lifestyle.



Darker Isn’t Necessarily Better

Remember, the tint and color of sunglass lenses has no bearing on the level of UV protection.

One of the biggest myths about sunglasses, in fact, is that the darker the lens, the more UV protection there is. Even clear glasses with UV treatments provide excellent coverage from the sun.

A Lifetime of Crucial Sunglass Considerations

Children and adults require different eyewear products as they age. When purchasing sunglasses, consider the following options to find the perfect pair for yourself, a parent or a child.



Sunglasses with large frames or adjustable straps (e.g., Velcro or elastic) are more likely to stay in place.

Look for shades without hinges so that children can put on their own sunglasses without pinching their fingers.

Wraparound sunglasses offer increased protection for the side of the eyes and eyelids.

For children who are prone to losing or breaking sunglasses, purchase plastic sunglasses; they’re inexpensive and easily replaceable.

INFANTS & CHILDREN

Most teenagers are concerned with trends and comfort and should buy a pair that they like and want to wear.

For active teens, consider polycarbonate lenses that are light and particularly durable.

Polarized lenses are also a good choice for teens who enjoy hiking, biking and water sports. They cut glare from reflective surfaces such as roads and water.



TEENAGERS



Avoid vintage shops and street vendors selling sunglasses, as they cannot guarantee UV protection. Often, the glasses are warped and scratched.

Both serious and recreational athletes can benefit from sports-focused sunglasses that are sweat-resistant, flexible and lightweight.

UV-protective contacts are not enough when it comes to the sun. Sunglasses should be worn in combination with contacts to protect all parts of the eye.

20s & 30s

Those with new or changing vision should consider added coatings and lens treatments to protect against UV rays.

In addition to UV treatments, front and back antireflective coatings prevent direct and reflected UV rays from entering the eye.

Certain tints are beneficial for golf, tennis and cycling. Brown and copper colors enhance contrast and make it easier to see objects such as a golf ball against the sky.



MIDDLE AGE



Aging increases sensitivity to light and glare, especially for adults with cataracts or AMD.

Photochromic lenses regulate the amount of light that comes through the lenses based on ambient conditions.

Polarized lenses reduce glare and minimize reflected UV rays. These lenses are often recommended for activities such as driving.

Anti-reflective lens treatments on prescription glasses to cut glare and improve clarity and contrast.

60+

Conclusion

Since 2011, The Vision Council has conducted the Sun Protection Survey to measure UV knowledge and sunglass use. Over four years, knowledge of UV-related eye damage has increased, but use of sunglasses and other UV-protective eyewear has decreased. It is time to break this trend and give sunglasses the same importance as skin-care products such as sunblock.

Consumers have more options than ever before. The eyewear industry is constantly evolving and expanding to provide more durable, flexible products for children and adults. And wearers of prescription glasses can have UV protections built into their corrective eyewear.

Ultimately, the preventive steps taken today will set up eyes for a healthy future. The small act of grabbing sunglasses before heading out the door can mitigate serious vision risks—some of which lead to blindness or severe vision impairment. It’s never too late to modify your behavior and begin a healthy routine of UV protection—over the lifetime.

In addition to this report, The Vision Council has developed a series of resources to help consumers make informed decisions about their UV protection. Daily UV index levels and videos can be found on The Vision Council’s website at www.thevisioncouncil.org.

Endnotes

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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.*



"The vision community continues to push the boundaries for sunglasses and other UV-protective eyewear. But even as trends change and eyewear evolves, the goal of providing UV protection has always remained our priority.

"Many people are still unaware of the damage associated with UV exposure to eyes, and this report seeks to underscore those risks while also highlighting eyewear solutions for a particular lifestyle or activity. Ultimately, we want the public to make informed decisions that will keep their eyes safe.

"Through an annual UV safety campaign, The Vision Council hopes to emphasize just how preventable UV damage is and that it's never too soon to take action. The most debilitating vision problems happen over a lifetime."

*Bob Grow
Chair, Sunglass and Reader Division
The Vision Council*



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