

# EYES OVEREXPOSED:

## The Digital Device Dilemma



2016 DIGITAL EYE STRAIN REPORT



THE **VISION**COUNCIL

Digital eye strain is the physical eye discomfort felt by many individuals after two or more hours in front of a digital screen

**90%** Nearly 90% of Americans use digital devices for two or more hours each day.

More than nine out of 10 people with digital eye strain use devices for two or more hours each day.



Use of technology can have unintended consequences for our health.



76% of Americans look at their digital devices in the hour before going to sleep.



Adults under 30 experience the highest rates of digital eye strain symptoms (73%) compared with other age groups.



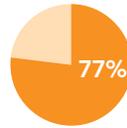
41% of women report experiencing back pain or text neck symptoms compared to 30% of men.

Digital device use is a family affair, but every generation has their own unique habits.

<p><b>GRANDPARENTS:</b> More than 30% of adults 60 and older have had prolonged use of digital devices (two or more hours per day) for more than 15 years.</p>	<p><b>YOUNG ADULTS:</b> Nearly nine of 10 use two or more devices at a time and are more likely to use their smartphones for activities such as getting news updates.</p>	<p><b>CHILDREN AND TEENS:</b> 65% spend two or more hours per day on a digital device, yet 77% of parents report being somewhat or very concerned about the impact of devices on children's eyes.</p>	<p><b>PARENTS AND CAREGIVERS:</b> 64% spend more than five hours a day looking at digital screens. 55% use computers to shop online.</p>
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**60%** Nearly 60% of Americans use digital devices for five or more hours each day and 70% of Americans use two or more devices at a time.



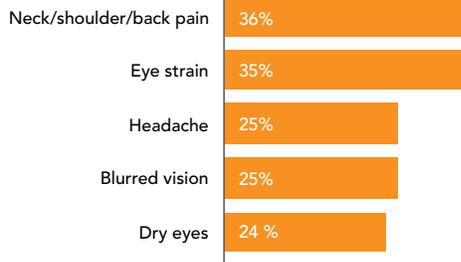
77% of the individuals who suffer from digital eye strain use two or more devices simultaneously.



70% of women report experiencing symptoms of digital eye strain and are more likely than men to simultaneously use multiple devices.

65% of Americans report experiencing symptoms of digital eye strain.

Symptoms Reported:



**27%** of Americans do not know computer eyewear can protect against digital eye strain.



Americans are becoming increasingly digitized. More of our hobbies and activities are moving online.



96% of adults use digital devices to find a recipe.



Women (56%) are more likely than men (51%) to use their smartphones to get directions.



More than half of adults use their smartphone most frequently to check the weather.



59% of individuals in their 40s use computers to shop online, more than any other age group.

83% of adults in their 20s use a smartphone as their alarm clock.



**90%** of patients do not talk with their eye care provider about digital device usage.

## EXECUTIVE SUMMARY



65%

of Americans experience digital eye strain



71%

play games on their devices

We awake to the glow of a phone acting as an alarm clock. We work for hours on our computer screens, perhaps stopping to look at something on another screen—a television, a tablet, a smartphone. The pattern is repeated again and again as our days are filled with electronic images of news reports, online shopping, video games, movies, emails and texts....

This constant exposure to technology is a shock to our eyes. For centuries, we have evolved our sight by viewing a wide variety of objects outside from varying distances. A combination of factors including the proximity at which we view digital screens, the frequency and length of time of this use, physical responses to screen habits, and exposure to high-energy visible (HEV) or blue light, have conspired to cause visual discomfort in 65 percent of Americans.<sup>1</sup> This stress and strain, combined with other physical discomforts, is called digital eye strain.

Digital eye strain is characterized by dry, irritated eyes, blurred vision and neck and back pain. It is not uncommon to start experiencing this discomfort after spending two or more hours staring at a device, or more realistically, multiple devices. In fact, on average, **75 percent of people who use two or more devices simultaneously report experiencing symptoms of digital eye strain** compared to only 53 percent of people who use just one device at a time.

Optimal optical set-ups for office spaces and desks can be designed to put computer or laptop screens 20-40 inches or an arm's length away from our eyes. However, the modern day workspace is far from "eye-gonomical," likely contributing to the strain in our necks and backs. This is especially true today in our modern society, where any place can become a workspace. Whether it is a kitchen island, a coffee shop lounge chair, a crowded airplane or even a bed, Americans are always connected, no matter the setting.

Americans report using devices on the go, turning to their ever-present smartphones to keep in touch with family and friends (54 percent), get directions (54 percent) and check the weather (51 percent). Because individuals typically hold these smaller devices 8-12 inches away from their faces, blinking rates can decrease with prolonged use, resulting in dry, irritated eyes. The angle at which devices are held can also contribute to neck and shoulder pain. Researchers have found that tilting your head forward to check your phone increases the pressure and stress on the spine contributing to "text neck" that leads to early wear, tear and degeneration.<sup>2</sup>

Adults with computer-oriented jobs may seem most vulnerable to digital eye strain, but children are also increasingly exposed to prolonged technology use. In addition to using devices for play, children are using technology during school and for homework. Eye care providers have reported seeing an increase in accelerated cases of myopia,<sup>3</sup> or nearsightedness in children,<sup>4</sup> which may be due to the increase of near-range activities, such as using a digital device. Parents are also apprehensive, nearly 80 percent report being very or somewhat concerned about the impact of digital devices on developing eyes.

While symptoms of digital eye strain, such as blurred vision and eye fatigue, can be irritating and may reduce productivity, the effects are generally temporary. But preliminary research points to a potential long-term hazard from the effects of too much screen time: consistent exposure to HEV, or blue light, may be linked to long-term vision issues such as age-related macular degeneration (AMD) and cataracts.<sup>5</sup>

Unplugging from this connected world is unlikely. In fact, one in three Americans who are aware of the potential damage from devices don't do anything to limit their exposure, despite solutions available to protect their eyes. Innovative eyewear and lens technology can shield eyes from the side effects of excessive use of technology. Designed to alleviate strain, eliminate glare, and filter out harmful blue light, computer eyewear is one option to protect vision while using technology responsibly. During a visit to an eye-care provider, an individual should plan to discuss technology use habits and the issue of digital eye strain, the impact of blue light penetration on vision, and the various optical options and/or lifestyle changes to protect against future discomfort.

The Vision Council, seeking to raise awareness about digital eye strain and solutions, commissioned its fourth annual VisionWatch<sup>6</sup> survey to examine the increasing usage of digital devices and their impact on vision. Nationwide, 10,329 adults participated in this survey, conducted in November 2015.



**3 out of 4 Americans use TVs and computers to get news**



## Computer Eyewear: The First Line of Defense

by Justin Bazan, OD

Our eyes are not built to stare at digital screens all day, but the demands of our modern-day world frequently put us in front of a computer, working from our smartphones, and reading on our tablets for hours on end. As a result, many of us are living with tired, sore and fatigued eyes, and even headaches – all symptoms of digital eye strain.

In my practice, I make it a point to discuss digital device use with my patients, but as many as 90 percent of patients do not have this conversation with their eye care provider. I find that my patients underestimate how much exposure they have to technology and may not understand the extent to which screen time is putting their eyes and bodies at risk for digital eye strain.

When using technology, many think suffering with digital eye strain is a necessary evil, but it doesn't have to be. If you are experiencing vision issues while using digital devices, talk with your eye care provider to see if computer eyewear or another solution would be right for you.

## TECHNOLOGY OVERLOAD AT EVERY AGE

Every generation has unique habits and weaknesses when it comes to digital device use, but they may not be aware of the health consequences associated with so much exposure to technology. Outlined below are recent findings from The Vision Council's VisionWatch survey on digital device use.



### » Children

Children are being raised with technology integrated into their everyday lives. However, they are not likely informed how to use these devices safely to protect their health. For example, they do not often know how to hold their devices to prevent squinting or how to sit comfortably to avoid strain.

- 65% of parents report that their children (under the age of 18) spend two or more hours on digital devices on a daily basis.
- More than three-fourths of parents (76.9%) report being somewhat or very concerned about the impact of digital devices on children's developing eyes.
- 70% of parents who let their children use devices for three or more hours a day, or who do not set limits, report being very or somewhat concerned about the impact of digital devices on their children's developing eyes.



### » Adults in their 20s

Millennials in their 20s are the ultimate device multitaskers. These individuals switch back and forth between different technologies to binge-watch a favorite show, work at a laptop and scroll through social media.

- 73% of individuals in their 20s report symptoms of digital eye strain.
- Nearly nine out of 10 people (87%) in their 20s use two or more devices simultaneously.
- They opt for getting their news via their smartphones, computers and tablets, compared to 66% of people who are 60 or older who get their news from television.
- Nearly 90% of people in their 20s check their devices in the hour before going to sleep.



### » Adults in their 30s

Adults in their 30s are cubicle dwellers, using computers and laptops consistently at work. As their vision begins to evolve with age, they will need to think about more than just a pair of reading glasses and must consider additional eyewear solutions, including computer eyewear, to help address vision issues associated with technology use.

- 93% of people in their 30s are at risk for digital eye strain from spending two or more hours on a digital device per day.
- 68% use their smartphones to get directions.
- 67% of people in their 30s spend five or more hours each day on digital devices.
- Nearly 2 in 5 (18.1%) use a tablet to find a recipe, and one in 10 use tablets for online shopping.
- More than one out of three (34%) play games on their smartphones.

## » Women and Men

- Women are more likely to report symptoms of digital eye strain (69%) compared to men (60%).
- Men use computers and laptops every day more than women do. Women tend to use smartphones for daily activities.
- Women are slightly more likely to check devices before bed than men.
- Women are more likely than men to use two or more screens at the same time (74% compared with 67%).



## » Adults in their 40s

As adults in their 40s experience vision changes that accompany aging, many may face challenges trying to focus their eyesight at varying distances and moving between devices.

- 66% experience one or more symptoms of digital eye strain.
- 65% spend more than five hours on digital devices each day.
- 59% use desktop and laptop computers to go online shopping, more than any other age group.
- More than one in five (21.5%) 40-year-olds use computers to keep track of professional sports.
- Nearly one in four report using just a single device at a time, compared with only 16.5% of 30-year-olds and 12.1% of 20-year-olds.



## » Adults in their 50s

Adults in their 50s were the original early adopters of technology—having mastered computers in the 1990s. As such, most rely on computers and laptops as their core digital devices.

- More than 30% have had prolonged use of digital devices (two or more hours/day) for more than 15 years.
- 63.9% report symptoms of digital eye strain.
- 86% spend two or more hours on digital devices each day.
- 55% spend more than five hours on digital devices each day.



## » Adults 60-plus

Adults ages 60 and older represent the fastest growing demographic on Facebook, and because of their commitment to wellness and healthy aging, this population has been quick to monitor health data captured through wearables and devices. They also have been eager to adopt technology to support independent living. However, more than half of these aging eyes experience symptoms of digital eye strain (53.4%).

- 37% spend five or more hours on digital devices daily.
- These older Americans are more likely to use a desktop or laptop computer for activities like getting directions (55%), finding a recipe (61%), doing research (84%), checking social media (59%), and playing games (21%) than younger generations who instead use their smartphones.

## 20/20 VIEW: THE SHORT- AND LONG-TERM EFFECTS OF DIGITAL EYE STRAIN

The evolution of how we use our eyes in a technology-driven world raises the question: how will our vision adapt to our relatively newfound habits?

If you are spending several hours staring at digital screens and/or experiencing any of the above symptoms, it is important to talk with your eye care provider about your digital habits and what solutions are available to help relieve your strain. Solutions such as computer eyewear can help alleviate the strain and prevent harmful blue light from penetrating your eyes.

### The Damaging Effect of Blue Light

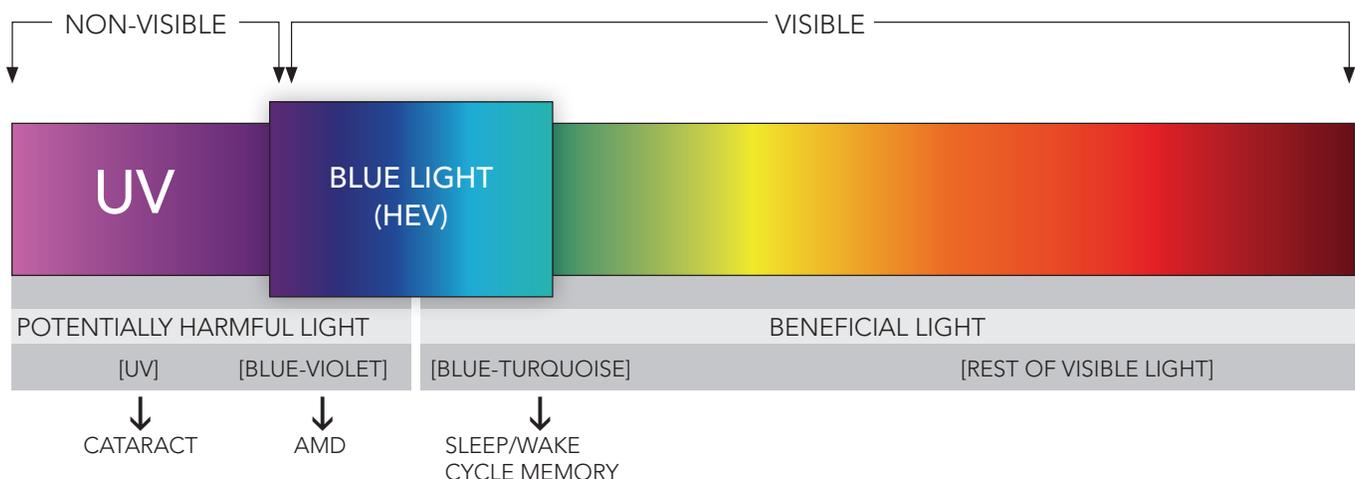
Virtually every digital device, as well as light emitting fixtures and appliances including fluorescent lamps, has light-emitting diodes (LED) that radiate blue wave-length light. Emerging research suggests cumulative and constant exposure to the blue light emitted from backlit displays can damage retinal cells.<sup>7</sup>

Blue light penetrates deeper into the eye compared to ultraviolet light, so the exposure may damage the retina by exposing the eye to hidden spikes in intensity. The wavelengths within the blue-violet portion of the light spectrum that are considered potentially most harmful to retinal cells range from 415 to 455 nanometers, and most of our devices emit a high level of blue light, typically around the wavelength starting at 400 nm.

Cumulative blue light exposure is linked to slow degeneration of the retina, which could accelerate long-term vision problems such as age-related macular degeneration (AMD) and cataracts.<sup>8</sup>

While this high-energy light is necessary for aiding cognitive functions, such as alertness, memory and emotion regulation, it can also disrupt sleep by suppressing the natural release of melatonin.<sup>9</sup> According to the VisionWatch survey, more than 75 percent of American adults report checking their digital devices in the hour before going to sleep. This eye exposure before bedtime has been shown to disrupt sleep patterns by increasing alertness in the brain.

Computer eyewear is available with blue light filtering capabilities that reduce the effects of this wavelength on circadian rhythm—which can hinder a good night’s sleep. Researchers examined the effect of blue light blocking glasses on teenagers who use LED screens before bed. They found that the glasses significantly weakened the LED-induced melatonin suppression and decreased alertness brought on by blue light before bedtime.<sup>10</sup>



## TECH INFLUENCE: BEYOND OUR EYES

Our use of technology can have unintended consequences for our health. In addition to impacting our eyes, below are three ways digital devices are altering our everyday lives:

### » Productivity

According to the VisionWatch survey, **nearly 70 percent of Americans use two or more devices simultaneously**. This common practice of multitasking is not only harsh on our eyes, but can lead to decreased productivity. Even children and teens admit to multitasking when doing school work. Half of teens say they often or sometimes use social media or watch TV while doing their homework, while 60 percent admit to texting when trying to study.<sup>11</sup> Research conducted at Stanford University<sup>12</sup> found that people who are regularly bombarded with several streams of electronic information cannot pay attention, recall information or transition from one project to another as well as those who complete one task at a time.



### » Sleep Habits

We now know that exposure to blue light before bed can disrupt sleep patterns and foster brain activity, which can make it difficult to go to sleep. However, **more than 75 percent of Americans look at their digital devices in the hour before going to bed**. This number is even higher for people between the ages of 18 and 29, who are sometimes using two or more devices before falling asleep—doubling their exposure to blue light and to the risk of digital eye strain. Even having devices turned on nearby when sleeping can be problematic; a study from University of Texas at Austin found that the average college student loses 46 minutes of sleep each night due to answering phone calls or checking for messages while in bed.<sup>13</sup>



### » Posture

How we position our bodies when we are looking at digital devices can affect our posture and put unnecessary strain on our muscles. When working at a computer, people tend to lean towards the screen and/or slouch in their chairs, which can put strain on the neck and back. In fact, a **large majority (80%) of people who report symptoms of digital eye strain (including neck and back pain), also report doing research regularly on a computer**. In addition to computer use, nearly half (46%) of adults who report using three devices simultaneously experience neck and shoulder pain. A new phenomenon called “text neck” has emerged since the use of smartphones has become commonplace; research suggests that when you tilt your head forward 60 degrees to look at your phone, you're putting 60 pounds of pressure on your neck.<sup>14</sup>





## AN EYE ON CHILDREN: EARLY SCREEN TIME AFFECTS VISION HEALTH

**33%**  
of children use  
a digital device  
use three or more  
hours each day.

Children increasingly learn how to use a device before they can talk, walk or read. This often continues into adolescence, as children utilize devices for entertainment and games, and eventually for learning and parents may not realize how this trend is impacting their child's eyes. Seventy percent of parents who don't limit their children's screen time report being very or somewhat concerned about the impact of digital devices on their children's eyes, which is cause for concern.

The short-term effects of digital eye strain are not only a threat to adults who spend hours in a cubicle. In a recent focus group study, children ages 9-16 reported experiencing eye issues, headaches and tiredness when using the internet and technology, even though they did not think they used devices excessively.<sup>15</sup>

Additionally, children may be using computer workstations that are set up for adults, which can be uncomfortable and contribute to eye strain symptoms. The optimal viewing of a computer screen is slightly downward, at a 15-degree angle, which should be adjusted for a child's height. Children may also have difficulty reaching the keyboard or placing their feet on the ground, which can cause neck and back pain.

Long-term issues can also result from overexposure at a young age – eye care providers have reported seeing an increase in accelerated cases of myopia<sup>16</sup> or nearsightedness in children, which may be due to the increase of near-range activities like using a digital device. A recent study found that kids who spent more time outdoors were 23 percent less likely to develop nearsightedness.<sup>17</sup>

## DIGITIZE YOUR EYES

Using technology has many benefits, but it should be used responsibly. There are several solutions to relieve the irritating and sometimes painful symptoms of eye strain which can also potentially help mitigate long-term vision issues.

### Lens Technology to Combat Digital Eye Strain

In response to the shift in technology consumption habits over the past decade, the optical industry has developed new lens technology that cuts glare, blocks out blue light from penetrating our eyes and prevents vision fatigue when staring at digital devices.

Referred to as computer eyewear, these lenses are built for the mid-distance range at which we typically view a digital screen, and they can be purchased with or without a prescription. The lenses and filters are customized to reduce blurriness and pixilation, decrease brightness and minimize glare during prolonged use of devices.

Talking to an eye care provider about your digital device habits is vital in determining what type of computer eyewear is right for you. During a comprehensive annual eye exam, be sure to discuss how much time you spend in front of a digital screen, what your lighting conditions are, the typical distance between you and your screen and the type of work you are doing. Depending on your activities, you may need lenses that offer a very wide, but shallow field of view – ideal for sustained computer work – or ones that offer good computer vision but also allow you to see clearly, wherever you are, whether it's your office or your home.

#### » Lens Options

- **Single Vision Lenses** – function at an individual's computer working distance
- **High-Fitting Bifocals** – provide a large diameter bifocal section at the bottom and middle of the lens, specifically for the face-to-computer distance; above the bifocal section, the lens is built to view objects that are far away
- **Occupational Lenses** – offer appropriate computer screen viewing assistance at the top of the lens; the bottom of the lens is for reading
- **Progressive Lenses** – developed as a solution for everyday vision needs, near, intermediate and far; prescribed for adults with limited computer use
- **Computer Progressive Lenses** – designed to provide large, distortion-free viewing areas for computer distance and up-close objects; recommended for computer use, reading and limited distance viewing

#### » Lens Treatments and Filters

- **Anti-Reflective Coating** – reduces reflection and glare from indoor and outdoor lighting sources
- **Amber/Yellow Filters** – customized to filter out harmful blue and violet light that is emitted by many digital devices
- **HEV Filters/Coatings** – customized coatings and filters specifically designed to block out high-energy visible or blue light



## FIVE WAYS YOU ARE USING YOUR DEVICE WRONG:



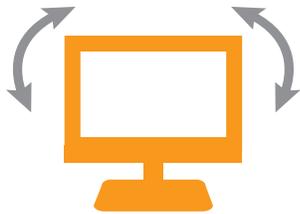
### Looking at your smartphone under the table during meetings

When you tilt your head forward to look at your phone, you put a lot of added weight and pressure on your neck—a culprit for serious symptoms of digital eye strain. When using handheld devices, make sure to keep them at a comfortable distance, and just below eye level.



### Getting too close to the computer screen

When the text on a screen is too small, we tend to lean forward towards the screen, putting extra strain on our neck and back. It is ideal to sit an arm's-length away from the computer screen, and to help out your vision by making the text larger. It can also be useful to wear computer lenses that have a special boost for the mid-distance range of the screen.



### Tilting your screen

Tilting your computer screen can also be hard on your neck and back—it is best to position your screen so that it is directly in front of your face and slightly below eye level. This keeps eyes at a relaxed position that promotes more frequent blinking.



### Turning all the overhead lights on or off

Lighting can create a setting that is harsh. Overhead and surrounding light competes with your device's screen, and doubles the amount of blue light penetrating your eye. Watching TV or working on a computer in a dark room also adds strain by forcing eyes to constantly adjust to the lighting levels.<sup>18</sup> Utilize computer eyewear to combat the blue light, and strive to match the room lighting to the brightness of your devices to further ease strain.



### Not taking breaks

Staring at a screen for long periods can significantly decrease our blinking rate, which leads to dry eyes. Follow the 20-20-20 rule to avoid dry, tired eyes: Every 20 minutes, take a 20-second break and look at something 20 feet away.

## IN CONCLUSION

Technology has opened our eyes to do more and see more than ever before. Gadgets and apps give us the convenience necessary to live our life on the go, but we must learn to use these devices responsibly. More than 65 percent of Americans feel the strain after prolonged use of devices.

There are solutions available to keep our eyes fresh and healthy without powering down. Wearing computer eyewear, looking away from your screen periodically, reducing the brightness of a device and adjusting our workspaces to create more optimal, optical conditions can help us interact safely with this technology and develop healthy eye habits.

The Vision Council is working with eye care providers and member companies to educate consumers about the problems associated with digital eye strain. While symptoms aren't permanent, they can be distracting and painful and often do not go away without proactively addressing the cause. Experiences of digital eye strain may also be due to, or symptoms of, a more serious eye disease. Regular comprehensive eye exams are a part of healthy vision maintenance and should be considered for both adults and children. Preventative eye care can help preserve vision and help identify vision and other health issues early on in disease progression, ensuring lifelong vision health.

During an exam, an eye care provider can take a closer look at the health of your eyes and vision and determine a plan to address personal vision needs based on your lifestyle and digital device use. With reassurance and advice, individuals can be more confident to create a comfortable and productive environment that accommodates digital needs and vision health.

» For more information about digital eye strain, visit [www.thevisioncouncil.org/des](http://www.thevisioncouncil.org/des)



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