

Computer Vision Syndrome, also referred to as Digital Eye Strain, describes a group of eye and vision-related problems that result from prolonged computer, tablet, ereader and cell phone use.

Many

individuals experience eye discomfort and vision problems when viewing digital screens for extended

periods. The level of discomfort appears to increase with the amount of digital screen use.

The average American worker spends seven hours a day on the computer either in the office or working from home. March is Save Your Vision Month and the American Optometric Association is working to educate both employers and employees about how to avoid digital eye strain in the workplace. To help alleviate digital eye strain, follow the 20/20/20 rule; take a 20-second break to view

something 20 feet away every 20 minutes.

The most common symptoms associated with Computer Vision Syndrome (CVS) or Digital Eye

Strain are eye strain, headaches

blurred vision

dry eyes

neck and shoulder pain

These symptoms may be caused by:

poor lighting

glare on a digital screen

improper viewing distances

poor seating posture

uncorrected vision problems

a combination of these factors

The extent to which individuals experience visual symptoms often depends on the level of their visual

abilities and the amount of time spent looking at a digital screen. Uncorrected vision problems like farsightedness and astigmatism, inadequate eye focusing or eye coordination abilities, and aging changes of the eyes, such as presbyopia, can all contribute to the development of visual symptoms

when using a computer or digital screen device.

Many of the visual symptoms experienced by users are only temporary and will decline after stopping

computer work or use of the digital device. However, some individuals may experience continued reduced visual abilities, such as blurred distance vision, even after stopping work at a computer. If nothing is done to address the cause of the problem, the symptoms will continue to recur and perhaps

worsen with future digital screen use.

Prevention or reduction of the vision problems associated with Computer Vision Syndrome or Digital

Eye Strain involves taking steps to control lighting and glare on the device screen, establishing proper

working distances and posture for screen viewing, and assuring that even minor vision problems are

properly corrected.

What causes Computer Vision Syndrome or Digital Eye Strain?

Viewing a computer or digital screen often makes the eyes work harder. As a result, the unique characteristics and high visual demands of computer and digital screen device viewing make many individuals susceptible to the development of vision-related symptoms.

Uncorrected vision problems can increase the severity of Computer Vision Syndrome or Digital Eye Strain symptoms. Viewing a computer or digital screen is different than reading a printed page.

Often the letters on the computer or handheld device are not as precise or sharply defined, the level of contrast of the letters to the background is reduced, and the presence of glare and reflections on the screen may make viewing difficult.

Viewing distances and angles used for this type of work are also often different from those commonly used for other reading or writing tasks. As a result, the eye focusing and eye movement requirements for digital screen viewing can place additional demands on the visual system.

In addition, the presence of even minor vision problems can often significantly affect comfort and performance at a computer or while using other digital screen devices. Uncorrected or under corrected vision problems can be major contributing factors to computer-related eyestrain. Even people who have an eyeglass or contact lens prescription may find it's not suitable for the specific viewing distances of their computer screen. Some people tilt their heads at odd angles because their glasses aren't designed for looking at a computer. Or they bend toward the screen in order to see it clearly. Their postures can result in muscle spasms or pain in the neck, shoulder or back. In most cases, symptoms of CVS or Digital Eye Strain occur because the visual demands of the task exceed the visual abilities of the individual to comfortably perform them. At greatest risk for developing CVS or Digital Eye Strain are those persons who spend two or more continuous hours at a computer or using a digital screen device every day.

How is Computer Vision Syndrome, or Digital Eye Strain treated?

Solutions to digital screen-related vision problems are varied. However, they can usually be alleviated by obtaining regular eye care and making changes in how you view the screen.

#### Eye Care

In some cases, individuals who do not require the use of eyeglasses for other daily activities may benefit from glasses prescribed specifically for computer use. In addition, persons already wearing glasses may find their current prescription does not provide optimal vision for viewing a computer. Eyeglasses or contact lenses prescribed for general use may not be adequate for computer work. Lenses prescribed to meet the unique visual demands of computer viewing may be needed. Special lens designs, lens powers or lens tints or coatings may help to maximize visual abilities and comfort.

Some computer users experience problems with eye focusing or eye coordination that can't be adequately corrected with eyeglasses or contact lenses. A program of vision therapy may be needed to treat these specific problems. Vision therapy, also called visual training, is a structured program of visual activities prescribed to improve visual abilities. It trains the eyes and brain to work together more effectively. These eye exercises help remediate deficiencies in eye movement, eye focusing and eye teaming and reinforce the eye-brain connection. Treatment may include office-based as well as home training procedures.

#### Viewing the Computer

Proper body positioning for computer use.

Some important factors in preventing or reducing the symptoms of CVS have to do with the computer and how it is used. This includes lighting conditions, chair comfort, location of reference materials, position of the monitor, and the use of rest breaks.

**Location of computer screen** Most people find it more comfortable to view a computer when the eyes are looking downward. Optimally, the computer screen should be 15 to 20 degrees below eye level

(about 4 or 5 inches) as measured from the center of the screen and 20 to 28 inches from the eyes.

**Reference materials** These materials should be located above the keyboard and below the monitor. If this is not possible, a document holder can be used beside the monitor. The goal is to position the documents so you do not need to move your head to look from the document to the screen.

**Lighting** Position the computer screen to avoid glare, particularly from overhead lighting or windows. Use blinds or drapes on windows and replace the light bulbs in desk lamps with bulbs of lower wattage.

**Antiglare screens** If there is no way to minimize glare from light sources, consider using a screen glare filter. These filters decrease the amount of light reflected from the screen.

**Seating position** Chairs should be comfortably padded and conform to the body. Chair height should be adjusted so your feet rest flat on the floor. If your chair has arms, they should be adjusted to provide arm support while you are typing. Your wrists shouldn't rest on the keyboard

when typing.

**Rest breaks** To prevent eyestrain, try to rest your eyes when using the computer for long periods. Rest your eyes for 15 minutes after two hours of continuous computer use. Also, for every 20 minutes of computer viewing, look into the distance for 20 seconds to allow your eyes a chance to refocus.

**Blinking** To minimize your chances of developing dry eye when using a computer, make an effort to blink frequently. Blinking keeps the front surface of your eye moist.

Regular eye examinations and proper viewing habits can help to prevent or reduce the development of

the symptoms associated with Computer Vision Syndrome.

American Optometric Association,

## Paper vs computer

A new Norwegian study of 10th graders confirms that reading texts in print versus on a computer screen is better for some aspects of comprehension. It was carried out by Anne Mangen and her colleagues at the Reading Centre of the University of Stavanger.

They randomly divided 72 of their 10th grade teens into two groups. Both were given two texts, a fiction piece and a factual piece.

One group was asked to read the two texts as PDF files on standard computer screens, the other read the texts on paper. The pupils' individual reading skills and vocabularies had been charted beforehand, to make allowances for these variations.

The teens were then asked to answer questions that would show how well they had comprehended the text.

The results clearly demonstrated that those who had read on computer screens had understood less than

those who read on paper. Perhaps surprisingly, this disparity was encountered with both the fiction and the factual prose.

## Comprehension

anne Mangen of Norway's Stavanger University, a lead researcher on the study, thought academics might "find differences in the immersion facilitated by the device, in emotional responses" to the story. Her predictions were based on an earlier study comparing reading an upsetting short story on paper and on iPad. "In this study, we found that paper readers did report higher on measures having to do with empathy and transportation and immersion, and narrative coherence, than iPad readers," said Mangen.

But instead, the performance was largely similar, except when it came to the timing of events in the story. "The Kindle readers performed significantly worse on the plot reconstruction measure, ie, when they were asked to place 14 events in the correct order."

The researchers suggest that "the haptic and tactile feedback of a Kindle does not provide the same support for mental reconstruction of a story as a print pocket book does".

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"When you read on paper you can sense with your fingers a pile of pages on the left growing, and shrinking on the right," said Mangen. "You have the tactile sense of progress, in addition to the visual ... [The differences for Kindle readers] might have something to do with the fact that the fixity of a text on paper, and this very gradual unfolding of paper as you progress through a story, is some kind of sensory offload, supporting the visual sense of progress when you're reading."

Perhaps this somehow aids the reader, providing more fixity and solidity to the reader's sense of unfolding and progress of the text, and hence the story."

Mangen also pointed to a paper published last year, which gave 72 Norwegian 10th-graders texts to read in print, or in PDF on a computer screen, followed by comprehension tests. She and her fellow researchers found that "students who read texts in print scored significantly better on the reading comprehension test than students who read the texts digitally".

Ebook before sleep

A [recent study](#) out of Harvard University found that reading an e-book before bed lessened the production of an important sleep hormone known as melatonin. As a result, people took much longer to fall asleep, experienced less deep sleep, and were more fatigued in the morning.

"The light emitted by most e-readers is shining directly into the eyes of the reader, whereas from a printed book or the original Kindle, the reader is only exposed to reflected light from the pages of the book," Charles Czeisler, lead author of the study, told the [BBC](#). "Sleep deficiency has been shown to increase the risk of cardiovascular disease, metabolic diseases like obesity and diabetes, and cancer. Thus, the melatonin suppression that we saw in this study among participants when they were reading from the light-emitting e-reader concerns us."

In contrast, reading an old-fashioned book can actually help you sleep *better*. By taking your mind off the things that you may normally stress about before falling asleep, a book can clear your mind and also make you sleepy, easing you into a full night's rest. In addition, soft light being reflected off the pages of a book doesn't signal to your brain that it's time to wake up like the glaring screen of an e-book or phone.

### **Screens = Stress**

Reading helps you de-stress faster or just as fast as listening to music, taking a walk, or having a cup of tea or coffee, according to a 2009 [study](#). When researchers measured heart rate and muscle tension, they found that people relaxed just six minutes into reading.

But reading on a device might cancel out this effect, and may even impact your stress levels negatively. Repeated use of mobile phones or laptops late at night has been [linked](#) to depression, higher levels of stress, and fatigue among young adults. Constant use of technology not only disrupts our sleeping patterns and throws off our circadian rhythms, but it fosters a shorter attention span and fractured focus — online, we jump from meme to meme and link to link, checking Facebook intermittently. Social media and technological distractions also always seem to foster guilt and regret, and before we know it, three hours have passed and our brains feel like mush.