THE
EYE PRACTICE

DIGITAL EYESTRAIN

A comprehensive guide on how to minimise the effects of digital eye strain

INTRODUCTION

Words Dr. Jim Kokkinakis

Are computers bad for your eyes? And if so, what can be done about it? These are questions that thousands of Australians ask every week. The past decade has seen the computer screen evolve from a desktop device used only at work to mobile technology that accompanies us 24/7. The latest generation of teens and young adults spend their days immersed in smartphones, tablets, and gaming consoles – often for many hours without break.

Screen technology is part of the problem. Today's displays are bigger, brighter, and more vibrant than ever before. While this is marketed as a benefit, the question remains: is it really doing our eyes any good? The latest LED screens emit significantly more blue light than older technologies, contributing to unprecedented levels of what eye care professionals now call **computer vision syndrome** or **digital eyestrain**.

At The Eye Practice, we're seeing more patients than ever before seeking strategies to reduce the impact of digital screens on their vision. Children's developing eyes are particularly vulnerable to the effects of screen-emitted blue light, and emerging clinical data suggests that even moderate amounts of screen time can be problematic for young eyes.

This guide examines the role computers play in causing eyestrain and explores evidence-based strategies to minimise symptoms and protect your vision for the long term.

Read on to discover the latest information on how digital screens affect your eyes and what you can do to protect them.

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COMPUTERS AND BLUE LIGHT

Understanding the difference between harmful and beneficial blue light is essential for making informed decisions about screen technology and eye protection.

LCD versus LED – which is better?

This question appears frequently when people shop for new displays, but it reflects a common misunderstanding about screen technology. Manufacturers often create an artificial distinction between LCD and LED monitors, leading consumers to believe that LCD technology has been superseded by LED – when in reality, only the backlighting method has changed.

Above: The light emitted from certain devices is linked to digital eyestrain.

LCD (liquid crystal display) technology involves sandwiching a liquid crystal layer between two pieces of glass and illuminating it from behind. Older monitors used fluorescent backlighting called CCFL (cold cathode fluorescent light), which produced light across the full spectrum with peak intensity in the green wavelength range.

Modern computers still use LCD screens, but they're now backlit with LED (light emitting diode) technology. This offers several advantages: thinner profiles, lighter weight, better energy efficiency, reduced heat generation, and lower power consumption. However, LED backlighting produces a dramatically different light spectrum – one that emits significantly more light from the blue-violet portion of the spectrum.

Are there good and bad kinds of blue light?

Not all blue light is created equal. Understanding the difference is crucial for protecting your vision.

Blue-violet light

Blue-violet light (approximately 380-450 nanometers) sits adjacent to ultraviolet light on the electromagnetic spectrum. This shorter wavelength light can penetrate deeper into the eye, reaching the retina. Research indicates that blue-violet light may contribute to oxidative stress in retinal cells, potentially accelerating age-related macular degeneration. The mechanism appears to involve disruption of cellular metabolism at the back of the eye.

Blue-turquoise light

Blue-turquoise light (approximately 465-495 nanometers) serves beneficial functions in our bodies. This wavelength helps regulate circadian rhythms, signalling when to feel alert in the morning and when to prepare for sleep at night. Blue light suppresses melatonin production, which is helpful during daytime hours but problematic when exposure continues into evening.

Not all blue light is bad

Blue-turquoise light plays an essential role in maintaining healthy sleep-wake cycles. However, problems arise when we're exposed to artificial blue light during evening hours, as this interferes with our natural wind-down mechanisms.

Ever wondered why you feel wired after using your digital device late at night? The blue light emitted by your LED screen may be disrupting your body's natural biorhythms, stimulating alertness just when you should be preparing for sleep. Even e-readers like Kindle expose us to blue-light emitting screens during what should be quiet evening hours. Sometimes there truly is no substitute for a traditional book.

Above: Avoid the blue light from devices before bed time.

Take home message on blue light

Exposure to blue-violet light should be minimised whenever possible. Some manufacturers, like BenQ, now incorporate blue light filtering technology directly into their displays. This can significantly reduce symptoms of computer-related eyestrain.

For children, digital screen use should be limited to protect their particularly sensitive developing eyes. For adults, blue-blocking lenses can provide protection from harmful blue-violet light while allowing beneficial blue-turquoise light to pass through during

daytime hours. However, to ensure quality sleep, all screen exposure should be limited before bedtime – and yes, that includes digital devices and television.

Strategies for protecting our eyes from blue light at work

Take regular breaks

We're all guilty of it: you're in the zone, ideas are flowing, emails are piling up, and it seems more efficient to eat lunch at your desk and power through. But this approach is detrimental to your back, neck, and especially your eyes. Whether you're heading to the cafeteria or enjoying a packed lunch, find a park bench or outdoor space and take a proper break from screens.

Adjust your display settings

Reduce both contrast and brightness on your monitor – your screen doesn't need to be as vivid as you think. Better yet, choose a monitor with built-in low blue light emission technology. Companies like BenQ lead this field. Selecting a low blue light display will not only reduce eyestrain discomfort but also protect your eyes from the long-term oxidative stress that can damage retinal cells.

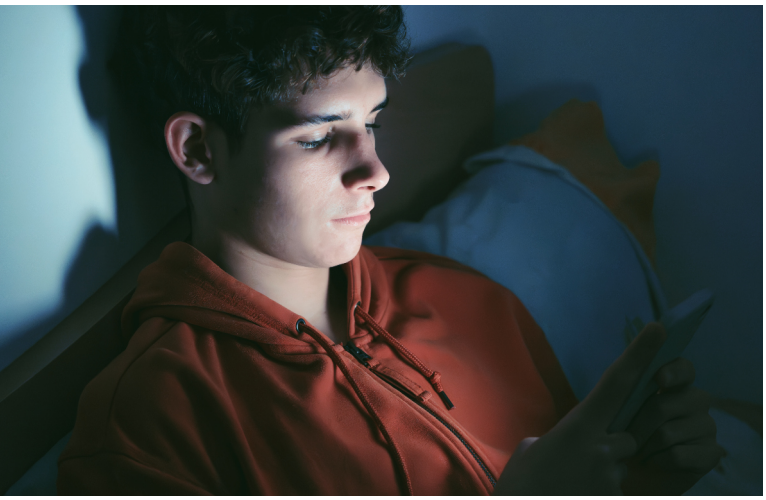
Consider blue-blocking lenses

Light from the blue end of the spectrum has a shorter wavelength and greater ability to penetrate eye tissues. Both ultraviolet and visible blue-violet light can cause oxidative stress to the retina. Quality blue-blocking filters (available for both prescription and non-prescription glasses) selectively filter harmful blue-violet light while allowing important blue-turquoise light to pass through. Our patients consistently report relief from eyestrain when wearing these lenses, and they appreciate knowing they're providing their eyes with protection against potential long-term damage.

COMPUTERS AND CHILDREN'S EYES

Children's developing visual systems are particularly vulnerable to digital screens, making protective strategies essential for preserving their long-term eye health.

It's become a familiar sight: young children expertly navigating tablets and smartphones, completely absorbed in games and apps. The days of colouring books and dot-to-dot puzzles seem to be fading. But are we doing our children a disservice by introducing them to digital screens at such early ages?



Above: Blue light exposure can have debilitating effects on young people.

Are computers bad for kids' eyes?

The short answer is yes. While moderate computer use (up to one hour daily) has been shown to benefit children academically and socially, mounting evidence suggests that even moderate screen time is problematic for developing eyes.

The intensity of light emitted by modern digital displays far exceeds anything we've seen before. The shift from older LCD screens to LED technology over the past five to six years has created displays that are brighter and more affordable – but unfortunately much higher in blue spectrum light emission. This light causes oxidative stress to the retina and other eye structures, potentially accelerating damage that leads to conditions like cataracts and macular degeneration.

Blue light exposure can also trigger eyestrain and headaches in children, resulting in irritability and difficulty concentrating. So if

you're considering a tablet for your child's next birthday, you might want to reconsider. Modern devices – regardless of brand – typically emit peak light intensity at the blue end of the spectrum. This is concerning for children who often spend multiple hours daily on tablets, smartphones, and gaming devices.

Slip-slop-slap or Reduce-replace-reflect?

Everyone understands UV light and its harmful effects on skin – the slip-slop-slap campaign successfully educated us about sun protection. Visible blue-violet light poses similar risks to young, developing eyes. Here are three strategies to protect your children's vision:

Reduce

Limit total exposure to digital screens, including smartphones, tablets, laptops, gaming consoles, and television. Don't worry about your children falling behind technologically – they use computers at school and with friends anyway.

Complete bans aren't necessary, especially for older children who rely on social media for peer interaction. However, setting daily screen time limits is wise parenting.

Use a timer! Keep a small timer near your devices and establish time limits in advance. When it rings, screen time is over until tomorrow.

Replace

Put devices away and encourage alternative activities. While we often convince ourselves of the educational value of screens, let's be honest – devices frequently serve as convenient ways to keep children occupied in restaurants or during travel. We all do this occasionally.

Above: Replace device time with time spent playing other games.

However, we serve our children better by being more creative with alternatives. Traditional games offer excellent substitutes: Smart Games produces wonderful single-player puzzles that are both educational and engaging. Playing cards, model building, and origami provide screen-free entertainment. For indoor alternatives, consider classic activities that don't emit blue light.

Most importantly, encourage outdoor play. Studies confirm that myopia (short-sightedness) is influenced less by close-up work and more by insufficient distance vision use. Outdoor activities like beach cricket or

park games benefit developing eyes significantly.

Reflect

When children do use digital devices, blue-blocking lenses offer excellent protection. These lenses effectively filter harmful blue spectrum light and can be incorporated into any prescription or non-prescription glasses. Blue-blockers have become standard for adults who use computers regularly at work, and they look identical to regular glasses. They're particularly beneficial for children's delicate developing eyes.

Implementing these strategies helps protect the next generation from the potentially harmful effects of computer-emitted blue light.

COMPUTER VISION SYNDROME AND EYESTRAIN

Digital screens create unique visual challenges that our eyes weren't designed to handle, leading to a recognised medical condition with specific symptoms.

Computer vision syndrome, also called digital eyestrain, has become one of the most common vision-related complaints in the digital age. The American Optometric Association recognises this as a distinct condition affecting people who spend two or more hours daily looking at digital screens.

What causes computer vision syndrome?

Several factors contribute to digital eyestrain, many of which differ from traditional reading or other visual tasks:

Blue light scattering: Natural light contains all colours of the spectrum at various wavelengths. Blue light has shorter wavelengths that scatter more easily – this is why the sky appears blue. LED-backlit computer screens emit primarily blue wavelength light, which scatters within the eye and interferes with visual contrast, increasing eye fatigue.

Reduced blinking: People blink significantly less when using computers compared to other activities. Normal blinking rates of 15-20 times per minute can drop to as few as 5 times per minute during screen use. Blinking is essential for distributing tears across the eye surface and keeping eyes moist.

Poor viewing conditions: Digital screens often involve:

- Glare or reflections
- Poor contrast between text and background
- Less-than-ideal viewing distances or angles
- Improper screen positioning

Environmental factors: Air-conditioned offices create dry environments that further stress the eyes. Moving air from fans, heating systems, or air conditioning compounds the problem.

Uncorrected vision problems: Small refractive errors (particularly astigmatism and farsightedness) that might not cause problems during other activities can trigger

significant eyestrain during prolonged screen use.

What are the symptoms?

Computer vision syndrome symptoms include:

- Tired, achy, or burning eyes
- Dry or watery eyes
- Blurred or double vision
- Headaches
- Neck, shoulder, or back pain
- Increased light sensitivity
- Difficulty concentrating
- General fatigue
- Feeling unable to keep eyes open

According to the Mayo Clinic, these symptoms are directly proportional to hours spent viewing digital screens – and that includes not just desktop computers, but smartphones, tablets, and televisions.

What can I do about it?

Immediate adjustments:

Reduce screen brightness and contrast – Your monitor doesn't need to be as vivid as you think

Increase viewing distance – This is especially important for children, who often hold devices very close to their eyes

Follow the 20-20-20 rule – Every 20 minutes, look at something 20 feet away for 20 seconds, and blink 20 times deliberately

Limit device use – Take regular breaks from all screens

Equipment solutions

Use blue-blocking lenses – These specialised filters reduce scattered blue light reaching your eyes, often providing immediate relief from digital eyestrain

Consider computer glasses – Even if you don't normally need prescription glasses, a mild prescription can relax focusing muscles that become fatigued during prolonged screen use. Computer glasses can also incorporate blue-blocking technology and provide a physical barrier against air conditioning

Environmental modifications

Adjust lighting – Reduce overhead lighting and eliminate glare sources

Position screens properly – The top of your monitor should be at or below eye level

Improve air quality – Use a humidifier if possible, and avoid direct airflow from fans or air conditioning

Digital eyestrain has become a modern epidemic. Unless we're prepared to live on a tropical island without air conditioning or digital devices, we need to learn to manage our relationship with technology.

COMPUTERS AND DRY EYE

The digital revolution has transformed dry eye from a rare condition to an epidemic, fundamentally changing how we understand and treat this.

The link between computers and dry eye syndrome

Twenty-five years ago, when optometrists graduated from university, everything they learned about dry eye could fit on a postage stamp. Dry eye was relatively rare, typically affecting only post-menopausal women. The digital age has changed everything.

Above: Digital devices are fuelling the epidemic of dry eye syndrome..

There has been exponential change in how we live and use our eyes since smartphones and tablets became ubiquitous. If you live and work in an urban environment, you likely have some degree of dry eye. Digital screen use contributes to this epidemic in several ways.

Blinking: use it or lose it

Until recently, most people blinked regularly throughout the day – 15-20 times per minute – during various activities. The main exception was television watching, which reduced blink rates temporarily.

Now it's common to stare at digital devices for ten or more hours daily. Between desktop computers at work, tablets at home, smartphones, gaming consoles, television, and e-readers, we're using screens constantly. This dramatically reduces our blink rate, and our blink muscles can actually atrophy over time.

Incomplete blinking – where eyelids don't fully close – fails to stimulate the oil glands along the eyelid margins. These glands play crucial roles in maintaining healthy tear film quality. Some dry eye patients require rehabilitation therapy to restore normal blinking patterns.

Blinking exercises can help restore normal function, and smartphone apps are available to remind you to take blinking breaks every 30 minutes.

Environmental factors

Desktop computers typically operate in heavily air-conditioned offices. This atmosphere dehydrates your entire body, but particularly affects your eyes. Staring at screens without adequate blinking allows dry air to further dehydrate the corneal surface, creating dry patches across the eye that cause discomfort and blurred vision.

The solution

Humidification: While humidifiers work well in small or home offices, they may be less effective in large open-plan environments.

Hydration: Maintaining adequate fluid intake helps, but don't overdo it. Excessive water consumption can stress kidneys and leave you feeling worse. Eight glasses (about 2 litres) daily provides a good benchmark.

Artificial tears: Dry eye drops designed for computer users can replace moisture stripped away by screen use in air-conditioned environments, but use them sparingly as they can worsen the underlying problem.

Protective eyewear: Glasses provide a physical barrier against air conditioning effects. Combined with blue-blocking filters and correction for any refractive error, they can provide comprehensive relief.

The 20-20-20 rule: Every 20 minutes, look into the distance for 20 seconds and blink 20 times deliberately. This simple practice helps maintain healthy tear film function.

Blue light reduction: Minimising blue light exposure (discussed in detail earlier) addresses one of the primary contributors to digital eye strain and associated dry eye symptoms.

Dry eye is closely linked to digital screen use and represents one of the most common side effects of our digital lifestyle. Along with computer vision syndrome and blue light exposure, it's become an occupational hazard of the modern age.

CONCLUSION

While computers bring tremendous benefits to modern life, protecting our vision requires understanding their impact and implementing practical preventive strategies consistently.

Computers have irrevocably changed how we live – bringing tremendous advantages in communication, education, entertainment, and convenience. However, they can be challenging for human eyes that have had little time to adapt to these new visual demands.

It's wise to consider the impact of computers on both your eyes and your children's vision, and to implement strategies that limit exposure to potentially harmful effects. The techniques discussed in this guide – from blue light management to proper screen habits to environmental modifications – can significantly reduce digital eyestrain and help protect your vision for years to come.

Remember, computer vision syndrome and digital eyestrain are treatable conditions. If self-care measures don't provide adequate relief, consult with an eye care professional who can assess your individual situation and recommend personalised solutions.

ABOUT THE AUTHOR

Dr Jim Kokkinakis combines decades of clinical experience with cutting-edge technology to provide world-class treatment for computer-related eye conditions and dry eye.

Dr Jim Kokkinakis is one of Australia's most experienced optometrists and is recognised among his peers as an expert in dry eye diagnosis and treatment. Many colleagues refer patients from across Australia to Jim's practice in the Sydney CBD. Over three decades, he has worked alongside world-renowned contact lens specialists and ophthalmic surgeons.

Jim has witnessed firsthand how prevalent dry eye has become, particularly following the digital revolution. At The Eye Practice, he has developed one of the world's best-equipped dry eye clinics for diagnosis and treatment of all types of dry eye conditions. Even severe symptoms can be alleviated using his comprehensive approach.

Jim understands that successful dry eye treatment requires thorough medical knowledge of the eye, understanding of patient lifestyle and environment, and cutting-edge diagnostic and treatment approaches. Most importantly, effective treatment requires empathy for patients who have often endured symptoms for years with limited success.

Career Highlights

- Senior lecturer and clinical supervisor at the Optometry School (UNSW)
- Co-author of Keratoconus – A User's Manual
- One of only 40 full members of The International Society of Contact Lens Specialists
- International lecturer on advanced contact lens fitting, dry eye treatment, and computer vision syndrome
- One of Australia's first optometrists qualified in Ocular Therapeutics

Call today on 02 9290 1899 for an appointment with Dr. Jim Kokkinakis, or book online at theeyepractice.com.au