

FROM (ARTIFICIAL) BLUE LIGHT TO SUNLIGHT

Welcome back to our Digital Detox series! Last time (<https://www.thewellnessway.com/digital-detox-kickoff-summer-series/>), we gave an overview of what happens when families spend more time online and less time outside. In this article, we'll go a little deeper into what happens when our kids spend more time in front of artificial blue light and less time in the natural sunlight. We'll also share ideas for using technology while limiting the negative health effects.

HOW ARTIFICIAL BLUE LIGHT DAMAGES KIDS' HEALTH

We instinctively know screens aren't good for our health, but why aren't they? It turns out that this constant exposure to blue light messes with our physiology on just about every level. From eye problems to cancer, it's time to take blue light exposure seriously.

WORSENING EYESIGHT

It makes sense that staring at artificial light for hours would not be the best thing for eyesight. Well, it's true. Scientific evidence is beginning to surface, confirming that too much blue light can damage the retina.

An animal study (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6356720/>) published in the journal *Cells* in 2019 showed that there was DNA damage in retinas after prolonged blue light exposure. Another study (<https://pubmed.ncbi.nlm.nih.gov/15302349/>) found that blue light increased free radicals around the retina when oxygen was present. The increase in free radicals led to the breakdown of the retinal lining. Researchers concluded that blue light is a risk factor for macular degeneration.

Since the retina plays a key role in vision, excess blue light exposure damaging the retina over time could lead to worsening eyesight – including in children. There isn't a lot of research showing damage

just yet, but why wait to see what harm can come from it?

Children are more affected

(https://ec.europa.eu/health/scientific_committees/scheer/docs/sunbeds_co240n_en.pdf) than adults since their lenses absorb fewer short-wavelength light than adult lenses. As a result, more blue light reaches the retina, potentially causing damage. Excess blue light exposure early on can lead to eye problems later in life.

HEADACHES

Along with its effects on eyesight, excess screen time may also trigger headaches and migraines. A study of [screen time and headaches](https://pubmed.ncbi.nlm.nih.gov/26634831/) (<https://pubmed.ncbi.nlm.nih.gov/26634831/>) published in 2016 found that high levels of screen time were associated with migraine headaches (but not non-migraine headaches) in young adults.

However, a [May 2022 study](https://pubmed.ncbi.nlm.nih.gov/35574178/) (<https://pubmed.ncbi.nlm.nih.gov/35574178/>) published in *Chronic Stress* reported the results of two surveys of young people following the COVID-19 lockdowns. During this time, screen use rose significantly. In fact, over 95 percent of respondents spent 9 hours or more on the screen per day. The frequency of headaches in general went up with increased screen use.

To learn about other causes of headaches in children, see our article [Children And Headaches](https://www.thewellnessway.com/children-and-headaches/) (<https://www.thewellnessway.com/children-and-headaches/>)

ATTENTION PROBLEMS

Researchers from the [University of Alberta, in Edmonton](https://pubmed.ncbi.nlm.nih.gov/30995220/) (<https://pubmed.ncbi.nlm.nih.gov/30995220/>), had parents report their child's daily screen time, including gaming and use of their smartphone. When the child was five years old, they completed a Child Behavior Checklist. Compared to children who spent less than 30 minutes a day on the screen, those who spent two hours or more per day had a 7.7-fold increase in meeting ADHD criteria.

Dr. Piush Mandhane, the study's lead researcher, [shared their findings](https://abcnews.go.com/Health/screen-time-linked-higher-risk-adhd-preschool-aged/story?id=62429157#:~:text=A%20new%20study%20out%20of%20the%20University%20of,minutes%20or) (<https://abcnews.go.com/Health/screen-time-linked-higher-risk-adhd-preschool-aged/story?id=62429157#:~:text=A%20new%20study%20out%20of%20the%20University%20of,minutes%20or>

– that for children under five, “between zero and 30 minutes per day is the optimal amount of screen time.”

SLEEP ISSUES

Our eyes, along with the other four senses, take in information that goes directly to the brain. The hypothalamus then takes information about the world around us and impacts our physiology. It helps determine our circadian rhythm; our daily sleep-wake cycle.

When blue light enters our eyes, it sends a signal that it’s daytime and suppresses melatonin release. That is great in the morning and into the afternoon. However, once evening approaches, we want melatonin to increase, promoting sleep.

By disrupting the circadian rhythm and suppressing melatonin production, artificial blue light worsens sleep quality. In clinical trials, nighttime blue light exposure made it more [difficult to fall asleep \(https://pubmed.ncbi.nlm.nih.gov/23509952/\)](https://pubmed.ncbi.nlm.nih.gov/23509952/) and [reduced sleep quality \(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3656905/\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3656905/), including the time spent in deep sleep. And as Doc always says, “If you cannot sleep, you cannot heal.”

It does not take much blue light to impact sleep. Even using a [nightlight can inhibit melatonin \(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3047226/\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3047226/) release. It’s also important to note that if you’re replacing traditional incandescent light bulbs with energy-efficient LED ones, you’ll have nearly [double the melatonin-suppressing effect \(https://pubmed.ncbi.nlm.nih.gov/33154450/\)](https://pubmed.ncbi.nlm.nih.gov/33154450/) in your home. Computer and smartphone screens also use LED lighting.

Getting quality sleep is a big deal for kids because they are still growing and developing. They need more sleep than adults do for that very reason. When sleep quality goes down, it can lead to many different health issues – if not right away, then down the road.

WEIGHT GAIN

One unexpected side effect of blue light exposure after sunset is weight gain. Disrupting the circadian rhythm by [exposing mice to light at night \(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4033305/\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4033305/) was shown to increase weight compared

to those who were not exposed to the light. The mice received the same diet, and circadian disruption at night was the only difference causing weight gain.

Artificial light exposure may cause blood sugar dysregulation, ultimately leading to weight issues. In a [small study \(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4871543/\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4871543/) of 19 healthy people, evening light exposure led to blood sugar spikes. A study of over 27,000 [shift workers \(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1740071/\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1740071/) (regularly exposed to light at night) observed that those workers tended to have higher rates of obesity than non-shift workers.

This may be one reason childhood obesity rates are skyrocketing. Not only are kids eating a lot more sugar and processed foods than ever before, but they are also exposed to unnatural light daily –both through school and family life.

DEPRESSION

Artificial blue light exposure, especially without adequate sun, may contribute to mood disorders like depression. Animal studies have found that when melatonin is suppressed by blue light, there's an increase in [depression-like behaviors \(https://pubmed.ncbi.nlm.nih.gov/22824811/\)](https://pubmed.ncbi.nlm.nih.gov/22824811/).

A [study of 500 elderly adults \(https://pubmed.ncbi.nlm.nih.gov/23856285/\)](https://pubmed.ncbi.nlm.nih.gov/23856285/) published in the *Journal of Affective Disorders* found an association between exposure to light at night and depression. Scientists suspect the increase in depression may be due to brain inflammation caused by free radicals from the artificial blue light.

A [2017 study \(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5574844/\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5574844/) based on data from the National Health and Nutritional Examination Survey (NHANES) showed that moderate or severe depression was associated with more screen time.

Researchers have also found that [depression and suicide attempts rose after 2010 \(https://journals.sagepub.com/doi/10.1177/2167702617723376\)](https://journals.sagepub.com/doi/10.1177/2167702617723376), along with the increase in screen time. One of the researchers behind that study, Jean M. Twenge, published a book on it: *iGen: Why*

Today's Super-Connected Kids Are Growing Up Less Rebellious, More Tolerant, Less Happy—and Completely Unprepared for Adulthood—and What That Means for the Rest of Us.

CANCER

Believe it or not, blue light exposure after the sun has gone down is linked to increased cancer risk. One of the reasons for that is the suppression of melatonin. Melatonin is more than simply a sleep hormone. It's also a powerful antioxidant that protects cells from damage.

Studies of shift workers have found associations between lowered melatonin levels and increased risk for several cancers, especially [breast cancer](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4301735/)

(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4301735/>) and [colon cancer](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3198018/)

(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3198018/>). In a study of 50,000 women with careers in shift work, lower melatonin levels were associated with an increase in [endometrial cancer](https://pubmed.ncbi.nlm.nih.gov/17975006/)

(<https://pubmed.ncbi.nlm.nih.gov/17975006/>).

A worldwide study of 158 countries (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5454613/>) found a significant association between artificial light at night and several forms of cancer, including lung, breast, colorectal, and prostate. This chronic artificial light exposure is not something to take lightly.

Fortunately, there are solutions. One of them is to turn to natural sunlight instead.

HOW SUNLIGHT EXPOSURE IMPROVES KIDS' HEALTH

Sunlight exposure is essential for raising healthy kids. Not only is it important for getting adequate vitamin D; it also improves eye health, promotes restful sleep, and helps the brain.

VITAMIN D: IMMUNE SYSTEM SUPPORT

Vitamin D is the sunshine vitamin. Sunlight exposure causes the body to make vitamin D in the skin.

Vitamin D is vital for a strong and [healthy immune response](https://pubmed.ncbi.nlm.nih.gov/29346788/)

(<https://pubmed.ncbi.nlm.nih.gov/29346788/>) and [good mental and emotional health](https://pubmed.ncbi.nlm.nih.gov/26141257/)

(<https://pubmed.ncbi.nlm.nih.gov/26141257/>). Having optimal vitamin D levels is protective against

numerous diseases and conditions, including multiple sclerosis (M.S.), metabolic syndrome, diabetes, and cancer (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2290997/>).

LOWERS RISK FOR NEAR-SIGHTEDNESS

While excess screen time is associated with near-sightedness, sunlight may be protective. A 2021 study found that time outside in the sunshine [lowered the risk of developing myopia](https://pubmed.ncbi.nlm.nih.gov/34500538/) (<https://pubmed.ncbi.nlm.nih.gov/34500538/>), or near-sightedness.

Another study of adults showed that those who spent [at least 2 hours per day outside](https://pubmed.ncbi.nlm.nih.gov/27861336/) (<https://pubmed.ncbi.nlm.nih.gov/27861336/>) in the sun had significantly less near-sightedness compared to those who spent less than 2 hours per day in the sun.

Lower blood levels of vitamin D (25-hydroxyvitamin D) were associated with a greater chance of having near-sightedness.

IMPROVES SLEEP

Because the sun has such a strong impact on circadian rhythm, it can improve kids' ability to fall asleep and sleep soundly through the night. The best thing you can do to support a good circadian rhythm is to get sunlight early in the day. This should be for about 15 minutes (or more).

Giving the body a reset by getting light in the eyes first thing in the morning helps direct the rhythm for the rest of the day. A 2017 study (<https://pubmed.ncbi.nlm.nih.gov/28526259/>) found that those who spent time in bright morning light fell asleep faster and had fewer sleep disturbances through the night.

BOOSTS MOOD

Sunlight has a strong impact on mood. That's why short daylight hours through the winter may lead to Seasonal Affective Disorder – S.A.D. Getting plenty of healthy sun exposure can help boost mood and motivation. As mentioned, blue light exposure at night can increase depression; but getting [natural sunlight decreases it](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6746555/) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6746555/>).

GOOD FOR THE BRAIN

Regular sunlight also supports the brain. A [clinical trial in preschool-age children](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6117001/) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6117001/>) showed that extra blue light during the day improved their ability to switch from one task to another, showing improved cognitive performance.

In another [trial on daytime blue light exposure](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4989256/) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4989256/>), researchers found that the blue wavelength had an alerting effect on the brain, improving working memory and executive functions in the brain.

5 HACKS FOR HEALTHY LIVING IN A DIGITAL WORLD

1. GET OUTSIDE! MAKE SURE KIDS GET SUNLIGHT DURING THE DAY

Make sure your kids reset their circadian rhythm daily with morning sunlight and evening darkness. It doesn't have to be long – just 15 to 20 minutes can help. Having the kids eat breakfast in a sunny room is one way to improve their morning light exposure.

2. AVOID BLUE LIGHT CLOSE TO BEDTIME

Harvard Medical School recommends avoiding blue light from electronic devices and other sources 2 to 3 hours before bed. For kids who go to bed at 8 or 9 pm, that's pretty early. It means putting away the devices and turning off the T.V. by 7 or 8 pm. For little kids, it could mean little to no screen time after dinner.

3. USE BLUE-BLOCKING GLASSES IN THE EVENING

If there's going to be screen time after the sun has gone down, be sure to have everyone wear their blue-blocking glasses to limit the negative effects.

Blue-blocking glasses do work, but you have to get the real thing. If you look on Amazon for reviews, you'll find a lot of comments reporting that they weren't effective. It's probably best to go directly to

the company website to make sure you're getting the authentic product. You'll also want to order a couple of versions to try so that you can ensure a good fit.

After first gathering data for a week to see how the participants began, [researchers \(https://pubmed.ncbi.nlm.nih.gov/28656675/\)](https://pubmed.ncbi.nlm.nih.gov/28656675/) had subjects wear blue-blocking glasses for three to five hours before bed for two weeks. At the end of the study, the participants were evaluated again. Nighttime melatonin had increased, and so had total sleep time. Their subject sleep quality, as measured by a sleep quality survey, also improved.

4. USE NIGHT SHIFT OR A SIMILAR PROGRAM ON COMPUTERS AND TABLETS

If you don't already have a "night shift" setting on your computer, installing a similar program on your devices can help. These programs gradually adjust the color of your screen so that they emit less blue light as you go into the evening. You'll notice a slow shifting to more of a red-orange spectrum that mimics the sunset. You can download them online for free or for a monthly or yearly fee.

You can also buy a screen protector, which [may block 30 to 60 percent of blue light \(https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7813134/\)](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7813134/) emitting from the device.

5. ADD RED, ORANGE, AMBER, OR BLUE BLOCKING BULBS

Modern blue/white lightbulbs disrupt the circadian rhythm. One strategy is to replace certain lightbulbs in your house with red, orange, or amber bulbs. Then, as the sun goes down, you just turn off the blue/white overhead lights or lamps and switch on the ones with the red-orange hue. It creates a very cozy, calming atmosphere that helps promote sleepiness before bed.

DON'T GUESS, TEST!

Is blue light causing eyesight, behavioral, sleep, or other health issues for your child? You won't know until you have them tested. There are many potential causes of deteriorating eyesight, blood sugar issues, or emotional problems. But you don't know what you don't know. Make an appointment at a Wellness Way Clinic to get to the bottom of why your child isn't getting good sleep or what's causing them to gain weight despite eating a healthy diet. You'll be glad you did.

Resources:

1. Retinal Neuron Is More Sensitive to Blue Light-Induced Damage than Glia Cell Due to DNA Double-Strand Breaks – PMC (nih.gov)
(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6356720/>)
2. Do blue light filters confer protection against age-related macular degeneration? – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/15302349/>)
3. Screen time exposure and reporting of headaches in young adults: A cross-sectional study – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/26634831/>)
4. The Effects of the COVID-19 Confinement on Screen Time, Headaches, Stress and Sleep Disorders among Adolescents: A Cross Sectional Study – PubMed (nih.gov)
(<https://pubmed.ncbi.nlm.nih.gov/35574178/>)
5. pdf (europa.eu)
(https://ec.europa.eu/health/scientific_committees/scheer/docs/sunbeds_co240n_en.pdf)
6. Screen-time is associated with inattention problems in preschoolers: Results from the CHILD birth cohort study – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/30995220/>)
7. More screen time linked to higher risk of ADHD in preschool-aged children: Study – ABC News (go.com) (<https://abcnews.go.com/Health/screen-time-linked-higher-risk-adhd-preschool-aged/story?id=62429157#:~:text=A%20new%20study%20out%20of%20the%20University%20of,minutes%20per%20day,minutes%20per%20day>)
8. Exposure to Blue Light Increases Subsequent Functional Activation of the Prefrontal Cortex During Performance of a Working Memory Task – PMC (nih.gov)
(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4989256/>)
9. Acute exposure to evening blue-enriched light impacts on human sleep – PubMed (nih.gov)
(<https://pubmed.ncbi.nlm.nih.gov/23509952/>)
10. Meta-Analysis: Melatonin for the Treatment of Primary Sleep Disorders – PMC (nih.gov)
(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3656905/>)
11. Exposure to Room Light before Bedtime Suppresses Melatonin Onset and Shortens Melatonin Duration in Humans – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3047226/>)
12. Evening home lighting adversely impacts the circadian system and sleep – PubMed (nih.gov)
(<https://pubmed.ncbi.nlm.nih.gov/33154450/>)

13. Dim Light at Night Disrupts Molecular Circadian Rhythms and Affects Metabolism – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4033305/>)
14. Morning and Evening Blue-Enriched Light Exposure Alters Metabolic Function in Normal Weight Adults – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4871543/>)
15. Is there an association between shift work and having a metabolic syndrome? Results from a population based study of 27 485 people – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1740071/>)
16. Chronic dim light at night provokes reversible depression-like phenotype: possible role for TNF – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/22824811/>)
17. Exposure to light at night and risk of depression in the elderly – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/23856285/>)
18. Association between screen time and depression among US adults – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5574844/>)
19. Increases in Depressive Symptoms, Suicide-Related Outcomes, and Suicide Rates Among U.S. Adolescents After 2010 and Links to Increased New Media Screen Time – Jean M. Twenge, Thomas E. Joiner, Megan L. Rogers, Gabrielle N. Martin, 2018 (sagepub.com) (<https://journals.sagepub.com/doi/10.1177/2167702617723376>)
20. Melatonin and breast cancer: cellular mechanisms, clinical studies and future perspectives – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4301735/>)
21. Distribution, function and physiological role of melatonin in the lower gut – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3198018/>)
22. Night shift work and the risk of endometrial cancer – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/17975006/>)
23. Artificial Light at Night and Cancer: Global Study – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5454613/>)
24. Vitamin D: Classic and Novel Actions – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/29346788/>)
25. Low vitamin D status is associated with more depressive symptoms in Dutch older adults – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/26141257/>)
26. Benefits of Sunlight: A Bright Spot for Human Health – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2290997/>)

27. Serum 25-hydroxyvitamin D level is associated with myopia in the Korea national health and nutrition examination survey – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/27861336/>)
28. The impact of daytime light exposures on sleep and mood in office workers – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/28526259/>)
29. Light correlated color temperature and task switching performance in preschool-age children: Preliminary insights – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6117001/>)
30. Attenuation of short wavelengths alters sleep and the ipRGC pupil response – PubMed (nih.gov) (<https://pubmed.ncbi.nlm.nih.gov/28656675/>)
31. The Effect of a Screen Protector on Blue Light Intensity Emitted from Different Hand-held Devices – PMC (nih.gov) (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7813134/>)