Device use is on the rise globally, with mobile phone use in particular growing by 222% between 2013 and 2018. On average, children 8 to 12 years old in the United States are on devices 4 hours, 44 minutes per day, and teen use is an average of 7 hours, 22 minutes per day—in addition to time spent using screens for school or homework.

With increased device use comes increased demand on the visual system. Digital eyestrain can occur as a result of uncorrected refractive error, altered blinking pattern, closer working distance, accommodative and vergence anomalies, and excessive exposure to intense light. Cognitive demand causes a decrease in overall blink rate, and electronic device use causes an increase in partial blinks compared with other forms of media such as a printed book.

In this article I examine the effect of digital device use on the vision of young patients and review some steps eye care providers can take to educate these patients and their parents in order to improve their quality of life.

A CLOSER LOOK AT THE PROBLEM

Incomplete blinking resulting from digital device use can lead to inferior corneal desiccation and staining and to desiccating stress, which causes hyperosmolarity leading to inflammation through dendritic cell activation. Incomplete blinking can also cause meibum to stagnate and thicken, as it’s not being forced out by a complete blink. This stasis can lead to obstruction, meibomian gland dysfunction, and gland atrophy.

A 2016 study of 916 patients aged 7 to 12 years found that 60 patients had both signs and symptoms of dry eye disease. When 30 of those 60 patients had their smartphones taken away for 1 month, both dry eye signs and symptoms improved. (To find out more about the causes of dry eye in children and how to identify it, read “Dry Eye ... in Children?” by Mile Brujic, OD, FAAO, on page 58).

CASE EXAMPLE

Let’s take a look at the effects of excessive digital device use without proper counter-management tactics in a typical patient.

Nathan (not his real name) is a 10-year-old patient who ended up in my exam chair recently at the behest of his mother because his eyes had been bothering him lately. I had him fill out the Standardized Patient Evaluation of Eye Dryness (SPEED)
Nathan scored an 11, meaning he’s moderately symptomatic for dry eye disease. I asked him how and when his eyes bothered him, and he replied that his eyes start burning and get watery when he’s gaming. He said they start to bother him after he has been gaming for about 4 hours and they really get bad at about 8 hours.

Nathan’s visual acuity was 20/20 in each eye with a small hyperopic astigmatic correction. His ocular examination was positive for mild diffuse corneal staining. His tear film breakup time was 8 seconds in each eye. Meibum was clear, and the meibomian glands were normal.

My diagnosis for Nathan? Mild to moderate dry eye disease as a result of excessive digital device use.

**Assessment and Treatment Plan**

Before initiating treatment, I educated Nathan and his parents about the importance of decreasing screen time and advised him to practice the 20/20/20 rule: every 20 minutes, look 20 feet away for 20 seconds.

I prescribed a gamma-linolenic acid nutraceutical (half the adult dose), artificial tears (to be used four times a day in each eye), and glasses with a blue light filter and an antireflective coating for viewing things at TV distance and closer.

**Follow-Up**

One month later, Nathan’s SPEED score decreased from 11 to 4. No corneal staining was seen at the follow-up examination. Because he was symptomatic enough to instigate the office visit, he had readily complied with the treatment plan.

**EASY WAYS TO PROTECT YOUNG PATIENTS**

Our young patients are most at risk from the potential long-term effects of extended digital device use. As eye care practitioners, how can we help this vulnerable population? Here are some tips.

**Screen Everyone for Symptoms**

Hand out a validated symptom questionnaire, such as SPEED or the five-item Dry Eye Questionnaire, to all patients who are old enough to read and understand the questions. Although postmenopausal women may be the highest on the dry eye (Continued on page 57)
suspect list, think of all of your patients as susceptible.

Use Vital Dyes
It doesn’t take long to instill a drop of fluorescein to evaluate tear film breakup time and corneal staining. Remember to give the dye 1 or 2 minutes for the staining to become visible.

Examine the Meibomian Glands
Meibomian gland dysfunction is arguably the most prevalent eye disease. Transillumination of the glands at the slit lamp is quick and easy, and numerous treatments are available. Better yet, invest in a meibographer and use it to image patients who are symptomatic.

Offer Solutions
Have a treatment plan at the ready for your young patients with dry eye. The 2017 Tear Film and Ocular Surface Society (TFOS) Dry Eye Workshop (DEWS) II Report is an excellent framework on which to base your treatment protocol.

IT’S A DIGITAL WORLD
With the continued progression of technology, digital device use isn’t going away any time soon, if ever. Our worlds exist in our phones and computers, and we are now asking more of our eyes than ever. Therefore, it’s increasingly important for eye care providers to educate parents and children about the effects of device use on ocular health and the steps they can take to minimize them.


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