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The effects of 'blue light' on human health are still unclear, says panel

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For years, scientists have expressed concern about potential adverse health effects of excessive exposure to short wavelength light (SWL), which includes the "blue light" from smartphones, laptops, and tablets.

However, the International Commission on Non-Ionizing Radiation Protection (ICNIRP) has identified a lack of consensus among public health officials about whether SWL from artificial sources disrupts circadian rhythm, and if so, whether SWL-disrupted circadian rhythm is associated with adverse health outcomes.

ICNIRP now presents an extensive statement on SLW exposure in the April issue of *Health Physics*.

Research conflicts on physiological effects of SWL exposure

The neuroendocrine system and circadian rhythms are particularly sensitive to SWL, which is defined in the ICNIRP statement as light in the wavelength range of 380 to 550 nanometers. In addition, SWL might have the potential to reduce evening sleepiness by an alerting effect, suppress melatonin levels, and consequently affect sleep quality and duration, which over time may negatively affect health.

Still, "the evidence from experimental studies is inconsistent," the ICNIRP panel says, "with many studies indicating possible effects of SWL on alertness or sleep, and many others not supporting such effects." Reasons for the conflicting results may include differences between studies in the intensity, wavelengths, duration, and timing of light; differences in outcome variables; and effects of moderating variables such as prior light exposure and the age and sex of study participants.

The panel notes that although it is difficult to draw a general conclusion, SWL might reduce sleepiness for some individuals, or under certain circumstances, and thereby negatively affect sleep.

Potential long-term adverse effects of SWL exposure

are also unclear

A large body of evidence from long-term studies shows that insufficient sleep, including sleep deficit caused by circadian system disruption, is related to a range of health effects, including cognitive impairments, anxiety and mood disorders, and endocrine dysfunction, the panel explains. Circadian disruptions, including decrease of melatonin levels, have been suggested to play an important role in the development of chronic diseases and conditions such as cancer.

"However, the majority of studies that have assessed circadian disruption due to exposure to light have been conducted in shift workers," the panel reports. "In these studies, shift workers' exposure to light during biological night has been taken for granted without direct measurements of their light exposure." It is often assumed that shift workers are predominantly exposed to SWL, the authors add, but no long-term studies have directly measured the wavelength of light sources to verify and quantify this.

The ICNIRP panel calls for an analysis of data gaps "to delineate the types of studies needed, the parameters that should be addressed, and the methodologies that should be applied in future studies so that a decision about the need for exposure guidelines can be made."

More information: Sharon Miller et al, ICNIRP Statement on Short Wavelength Light Exposure from Indoor Artificial Sources and Human Health, *Health Physics* (2024). DOI: 10.1097/HP.0000000000001790

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