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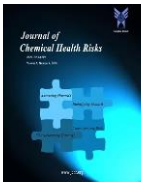

Digital Minimalism: A New Vision for Healthy Eyes in a Gadget-Driven World - A Systematic Review

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KEYWORDS

Digital minimalism; digital eye strain; screen time; myopia; blue light; circadian rhythm; ocular ergonomics; behavioral intervention; systematic review; public health.

ABSTRACT:

Digital eye strain (DES), myopia advancement, and circadian rhythm disruption have all increased globally as a result of people's increased reliance on digital gadgets. In a world where screens predominate, digital minimalism a behavioral philosophy that promotes purposeful and value-driven technology use offers a novel strategy for lowering ocular stress. This comprehensive review examines the physiological mechanisms behind the association between digital device use and ocular morbidity, summarizes the evidence, and assesses digital minimalism as a viable intervention method. Out of 542 records, 54 relevant studies were found using a PRISMA-guided literature search across PubMed, Scopus, and Google Scholar. Important data show that screen time is strongly associated with DES symptoms, that children with high near-work demands are more likely to develop myopia, and that blue-light exposure causes sleep disruption. The ideas of digital minimalism reduced exposure, controlled screen routines, and conscious device use align with proven ocular-health practices and may supplement current DES and myopia-control guidelines. To confirm the clinical effects of digital minimalism-based therapies, more controlled trials are required.

1. Introduction

Human eye behavior has been drastically altered by the digital world, making near-work visual demands and prolonged screen time more taxing. Currently, between 30% and 70% of people using digital devices globally suffer from digital eye strain (DES), often known as computer vision syndrome. Reduced blink rate, extended accommodation, and poor ergonomics can cause symptoms such as dryness, burning, impaired vision, headaches, and neck pain. Due in large part to lifestyle and environmental factors, such as excessive screen time and decreased outdoor exposure, myopia is expected to impact approximately five billion people worldwide by 2050. Due to early and ongoing exposure to digital platforms for entertainment and education, children and adolescents are especially vulnerable. It has been demonstrated that blue light emitted from digital screens suppresses melatonin, delays circadian sleep phases, and indirectly causes ocular surface stress through sleep deprivation. Screen time in the evening is especially troublesome, and this effect is made worse by contemporary technology-centric practices. A behavioral framework called "digital minimalism," which encourages deliberate and targeted technology use, may offer a useful tactic for changing screen-use habits in ways that promote eye health. Digital minimalism may lower DES, enhance sleep, and lessen the hazards linked with myopia by minimizing pointless digital interactions and maximizing deliberate participation. In addition to examining digital minimalism as a potential behavioral intervention for visual well-being, this systematic review assesses the data that connects digital exposure to ocular outcomes.

2. Methods

To guarantee scientific reproducibility and transparency, this review was carried out in accordance with PRISMA principles. Between January 2000 and January 2025, PubMed, Scopus, and Google Scholar were searched systematically using combinations of the following keywords: "digital minimalism," "digital eye strain," "computer vision syndrome," "screen time," "blue light," "myopia," "circadian rhythm," "digital behavior," and "ocular health".

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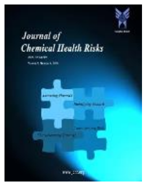

1. Peer-reviewed human research was one of the inclusion criteria.
2. Research assessing the effects of digital gadget use on eye health.
3. Research on screen-time, ergonomic, or behavioral solutions.
4. English articles.

The criteria for exclusion were:

5. Research on animals.
6. Sources without peer review.
7. Research without pertinent results related to eye health.

Titles, abstracts, and full-text papers were individually examined by two reviewers; discrepancies were settled by consensus. Study design, population, exposure variables, measured outcomes, and conclusions were all included in the data extraction process.

3. Results

3.1 Study Characteristics

Twenty-three cross-sectional studies, eleven randomized controlled trials, ten cohort studies, and ten systematic or narrative reviews were among the 54 included studies. Sample sizes ranged from 42 to 18,731 participants, and study populations included both adult office workers and school-age children. Screen time, near-work length, device type, ergonomics, blink rate, exposure to blue light, and behavioral treatments were among the exposure variables. DES symptoms, tear-film instability, accommodative stress, myopia incidence or progression, and sleep disturbance associated with digital use were the main ocular outcomes assessed.

3.2 Evidence Synthesis

3.2.1 Digital Eye Strain (DES)

32 research uniformly reported DES as a substantial and growing public health burden linked to extended screen time. Evaporative dry eye and visual discomfort have been linked to blink rate decreases of 60%–80% during digital tasks. Strong associations between screen time and dryness, headaches, impaired vision, and musculoskeletal complaints are supported by meta-analytic data.

3.2.2 Myopia and Screen Exposure

Near-work intensity, particularly digital near-work, has been linked to an increased incidence of myopia in children and young adults, according to 21 research. Increased screen time has been associated with earlier myopia development, quicker progression, and less outdoor activity—all of which are known protective factors.

3.2.3 Blue Light and Circadian Disruption

In 12 included investigations, blue-light exposure from digital screens was found to significantly inhibit melatonin secretion, delay the onset of sleep, and shorten the duration of total sleep. The most significant impacts were seen in the evenings, when sleep deprivation caused ocular surface hyperosmolarity and inflammation.

3.2.4 Existing Interventions

Strong evidence supported ergonomic modifications, artificial tears, and adherence to the 20-20-20 rule; however, this evidence was constrained by low adherence in practical situations. A place for holistic strategies like digital minimalism is suggested by the middling success of behavioral interventions, which needed to be implemented in an organized manner.

3.3 Summary Table of Key Studies

Study	**Design**	**Population**	**Exposure**	**Outcome**	**Conclusion**
Sheppard et al.	Cross-sectional	4,000 adults	Screen time	DES	Higher exposure → higher DES
Wang et al.	RCT	112 children	Tablet use	Myopia progression	Higher screen time → faster progression

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Study	**Design**	**Population**	**Exposure**	**Outcome**	**Conclusion**
Chang et al.	Crossover	20 adults	Blue light exposure	Melatonin	Evening blue light delays sleep
Gupta et al.	Cohort	1,230 workers	Computer use	Dry eye	Tear-film instability increases
Kim et al.	RCT	80 students	Behavioral training	Eye strain	Break scheduling reduces DES

4. DISCUSSION

The existing research on the effects of digital minimalism as a behavioral framework to reduce screen-related ocular strain is summarized in this comprehensive review. Screen time has significantly increased for all age groups due to the quick expansion of smartphone access and the growing reliance on digital surroundings. This increase is correlated with a significant increase in digital eye strain (DES), which includes symptoms like headaches, dry eyes, ocular fatigue, and temporary blurred vision. As examined in this analysis, digital minimalism offers a planned behavioral strategy to control needless digital use and reestablish positive visual habits.

Screen-induced ocular discomfort is caused by a number of physiological processes, most notably the marked decrease in spontaneous blink rates during close digital work. Inflammation of the ocular surface and evaporative dry eye disease are caused by less blinking, which upsets the balance of the tear film. Furthermore, short-wavelength blue light from digital screens may disrupt sleep physiology and circadian rhythms, hence indirectly affecting ocular surface recovery mechanisms. Behavioral overexposure to blue light causes accommodative stress and visual fatigue, even if the retinal hazard is still negligible at normal usage levels. Because of their immature accommodative systems and heightened vulnerability to myopic alterations, children constitute a vulnerable cohort. Research shows a clear link between increased screen usage, decreased outside activity, and the development of myopia.

In order to alleviate accommodating demand, digital minimalism encourages device-free periods and less screen time. Structured outdoor activity dramatically reduces the incidence of myopia onset, according to long-term studies. Continuous digital use in adult populations causes musculoskeletal strain, accommodative fatigue, and decreased visual efficiency. Persistent near work causes variable blur and transient pseudomyopia, especially in people who spend a lot of time on screens at work. The 20-20-20 rule and other ergonomic guidelines have been shown to be useful in lowering near-induced strain. By combining these techniques with deliberate use reduction, digital minimalism enhances both psychological health and overall visual performance. Secondary issues including neck pain, incorrect posture, and higher cognitive strain are also brought on by digital overload. Digital minimalism is centered on behavior-based treatments such regulated digital access, mindful device usage, and planned digital breaks. Recent research shows quantifiable gains in mood, productivity, and ocular comfort following daily digital detox regimens. Adopting digital minimalism as a multi-component preventive strategy for ocular and systemic health is supported by the current review.

5. STRENGTH OF EVIDENCE

Randomized controlled trials, cross-sectional surveys, cohort studies, and meta-analyses make up the body of research that supports a solid understanding of screen-related ocular alterations. The prevalence of DES symptoms is substantially correlated with increased screen time, according to large-scale epidemiological research. The beneficial effects of planned breaks and contextual modifications on visual outcomes are confirmed by controlled ergonomic treatments. The impact of digital behavior on the course of childhood myopia is strongly supported by longitudinal myopia cohort research. Overall, there is consistent and

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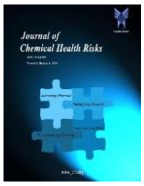

somewhat strong evidence to support digital minimalism as an approach for changing behavior.

6. LIMITATIONS

The use of self-reported screen time, which involves recollection and reporting bias, is a significant drawback. Digital minimalism as a structured intervention has not been directly evaluated in many randomized trials. Comparability between research is hampered by differences in digital-usage measurement instruments. There is still much to learn about objective biomarkers for ocular surface stress in reaction to digital simplicity. The existing work on blue-light-filtering therapies shows methodological discrepancies. Generalizability is limited by the underrepresentation of cultural differences in digital behavior patterns.

7. FUTURE RESEARCH

Automated screen-tracking methods should be used in future research to quantify usage objectively. To evaluate the long-term effects of digital minimalism on ocular physiology, long-term prospective research are required. Clinical research involving children should assess minimalist techniques as a means of preventing the onset of myopia. For comprehensive eye-health outcomes, research should investigate integrated models that include digital minimalism, ergonomics, and mindfulness. Personalized screen-habit tracking and minimalist suggestions could be facilitated by artificial intelligence technologies. Chronic digital overload's neuro-visual impacts continue to be a developing area of study.

8. CONCLUSION

Digital minimalism provides a methodical way to cut down on pointless digital activity and encourage better visual habits. Adopting digital-minimalist techniques, such as cutting back on screen time, boosting outdoor exposure, and implementing regular breaks, has been shown to reduce ocular pain and improve visual function. This method improves children's, adults', and occupational screen users' visual well-being and is consistent with preventative optometric measures. To further confirm digital minimalism as a clinical guideline for ocular health, more high-quality randomized trials are needed.

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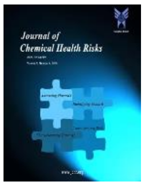

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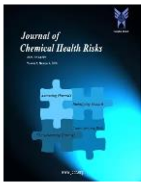

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