LETTER

Reply to Zeitzer: Good science, in or out of the laboratory, should prevail

In our randomized, within-participant, inpatient study, we demonstrated that reading from a light-emitting eReader compared with a printed book induced biological effects on alertness and on specific sleep and circadian measures. We strongly disagree that these results do not apply to normal individuals, as all of the participants in our study were healthy young men and women and the results were both substantial and significant. The experimental protocol was designed as a mechanistic study and not as an epidemiological investigation in the field. Although we acknowledge that there are limitations to studies designed to elucidate physiologic mechanisms, such studies are critical to both the design and interpretation of large-scale epidemiologic studies.

We agree with Zeitzer (1) that further research is necessary to determine the health impact of the use of light-emitting eReaders, which is why we noted in our paper that "further investigation of the physiological and medical effects of electronic devices is warranted (2)." However, we disagree with the inference that the lighting conditions in our laboratory study overestimated the real-life effects of reading from a light-emitting eReader compared with reading from a printed book. First, participants in these studies were not "spending the entire day in dim room lighting." They were housed in a well-lit room in the 90-lux condition. We measured illuminance at the eye in the angle of gaze, unlike the standard engineering practice of measuring illuminance from a desktop sensor pointing at ceiling lamps, which yields much higher readings that are inappropriate for quantifying human photobiological responses. Second, such minor differences in daytime ambient lighting are unlikely to account for our findings. As Zeitzer et al. demonstrated 15 y ago in a protocol very similar to that of the present study, illuminance has a saturating nonlinear relationship with the circadian phase-shifting response, such that "~100 lux of light will generate half of the response observed for a stimulus that is nearly 100-fold brighter (~9,000 lx)" (3). Third, the direct alerting effects of the blue-enriched light emitted by such devices likely leads people in real-life conditions to remain awake later than allowed in our protocol, in which complete darkness was imposed on participants at 10:00 PM nightly. In real life, 71% of adolescents spend 12 h daily on recreational media (excluding homework), which they pack into 8.5 h through multitasking (4). They also spend an hour talking plus 2.5 h texting on their light-emitting cell phones (4). Sixty-two percent of adolescents in Belgium do so after lights out, 20% of whom do so between midnight and 3:00 AM (5). Thus, our results probably underestimate the biological impact of light-emitting eReaders in real-world conditions. That hypothesis is consistent with the recent demonstration that the average circadian melatonin phase of participants after a week without artificial light exposure was significantly earlier than that measured after a week of self-selected exposure to artificial light each evening—even though the latter condition included the real-life exposure to brighter light during the daytime that Zeitzer espouses (6).

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The authors declare no conflict of interest.

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