

Supplementary Materials

Results of 5 (Ambient Illuminance: 0, 25, 50, 75, and 100 lx) × 6 (Screen Luminance: 3.87, 21.47, 42.74, 64.12, 84.77 and 106.7 cd/m²) repeated analysis of variance (ANOVA)

S1. Effects of screen luminance and ambient illuminance on subjective evaluations

S1.1. Screen brightness

The ANOVA results showed the significant main effects of screen luminance and ambient illuminance [$F(5, 160) = 133.21, p < .001, \eta^2 = .81$; $F(4, 128) = 15.60, p < .001, \eta^2 = .33$], but no significant interaction existed between them [$F(20, 640) = 1.34, p = .23, \eta^2 = .04$]. The main effect of screen luminance revealed a statistically significant difference among the six luminance levels ($ps < .04$, except for 84.77 cd/m² vs. 106.7 cd/m² ($p = .697$)). The main effect of ambient illuminance indicated that subjective ratings of screen brightness under 0 lx illuminance were significantly higher than those under other illuminance levels ($ps = .001$ for 0 lx vs. 25 lx and 0 lx vs. 75 lx; $ps < .001$ for 0 lx vs. 50 lx and 0 lx vs. 100 lx).

S1.2. Visual comfort with screen luminance

The findings of visual comfort showed significant main effect of screen luminance [$F(5, 160) = 10.81, p < .001, \eta^2 = .25$], ambient illuminance [$F(4, 128) = 16.16, p < .001, \eta^2 = .34$] and significant interaction between screen luminance and ambient illuminance [$F(20, 640) = 6.23, p < .001, \eta^2 = .16$] (see Figure S1). Post hoc analyses revealed that when the screen luminance level was 3.87 cd/m², the visual comfort at 75 lx ($2.42 \pm .75$) ($M \pm SD$) was significantly lower than that at 25 lx ($2.91 \pm .77, p = .031$) and 50 lx ($2.79 \pm .74, p = .031$) conditions; when the screen luminance level was 21.47 cd/m², the visual comfort at 100 lx ($2.24 \pm .71$) was significantly lower than that at 0 lx ($3.03 \pm .73, p < .001$), 25 lx ($3.18 \pm .73, p < .001$), 50 lx ($3.00 \pm .75, p = .001$) and 75 lx ($2.79 \pm .70, p = .007$) conditions, the visual comfort at 25 lx was significantly higher than that at the 75 lx condition ($p = .048$); when the screen luminance level was 42.74 cd/m², the visual comfort at 50 lx ($3.73 \pm .45$) was significantly higher than that at 0 lx ($2.82 \pm 1.01, p = .001$), 75 lx ($3.36 \pm .55, p = .031$) and 100 lx ($3.09 \pm .77, p = .003$) conditions, and the visual comfort at 25 lx ($3.55 \pm .51$) was significantly higher than that at the 0 lx condition ($p = .002$); when the screen luminance level was 84.77 cd/m², the visual comfort at 0 lx ($2.21 \pm .86$) was significantly lower than that at 25 lx ($2.82 \pm .77, p = .001$), 50 lx ($3.21 \pm .74, p < .001$), 75 lx ($3.18 \pm .58, p < .001$) and 100 lx ($3.00 \pm .75, p = .006$) conditions; when the screen luminance level was 106.7 cd/m², the visual comfort at 0 lx ($2.12 \pm .70$) was significantly lower than that at 25 lx ($2.88 \pm .82, p < .001$), 50 lx ($3.27 \pm .52, p < .001$), 75 lx ($3.09 \pm .68, p < .001$) and 100 lx ($2.91 \pm .68, p = .002$) conditions.

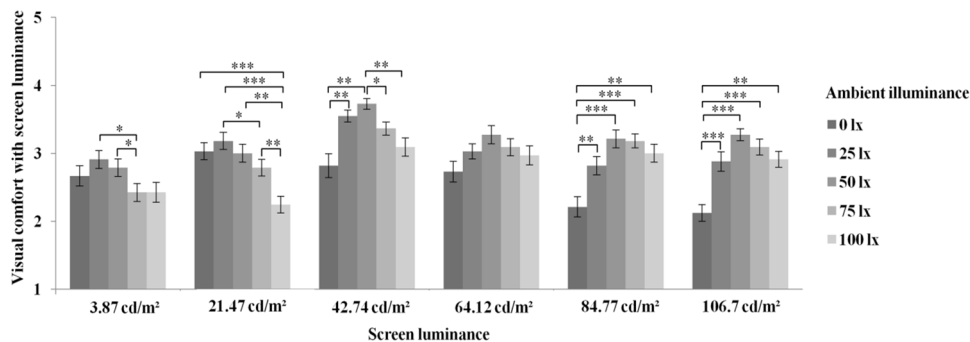


Figure S1. Subjective ratings of visual comfort with screen luminance under different ambient illuminance conditions. Error bars indicate ± 1 standard error of the mean. *** $p < .001$, ** $p < .01$, * $p < .05$.

S1.3. Illuminance satisfaction

The main effects of screen luminance [$F(5, 160) = 4.08, p = .005, \eta^2 = .11$] and ambient illuminance [$F(4, 128) = 11.16, p < .001, \eta^2 = .26$] and the interaction between screen luminance and ambient illuminance [$F(20, 640) = 2.30, p = .013, \eta^2 = .067$] were significant for illuminance satisfaction (see Figure S2). Post hoc analyses showed that when the screen luminance level was 3.87 cd/m², satisfaction at 25 lx ($3.27 \pm .57$) was significantly higher than that at 0 lx ($2.79 \pm .86, p = .021$) and 100 lx ($2.33 \pm 1.05, p = .001$) conditions, and satisfaction at 50 lx ($2.91 \pm .68$) was significantly higher than that at 100 lx ($p = .013$); when the screen luminance level was 21.47 cd/m², satisfaction at 100 lx ($2.61 \pm .79$) was significantly lower than that at 50 lx ($3.19 \pm .73, p = .009$) and 75 lx ($3.00 \pm .83, p = .03$) conditions; when the screen luminance level was 42.74 cd/m², satisfaction at 50 lx ($3.67 \pm .54$) was significantly higher than that at 0 lx ($2.97 \pm .88, p = .002$), 75 lx ($3.00 \pm .83, p < .001$) and 100 lx ($2.58 \pm 1.03, p < .001$) conditions, and satisfaction at 100 lx was significantly lower than that at 25 lx ($3.39 \pm .70, p = .009$) and 75 lx ($p = .043$) conditions; when the screen luminance level was 64.12 cd/m², satisfaction at 50 lx ($3.21 \pm .55$) was significantly higher than that at 75 lx ($2.64 \pm .86, p = .024$) and 100 lx ($2.33 \pm .96, p = .001$) conditions, and satisfaction at 25 lx ($3.18 \pm .68$) was significantly higher than that at 100 lx condition ($p = .006$); when the screen luminance level was 84.77 cd/m², satisfaction at 50 lx ($3.33 \pm .60$) was significantly higher than that at 0 lx ($2.58 \pm .94, p = .002$) and 100 lx ($2.79 \pm .86, p = .021$) conditions; when the screen luminance level was 106.7 cd/m², satisfaction at 0 lx ($2.45 \pm .79$) was significantly lower than that at 25 lx ($3.00 \pm .90, p = .038$) and 50 lx ($3.06 \pm .70, p = .002$) conditions.

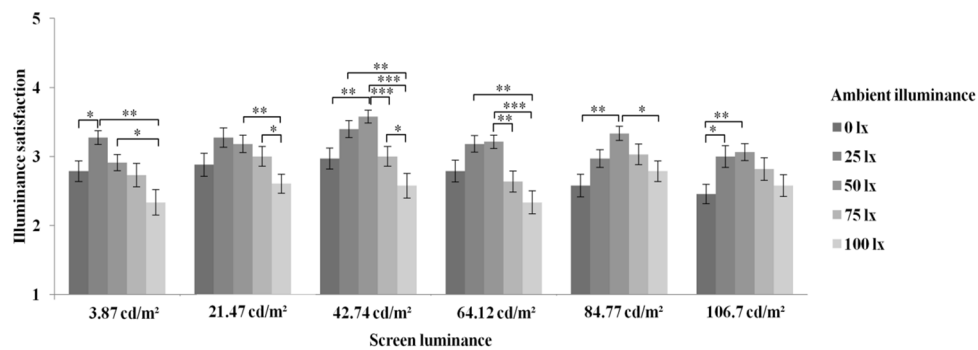


Figure S2. Subjective ratings of illuminance satisfaction with different screen luminance conditions. Error bars indicate ± 1 standard error of the mean. *** $p < .001$, ** $p < .01$, * $p < .05$.

S1.4. Visual fatigue

There were significant main effects of screen luminance [$F(5, 160) = 3.96, p = .007, \eta^2 = .11$] and ambient illuminance [$F(4, 128) = 3.21, p = .046, \eta^2 = .09$]. The interaction between screen luminance and ambient illuminance was also significant [$F(20, 640) = 2.42, p = .011, \eta^2 = .07$] (see Figure S3). Post hoc analyses revealed that when the screen luminance level was 84.77 cd/m², the visual fatigue under 50 lx ($1.85 \pm .67$) was significantly lower than that under 0 lx ($2.48 \pm .83, p = .003$) and 25 lx ($2.24 \pm .71, p = .017$) conditions, and visual fatigue under 75 lx ($1.97 \pm .68$) was significantly lower than that under the 0 lx condition ($p = .026$); when the screen luminance level was 106.7 cd/m², the visual fatigue under 50 lx ($1.97 \pm .68$) was significantly lower than that under the 0 lx condition ($2.42 \pm .90, p = .037$).

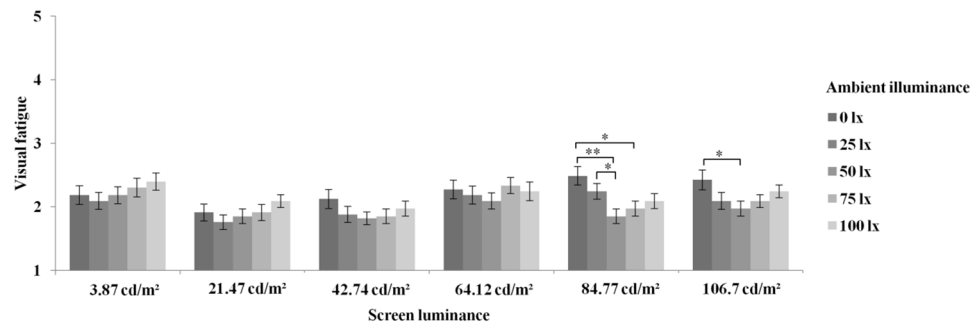


Figure S3. Subjective ratings of visual fatigue under ambient illuminance with different screen luminance conditions. Error bars indicate ± 1 standard error of the mean. ** $p < .01$, * $p < .05$.