



## Level of aversion to light of LED-screens according to the interest of visual

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### INTRODUCTION

In today's world, the visualization of digital screens has become a large part of daily life at home, at work, during free time and in movement. The use of data visualization terminals (desktop, laptops, tablets and smartphones) has become a universal activity. In fact, a recent report suggests that adults can pass, in average, approximately 8.5 hours per day watching digital screens. Studies suggest that between 64 and 90% of device users experience visual symptoms. These symptoms include visual fatigue, headache, eye discomfort, dry eye, diplopia and blurred vision, either in far or near vision. In this study, the risks of the use of LED screens are evaluated in working age adult population who spend large amounts of time working in front of LED screens.

### MATERIALS AND METHODS

The study was performed with 30 people of both sexes (gender balanced), aged between 21 and 50 years (mean of 30 +/- 8 years). After an adaptation to the ambient light (100cd / m<sup>2</sup>), they were requested to read a coherent text (except from a novel) on a tablet located at 40 cm for 15 minutes while gradually increasing the intensity of the LED display. At the end of the task they were asked about their visual fatigue, level of discomfort and comprehension of the text. Then, three different tests were presented: coherent text, stripes and dots randomly presented. Each minute the observer scored from 1 to 10 the level of eye fatigue in order to assess the effect of visual stimuli on fatigue symptoms. Between one presentation and the next one, the subjects had a 5 minute rest. Finally, a questionnaire about the symptoms experienced was handed.



Figure 1: Screen luminance may be excessive in many circumstances, causing different ocular signs and symptoms.

### PURPOSE

To evaluate the effect of visual information during the visualization of LED displays on the fatigue symptoms.

### RESULTS

The following graphs show the frequencies in the symptoms associated with the use of LED screen devices, in population of young people and adults of working age.

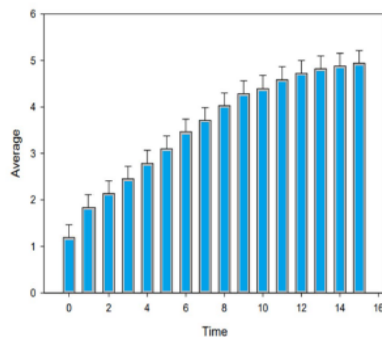


Figure 2: Degree of visual fatigue after reading a text for 15 minutes, on an electronic device.

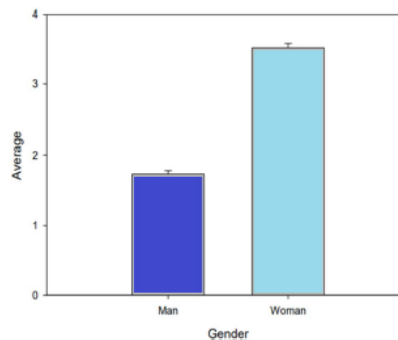


Figure 3: Average value of degree of fatigue manifested by gender

During the 15 minutes of coherent reading the individuals did not detect the increase of the brightness of the screen. With the test text-stripes-points it was detected that the visual fatigue increased with time, being the annoyances at the end of the test up to 4 times stronger than at the beginning. Women are twice as sensitive to light as men (women: 4.24 / men: 2.13).

### CONCLUSION

The interest that the visual stimuli cause in the observer can cause a desensitization with respect to the excess light emitted by the LED screens. The tolerance of the visual system of young people cancels the aversion to the excess of light emitted by screens although it does not eliminate the appearance of symptoms and visual signs after the continued use of screens.

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