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Does the spectral composition of an ambient light vary between indoors and outdoors “in myopia perspective”? | IOVS

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ARVO Annual Meeting Abstract | June 2022

Does the spectral composition of an ambient light vary between indoors and outdoors “in myopia perspective”?

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Abstract

Purpose : Considering that differences in the characteristics of ambient light between indoor and outdoor environment may impact myopia development in children, this study investigated the spectral composition of ambient light in different a) outdoor/indoor locations, b) times of a day, and c) seasons.

Methods : The spectral power distribution (SPD) was recorded using a hand-held spectrometer in three outdoor (‘open playground’, ‘under shade of tree’, and ‘canopy’) and three indoor locations (‘room with multiple windows’, ‘closed room’, and ‘closed corridor’) at five different time points (3-hour intervals between 6:30 and 18:00 clock-hours) on two days, each during summer and monsoon seasons. The pattern and the distribution of SPD across the spectrum, namely the short (380-500 nm), middle (505-565 nm) and long wavelengths (625-780 nm) were further assessed to understand the percentage composition in different locations.

Results : The overall median SPD (IQR [25th-75th percentile] W/nm/m²) across three outdoor locations (0.11 [0.09,0.12]) was 157 times higher than indoor locations (0.0007 [0.0001,0.001]). A considerable locational, diurnal and seasonal variation was observed in the distribution of median SPD value, with the highest value recorded in the ‘open playground’ (0.27 [0.21,0.28]) followed by ‘under shade of tree’ (0.083[0.074,0.09]), ‘canopy’ (0.014[0.012,0.015]), and ‘room with multiple windows’ (0.023[0.015,0.028]). While the spectral power of short, middle, long, and blue wavelengths was significantly lower in indoor compared to outdoor locations, the pattern and the relative percentage composition of short, middle and long wavelengths were similar in both the outdoor and indoor locations.

Conclusions : Irrespective of variation in SPD values with location, time, day and season, outdoor locations exhibited significantly higher SPD than indoor locations. The relative percentage composition of short, middle and long wavelengths of light are similar across all the locations. From a myopia perspective, our findings indicate a possibly

greater importance of the spectral power of ambient light rather than its spectral composition, as the latter was similar across outdoor and indoor locations. This finding warrants further research to understand its causal association with myopia.

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