

Seasonal Impact of Greenspace on Child Opportunity: An Analysis of NDVI and the Child Opportunity Index Across US Census Tracts

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Research shows greenspaces significantly boost children's health by promoting physical activity, reducing stress, and facilitating play and social interaction. The Child Opportunity Index (COI) score, which evaluates neighborhood potential to improve children's health and reduce disparities, currently does not include greenspace in its metrics. Additionally, it does not explore seasonal changes in greenspace and the potential impacts on health. To fill this gap, we analyze how the seasonality of greenspace is associated with the COI score. We assess the correlation between seasonality and the Normalized Difference Vegetation Index (NDVI). Additionally, we use Ordinary Least Squares (OLS) linear regression and Geographically Weighted Regression (GWR) to analyze how the seasonality of NDVI is associated with the COI overall and locally at the US Census tract level. The study results show strong correlations between summer and both spring (0.90) and fall (0.97) while illustrating a weaker correlation between summer and winter (0.58). The OLS result shows that the NDVI was significantly associated with COI in fall (coefficient: 13.76; r^2 : 0.006) the most, followed by spring (coefficient: 12.98; r^2 : 0.005) and summer (coefficient: 12.51; r^2 : 0.006), while winter (coefficient: 7.16; r^2 : 0.0008) exhibits the weakest impact. The GWR results indicate spatial variations of the local coefficients for NDVI are higher in winter than in other seasons, especially in the northern US (R^2 spring: 0.78, summer: 0.79, fall: 0.79; and winter: 0.78). In conclusion, our study highlights the significant association of seasonal greenspaces with the COI. It emphasizes the need to integrate greenspace considerations into urban and public health policies to enhance child development throughout the year.

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Key Word: Children; Child Opportunity Index (COI), Greenspace, GWR

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