

Study Finds Lower Oxidative Stress in Children Who Live and Study Near Green Spaces

The association between green space and oxidative stress was not found to be related to the frequency of children's physical activity

Barcelona, 1st of March, 2022- A study led by the Barcelona Institute for Global Health (**ISGlobal**), a centre supported by the "la Caixa" Foundation, has analysed, **for the first time**, the relationship between exposure to different green spaces and oxidative stress in children. The study concluded that greater exposure to vegetation is associated with **lower levels of oxidative stress** and that this association is observed **regardless of the children's physical activity**.

Oxygen is essential for numerous biochemical reactions that keep us alive, but its **oxidation** process generates **harmful reactive substances** that the body cannot always neutralise quickly or which cause damage that the body is unable to repair. This results in what is known as **oxidative stress**, which causes **ageing** or even **illness**.

To date, various studies have shown that having green spaces in the vicinity of one's home has a **positive effect on health**, especially because greenness improves mental health and encourages physical exercise, thereby reducing the risk of overweight or obesity. But less attention has been paid to the **direct effects of vegetation on biological processes**, such as inflammation and oxidative stress. This is particularly important for understanding the role that green spaces can play in **respiratory and allergic diseases**.

Study Analysed Over 300 Italian Children

In order to determine whether green spaces might be associated with lower levels of oxidative stress in children, and also whether physical activity plays a role in this possible association, the researchers analysed **323 healthy children aged 8-11 years** from five primary schools in Asti, a small city in north-western **Italy**.

Parents completed a **questionnaire** on how often their children engaged in physical activity. Oxidative stress was quantified in **urine** by measuring the concentration of the compound isoprostane. Residential and school greenness were defined according to the **Normalised Difference Vegetation Index (NDVI)** and vegetated portion was also estimated. Multisite exposures were obtained accounting for **NDVI around the children's homes and schools**, weighted for the time spent in each location.

Possible Explanations

Several **biological mechanisms** could explain this direct link between green space and oxidative stress in children. Firstly, "increased exposure to these areas may contribute to children's **immune development** by bringing them into **contact with organisms** that tend to colonise natural environments," commented last author **Judith Garcia-Aymerich**, researcher and head of the Non-Communicable Diseases and Environment Programme at ISGlobal. Secondly, contact with green spaces can increase **vitamin D synthesis** due to ultraviolet radiation from sunlight. Vitamin D acts as an **antioxidant**

that prevents the negative effects of oxidative stress and inflammation. Finally, vegetation improves **air quality** in urban areas.

No Effect Found for Physical Activity

Although proximity to green space has been associated with increased physical activity, which in turn affects oxidative stress, the study **found no evidence** that exercise was involved in the association between green space and oxidative stress.

Garcia-Aymerich concluded: “The short- and long-term health effects of excess oxidative stress are unknown, so we need to **conduct further research** and **support city and public-health strategies** that favour greenness.”

Reference

Giulia Squillacioti, Anne-Elie Carsin, Valeria Bellisario, Roberto Bono, Judith Garcia-Aymerich. Multisite greenness exposure and oxidative stress in children. The potential mediating role of physical activity. *Environmental Research*, Volume 209, 2022, 112857, ISSN 0013-9351. doi.org/10.1016/j.envres.2022.112857.

About ISGlobal

The Barcelona Institute for Global Health, ISGlobal, is the fruit of an innovative alliance between the “la Caixa” Foundation and academic and government institutions to contribute to the efforts undertaken by the international community to address the challenges in global health. ISGlobal is a consolidated hub of excellence in research that has grown out of work first started in the world of health care by the Hospital Clínic and the Parc de Salut MAR and in the academic sphere by the University of Barcelona and Pompeu Fabra University. Its working model is based on the generation of scientific knowledge through Research Programmes and Groups, and its translation through the areas of Training and Analysis and Global Development. ISGlobal has been named a Severo Ochoa Centre of Excellence and is a member of the CERCA system of the Generalitat de Catalunya.

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