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Urban Areas With High Levels of Air Pollution, Traffic and Noise May Increase Risk of Childhood Obesity

A study of more than 2,000 children in Sabadell associates these three environmental factors with higher body mass index

Barcelona, 12 July 2021. Children living in **urban areas** with high levels of **air pollution, noise** and **traffic** may be at higher risk of childhood **obesity**, according to a study by the Barcelona Institute for Global Health (**ISGlobal**)—a centre supported by the “la Caixa” Foundation—and the University Institute for Primary Care Research Jordi Gol (**IDIAP Jordi Gol**). The study was funded by the **La Marató de TV3 Foundation**.

Published in *Environment International*, the study analysed data on **2,213 children aged 9 to 12 years** in the city of **Sabadell** (Barcelona) who were participating in the ECHOCAT and INMA projects. Forty percent of the children were overweight or obese. The researchers investigated the association between **urban factors** that the children were exposed to between October 2017 and January 2019 (ambient air pollution, green spaces, built environment, density of unhealthy food establishments, road traffic and road traffic noise) and various measures of **childhood obesity** (body mass index, waist circumference and body fat) and **weight-related behaviours** (fast food and sugar-sweetened beverage consumption, physical activity, sedentary behaviour, sleep duration and well-being).

To date, few studies have assessed whether the urban environment influences children’s behaviours in order to better understand the relationship between this environment and the risk of childhood obesity. An understanding of the mechanisms of this relationship will facilitate the development of community-level health promotion programmes to encourage healthier behaviours in the city. Another novel aspect of this study is that it assessed **multiple urban exposures together**, in accordance with the concept of exposome or the study of multiple simultaneous environmental factors.

Possible Mechanisms

“Higher levels of **air pollution, traffic** and **noise** were associated with **higher body mass index** and a higher likelihood of the child being overweight or obese,” explained lead author Jeroen de Bont, a researcher at ISGlobal and IDIAP Jordi Gol. Although the mechanisms that could explain this association remain unknown, the scientific team proposed **various hypotheses**. Air pollution could **disrupt the molecular mechanisms** that cause obesity by inducing inflammation or oxidative stress, hormone disruption and visceral adiposity (although the studies published to date have been performed in mice). Noise could influence **sleep deprivation** and increase **stress hormones**, which are associated with physical development in childhood and could increase the risk of becoming overweight.

The findings were consistent with those obtained in the same study when some environmental exposures were analysed separately. In particular, the **number of unhealthy food establishments in an area** was also found to be associated with childhood obesity, probably because such an environment may favour higher fast food consumption and higher caloric intake.

The study did not, however, find an association between the urban environment and the **level of physical activity, sedentary behaviour and other weight-related behaviours** in children, although it is thought that such factors could play a role. (For example, in areas with a good public transport network and nearby facilities and shops, journeys tend to be made on foot or by bicycle, which increases children's physical activity.) The fact that the study did not find an association between these factors could be attributed to "the difficulty of determining to what extent obesity itself influences weight-related behaviours," explained de Bont. Moreover, information on children's physical activity was collected using a questionnaire that did not take into account where the activities took place. "We were able to find out if the children played basketball or football, but not if they cycled in nearby green spaces, for example," he added.

Finally, "**socioeconomic status** plays an important role in the association between the urban environment and childhood obesity that is not yet clear," commented last author **Martine Vrijheid**, a researcher at ISGlobal. In this study, children living in more deprived areas on the outskirts of the city had higher rates of overweight and obesity even though they were exposed to lower levels of air pollution, road traffic and noise and had access to more green spaces. Further research is needed to shed light on this issue.

Reference

Jeroen de Bont, Sandra Márquez, Sílvia Fernández-Barrés, Charline Warembourg, Sarah Koch, Cecilia Persavento, Silvia Fochs, Núria Pey, Montserrat de Castro, Serena Fossati, Mark Nieuwenhuijsen, Xavier Basagaña, Maribel Casas, Talita Duarte-Salles, Martine Vrijheid. Urban environment and obesity and weight-related behaviours in primary school children. *Environment International*. Volume 155, 2021. <https://doi.org/10.1016/j.envint.2021.106700>.

About ISGlobal

The Barcelona Institute of Global Health (ISGlobal) is the result of an innovative alliance between the "la Caixa" Foundation and academic and government institutions. The Institute was set up to contribute to the work undertaken by the international community to address global health challenges. ISGlobal has consolidated a hub of excellence in research and medical care that has its roots in work first started in the world of health care by the Hospital Clínic and the Mar Health Park and in the academic sphere by the University of Barcelona and Pompeu Fabra University. ISGlobal's work model is based on generating knowledge through its scientific programmes and research groups and translating this knowledge into practice and policy through its Education, Policy and Global Development departments. ISGlobal is accredited as a Severo Ochoa Centre of Excellence and is a member of CERCA, the Catalan Government's network of research centres.

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