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PERSPECTIVES

Healthy and happy children: two-wheel focused cities and a golden opportunity for local governments

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Abstract

Urban environments profoundly shape the health and development of children and adolescents. As pediatricians and key advocates for child health, we must acknowledge car-centric urban design as a major yet underappreciated determinant of pediatric well-being. By 2050, 70% of the children worldwide will live in cities, many of which are designed primarily for car mobility. This paradigm contributes to environmental degradation, increased accidents, and a higher incidence of conditions such as asthma, respiratory infections, and hypertension. Exposure to air pollutants has also been linked to prematurity, impaired neurodevelopment, and allergic diseases. In contrast, active mobility, especially cycling, offers substantial benefits for children's physical, psychological, and social health, enhancing motor skills, autonomy, and self-esteem, while addressing the global rise in childhood obesity. Despite this, barriers such as unsafe infrastructure and poor urban planning hinder its adoption. Evidence from "bike-friendly" cities demonstrates that investing in active mobility yields health, environmental, and economic gains. Promoting child-centered, sustainable urban design requires coordinated action across individual, social, infrastructural, and public health levels. Pediatricians should leverage their unique position to advocate for policies that prioritize safe, accessible, and active mobility, helping ensure healthier, more sustainable cities for future generations.

Keywords: Public health. Bicycling. Urban health. Environment design. Exercise. Child health.

Crianças felizes e saudáveis: cidades amigas das bicicletas e uma oportunidade única para as autarquias

Resumo

O ambiente urbano condiciona profundamente a saúde e desenvolvimento dos jovens. Como pediatras e defensores-chave da saúde infantil precisamos de reconhecer a gestão centrada no automóvel como determinante, embora subvalorizada, do bem-estar pediátrico. Em 2050, 70% das crianças no mundo viverão em cidades, planeadas frequentemente para a mobilidade automóvel. Este paradigma contribui para maior degradação ambiental, risco de acidentes e de incidência de patologias como asma, infeções respiratórias e hipertensão. A associação entre exposição a poluentes atmosféricos e prematuridade, alterações do neurodesenvolvimento e doenças alérgicas foi também já demonstrada. Contudo, a mobilidade ativa, nomeadamente de bicicleta, beneficia substancialmente a saúde física, psicológica e social, potenciando as capacidades motoras, autonomia e auto-estima, atuando também na obesidade infantil, em agravamento mundialmente. Apesar destes benefícios, barreiras como infraestruturas e planeamento urbano deficitário limitam a adoção deste meio de transporte. Cidades "amigas da bicicleta" demonstraram que o investimento na mobilidade ativa traz ganhos em saúde, ambientais e económicos. Promover o

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planeamento urbano sustentável e focado na criança requer intervenções coordenadas a nível individual, social, estrutural e nas políticas de saúde. Os pediatras devem usar a posição única para advogar pela priorização da mobilidade segura, acessível e ativa, garantindo cidades saudáveis e sustentáveis para gerações futuras.

Palavras-chave: Saúde pública. Ciclismo. Saúde da população urbana. Planeamento ambiental. Exercício físico. Saúde infantil.

Keypoints

What is known

- Car-centric urban environments expose children and adolescents to air pollution, traffic-related injury risk, sedentary lifestyles, and limited opportunities for active mobility, contributing to adverse health outcomes.
- Cycling and active mobility can promote physical activity, motor and psychosocial development, independence, and potentially reduce obesity and other health risks in children.
- Safe, connected cycling infrastructure, traffic calming, accessible destinations, and supportive policies are important determinants of cycling uptake, but significant infrastructural and cultural barriers remain, including in Portuguese cities.

What is added

- We highlight child health as a central rationale for shifting from car-centric to active-mobility-oriented urban planning, emphasizing the role of pediatricians as advocates beyond the clinical setting.
- We connect cycling promotion with multiple dimensions of child health and development, including physical activity, neurodevelopment, autonomy, social interaction, obesity prevention, and exposure to traffic-related environmental risks.
- We identify opportunities for Portuguese cities to accelerate this transition, including connected and protected cycling networks, safer school environments, traffic calming, e-bike access, and the redevelopment of major urban areas such as the future Humberto Delgado Airport site.

As pediatricians and main advocates for the health of all children and adolescents – maybe second only to their parents and caregivers – we must not ignore one important factor for the health of this vulnerable population: car-centric cities.

The World Health Organization estimates that, by 2050, 70% of the children worldwide will live in cities.[1] Cities are often organized by adults and planned with a focus on how adults move through the city; thus, in many parts of the world, the main goal remains to shorten and accelerate private car trips. This paradigm continues to favor a mode of transportation that not only has local and global environmental impacts,[2] but also contributes to increased accidents[3] and higher rates of obstetric complications[4] and pediatric conditions, such as asthma, respiratory infections, and hypertension.[5,6] Notably, transition toward electric vehicles, despite important benefits in reducing emissions and noise, does not address sedentarism, urban space overconsumption, or safety risks, reinforcing the need to prioritize active mobility.

Syed et al. observed that, compared to children living in areas with lower pollution, those exposed to higher levels of air pollutants had more severe asthma symptoms and lower levels of regulatory T cells.[7] This negative environmental exposure has also been associated with an increased risk of infant death and adverse perinatal outcomes. Estimates suggest that, in 2019, prematurity could be attributed to exposure to environmental particulate matter with a diameter of 2.5 μm or less (PM2.5)[4] in about 2 million newborns worldwide,. Prenatal exposure to several air pollutants may also contribute to lower cognitive levels, attention problems, attention deficit hyperactivity disorder (ADHD), and autism spectrum disorder (ASD), in children.[8,9]

Notably, learning to ride a bicycle is itself a significant milestone in child neurodevelopment and is often a memorable family bonding experience. Cycling supports motor coordination, balance, social interaction, and self-image.[10] Furthermore, initiatives that bring children together for group cycling lessons may serve as an alternative in certain urban or family contexts. School-based initiatives, such as incorporating cycling into Physical Education, could help teach bicycle riding to children whose families face logistical or financial barriers. Community initiatives such as supervised "bike trains" and municipal cycling programs have also already been piloted in several Portuguese cities. Even for children with motor impairment due to neurodevelopmental disorders, group cycling activities have shown additional benefits and effectiveness in promoting self-esteem.[10] Beyond being a key motor skill, cycling enhances children's independence and autonomy, while fostering social interactions with peers of a similar age.[11,12]

Another major global issue that is impossible to ignore is overweight and obesity in children. The World Health Organization estimates that in 2024, 35 million

children under 5 years of age presented with overweight, and, if we extend the age range to 5-19 years, there were 390 million cases of overweight and obesity in 2022, 160 million of which were obese.[13] To make matters worse, the prevalence of this condition has been increasing, resulting in multiple health consequences.[14] A milestone in this alarming trend was recently reported: among children aged 5-19 years, obesity prevalence has surpassed underweight for the first time in history, in all regions of the world except sub-Saharan Africa and South Asia.[15] Obesity depends on hereditary, behavioral, environmental, and socioeconomic influences, so addressing it requires not only healthcare professionals but also public policy.[14] Increasing physical activity and reducing sedentary behavior will be essential in this challenging process. Why not enable and encourage children (and adults) to include physical activity in their daily commutes, whose benefits have already been proven?[16]

If the benefits of this type of mobility are so clear and well-studied, why don't we see children – and, again, adults – riding bicycles more frequently? From an urban planning perspective, there are several barriers in many parts of the world.[17,18] Some key factors for positively perceiving and adopting cycling as a mode of transportation include street connectivity, distance and accessibility to destinations, and perceived safety.[18] Portuguese legislation currently does not mandate helmet use for everyday urban cycling among minors, besides e-bike use and regulated sports. However, helmet promotion may influence parental risk perception and cycling adoption, highlighting the need for balanced safety messaging.

The perception of safety ultimately depends on existing infrastructure. In Portuguese cities, despite recent cycling networks expansions, challenges remain, including fragmented infrastructure, traffic density, and complex urban morphology – particularly in cities with steep hills and narrow historical streets. Mitigation strategies such as traffic calming, safer school zones and access to e-bikes and protected bike lanes may improve feasibility and safety. Road traffic accidents remain one of the leading causes of pediatric mortality nationally and worldwide.[19,20] It is estimated that, in the European Union, 13% of road traffic deaths among children aged 0-14 years are due to bicycle accidents.[21] Although 2024 data show a modest reduction in road traffic fatalities and severity, Portugal continues to rank among the European countries with the highest road mortality rates, alongside a simultaneous increase in total accidents and in both serious and minor injuries.[22] Reducing these numbers – even slightly – is possible and can save dozens of lives each year.[21]

Several scientifically studied global initiatives have been implemented to create "bike-friendly" cities.[23-26] In France, urban planning efforts have been made in recent years, including in the capital.[23,27] Paris has implemented the 15-minutes city concept, which aims to make most necessities and services (workplace, public services and leisure), easily accessible within a 15-minute walk, bike ride, or public transit trip, with clear and demonstrated benefits.[27] Unlike Paris, other countries have implemented this philosophy in various cities for decades. A study by Delft University researchers in the Netherlands reported that the national bike-sharing program generates a return on investment of €1.50-€2.40 per euro invested. This is explained by increased accessibility, reduced road congestion, and improved health outcomes, which have been corroborated by other studies.[28-31] Portuguese cities are at an earlier stage of transformation, with ongoing efforts to expand connected cycling networks and reduce car dependency, though important infrastructural and cultural gaps remain.[32]

If our true ambition is to promote this type of mobility, we must act across several levels: individual (addressing biological and psychosocial factors), social (community, school, and family-based approaches), physical and infrastructural interventions (lowering urban speed limits, discouraging car use, and implementing segregated and connected bike lanes), and public health (legislation, financial incentives, and government priorities).[18] Several organizations around the world, including the World Health Organization and non-governmental organizations such as BYCS (https://bycs.org/), have already published guidelines on how to implement such changes.

As pediatricians, our role is more evident at the individual level, through direct contact with children, and at the social level through family engagement. However, we must not forget our influence and importance as professionals whose mission is to foster the healthy growth of future citizens. At this early stage of new municipal duties following local elections, now is the right time to collaborate with various organizations (e.g., Mubi, https://mubi.pt/), demanding a change in the urban paradigm for our children. Decisive and effective infrastructure legislation is required since long-term urban planning opportunities will always arise. Considering the future relocation of Lisbon's Humberto Delgado Airport, it may offer an opportunity to redesign large urban areas toward greener, child-friendly, and less car-dependent neighborhoods.

Author contributions

T. Ferrão: conceptualization, data curation, formal analysis, writing – original draft; S. Rebimbas: conceptualization, supervision, validation, writing – review & editing.

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Conflicts of interest

None.

Ethical considerations

Protection of human subjects and animals. The authors declare that no experiments on humans or animals were performed for this research.

Confidentiality, informed consent, and ethical approval. This study does not involve personal patient data, medical records, or biological samples, and does not require ethical approval. SAGER guidelines do not apply.

Declaration on the use of artificial intelligence. The authors declare that no generative artificial intelligence was used in the writing or creation of the content of this manuscript.

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