

working paper
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**Cycling-to-school
programmes and
children's
well-being:
The case of 'Al
Colegio en Bici' in
Bogotá, Colombia**

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Project's summary

"On the Way to School" (OWS) is an implementation research study aiming at understanding how to plan, develop, and evaluate Active Mobility To -and from- School (AMTS) interventions in urban and peri-urban contexts in low- and middle-income countries (LMICs) in the Global South. OWS focuses on interventions that promote walking and cycling and evaluates their effect on children aged 8 to 16 concerning the prevention in reducing the risks of non-communicable diseases (NCDs).

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The project is led by The Bartlett Development Planning Unit in University College London in partnership with nine academic and practice organisations in Colombia, Mozambique, the United Kingdom, and the United States.

About OWS Working Papers:

The OWS Working Paper Series is a collection of preliminary research outputs of the project that are currently under consideration for an academic publication. These are preprints that have not yet been peer-reviewed and are thus subject to change.

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Working Paper abstract

This paper examines the relationship between active travel to school and the well-being of children and adolescents from public schools in Bogota, Colombia. We focus on “Al Colegio en Bici (ACB)”, a 10 year intervention that facilitates active commuting through cycling in organised caravans involving pedagogical activities.

The paper applies a conceptual framework for transport well-being to assess the contributions of different components of the ACB programme to the material, relational, and subjective dimensions of well-being in school children and adolescents. This qualitative research operationalises the transport well-being framework through content analysis of secondary data. At the individual level, findings suggest that cycling-based active commuting has helped ACB beneficiaries become more autonomous and empowered as agents of change. Collectively, the programme has also contributed to active social participation in the space of the bike caravans to school, enhancing familiarity with the city and the environment and strengthening civic and cycling culture.

The paper reflects on these findings to identify key programme components and opportunities for improvement in pedagogy and scale, ultimately assessing its potential for addressing outcomes beyond mobility and road safety in Bogotá and similar cities in the global south.

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1. Introduction

'Al Colegio en Bici' (ACB) is a biking-to-school programme developed in Bogotá. This 10-year active commuting initiative accompanies groups of children to and from public schools in Bogotá, Colombia's capital, in organised bike caravans seeking to ensure a safer and more enjoyable journey [1]. The programme was officially launched in September 2013 as an intersectoral strategy run by the Secretariat of Education (SDE) in collaboration with the Secretariats of Mobility (SDM) and Culture (SCRD), the Urban Development Institute (IDU), the District Institute of Recreation and Sport (IDRD), the National Police and local mayors' offices [1]. ACB teaches children about road safety, enhances their environmental and social awareness, and helps them discover their city. It has gained international recognition due to several awards and accolades granted by international development organisations, global philanthropy, and international civil society groups striving for sustainable development.

This paper examines the contributions of the components of ACB programme to children's transport well-being via 1) understanding the relationship between children's active mobility and well-being to contribute to the existing knowledge on active-mobility-to-school in Latin America and other low- and middle-income countries (LMIC); 2) applying the conceptual framework of transport well-being adapted by Oviedo et al. in 2017 [2] to each component of the ACB case study; and 3) analysing and reflecting on the relationship between transport well-being domains, dimensions, and the programme's components through content analysis of secondary evidence.

Walking and cycling enable diverse positive impacts on physical and mental health as low-carbon, affordable and flexible modes of transport [3]. As different municipalities worldwide develop Active Travel (AT) initiatives

to solve societal and environmental issues, walking and cycling as transport modes have attracted much attention as crucial components of urban travel, providing health and well-being benefits to all demographics [4,5]. Furthermore, some research underscores AT's pivotal role in youth's psychological, biological, and social development, encompassing adjustment, skill acquisition, fostering independent relationships, and adopting habits and responsibilities [6–8]. However, despite numerous studies emphasising the multi-dimensional benefits of physical activity on well-being, research on its effects on children remains limited regarding the effects of AT [9–15].

According to previous studies, children who engage in active transport are significantly more active than those who use motorised travel modes [16]. Furthermore, in low- and middle-income countries (LMICs), where disparities in access to education, safety, and transport are most pronounced, enabling active and protected access to school can positively impact well-being in both the immediate and long term. However, when understanding how children and adolescents go to school, active mobility to school (AMTS) has been primarily studied in high-income countries [17] compared to the studies in LMIC cities. Those studies, especially in vulnerable settings, require more targeted research regarding physical activity and well-being through AMTS programmes [18,19] and the recognition of urban policy innovations focused on low-income and vulnerable young populations in such contexts.

This paper analyses 'Active Mobility to and from school' (AMTS) as a feasible strategy to encourage healthier development in children and adolescents in a LMIC city, contributing to emerging evidence suggesting that AMTS can significantly positively contribute to children's and adolescents' well-being. We approach the programme from a well-being perspective as it

encompasses an "overall evaluation of an individual's life in all its aspects" [20], offering a comprehensive perspective on human development [21]. The results of this research will unpack material, relational, and subjective contributions to children's well-being of active travel to school interventions, such as the 'Al Colegio en Bici' programme.

The remainder of the paper is organised as follows: Section 2 reviews the existing literature on well-being and transport. Section 3 presents the case study of 'Al Colegio en Bici' in Bogotá. Section 4 presents the methodology and well-being conceptual framework used to analyse the programme. Section 5 describes the findings. Finally, Sections 6 and 7 present the discussion and conclusions.

2. Literature review

Well-being, as described by White in 2010 [22], comprises material, relational, and subjective domains. The multidimensional nature of well-being is a prerequisite for studying it in rapidly growing and changing global south environments [23]. As proposed by Diener et al. in 2009 [20], well-being can be described as the overall evaluation of an individual's life in all aspects. In this sense, the multidimensionality of well-being can be captured in the 'living well' -material domain -, 'good living' -relational domain -, and 'personal viewing' - subjective domain - aspects of human beings [22].

On the other hand, transport well-being refers to how transport conditions facilitate movement and access to valuable opportunities for human, economic and social capital growth while ensuring safety and comfort [24]. In addition, it evaluates how people experience and perceive walking or cycling activity in the road space. Therefore, whether the transport infrastructure and services are in good or bad condition or the city's social, economic, and environmental conditions are favourable or unfavourable, it

influences both the access to opportunities and citizens' exposure to hazards or well-being [24].

Few studies have connected well-being definitions with transport [25], and even fewer have looked at the connections between transport and well-being in communities at a social disadvantage [24]. With studies in transport and well-being focused on the global north, there is a gap in the literature for south contexts, where most of the population walks for necessity [26]. More so, when studying commute mobility for children, where some studies from low-income or disadvantaged environments indicate that children frequently travel long distances to get to school and stroll through neighbourhoods without safe street-level infrastructure [27]. A study in South Africa has shown that parents who live in low-income neighbourhoods expressed discomfort with their children walking to school due to safety concerns, yet limited alternatives were available [27]. The distance to school has consistently been reported as the primary obstacle to active commuting to school and associated physical activity among children [16]. However, some evidence indicates that children and teenagers from low-income families are more inclined to commute to school actively [28] out of necessity and not choice. Consequently, walking remains the predominant mode of transport for school journeys, indicating a reliance on necessity-driven means [29,30]

Transport was not seen as a fundamental factor for public health until the early 2000s when viewed from a health perspective [16]. However, in the last decade, there has been a surge in the need to study the relationship between transport, specifically to school, and physical activity levels. Some studies have included the existence of Active Mobility To and from School (AMTS) interventions [31]. For example, throughout two 6-year longitudinal studies in Sweden and Spain, it was discovered that children who started riding to school between the ages of 9 and 15

significantly increased their cardiovascular fitness [32,33]. The ongoing studies consistently reveal that children who use active modes of transport tend to exhibit significantly higher levels of physical activity than those who rely on motorised modes [31]. Hence, urban planning strategies and public health/grass-roots level programmes are paramount to encourage children to participate in active transport, especially in the Global South.

When considering strategies to improve health and well-being, youth is an essential stage of growth and development at which regular physical activity can significantly improve health and well-being [4,5]. Sadly, 80% of children do not meet the minimum expected time for physical activity recommended by the World Health Organisation of 60 minutes/day [34] [35,36]. Moreover, research has demonstrated that independent mobility, as gained by AMTS programmes, is critical for children's self-efficacy, autonomy, spatial navigation abilities, and socio-emotional development [37]. In this sense, Motl et al. in 2004 [38] reported that early adolescent depressive symptoms are inversely correlated with physical activity [39]. Hence, limiting or reducing active mobility can significantly affect children's mental, social, and physical development [10].

'Active mobility to and from school' (AMTS) programmes have emerged as a feasible and effective method for boosting daily physical activity levels, providing multiple benefits to children's well-being and urban environments [27]. While these programmes hold the potential to contribute to increasing and maintaining healthy habits [31] and being more physically active [40], they require a comprehensive understanding of children's perspectives of their school journeys and self-development through youth-centred procedures geared towards providing child-friendly social environments [41].

Prior studies underscore the significance of

integrating children's viewpoints on their neighbourhoods into research and practical applications, as their perceptions of safety directly influence the relationship between active school travel and health-related quality of life [28]. Furthermore, AMTS can also influence children's psychological well-being (PWB) and emotional experiences during their school commutes. Stark et al. in 2018 [42] highlight a strong association between active school travel and children's PWB, with travel-related attitudes also playing a crucial role in overall well-being. Different authors have showed that active travellers experience more positive emotions than their peers, which aids in coping with academic stress [29,43]. Initiatives such as the 'Schoolwalker' programme in Austria and a case study in Hong Kong demonstrated that active mobility enhances children's mood and happiness during their journeys [42].

Lastly, Aliyas et al. in 2022 [44] and Martin et al. in 2021 [45] have further advocated for the incorporation of AMTS into health promotion strategies, emphasising its positive impact on children's emotional and social well-being through enhanced physical activity and social interactions with peers, family, and the community.

3. Case Study

3.1. Bogota

Bogotá, Colombia's capital city with an extension of 1,776 km² and a population of around 7.9 million inhabitants [46], has garnered significant national and international acclaim as a benchmark for implementing transport planning changes in other cities [47]. Bogotá counts with 630 km of bike paths between segregated and preferential-use roads, with 80 of those km built between 2020 and 2024. According to the last Household Mobility Survey, in 2023, the city reached more than 1.1 million daily bicycle trips of more than 15 minutes, equivalent to 7.9% of the city's daily trips. This data has surpassed other major

cities like Amsterdam (665,000), Copenhagen (250,000), Utrecht (125,000), and Santiago de Chile (676,000).

Since 1998, Bogotá has established plans, programmes and actions for the use and promotion of cycling, institutionalising bicycles as a transport mode in 2005 with the Mobility Master Plan [48] and creating a bicycle public policy in 2021 [49]. During the last 30 years, the city has been driven by several key factors in promoting Bogotá's urban cycling culture [50]. First, the historical prominence of cycling as a national sport during the mid-20th century laid the foundation for citizens' widespread acceptance of cycling culture. Second, the installation of the "Ciclovía Recreativa" in 1976 - a temporary opening of some city streets for exclusively cycling and walking on Sundays - has further strengthened the cycling culture, serving as a solid platform for community engagement. Third, the constant citizen participation through cycling collectives has been instrumental in championing cycling initiatives within the community, fostering a sense of ownership and pride in promoting urban cycling culture. Lastly, the development of segregated bike paths and bicycle preferential-use roads has substantially improved safety and accessibility throughout the city for bicycle users.

The community and policymakers' joint efforts have resulted in 6 robust public policies that support, institutionalise, and consolidate urban cycling since 2005 up until now. The public policies vary considering the bicycle as a transport mode, to understanding the necessities for using the bicycle as a transport mode, to seeking the reduction of bicycle-involved road collisions, and promoting the use of bicycles in different settings, including public schools. Appendix A summarises the policies and plans established. As stated by Rodríguez et al. in 2022 [48] the city bicycle use promotion is an economically sound public policy that helps the city's sustainable development and has multiple benefits for people's well-being. In this

context, the 'Al Colegio en Bici' programme (bike-to-school program) as an AMTS programme serves as a compelling case study, demonstrating the success of biking initiatives within the city.

3.2. 'Al Colegio en Bici'

'Al Colegio en Bici' (ACB) is a pedagogy mobility programme that has been operating for more than ten years in Bogotá, targeting children and adolescents in public schools with difficult access to and from school. The programme, which started in 2012 and officially launched in 2013, is a cross-sectoral programme involving the "Niños y Niñas primero" (Children First) framework programme from the Mobility Secretariat and the Access to School dependency from the Education Secretariat [1]. ACB aims to promote cycling as a sustainable mode of transport, improving access to education, safe mobility, and travel experience to school [1].

The programme started in 2004 as an experiment by the schoolteacher Liliana Godoy Betancourt in one of the most deprived neighbourhoods in Bogotá. At the time, the community activity, known as "ciclo-paseos", created a safe route to school for children riding bikes. The initiative was then adopted by the Education Secretariat and the District's Institute of Sports and Recreation, seeking to promote sustainable and safe transport in public schools to advance toward an inclusive, sustainable, protective, and safe city [1]. The programme has transitioned to a broader public policy, closely integrated into the education and mobility sector, through the bicycle public policy.

Currently, the ACB operation consists of predetermined routes for about 30 children and adolescents from the same school, guided by two monitors who accompany the students through the bike caravans. The routes have meeting points between the school and the last stop, 5.5 km away from the school. The programme is operated by the Mobility

Secretariat, which hires the monitors and provides logistic support for the program, and the Education Secretariat, which gives the children bicycles and safety kits and develops the education components of the programme.

Up to 2023, Al Colegio en Bici had benefited over 17,000 children across 86 schools in 15 out of 20 localities in Bogotá. By focusing on improving the experience on the way to school by fostering young people's capacities and building citizenship skills that link classroom learning to real-world experiences, the programme aims to tackle the lack of physical activity in children and adolescents aged 11 to 15 in Colombia and democratise the access to education for low-income students [1,34] while addressing the cross-cutting themes of Institutionalism, Gender Approach, and Environment and Health. The programme envisions children's participation as change agents for developing a child-centred educating city and promoting a healthier life. Indeed, based on the 'Children First' framework programme, the vision is to turn children into empowered city inhabitants and protagonists of their environment.

Al Colegio en Bici is structured into six components: Allocations, Operations, Safety, Pedagogy, Networks of support, and Local management & communications, understood as follows {dario}.

Allocations: All material assets that make it possible to develop the programme operation are provided to the users. They include basic safety kits and bicycle parking facilities, among others.

Operations: All the logistics and operation functions of the programme, including the design and implementation of trusted routes, on-road operations involving the ACB team, and improvement plans.

Safety: This component is the programme's cornerstone as it refers to the responsibility to care for the children. It involves mechanical

technicians, preventive care and bicycle repairs, and technical support assistants on the road.

Pedagogy: All the education assets, linking environment, education, city, and school. It includes the collective bicycle workshop provided to the beneficiaries before the start of the programme and the pedagogical activities around journeys to and from school.

Networks of support: Partnerships among institutions, educational community, police, monitor teams, and families, focused on the well-being and safety of students. Bike caravans to school and cycle expeditions are other support networks where interaction and sociability among children and adolescents become essential for their full development.

Local management & communication: Focused on all the long-term development strategies for the programme concerning its visibility, external approval, and sustainability. It includes the management of projects, resources for operation, search for articulations, and funding to expand the programme further at the city level.

4. Methodology

To understand the relationship between children's active mobility and well-being and analyse the relationship between transport well-being and the programme's components, we first developed a transport well-being framework for children. Then, we created a content analysis using said framework.

4.1. Transport Well-being Framework

We built the transport well-being framework for children considering White's definition of well-being, which comprises the Material, Relational, and Subjective domains[51], and the Transport well-being definition proposed by Oviedo and Sabogal in 2020 [52]. With the two definitions, we defined several dimensions fundamental for transport for each well-being

domain, considering only the dimensions relevant to the ACB programme. The rationale behind this conceptual framework is to explore how the domains and dimensions of well-being are interconnected and contribute to the different components of ACB. Fig. 1 shows the proposed Transport-Well-being conceptual framework, unpacking the well-being domains and the applicable dimensions based on the case study.

The material domain in the framework is associated with 'living well'. It refers to all the physical elements surrounding people and directly influencing their well-being. This aspect includes material assets necessary for achieving adequate living standards and the skills, abilities, and environmental conditions for securing assets to 'live well'.

The factors underpinning these living standards are framed by the built environment surrounding people, which relates to infrastructure, resources, services, access, tools and opportunities for personal growth, and the quality of the environment, understanding transport as a means to access living standards. Moreover, power dynamics can be determined and influenced by people's access to opportunities in equal or unequal terms, including health and (dis)abilities

The relational domain relates to the "good living" aspect. It comprises personal and social relationships shaped by power dynamics in each cultural context. This domain involves the dimensions of networks of support and obligation, relations of love and care, and the conditions established for personal or collective action, among other dimensions. Active mobility fosters social connections and community engagement by generating accessibility and connectivity, tackling the risk of social isolation by some groups that are further away from the city or live in places with poor road access/connectivity.

The subjective domain relates to how individuals view themselves and their

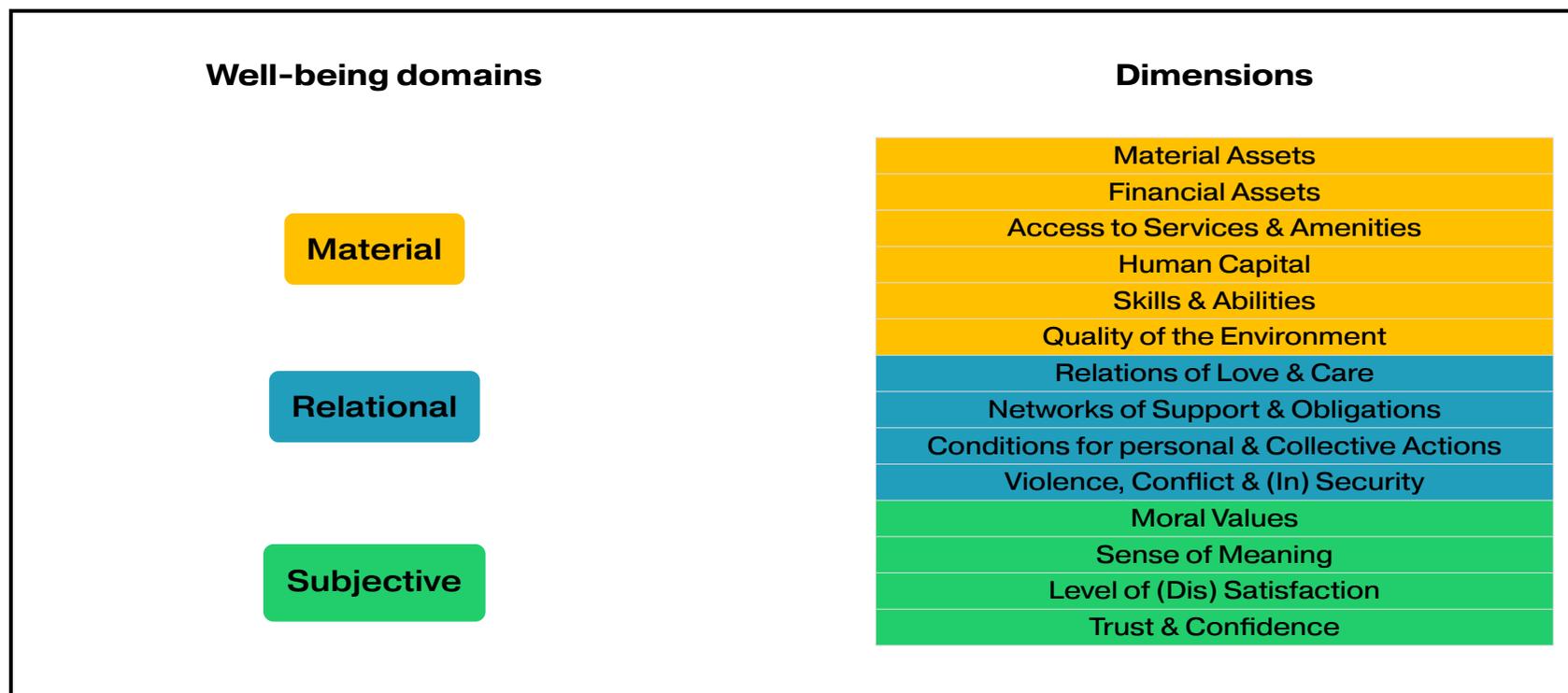
environments (perceptions), considering dimensions such as moral principles, social context and experiences. This domain entails an assessment of mental health and well-being around the dimensions of self-concept and personality hopes, fears and aspirations, a sense of meaning and satisfaction, trust and confidence. Transport is related to this domain on the user experience side. To enrich their experience, it is necessary to have proper and safe infrastructure transport and, first and foremost, make it affordable, suitable, and available for them.

4.2. Strategy for Social Research and Method for Content Analysis

After developing the Transport Well-being Framework, we used content analysis to understand the relationship between the 'Al Colegio en Bici' programme's components and the framework's domains and dimensions and unpack the contributions of this intervention to the well-being of children and adolescents in the global south. The materials and sources for this investigation consisted of secondary data from official documents, reports, articles, research papers, videos, social media entries, and academic theses. We used 14 main sources for the analysis, including four audio recordings, three press articles, two master theses, three reports, one book, and one research paper. Additionally, we held an interview with the Operational Coordinator of Al Colegio en Bici to delve into the details, close the gaps, and update the information missing.

We conducted a descriptive analysis to interpret, analyse, and describe the interrelationships of ACB's descriptions and actions and their contribution to each domain of well-being based on the related dimensions. For the analysis, the allocations, operations, and safety components of 'Al Colegio en Bici' have been collapsed into one component, as they relate to the design of trusted routes, use of facilities, safety, and all necessary elements for the effective and efficient operation of the

Fig 1. Transport well-being framework



programme.

Through secondary data analysis, we found interrelations and insights into how ACB actions contribute to the material, relational and subjective dimensions of child and adolescent well-being. Patterns, crossovers, and relevant themes were analysed by selecting the dimensions most closely aligned with the ACB components and exploring how each component's actions respond to the well-being domains and these dimensions.

5. Findings

We found intersections of the ACB components with the following five dimensions of the Material domain: material assets, access to services, quality of the environment, human capital—skills and abilities, and financial assets. Figure 2 describes each ACB component in response to the dimension it is related to.

5.1.1. Operations, Safety & Allocations component

The “operations, safety & allocation” component influences material assets, access to services and amenities, and quality of environment dimensions. Furthermore, the state of infrastructure and physical elements of the programme's routes directly influence beneficiaries' well-being.

Regarding material assets, the design and implementation of the routes and the provision of bicycles and safety kits add to the improvement in the material well-being of children. First, the design and implementation of the routes consist of five steps developed to determine the best routes, benefit the maximum number of children, and ensure the beneficiaries' safety. The Mobility Secretariat and the Education Secretariat have undergone an assessment of the built environment surrounding the school to determine if the school is suitable for having the programme in terms of topography, safe access to school, storage space for bicycles, and the average distance from school to the children's households. Second, the school must demonstrate its commitment by providing spaces for collective bicycle workshops for children. Once the ACB implementation is

Fig 2. Description of ACB components in the well-being material domain

| ACB Components | Material Assets | Access to Services & Amenities | Quality of Environment | Human Capital / Skills & Abilities | Financial Assets |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|
| Operations, Safety & Allocations | <ul style="list-style-type: none"> Trusted routes & process design Bikes provided by the State Road safety kit | <ul style="list-style-type: none"> Cycling parking Bike service maintenance & safety support Centre of interest & strengthening centres | Bicycle travel: <ul style="list-style-type: none"> Reduces exposure to air pollutants Contributes to public health | | |
| Pedagogy | | | | <ul style="list-style-type: none"> Collective bicycle workshop Civic education and youth cycling culture | |
| Networks of Support | | | | <ul style="list-style-type: none"> Autonomy, empowerment, and responsibility | |
| Local Management & Communications | | | | | <ul style="list-style-type: none"> Resources / funding to expand ACB TICs investment |

approved, the Mobility Secretariat identifies interested children and pre-plans the route with meeting points. The Mobility Secretariat considers several route design criteria, including road infrastructure, safe crossings, road network, and other critical points. Finally, the ACB operational coordination grants final approval and shares the trusted route with parents through a co-responsibility agreement, marking the programme's official launch. In the last step, the Education Secretariat gives the beneficiaries the bicycles as a year-long loan and a safety kit, including a helmet, elements for removing debris, a waterproof jacket, a reflective vest, multipurpose tools, gloves, and a collar [53]. The bicycle is another physical element to highlight as the central tool of the programme, which is the starting point for achieving public health for its citizens and more sustainable cities. ACB introduces the bike as a flexible and environmentally friendly transport alternative for promoting sustainable mobility and safe access to education [54].

Regarding access to services & amenities dimension, the State has provided 10,000 bicycle parking spots installed in public schools across the city and services of maintenance. The Education Secretariat has a team of technicians who make preventive maintenance visits, and they have spare parts for the bicycles if needed. At the beginning of each year, they check each bike to see if it is in good mechanical condition; when they are in operation, the monitors generate periodic reports showing the condition of each bicycle and which ones should be checked by the technicians. In case of a mechanical issue during the route, the routes' monitors, zonal leaders (responsible for guarding the perimeter of the area where children pass through on the trusted route) and mechanical technicians are trained to prioritise children's safety.

Along its development, ACB has tested different strategies for engaging with children around the use and operation of a bicycle.

Some highlights that are no longer in operation include the implementation of “Centros de Interés” where training workshops on bicycles and extracurricular activities for the students’ extended school days were carried out. At its peak, there were 30 centres of interest to welcome all enrolled students, reinforcing access to education. This initiative, however, was rolled back after the COVID pandemic.

Overall, the programme’s operations, safety and allocation components present a solution to factors that traditionally detract from children’s well-being, such as a low built environment quality, low safety perception, and lack of bicycles.

5.1.2. Pedagogy

The “pedagogy” component is related to the dimension of human capital skills and abilities, as it considers integrating the programme with the educational process and the learning spaces inside and outside the trusted routes. ACB aims to combine traditional education with road education, citizen participation, and climate change, giving an attractive citizenship education proposal where students can develop their identities through the territorial appropriation of the city as engaged participants in their mobility [53].

The programme gives the children and adolescents a collective bicycle workshop at the beginning of the year, where the potential beneficiaries learn the skills and knowledge to ride a bike, become familiar with its fundamental mechanics, and receive training in becoming responsible citizens (Ovalle, 2019). This workshop is mandatory, and children can only be part of the route if they complete it.

During the year, the children and adolescents participate in extracurricular activities guided by the “cycle expeditions” programme. Beyond generating ownership of the territory, with its pedagogic component, the programme encourages children to develop civic skills by

connecting classroom learning to real-world situations [54]. The programme generates spaces for exploring the city that enhance the coexistence among students and schools from different contexts and realities, promoting citizen participation and civic education, connecting the school with the environment and encouraging a youth cycling culture.

5.1.3 Networks of Support

The “networks of support” component is related to the Human capital skills and abilities dimension, as the programme relies on the families, school members and community so that the children and adolescents can develop different knowledge and skills to be more autonomous, empowered and independent in the public space.

The programme teaches the beneficiaries how to be more aware of their surroundings by identifying dangers, traffic signals, and every other element required for everyday travel, encouraging them to develop their resilience to constant management and responsibility for their mobility (Ovalle, 2019). Moreover, due to constant social interaction with the other beneficiaries, the guides, and the community, the programme helps the children improve their interpersonal skills to build a social network outside school.

5.1.4. Local management & Communications

The “local management and communications” component is related to the financial assets dimension, as the programme’s success has resulted from the constant resources and funds allocated to the Mobility Secretariat and Education Secretariat for the operation and logistics of ACB. However, as the programme evolves, the scope tends to exceed the mission and contractual objective of the budget, leading to the search for strategic partnerships with the private and public sectors, NGOs and academia for the development, sustainability, and expansion of

the programme [55].

Likewise, as part of local management, the programme is constantly improved by the standardisation of processes and participatory strategic planning among the different areas of the Mobility Secretariat, as well as better control and evaluation of the activities developed and articulation between the two secretariats [55].

Nothing is possible without having the right resources and sufficient funding to support the whole programme's operation and logistics. Therefore, these financial assets become the baseline for a sustainable intervention in the long run.

5.2. Relational Domain

We found intersections of the ACB components with the following three dimensions of the Rational domain: Conditions for personal & collective action; violence, conflict & (in) security; and relations of love & care/networks of support & obligations. Figure 3 summarises the results for each component in response to the dimensions applied.

5.2.1. Operations, Safety & Allocations

The “operations, safety, and allocations” component is related to the dimensions of “conditions for individual and collective action” and “violence, conflict, and (in)security”.

5.2.1. Operations, Safety & Allocations

The “operations, safety, and allocations” component is related to the dimensions of “conditions for individual and collective action” and “violence, conflict, and (in)security”. ACB offers a series of conditions for individual and collective action, allowing children and adolescents to have spaces for participation and a voice in their activities. Conditions for personal action are enabled when children feel empowered to make their own decisions and choices. For example, when children receive

their bicycles and safety kits, they feel autonomous in using and managing their bicycles and develop a sense of responsibility for their maintenance. In some cases, some beneficiaries develop a higher skill and desire for fixing bicycles and end up helping their classmates. Through the bike routes to school and the different academic components and activities, a robust and visible social support network is generated, which becomes valuable for the beneficiaries. Moreover, personal well-being is enhanced when individuals connect and have strong bonds among families and friends from other schools to rely on in times of need.

On the other hand, conditions for collective action are embedded in activities that foster teamwork and social cohesion. The cycle-expeditions is a clear example, where monitors define the destinations at emblematic places to visit according to children's interests and preferences. In the past, the children participated in “Siklas Clubs”, where schools formed teams, and students had the space to co-create by designing their team's brand and chants. The initiative was discontinued as it required extensive logistics needed in other areas of the programme, as an answer for the programme's rapid expansion.

Regarding violence, conflict and (in)security, the safety and protection of children and adolescents enrolled in the programme are essential for their physical integrity and the confidence of their guardians. Pedestrians and bicycle users are the most vulnerable road actors, as they are more prone to lethal road collisions involving vehicles [56] The ACB programme has implemented a series of rules and protocols for ensuring the safety of the participants. First, at least two guides accompany each route and every 30 children at any moment of the caravan. The guides are strategically positioned, one at the front and one at the back, rotating to ensure the children are safe at all moments. Second, the pick-up logistics, where there should always be a parent/guardian/ or designated adult to pick

Fig 3. Description of ACB components in the well-being relational domain

| ACB Components | Conditions for Personal & Collective Action | Violence, Conflict & (In) Security | Networks of Support & Obligations / Relations of Love & Care |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| Operations, Safety & Allocations | <ul style="list-style-type: none"> • Autonomy and sense of responsibility • Citizen participation: former 'Siklas Club'. • Cycle-expeditions: suggestion of emblematic places to visit. | <ul style="list-style-type: none"> • Safety programmes and protocols on the road. • Emergency management centres and technical support assistance. | |
| Pedagogy | | | Networks of Support & Obligations: - Co-responsibility agreement |
| Networks of Support | | | Relations of Love & Care - 'Red Protectora' - Safety Net - Community networks & support |
| Local Management & Communications | | | Networks of Support: - Strategic partnerships for resources, funding and exposure. |

up the children, are explained to the parents before starting the routes. In cases where parents or caregivers do not meet their child, there are dedicated centres (“Centros de Fortalecimiento”) that fulfil the role of safeguarding children, guaranteeing their safety and security.

Lastly, the programme has implemented safety and risk prevention protocols to protect the children enrolled. One of the protocols is the emergency protocol, which was approved in 2018 and comprises three main pillars: 1) the promotion and prevention of child and guide safety; 2) the emergency strategy for handling injuries involving programme participants; and 3) emergency care in a life-threatening incident. Every programme guide is trained to learn the emergency protocol, protection rules, safe driving techniques, and effective guidance for the children. In addition, the guides get a Situational Crime Prevention training course to prevent the theft of children’s bicycle accessories [54]. Lastly, assistance is always provided during the routes for any technical support or road emergencies.

For the emergency protocol to work, the programme’s operation is divided into 172 action buffers that enable real-time and effective communication. The buffers are all connected to a management centre where guides can contact the District Institute of Risk Management and Climate Change (IDIGER) and the fire brigade if necessary.

5.2.2. Pedagogy

The “pedagogy” component is related to the “networks of support & obligations/relations of love & care” dimension. The connection between the state and children created in ACB and the bond among schools, families, and neighbourhoods is characterised by care and reflected in the educational environments on and off the established trusted routes. These two formal and informal relationships greatly influence the students, as they contribute to their well-being, level of satisfaction with the programme and, therefore, their permanency.

The programme involves families in their children’s responsibility and active

participation. The parents/guardians sign a co-responsibility agreement with the school, committing to pick up the children from the meeting points and take care of the bicycle loaned by the Education Secretariat once the children complete the skills workshop (Hidalgo et al., 2015). This agreement enables all parties to commit to respecting and ensuring its smooth functioning to the best of their abilities for the benefit of the children.

Through co-responsibility, the pedagogical content of the programme becomes a relational learning process, constantly nurtured and adapted based on the experiences that the guides have with the beneficiaries and their families. The lessons deepen students' connection with their environment and city, empowering children to cultivate participation and cooperation among their peers and promoting healthy and eco-friendly practices individually and collectively.

5.2.3. Networks of support

The “networks of support” component relates to the “networks of support & obligations/relations of love & care” dimension, as the community networks and support, and the relations of love and care generated through the programme, make ACB an extended trust network.

As part of the programme, the different secretariats developed the “Red Protectora” (Safe Network) initiative in 2018, consolidating the involvement of the community and families in the day-to-day programme's development [55]. Furthermore, in 2023, ACB introduced 'Family Day' to strengthen the connection of the parents/guardians with the programme. This cultural event includes families as the primary audience, who engage with ACB guides and children, participate in costume contests, and showcase their entrepreneurial ventures.

The programme itself and the cycle expeditions, as pedagogic strategy for broadening the knowledge of cycling and the city, have been vital in creating a community of young cyclist where beneficiaries can share, coexist, and develop socio-emotional ties with their peers from other districts. These networks improve coexistence among students from different educational institutions and establish a social fibre in various neighbourhoods.

5.2.4. Local Management & Communications

Lastly, the “local management & communications” component relates to the “networks of support & obligations” dimension, as strategic alliances with schools, other public sectors, and the private sector have become fundamental for the programme's operation. ACB is constantly coordinating with new schools to expand the programme while seeking new partnerships with the private sector to help acquire resources to support the growth of the operation and logistics.

These partnerships are an essential aspect of “Networks of support & obligations” since they allow the building of meaningful, long-lasting relationships that can boost the programme's support and viability.

5.3. Subjective Domain

We found intersections of the ACB components with the following three dimensions of the Subjective domain: Trust & confidence, Level of (dis) satisfaction, and Sense of meaning/Moral values. Figure 4 summarises the results for each component in response to the dimensions applied.

5.3.1. Operations, Safety & Allocations

The “operations, safety, & allocations” component is related to the “trust and confidence” dimension in the feeling of

protection, self-confidence, and adequate perception of risk.

Children feel protected and self-confident due to the social and community support built within the programme. The programme has positive perceptions of the travel conditions, where beneficiaries feel safe being accompanied by their monitors while having fun in the caravan with their peers. Moreover, the programme's operation is related to the safety perception, especially in girls, where the program helps them to win self-confidence and develop social-emotional skills with the rest of their peers.

Furthermore, through the collective bicycle workshop, the beneficiaries have developed a better perception of risk while travelling around the city, and a raised awareness of active cycling as a way of contributing to the environment.

5.3.2. Pedagogy

The "Pedagogy" component is related to the "level of (dis) satisfaction dimension. The programme has helped the beneficiaries with their daily disposition for learning while building respect, trust, and positive influences towards their guides. The satisfaction levels of the programme, reflected in joy and confidence, help the children to overcome fears and aspirations, influencing their attitudes towards riding in the city. In addition, based on their pedagogical training, students develop a genuine concern for the environment and their surroundings in general, including their peers.

5.3.2. Networks of Support

The "Networks of support" component is related to the "Sense of meaning/Moral values" dimension, as the ACB model develops a sense of purpose and consciousness in the beneficiary and the groups formed, reinforcing the children's sense of belonging and identity.

Cycling in a group and sharing common

interests develops a feeling of belonging, allowing families and children to feel comfortable, even in different contexts and realities (Hidalgo et al., 2015). Likewise, the moral values promoted by the programme support the concept of civic culture, where social values such as harmony, cohesion, and solidarity are transmitted in all the relationships formed inside and outside the routes. At the same time, the positive and close relationship with the guides reinforces the sense of meaning, as they are seen as figures that instil respect, trust and aspiration.

Lastly, the programme provides children with valuable cultural exchange experiences, allowing them to learn from their peers and discover their city. To boost the programme's growth, it is essential to understand the children's perception of the programme and consider what aspects of ACB they enjoy the most and what it means to them.

5.3.3. Local Management & Communications

The "Local management & communications" concept is related to the "Trust and confidence" dimension. The recognition that ACB has gained is reflected in its positive external perception. The increased trust in the community and the word-of-mouth recommendation have partly allowed the continuous implementation and expansion of the programme. For the families, participation in the programme translated into reducing the extra burden of care chore. On the other hand, the programme has trained citizens committed to road safety and sustainable active modes, pushing children to promote the use of bicycles throughout their lives and improving the sustainability goals.

The external perception is determined by the visible actions generated by ACB, which continuously evolve and positively impact communities and districts. Although there are many areas for improvement in the communication processes and strategies

Fig 3. Description of ACB components in the well-being subjective domain

| ACB Components | Trust & Confidence | Level of (Dis) Satisfaction | Sense of Meaning / Moral Values |
|-----------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operations, Safety & Allocations | <ul style="list-style-type: none"> • The feeling of protection and self-confidence. • Adequate perception of risk • Environmentally conscious feeling. | | |
| Pedagogy | | | |
| Networks of Support | | | <ul style="list-style-type: none"> - Civic culture: harmony, cohesion, and solidarity. - Monitors as role models. - Sense of identity and purpose - Culture learning (social norms). |
| Local Management & Communications | <ul style="list-style-type: none"> - Word-of-mouth of ACB. - Win-win initiative - Promotion of the bicycle in youth. - Contribution to the city's sustainability | | |

related to the programme, the visibility and contribution of the programme to the city's sustainability naturally reinforce its positive image.

6. Discussion

This study highlights how different components of an AMTS intervention, such as *Al Colegio en Bici*, may contribute to children and adolescent's transport well-being across its material, relational, and subjective domains. The programme has shown evidence of positive effects on children's well-being, making it an attractive mechanism to promote active mobility and public health in schools in Bogotá.

First, we found that four programme components (Allocations, operations and safety, Pedagogy, Networks of support, and Local management & communication) are related to six dimensions in the Material domain. The design process of the routes, the bicycles, and the road safety kits are part of the material assets that contribute to the beneficiaries' material well-being. This finding

aligns with Márquez et al. [55] and Rodríguez et al. [56] who have pointed at the role of cycling in enabling access via dedicated infrastructure and the use of a vehicle with relatively low entry barriers for its use as a mode of transport. ACB's design, through its use of georeferencing and route planning that considers access for children to the school routes, alongside considerations of road and personal safety, and the empirical knowledge of facilitators about the availability of infrastructure, leverage the availability of infrastructure and its use as material approaches to foster active travel [57].

In terms of access to services and amenities and the quality of the environment, the programme has built over time an interconnected network of infrastructure and localised facilities that strengthen its influence on the territory. On the one hand, routes are increasingly implemented along bicycle infrastructure and supported by bicycle maintenance services and the dedicated centres for caring for children. This increases the likelihood that children adopt the bicycle as a regular mode of transport, incentivising its

associated environmental and health benefits. However, limited coordination between ACB and Bogotá's public works agency to address specific infrastructure improvements targeting the programme's routes misses opportunities to enhance further children's cycling experiences, as suggested by Gutiérrez et al. (2019). While ACB has indirectly influenced infrastructure planning by putting improvements on the agenda, limited capacity for direct implementation limits the programme's ability to ensure long-term physical changes.

Within the "human capital/skills and abilities" dimension, we found that the collective bicycle workshops, the civic education classes and the construction of a youth cycling culture are not only instrumental in the programme's sustained operation, but they developing autonomy, empowerment and responsibility within the beneficiaries. These activities resonate with findings by Friman et al. (2020), who argue that skill-building is crucial for fostering autonomy and confidence among children. However, the rapid expansion of ACB and its reliance on public-private partnerships suggests that challenges in resource allocation may hinder the ability of the programme to sustain and scale-up on its pedagogical components, as exemplified by the rolling back of the "Centros de Interés".

Regarding the Relational well-being domain, we detected that the four components are related to the three dimensions of the framework most connected with the role of independent mobility in enhancing social connections. The children within the programme develop conditions for personal and collective actions as they grow their autonomy and a sense of responsibility as part of the daily participation in the route and the extracurricular activities of the programme. Friman et al. (2020) and Guzmán et al. (2009) note that programmes like ACB strengthen social ties, build civic culture, and increase collective action. However, ACB adds unique elements to the literature by showing how

safety measures such as trained monitors, trusted routes, and emergency management systems, enable building trust and cohesion. The literature often assumes the presence of safe environments, which ignores the structural challenges posed by urban mobility ecosystems such as Bogotá's, often overlooking valuable strategies such as the protocols and systems developed by ACB to ensure safety in challenging urban contexts. This highlights ACB's innovative approach to creating a sense of security in a city with marked transport injustices [58,59].

Furthermore, the programme's co-responsibility agreements with parents and partnerships with local stakeholders underscore the importance of multi-stakeholder collaboration, as noted by Rodríguez et al. in 2021 [56]. The programme often pairs with private sector for resources, funding and outreach. However, there is limited discussion in both academic and policy circles about how such agreements balance the roles of families and institutions in supporting active mobility, an area that ACB's model brings to light.

Finally, regarding the Subjective domain, we detected that the four components of ACB are related to three dimensions. Trust and confidence are associated with the feeling of protection and self-confidence that the logistics of the guides and routes provide, which improves users' perception of risk. The psychological benefits of cycling, such as increased self-confidence and reduced stress, as highlighted by Gutiérrez et al. in 2019 [60], are thus visible effects of ACB. ACB's emphasis on civic culture, cultural learning, and contributions to the city's sustainability also reflects broader trends in educational mobility programmes that integrate experiential learning into their pedagogies.

The pedagogical toolkit of the programme affect the level of satisfaction of the programme in the disposition for learning, motivating the children to be agents of change

in and for their environment and generating genuine concern for people. However, our study identifies a critical gap in incorporating a gender perspective into ACB's pedagogy. While the literature recognises the socially constructed nature of gender differences in cycling confidence [61,62]. ACB's current framework does not fully address these disparities. Extending the programme's educational components to include discussions on gender-based violence, human rights, and equality could enhance its inclusiveness and impact.

Additionally, co-creation with children is currently underdeveloped in ACB. While children benefit from the programme, their voices must still be central to designing and implementing routes and activities. Engaging children as active participants in shaping their mobility experiences could align ACB more closely with the principles of child-friendly urban planning [45].

ACB's impact relies on its potential to help shape urban policies that consider children by prioritising active mobility and connecting education with public space, agreeing with [63] on the importance of integrating children's perspectives into urban planning. By fostering a sense of belonging, identity, and purpose, ACB contributes to creating cities that are not only accessible but also meaningful for children.

However, as Ovalle in 2019 [53] notes, achieving a fully integrated relationship between education, the environment, and urban design requires ongoing institutional support and innovation. ACB's limited influence over infrastructure and road safety improvements highlights the need for stronger policy integration with the city's agenda. Coordinated efforts between local authorities, educational institutions, and mobility agencies are essential to address these gaps.

7. Conclusion

The "Al Colegio en Bici" (ACB) program, a decade-long initiative promoting cycling to school, has not only transformed the daily commute for thousands of children in Bogotá but also offers significant contributions to academic literature and urban policymaking, particularly for cities in the Global South. As its primary pedagogical tool, the bicycle contributes to many aspects of people and cities. Its efficient use in public spaces helps reduce environmental emissions (air pollution and noise traffic), makes cities more liveable, and increases social cohesion[64–67]. Their outdoor activity positively affects health and well-being, complementing the holistic development of children and adolescents.

By examining the material, relational, and subjective dimensions of well-being among its young participants, this paper provides empirical evidence of how a targeted active travel program can foster autonomy, social cohesion, and a stronger connection to the urban environment. This analysis moves beyond simple mobility metrics to offer a more holistic understanding of the benefits of such initiatives.

In the policy arena, the ACB program has become a spearhead in Bogotá's broader urban mobility strategy. The city's larger "Niñas y Niños Primero" (Children first) strategy signals a significant policy shift towards prioritizing the needs and experiences of young citizens in urban and transport planning. Initiatives like ACB have the potential to be replicated in other cities trying to achieve sustainable mobility through a combination of pedagogy and active travel. The actions carried out by ACB through its six components have significant effects on the material, relational and subjective dimensions of the beneficiaries' well-being. From material and relational aspects such as the process and design of trusted routes, bicycle and safety training, accessories, physical facilities, access to different parts of the city, spaces for

participation, networks of bicycle communities, and an extensive network of support from schools, families, and the State; to subjective aspects, such as the capacities and skills developed by the beneficiaries, values and learning acquired through the experience on the road, and the great satisfaction they feel when going to school in caravans while contributing to the environment.

This research constitutes a first step in exploring the contributions ACB makes to children's well-being as a health-based argument for the further promotion of AMTS interventions in cities like Bogotá. Yet, the study is limited by available information about the programme. Secondary sources carry a potential risk of biased selection of participants and selective editing, which cannot be controlled. This limits the representativeness and generalizability of the results. Another limitation was the lack of information from guardians, who are uniquely positioned to comment on children's growth with the programme. Lack of formal feedback platforms for monitors and beneficiaries limit further available longitudinal information for our analysis. These gaps require further research with primary data from children, their caregivers, and the programme staff to unpack further the programme's mechanisms and their contributions to health and well-being of children.

Future research must explore gender perspective or diversity & inclusion topics within the ACB programme. Although this type of initiative demystifies stereotypes and gender roles in promoting bicycle use among women and girls, it is vital to include inclusion, mobility, and gender issues as a cross-cutting topic among all actors involved in the programme. "If we want the pedagogical line to generate egalitarian and equitable processes, it is essential to create citizenship competencies, for instance, with a gender and women's rights approach" (Márquez, 2019, p. 22). This must be extended from the

programme level to the policy and regulation spheres, taking advantage of Bogotá's recent successes in mainstreaming the bicycle in its mobility strategies across the lifecourse.

The above opens the door for further research on ACB from an intersectional perspective. How multiple social identities (of ethnicity, gender, class, sexual orientation, disability, and/or religion) intersect and how these shape the experiences, opportunities, and challenges each child faces while participating in the programme remains an open question. Such an approach will help recognise any unintended discrimination or social inequity that requires more targeted actions.

ACB exemplifies a successful model of experiential learning through active mobility to school. Yet its scalability and adaptability to other contexts remain open questions. It is necessary to explore further how similar programmes can be implemented in different urban environments, particularly those with varying levels of infrastructure, resources, and social dynamics.

8. Bibliography

- [1] Hidalgo D, Miranda L, Llera N, Ríos J. "Al Colegio en Bici" Bogotá's bike to school program 2015.
- [2] Oviedo D, Levy C, Dávila JD. Constructing wellbeing, deconstructing urban (im)mobilities in Abuja, Nigeria. *Urban Mobilities in the Global South*, Routledge; 2017, p. 173–94. <https://doi.org/10.4324/9781315265094-10>.
- [3] Chatterji T, Garfinkel-Castro A, Ogendi JO, Basil P, Nyachieo G. Exploring barriers and perceptions to walking and cycling in Nairobi metropolitan area. 2023.
- [4] Hallal PC, Andersen LB, Bull FC, Guthold R, Haskell W, Ekelund U, et al. Global physical activity levels: surveillance progress, pitfalls, and prospects. *Lancet* 2012;380:247–57. [https://doi.org/10.1016/S0140-6736\(12\)60646-1](https://doi.org/10.1016/S0140-6736(12)60646-1).

- [5] Guthold R, Stevens GA, Riley LM, Bull FC. Global trends in insufficient physical activity among adolescents: a pooled analysis of 298 population-based surveys with 1.6 million participants. *Lancet Child Adolesc Health* 2020;4:23–35. [https://doi.org/10.1016/S2352-4642\(19\)30323-2](https://doi.org/10.1016/S2352-4642(19)30323-2).
- [6] Erikson EH. *Identity : Youth and crisis*. W. W. Norton & Company; 1968.
- [7] Christie D, Viner R. ABC of adolescence: Adolescent development. *BMJ : British Medical Journal* 2005;330:301. <https://doi.org/10.1136/BMJ.330.7486.301>.
- [8] Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. *Lancet* 2007;369: 1302–13. [https://doi.org/10.1016/S0140-6736\(07\)60368-7](https://doi.org/10.1016/S0140-6736(07)60368-7).
- [9] Friman M, Olsson LE, Waygood EOD, Mitra R. Transport and children’s wellbeing: Future directions. *Transport and Children’s Wellbeing*, Elsevier; 2020, p. 361–73. <https://doi.org/10.1016/B978-0-12-814694-1.00019-1>.
- [10] Stark J, Meschik M, Singleton PA, Schützhofer B. Active school travel, attitudes and psychological well-being of children. *Transp Res Part F Traffic Psychol Behav* 2018;56:453–65. <https://doi.org/10.1016/j.trf.2018.05.007>.
- [11] Stark J, Singleton PA, Uhlmann T. Exploring children’s school travel, psychological well-being, and travel-related attitudes: Evidence from primary and secondary school children in Vienna, Austria. *Travel Behav Soc* 2019;16: 118–30. <https://doi.org/10.1016/J.TBS.2019.05.001>.
- [12] Waygood E, Friman M, Olsson L, Taniguchi A. A111 Transport and Child Well-Being. *J Transp Health* 2015;2:S62–3. <https://doi.org/10.1016/J.JTH.2015.04.599>.
- [13] Waygood EOD, Friman M, Olsson LE, Taniguchi A. Transport and child well-being: An integrative review. *Travel Behav Soc* 2017;9:32–49. <https://doi.org/10.1016/J.TBS.2017.04.005>.
- [14] Webb Jamme HT, Bahl D, Banerjee T. Between “broken windows” and the “eyes on the street:” Walking to school in inner city San Diego. *J Environ Psychol* 2018;55: 121–38. <https://doi.org/10.1016/J.JENVP.2018.01.004>.
- [15] Westman J, Friman M, Olsson LE. Travel and child wellbeing: The psychological and cognitive domains. *Transport and Children’s Wellbeing* 2020:41–59. <https://doi.org/10.1016/B978-0-12-814694-1.00003-8>.
- [16] Larouche R, Mitra R, Waygood EOD. Transport and physical wellbeing. *Transport and Children’s Wellbeing*, Elsevier; 2020, p. 21–39. <https://doi.org/10.1016/B978-0-12-814694-1.00002-6>.
- [17] Felez-Nobrega M, Werneck AO, Bauman A, Haro JM, Koyanagi A. Active school commuting in adolescents from 28 countries across Africa, the Americas, and Asia: a temporal trends study. *International Journal of Behavioral Nutrition and Physical Activity* 2023;20. <https://doi.org/10.1186/s12966-022-01404-y>.
- [18] van Sluijs EMF, Ekelund U, Crochemore-Silva I, Guthold R, Ha A, Lubans D, et al. Physical activity behaviours in adolescence: current evidence and opportunities for intervention. *Lancet* 2021;398:429. [https://doi.org/10.1016/S0140-6736\(21\)01259-9](https://doi.org/10.1016/S0140-6736(21)01259-9).
- [19] Ding D, Ramirez Varela A, Bauman AE, Ekelund U, Lee IM, Heath G, et al. Towards better evidence-informed global action: lessons learnt from the Lancet series and recent developments in physical activity and public health. *Br J Sports Med* 2020;54:462–8. <https://doi.org/10.1136/BJSPORTS-2019-101001>.
- [20] Diener E, Lucas R, Schimmack U, Helliwell J. *Well-Being for Public Policy*. Oxford University Press; 2009. <https://doi.org/10.1093/ACPROF:OSO/9780195334074.001.0001>.

- [21] UN General Assembly. Transforming our world : the 2030 Agenda for Sustainable Development. 2015.
- [22] White SC. Analysing wellbeing: A framework for development practice. *Dev Pract* 2010;20: 158–72.
<https://doi.org/10.1080/09614520903564199>.
- [23] Rigon A. An analysis of well-being in urban Nigeria. *Dev Pract* 2018;28: 195–207.
<https://doi.org/10.1080/09614524.2018.1421618>.
- [24] Oviedo D, Sabogal O. Unpacking the connections between transport and well-being in socially disadvantaged communities: Structural equations approach to low-income neighbourhoods in Nigeria. *J Transp Health* 2020;19.
<https://doi.org/10.1016/j.jth.2020.100966>.
- [25] Guzman LA, Arellana J, Oviedo D, Castaño Herrera D, Sarmiento OL. Lifting urban mobility for the poor: Cable-cars, travel satisfaction and subjective well-being. *Transp Res D Transp Environ* 2023;119: 103765.
<https://doi.org/10.1016/J.TRD.2023.103765>.
- [26] Sagaris L, Costa-Roldan I, Rimbaud A, Jennings G. Walking, The invisible transport mode? Research on Walking and Walkability today REPORT FOR THE VOLVO RESEARCH AND EDUCATION FOUNDATION, JANUARY 2022. 2022.
- [27] Salvo D, Jáuregui A, Adlakha D, Sarmiento OL, Reis RS. When Moving Is the Only Option: The Role of Necessity Versus Choice for Understanding and Promoting Physical Activity in Low-and Middle-Income Countries. *Annu Rev Public Health* 2023;44: 151–69.
<https://doi.org/10.1146/annurev-publhealth>.
- [28] Martin G, Graat M, Medeiros A, Clark AF, Button BLG, Ferguson KN, et al. Perceived neighbourhood safety moderates the relationship between active school travel and health-related quality of life. *Health Place* 2021;70.
<https://doi.org/10.1016/j.healthplace.2021.102623>.
- [29] Ramanathan S, O'Brien C, Faulkner G, Stone M. Happiness in motion: Emotions, well-being, and active school travel. *Journal of School Health* 2014;84:516–23.
<https://doi.org/10.1111/JOSH.12172>;CTYPE:STRING:JOURNAL.
- [30] Faulkner GEJ, Richichi V, Buliung RN, Fusco C, Moola F. What's quickest and easiest Parental decision making about school trip mode. *International Journal of Behavioral Nutrition and Physical Activity* 2010;7.
<https://doi.org/10.1186/1479-5868-7-62>.
- [31] Larouche R, Mitra R, Waygood EOD. Transport and physical wellbeing. *Transport and Children's Wellbeing*, Elsevier; 2020, p. 21–39.
<https://doi.org/10.1016/B978-0-12-814694-1.0002-6>.
- [32] Chillón P, Martínez-Gómez D, Ortega FB, Pérez-López IJ, Díaz LE, Veses AM, et al. Six-year trend in active commuting to school in Spanish adolescents: The AVENA and AFINOS studies. *Int J Behav Med* 2013;20:529–37.
<https://doi.org/10.1007/s12529-012-9267-9>.
- [33] Chillón P, Ortega FB, Ruiz JR, Evenson KR, Labayen I, Martínez-Vizcaino V, et al. Bicycling to school is associated with improvements in physical fitness over a 6-year follow-up period in Swedish children. *Prev Med (Baltim)* 2012;55: 108–12.
<https://doi.org/10.1016/J.YPMED.2012.05.019>.
- [34] World Health Organization. WHO | Physical activity. World Health Organization; 2016.
- [35] Pabayo R, Gauvin L, Barnett TA. Longitudinal changes in active transportation to school in Canadian youth aged 6 through 16 years. *Pediatrics* 2011;128.
<https://doi.org/10.1542/PEDS.2010-1612>
- [36] Corder K, Sharp SJ, Atkin AJ, Griffin SJ, Jones AP, Ekelund U, et al. Change in objectively measured physical activity during the transition to adolescence. *Br J Sports Med* 2015;49:730–6.
<https://doi.org/10.1136/bjsports-2013-093190>

- [38] Motl RW, Birnbaum AS, Kubik MY, Dishman RK. Naturally occurring changes in physical activity are inversely related to depressive symptoms during early adolescence. *Psychosom Med* 2004;66:336–42.
<https://doi.org/10.1097/01.PSY.0000126205.35683.0A>.
- [39] Ströhle A. Physical activity, exercise, depression and anxiety disorders. *J Neural Transm* 2009;116:777–84.
<https://doi.org/10.1007/S00702-008-0092-X/METRICS>.
- [40] Cooper AR, Page AS, Foster LJ, Qahwaji D. Commuting to school: Are children who walk more physically active? *Am J Prev Med* 2003;25:273–6.
[https://doi.org/10.1016/S0749-3797\(03\)00205-8](https://doi.org/10.1016/S0749-3797(03)00205-8).
- [41] Aliyas Z, Lak A, Cloutier MS. Emotional perceptions and barriers to Children’s active school travel in low and high socio-economic neighbourhoods in Iran. *J Transp Health* 2022;26.
<https://doi.org/10.1016/j.jth.2022.101483>.
- [42] Stark J, Meschik M, Singleton PA, Schützhofer B. Active school travel, attitudes and psychological well-being of children. *Transp Res Part F Traffic Psychol Behav* 2018;56:453–65.
<https://doi.org/10.1016/j.trf.2018.05.007>.
- [43] Lambiase MJ, Barry HM, Roemmich JN. Effect of a Simulated Active Commute to School on Cardiovascular Stress Reactivity. *Med Sci Sports Exerc* 2010;42: 1609.
<https://doi.org/10.1249/MSS.0B013E3181DOC77B>.
- [44] Aliyas Z, Lak A, Cloutier MS. Emotional perceptions and barriers to Children’s active school travel in low and high socio-economic neighbourhoods in Iran. *J Transp Health* 2022;26.
<https://doi.org/10.1016/j.jth.2022.101483>.
- [45] Martin G, Graat M, Medeiros A, Clark AF, Button BLG, Ferguson KN, et al. Perceived neighbourhood safety moderates the relationship between active school travel and health-related quality of life. *Health Place* 2021;70.
<https://doi.org/10.1016/j.healthplace.2021.102623>.
- [46] Bogotá n.d.
<https://www.caf.com/es/areas-de-accion/observatorio-de-movilidad-urbana/ciudades/bogota/> (accessed June 20, 2025).
- [47] Hidalgo D, Gutiérrez L. BRT and BHLS around the world: Explosive growth, large positive impacts and many issues outstanding. *Research in Transportation Economics* 2013;39:8–13.
<https://doi.org/10.1016/J.RETREC.2012.05.018>.
- [48] Rodríguez-Valencia A, Rosas-Satizabal D, Unda R, Barrero GA. Avances y retos para el caso de Bogotá. Bogotá: Ediciones Uniandes; 2022.
- [49] Política Pública de la Bicicleta para el Distrito Capital | Secretaría Distrital de Planeación n.d.
<https://www.sdp.gov.co/gestion-socioeconomica/politicas-sectoriales/politicas-publicas-sectoriales/politica-publica-de-la-bicicleta-distrito-capital> (accessed June 20, 2025).
- [50] Rodríguez-Valencia A, Rosas-Satizabal D, Unda R, Barrero GA. Avances y retos para el caso de Bogotá. Bogotá: Ediciones Uniandes; 2022.
- [51] White SC. Analysing wellbeing: A framework for development practice. *Dev Pract* 2010;20: 158–72.
<https://doi.org/10.1080/09614520903564199>.
- [52] Oviedo D, Sabogal O. Unpacking the connections between transport and well-being in socially disadvantaged communities: Structural equations approach to low-income neighbourhoods in Nigeria. *J Transp Health* 2020;19.
<https://doi.org/10.1016/j.jth.2020.100966>.

- [53] Bici CE, Localidad De Kennedy Edward Fabian Ovalle Clavijo Universidad Distrital Francisco Jose De Caldas Facultad De Ciencias Y Educación E LA. POR UNA CIUDAD AL ALCANCE DE LOS NIÑOS: SISTEMATIZACIÓN DE "AL. 2019.
- [54] Hidalgo D, Miranda L, Llera N, Ríos J. "Al Colegio en Bici" Bogota's bike to school program 2015.
- [55] Camilo J, Márquez Ospina F, De Movilidad P, Secretaria De Educación E, Producto D. Recomendaciones de mejora para la modalidad Al Colegio en Bici. Bogotá: 2019.
- [56] Rosas-Satizábal D, Rodríguez-Valencia A. Factors and policies explaining the emergence of the bicycle commuter in Bogotá. *Case Stud Transp Policy* 2019;7: 138–49. <https://doi.org/10.1016/j.cstp.2018.12.007>.
- [57] Webb Jamme HT, Bahl D, Banerjee T. Between "broken windows" and the "eyes on the street:" Walking to school in inner city San Diego. *J Environ Psychol* 2018;55: 121–38. <https://doi.org/10.1016/J.JENVP.2018.01.004>.
- [58] Attard M, Guzman LA, Oviedo D. Urban space distribution: The case for a more equitable mobility system. *Case Stud Transp Policy* 2023;14: 101096. <https://doi.org/10.1016/J.CSTP.2023.101096>.
- [59] Guzman LA, Oviedo D, Arellana J, Cantillo-García V. Buying a car and the street: Transport justice and urban space distribution. *Transp Res D Transp Environ* 2021;95: 102860. <https://doi.org/10.1016/J.TRD.2021.102860>.
- [60] Gutiérrez M, Hurtubia R, Ortúzar J de D. The role of habit and the built environment in the willingness to commute by bicycle. *Travel Behav Soc* 2020;20:62–73. <https://doi.org/10.1016/j.tbs.2020.02.007>.
- [61] Moscoso M, Ome L, Rincón M, Aguirre K, Felipe Sánchez C, Lleras N, et al. Género y movilidad activa: Acciones para no dejar a nadie atrás en Colombia. 2021.
- [62] Harkot MK, Lemos LL, Santoro PF. Can a Safe Cycling City be an Inclusive Cycling City? Findings on Gendered Cycling from São Paulo, Brazil. *Cycling Societies* 2021: 119–36. <https://doi.org/10.4324/9780429321092-10>.
- [63] Friman M, Olsson LE, Waygood EOD, Mitra R. Transport and children's wellbeing: Future directions. *Transport and Children's Wellbeing*, Elsevier; 2020, p. 361–73. <https://doi.org/10.1016/B978-0-12-814694-1.00019-1>.
- [64] Castillo H, Pitfield DE. ELASTIC – A methodological framework for identifying and selecting sustainable transport indicators. *Transp Res D Transp Environ* 2010;15: 179–88. <https://doi.org/10.1016/J.TRD.2009.09.002>.
- [65] Montero S. Worlding Bogotá's Ciclovía: From Urban Experiment to International "Best Practice." *Lat Am Perspect* 2017. <https://doi.org/10.1177/0094582X16668310>.
- [66] Sarmiento O, Torres A, Jacoby E, Pratt M, Schmid TL, Stierling G. The Ciclovía-Recreativa: A Mass-Recreational Program With Public Health Potential. *J Phys Act Health* 2010;7: 163–80.
- [67] Teunissen T, Sarmiento O, Zuidgeest M, Brussel M. Mapping Equality in Access: The Case of Bogotá's Sustainable Transportation Initiatives. *Int J Sustain Transp* 2015;9:457–67. <https://doi.org/10.1080/15568318.2013.808388>.

Appendix A. Bicycle public policies from 2005 until 2023

| Name | Type of policy | Description | Year |
|--------------------------------------|----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| The 2005 Mobility Master Plan | Public policy | Legal document and planning tool designed to set general guidelines for the city's goal of achieving sustainable and safe mobility | 2005 |
| 'Plan Bici' | Public policy | It focuses on all the fundamental requirements a bike rider must meet to be a road actor. | 2016 |
| Law 1811 | Law | Proposes to encourage bicycle use as the primary mode of transport throughout the national territory, increase the number of bicycle trips, advance the mitigation of the environmental impact produced by automobile traffic, and improve urban mobility. | 2016 |
| The Road Safety Policy - Zero Vision | Public policy | Prevent and reduce the road fatality rate to zero, seeking to protect the lives of the most vulnerable people, including children. | 2016 |
| The Public Cycling Policy | Public policy | Seeks to lay the general and future foundations for promoting cycling in the city over the next 18 years (until 2039). | 2021 |
| Bicycle Commission | Legislation | Installed in the Congress of the Republic seeking to advance public policies that will foster the development of sustainable mobility in the nation. | 2023 |

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