

RELISE

LACK OF GREEN AREAS AND CHILDREN'S SCREEN TIME IN URBAN PERIPHERIES: SOCIO-ENVIRONMENTAL CHALLENGES IN LIGHT OF THE SDG[1]

CARÊNCIA DE ÁREAS VERDES E TEMPO DE TELA INFANTIL NAS PERIFERIAS URBANAS: DESAFIOS SOCIOAMBIENTAIS À LUZ DOS ODS

Maria Miryam da Silva Alves[2] *Paulo Roberto Ramos*[3]

ABSTRACT

The advance of urbanization in recent decades has brought profound transformations to the social and environmental dynamics of Brazilian cities. Among its most noticeable effects is growing socio-spatial inequality, expressed in the concentration of infrastructure and services in central areas, while the outskirts remain lacking in public facilities and green spaces. This lack directly impacts opportunities for leisure, socialization, and contact with nature, particularly impacting urban children. At the same time, the intensive use of digital technologies has transformed the ways we play, learn, and interact. Children from different social backgrounds spend increasingly more time in front of screens, a phenomenon that, although it has educational and cultural dimensions, takes on the contours of a public health problem when it replaces physical activities, outdoor play, and social interactions. The COVID-19 pandemic has intensified this trend, increasing the time spent on electronic devices and further reducing access to public spaces. The combination of a lack of green infrastructure and increased screen time reflects not only behavioral changes but also structural inequalities that limit children's right to the city and nature. In this context, the Sustainable Development Goals (SDG), especially SDG 3 (Good Health and Well-being), 10 (Reduced Inequalities), and 11 (Sustainable Cities and Communities), offer a political and ethical framework for devising integrated solutions that reconcile urban planning, education, and public health. Therefore, this article presents an integrative literature review on the relationship between the lack of green spaces and increased screen time among children in peripheral urban contexts, considering the SDGs. Twenty-four studies published between

[1] Received on 01/11/2025. Accepted on 25/11/2025. DOI: doi.org/10.5281/zenodo.23863782
[2] Universidade Federal do vale do São Francisco. marymirya@gmail.com
[3] Universidade Federal do vale do São Francisco. paulo.ramos@univasf.edu.br



2018 and 2024 in the SciELO, PubMed and Web of Science databases were analyzed. The results demonstrate an association between reduced green infrastructure and sedentary behaviors, mediated by socioeconomic factors, urban security, and unequal access to technology. It is concluded that intersectoral and integrated public policies, involving urban planning, environmental education and health promotion, are essential to foster healthier and more equitable lifestyles, especially in Brazilian urban peripheries.

Keywords: green infrastructure, mobile phone, urbanism, childhood, inequality.

RESUMO

O avanço da urbanização nas últimas décadas vem provocando transformações profundas nas dinâmicas sociais e ambientais das cidades brasileiras. Entre seus efeitos mais perceptíveis está a crescente desigualdade socioespacial, expressa na concentração de infraestrutura e serviços nas áreas centrais, enquanto as periferias permanecem carentes de equipamentos públicos e de espaços verdes. Essa carência repercute diretamente nas oportunidades de lazer, socialização e contato com a natureza, impactando especialmente as infâncias urbanas. Paralelamente, o uso intensivo de tecnologias digitais tem transformado as formas de brincar, aprender e interagir. Crianças de diferentes contextos sociais passam cada vez mais tempo diante de telas, fenômeno que, embora possua dimensões educacionais e culturais, adquire contornos de problema de saúde pública quando substitui atividades físicas, brincadeiras ao ar livre e experiências de convivência social. A pandemia de COVID-19 intensificou essa tendência, ampliando o tempo de exposição a dispositivos eletrônicos e reduzindo ainda mais o acesso a espaços públicos. A combinação entre carência de infraestrutura verde e aumento do tempo de tela reflete não apenas mudanças comportamentais, mas também desigualdades estruturais que limitam o direito das crianças à cidade e à natureza. Nesse contexto, os Objetivos de Desenvolvimento Sustentável (ODS), especialmente os ODS 3 (Saúde e Bem-Estar), 10 (Redução das Desigualdades) e 11 (Cidades e Comunidades Sustentáveis), oferecem um marco político e ético para pensar soluções integradas que conciliam urbanismo, educação e saúde pública. Diante disso, este artigo apresenta uma revisão integrativa da literatura sobre a relação entre a carência de áreas verdes e o aumento do tempo de tela infantil em contextos periféricos urbanos, à luz dos ODS. Foram analisados 24 estudos publicados entre 2018 e 2024 nas bases SciELO, PubMed e Web of Science. Os resultados evidenciam uma associação entre a redução de infraestrutura verde e comportamentos sedentários, mediada por fatores socioeconômicos, segurança urbana e acesso desigual à tecnologia. Conclui-se que políticas públicas intersetoriais e integradas, envolvendo planejamento urbano, educação



ambiental e promoção da saúde, são essenciais para fomentar estilos de vida mais saudáveis e equitativos, especialmente nas periferias urbanas brasileiras.

Palavras-chave: infraestrutura verde, celular, urbanismo, infância, desigualdade.

INTRODUCTION

The rapid urban expansion in recent decades has brought about significant transformations in the social and environmental dynamics of Brazilian cities. Among its most evident effects is the increase in socio-spatial inequality, characterized by the concentration of infrastructure and services in central areas, while urban peripheries continue to lack public facilities and green spaces. This absence of green infrastructure directly affects the population's quality of life, reducing opportunities for leisure, community interaction, and contact with nature. At the same time, the spread of digital technologies has profoundly changed everyday practices, including those of childhood. The intensive use of electronic devices (cell phones, tablets, televisions) has transformed the ways children play, learn, and interact, creating new challenges for health, education, and child development.

During and after the COVID-19 pandemic, screen exposure time increased significantly among children and adolescents due to social isolation and the digitalization of school and recreational activities. This scenario heightened concerns among researchers, educators, and healthcare professionals regarding the physical, emotional, and social impacts of excessive screen use. Furthermore, children's screen time is influenced by socio-spatial determinants. In peripheral regions, the scarcity of green spaces and safe recreational areas makes the home environment and digital devices the main entertainment alternatives, creating a complex relationship between urban inequality, digital behavior, and child well-being.



Despite growing academic interest in the subject, there is a scarcity of systematized reviews that simultaneously address urban, technological, and socio-environmental dimensions, especially in the context of Brazilian urban peripheries. This study seeks to fill this gap by integrating recent evidence on green infrastructure, children's screen time, and socio-spatial inequality in light of the Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities).

This study aims to analyze, through an integrative literature review, how the lack of green infrastructure in Brazilian urban peripheries relates to increased screen time among children, discussing its socio-environmental and educational implications in light of the SDGs.

GREEN INFRASTRUCTURE AND URBAN SUSTAINABILITY

Green infrastructure has been recognized as a structuring element for urban sustainability by connecting natural ecosystems and the built environment to generate environmental, social, and economic benefits. According to Ximenes et al. (2020), contemporary urban life requires the redefinition of public spaces and green areas, integrating them into a model of a "safe, inclusive city with quality of life," capable of promoting socio-environmental resilience in the face of health and climate crises. The authors explain that green infrastructure constitutes a network of interconnected natural and semi-natural spaces that provide ecosystem services essential to urban survival, such as thermal regulation, drainage, improved air quality, and the promotion of human well-being (Ximenes et al., 2020). From this perspective, the city comes to be understood as a living system whose sustainability depends on the integration of its physical structures with natural cycles.



The study "Infraestrutura verde: conceitos, tipologias e terminologia no Brasil" reinforces this understanding by defining green infrastructure as an interconnected set of ecological elements, parks, ecological corridors, squares, gardens, and permeable areas that operate systemically to mitigate environmental impacts and improve urban environmental quality (Carvalho; Amorim, 2019). The article emphasizes that such infrastructure should be planned as permanent public policies rather than isolated interventions, ensuring a balance between environmental conservation and urban development.

Additionally, "Infraestrutura verde: conceitos e aplicações" proposes that urban sustainability depends on an integrated approach to environmental management and territorial planning, so that green infrastructure is incorporated as an instrument of urban organization and resilience (Fernandes; Souza, 2020). This integration contributes to reducing the effects of extreme events, promoting sustainable water management, and ensuring a more harmonious relationship between inhabitants and the environment.

The benefits of green areas also extend to the social dimension. According to Oliveira and colleagues (2023), sustainability involves "social justice, quality of life, and environmental balance," requiring participatory actions that raise awareness among the population about the care and responsible use of natural resources. The authors emphasize that children understand and practice caring behaviors, becoming agents of environmental education and spreading sustainable behaviors within their communities. The relationship between the natural environment and child development is emphasized by several contemporary studies. Silva et al. (2023) demonstrate that playing in nature enhances children's cognitive, motor, emotional, and social development, as direct contact with natural elements increases curiosity, creativity, and a sense of belonging. Similarly, "A natureza do brincar: experiências do brincar a partir de elementos naturais" argues that contact with the environment stimulates



autonomy, imagination, and meaningful learning, strengthening children's bonds with natural and social spaces (Pereira et al., 2022). This interaction is also recognized for the importance of play in child development, demonstrating how playfulness and contact with green environments favor learning, sociability, and emotional balance, functioning as essential pedagogical instruments for comprehensive development (Lima; Ferreira, 2021). Likewise, the article "Child psychology: the importance of play in child development" states that playing in natural environments contributes to healthy psychological development by stimulating empathy, self-control, and respect for the environment (Costa et al., 2022).

These perspectives reinforce that sustainable urban planning must consider nature as a space for human development. Daily contact with green areas awakens a sense of environmental responsibility from childhood and broadens understanding of the balance between human beings and the environment (Oliveira et al., 2023). In this sense, green infrastructure is not limited to ecological preservation but assumes an educational and social role, integrating sustainability into urban and school practices. Therefore, investing in green infrastructure means promoting fairer and more resilient cities, where environmental conservation, social equity, and collective well-being are interconnected within a shared vision of the future. By integrating nature, planning, and environmental education, cities become spaces for sustainable coexistence and the development of an ecological culture, where the right to the city coincides with the right to nature.

SCREEN TIME AND CHILD DEVELOPMENT

The advancement of digital technologies has transformed children's daily lives, reorganizing practices of play, learning, and socialization. Recent literature indicates that early and prolonged exposure to screens can affect multiple



aspects of child development, sleep, eating habits, social interaction, school performance, and physical health, creating a set of risks that deserve integrated attention from families, schools, and healthcare services (Barreto et al., 2023). Studies analyzing the scope of the phenomenon reinforce that, although digital devices can be used as educational tools, uncontrolled use tends to replace motor activities and face-to-face interaction, compromising psychomotor development and socio-emotional skills during childhood. In national samples and reviews, this tension between educational potential and the risks of excessive use is highlighted by several authors (Santana et al., 2021).

The psychological dimension of the problem has also been documented: reviews of the pandemic period indicate increased screen time among children and adolescents and an association between this increase and heightened signs of anxiety and reduced emotional well-being, resulting in explicit recommendations for parental mediation and psychoeducational interventions to promote healthy screen use (Oliveira et al., 2022).

At the epidemiological and public health levels, surveys conducted among Brazilian school populations identified a high prevalence of excessive screen time, associated with indicators of overweight, physical inactivity, and sleep disorders. This evidence reinforces the need for preventive measures in school environments and initiatives promoting physical activity and adequate sleep (Souza et al., 2022). Beyond physical and emotional effects, there are indications that "digitalized childhood" reshapes experiences of socialization and imagination: the frequent replacement of face-to-face play with screen-mediated experiences may reduce opportunities for creative development, empathy, and social learning (Silva et al., 2021).

Given this body of evidence, screen time should be treated as a critical technological dimension of child development: when pedagogically mediated and supervised, it can provide benefits; when excessive and unregulated, it



represents a risk to children's physical health, emotional balance, and social development. Therefore, the integration of parental guidance, school practices that encourage face-to-face activities, and public policies promoting child health is recommended. Together, these measures contribute to technology use that supports, rather than compromises, children's comprehensive development.

SDGs AND SOCIO-SPATIAL INEQUALITY

Socio-spatial inequality constitutes one of the main expressions of the contradictions inherent in the Brazilian urbanization process, historically reproduced through territorial segregation and the unequal distribution of infrastructure, services, and public facilities. Bernardini and Carmo (2021) emphasize that, in urban peripheries, the implementation and maintenance of public leisure spaces are frequently neglected, revealing the contrast between higher- and lower-income areas. In Campinas (SP), the authors demonstrate that while high-income regions concentrate recreational areas with better landscape quality and infrastructure, peripheral areas have more accessible spaces that are nevertheless poorly equipped and undervalued. These differences represent a materialization of social inequalities within urban territory. Vasconcelos and Góes (2021) reinforce this perception by analyzing the Rio Verde Ecological Park (GO), observing that the commodification of public spaces has reinforced social exclusion. Although public, the park predominantly benefits residents of higher-income neighborhoods while imposing physical and symbolic barriers on residents of lower-income areas, reproducing processes of segregation and socio-spatial fragmentation. This dynamic reflects the contradictory nature of urban policies that, under the discourse of sustainability, prioritize real estate interests and urban land appreciation.

Socio-spatial inequality is also related to how the right to the city is exercised. Hirsch and Silveira (2024) argue that public squares in peripheral



areas, when degraded or inaccessible, deny the population the full exercise of this right. According to the authors, access to public spaces is essential for building fair and inclusive cities, with squares serving as fundamental places for social interaction, leisure, and citizenship. However, the lack of these facilities in peripheral areas reveals the absence of public policies that promote territorial equity and democratic participation in urban planning. Along the same lines, Bernardini and Carmo (2021) and Hirsch and Silveira (2024) agree that the Brazilian urbanization model results from historically structured processes of exclusion, in which public authorities frequently act unequally in providing infrastructure and services. This territorial inequality is a direct obstacle to achieving the Sustainable Development Goals (SDGs), particularly SDG 11 – Sustainable Cities and Communities, which seeks to make cities more inclusive, safe, resilient, and sustainable (Fraga; Alves, 2021).

The 2030 Agenda for Sustainable Development, approved by the United Nations in 2015, proposes an articulation between economic, social, and environmental dimensions, aiming to reduce inequalities and promote more equitable development. According to Castro and Cruz (2018), the 2030 Agenda should be understood as an instrument for consolidating human rights and transforming social and economic relations. The authors state that sustainable development is a right of an instrumental nature, that is, a means of guaranteeing other fundamental rights, and requires state engagement in implementing policies that ensure social and territorial inclusion.

The effectiveness of these policies, however, depends on monitoring and governance mechanisms. Fraga and Alves (2021) point out that Brazil still faces difficulties in implementing indicators related to SDG 11 due to the absence of consolidated data and the lack of coordination among different levels of government. This scenario reinforces the need for integrated and sustainable public policies focusing on housing, mobility, and social inclusion.



These discussions are connected to reflections on the role of green areas and public spaces in urban quality of life. The study by Fernandes and colleagues (2020) demonstrates that the unequal distribution of green areas is directly related to the socioeconomic characteristics of neighborhoods, reinforcing environmental and social inequalities. Similarly, Oliveira and Santos (2020) demonstrate that socio-spatial inequalities affect perceptions of the human dimension of the city, influencing individuals' sense of belonging and their relationship with urban space.

In the Brazilian context, implementing the 2030 Agenda also involves integrating environmental and social policies. Rodrigues (2021) observes that municipalities play a central role in environmental health initiatives aimed at achieving SDG 3, demonstrating that sustainable development requires intersectoral coordination. Likewise, Barbosa and Lima (2020) emphasize that reducing social inequality, the central objective of SDG 10, requires structural public policies that address the causes of exclusion and vulnerability.

Carvalho's (2020) work proposes a critical reflection on the relationship between society and nature in the context of the 2030 Agenda, emphasizing that urban sustainability will only be achieved when there is a change in the rationale guiding development. This implies transitioning from an urban model centered on profit and the commodification of space to one oriented toward equity, social participation, and environmental justice.

In summary, the literature analyzed demonstrates that socio-spatial inequality is a cross-cutting obstacle to achieving the SDGs. Overcoming it requires strengthening public policies for territorial inclusion, democratizing urban planning, and ensuring the effective appropriation of public spaces as collective assets. The 2030 Agenda provides a global framework for this process, but its realization depends on local capacity to transform cities into territories of equity and citizenship.



Despite growing academic interest in the subject, there is a scarcity of systematized reviews that simultaneously address urban issues, children's digital behavior, and the SDGs, especially in the context of Brazilian urban peripheries.

METHODOLOGY

The research was characterized as an integrative literature review, a methodology chosen because it enables the integration of empirical and theoretical studies from different fields, such as education, urban planning, health, and the environment, and promotes interdisciplinary dialogue between urban inequalities, screen time, and sustainability.

The searches covered the years 2018 to 2024 in the Scientific Electronic Library Online (SciELO), PubMed/MEDLINE, and Google Scholar databases, with the latter used as a complementary source for studies not indexed in the previous databases. The search process was conducted in Portuguese, English, and Spanish, using combinations of controlled and uncontrolled descriptors related to green infrastructure, screen time, and childhood. An example of a search string used was: ("infraestrutura verde" OR "green space" OR "green area" OR "áreas verdes") AND ("tempo de tela" OR "screen time" OR "uso de telas" OR "digital device") AND (child OR criança OR infant), with adjustments according to the Boolean operators of each database. The searches took place between July 10 and 20, 2025. After removing duplicates, 467 records were identified, of which 282 articles were screened by title and abstract. Of these, 84 were assessed in full text, resulting in the final inclusion of 24 studies that met the eligibility criteria.

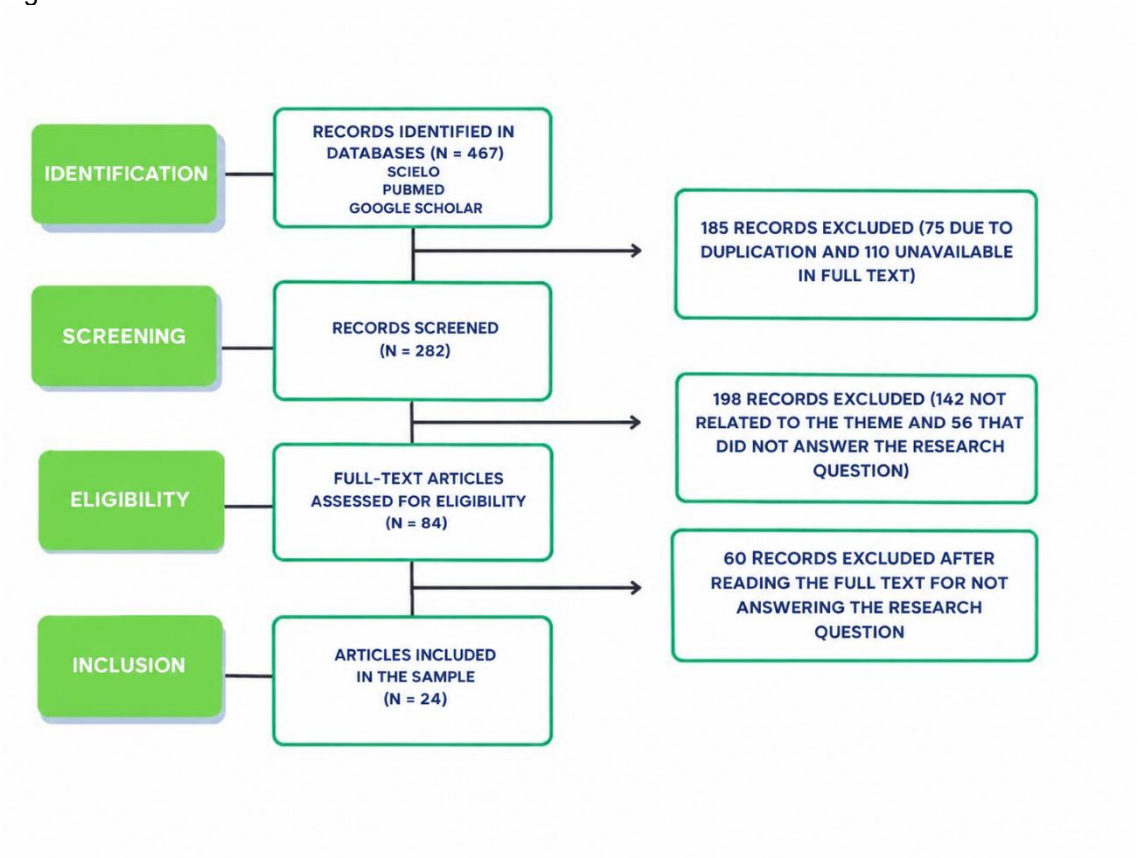
To illustrate the stages of the selection process, a PRISMA flowchart was developed, following recommendations from the scientific literature (Figure 1).

The review included empirical studies or reviews addressing the relationship between green infrastructure, screen time, and childhood, conducted

in urban or peri-urban contexts, particularly those focusing on peripheral areas or socio-spatial inequalities. Only publications available in full in Portuguese, English, or Spanish and published between 2018 and 2024 were considered. Strictly technological or biomedical studies without a socio-environmental connection, duplicate studies or those without full-text access, as well as articles that did not contain empirical data or discussions relevant to the topic, were excluded.

The selected studies were organized into a Metadata Chart (Chart 1), and data analysis followed a thematic-analytical approach, making it possible to identify convergences, gaps, and mediating relationships among urban, behavioral, and environmental factors.

Figure 1 – PRISMA Flowchart





RESULTS

The integrative review resulted in the selection of 24 studies investigating the interrelationships between green infrastructure, screen time in childhood, socio-spatial inequalities, and the Sustainable Development Goals (SDGs). These studies were organized into three analytical axes—environmental, technological, and sociopolitical—which reflect the main theoretical dimensions of the field under study. This structure seeks to highlight how urban planning, digital behavior, and territorial justice are interconnected in the construction of more equitable, sustainable urban environments that promote child development.

Axis 1 – Green infrastructure and urban sustainability

The studies analyzed (Franco, 2020; Bernardini & Carmo, 2021; Hirsch & Silveira, 2024) recognize green infrastructure as a strategic component of sustainable cities. It encompasses vegetated areas, parks, squares, gardens, and ecological corridors that contribute to climate regulation, drainage, biodiversity, and urban health. However, the spatial distribution of these areas is unequal, with a concentration in central neighborhoods and a shortage in urban peripheries (Vasconcelos and Góes, 2021). This inequality compromises the right to nature and environmental equity, directly affecting children's quality of life. In peripheral regions, the absence of squares, tree-lined sidewalks, and recreational facilities makes outdoor play a rare and unsafe experience.

The results suggest that green infrastructure acts as an environmental determinant of child health, promoting physical and emotional well-being. Empirical studies demonstrate that the presence of green areas is associated with reduced anxiety symptoms, increased physical activity, and improved cognitive performance in children (Silva et al., 2020; Barreto et al., 2023).



However, the literature also points to methodological gaps: few studies quantify the relationship between vegetation density (NDVI indices, tree cover) and indicators of digital behavior. This limitation reinforces the need to standardize "green infrastructure" metrics for more robust comparisons.

Axis 2 – Screen time and child development

The second axis highlights the role of screen time as a behavioral and social marker of contemporary childhood. The studies analyzed (Silva et al., 2020; Costa et al., 2022; Lima et al., 2022; Barreto et al., 2023) indicate that excessive use of electronic devices is correlated with sedentary behavior, motor delays, concentration difficulties, and increased anxiety. The studies suggest that the lack of safe green and public spaces is one of the main factors associated with increased screen time among children. In peripheral urban contexts, insecurity, heavy traffic, and the scarcity of public squares limit outdoor play, leading families to adopt digital devices as substitutes for leisure activities. Thus, screen time should not be interpreted solely as an individual choice but as a structural response to the lack of socio-environmental alternatives. It should be emphasized that not all screen uses have the same effects. Few studies differentiate between passive exposure (television, videos) and interactive or educational use (applications, video calls, collaborative games), a gap that needs to be addressed by future research.

The literature also indicates relevant mediating factors, such as parental education level, family income, gender, public safety, and digital access. These elements influence both the duration and type of screen use.

It is important to emphasize that the available evidence is predominantly correlational, making it impossible to infer direct causality. Thus, the most appropriate formulation is that the absence of green infrastructure is associated with increased screen time, mediated by socioeconomic and technological



conditions. Longitudinal and quasi-experimental studies are recommended to test causal hypotheses with greater rigor.

Axis 3 – SDGs and socio-spatial inequality

The third axis connects the environmental and technological dimensions to issues of equity and urban governance. The socio-spatial inequalities identified (Bernardini and Carmo, 2021; Hirsch and Silveira, 2024; Vasconcelos and Góes, 2021) reflect the historical pattern of Brazilian urbanization, in which peripheral areas accumulate deficits in infrastructure, services, and leisure opportunities.

The evidence shows that the absence of green and safe spaces amplifies social exclusion, especially during childhood. Unequal access to quality environments compromises not only health but also the development of children's civic and ecological awareness. In this context, the Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities), constitute a guiding framework for integrated policies on urban planning, education, and health.

Integrative synthesis of the results

Overall, the results converge toward the understanding that the scarcity of green infrastructure in urban peripheries is associated with increased screen time and reduced opportunities for playful and social experiences during childhood. This combination generates a cycle of vulnerability that affects child well-being, public health, and urban sustainability.

On the other hand, studies integrating environmental planning, education, and public policies demonstrate transformative potential. Experiences involving urban revitalization, the creation of school parks and community gardens, and "play in nature" programs reveal positive effects on children's



behavior, sociability, and learning. Thus, the integration of environmental sustainability, social equity, and childhood constitutes not only an ethical necessity but also a strategy for sustainable urban development, consistent with the principles of the 2030 Agenda.

Chart 1 – Synthesis of the Main Findings by Thematic Category

Thematic Category	Main Authors/Year	Main Findings and Contributions
Green Infrastructure and Urban Sustainability	Ximenes, Maglio e Franco (2020); Fernandes e Souza (2020)	Analyzes how public green spaces served as support for well-being, mental health, and social cohesion during/after the pandemic; identifies design strategies to increase resilience.
	Carvalho e Amorim (2019)	Conceptual review of green infrastructure; proposes interdisciplinary integration and terminological standardization for public policies.
	Santos e Mendes (2021)	Green infrastructure as a central element of sustainable urban planning and climate mitigation; provides technical support for master plans.
	Oliveira, Garcia e Barros (2023); Silva, Ramos e Serpa (2023); Pereira, Almeida e Souza (2022)	Playing in nature promotes motor, social, and cognitive development; children express emotional bonds with the environment; suggests expanding outdoor activities and educational parks.
	Lima e Ferreira (2021); Costa, Soares e Medeiros (2022)	Play is essential for overall development; recommends incorporating playful practices into curricula and teacher training.
Screen Time and Child Development	Barreto et al. (2023); Santana, Ruas e Queiroz (2021)	Excessive screen exposure negatively affects sleep, attention, and social interaction; suggests parental mediation and limits on use.
	Oliveira, Santos e Fernandes (2022); Silva, Lima e Costa (2020)	Reviews indicate an association between screen time and symptoms of anxiety, attention deficit, and obesity; recommends screening and guidance in schools.
	Souza, Nascimento e Silveira (2022)	High levels of screen time among students; associated factors: income, gender, and access to devices; provides a basis for health campaigns and school-based interventions.

continues



Chart 1 – Synthesis of the Main Findings by Thematic Category - continuation

Thematic Category	Main Authors/Year	Main Findings and Contributions
SDGs and Socio-spatial Inequality	Bernardini e Carmo (2021); Fernandes e Melo (2020)	Inequality in the provision and maintenance of green areas; correlation with socioeconomic indicators; proposes criteria for territorial equity.
	Vasconcelos e Góes (2021); Hirsch e Silveira (2024)	Parks and squares as spaces for social interaction and urban contestation; advocates policies for the protection and social use of public spaces.
	Fraga e Alves (2021)	Analysis of SDG 11 indicators; identifies data gaps and proposes improvements in urban monitoring and governance.
	Castro e Cruz (2018); Barbosa e Lima (2020); Carvalho (2020)	Critical reviews of the 2030 Agenda in Brazil; identify institutional shortcomings and the need for integration among levels of government.
	Rodrigues (2021)	Environmental health as a municipal responsibility for SDG 3; recommends intersectoral actions and the development of local indicators.
	Oliveira e Santos (2020)	Desigualdades urbanas afetam percepção de pertencimento e qualidade de vida; sugere inclusão de indicadores perceptivos nas políticas públicas.

Source: Prepared by the author (2025).

The integrative synthesis shows that the studies converge on the importance of green infrastructure and experiences with nature as elements that promote well-being, learning, and child development. In contrast, research on screen time highlights the negative effects of excessive exposure to digital devices, reinforcing the need for family mediation and educational policies that prioritize a balance between digital activities and outdoor experiences. Regarding the Sustainable Development Goals, emphasis is placed on socio-spatial inequality and the urgent need for public policies aimed at urban equity, indicator monitoring, and social participation.

CONCLUSION

The integrative literature review made it possible to understand that the lack of green infrastructure in Brazilian urban peripheries constitutes a structural



factor in the socio-environmental inequalities affecting childhood. The 24 studies analyzed indicate that the absence of safe and vegetated public spaces is associated with increased screen time, reduced opportunities for free play, and impaired comprehensive child development.

The results demonstrate that this relationship is not merely causal but is mediated by socioeconomic, technological, and cultural conditions. Although most studies indicate a positive correlation between the presence of green areas and reduced screen time, few consider variables related to urban safety and income inequality. Public insecurity, precarious urban conditions, and unequal digital access emerge as factors that shape children's behavior, influencing both screen exposure and opportunities for contact with nature. Thus, understanding screen time as a socio-spatial rather than merely individual phenomenon is essential for guiding effective public policies.

From an analytical perspective, the study advances by integrating three interdependent dimensions: the environmental dimension, which highlights the importance of green infrastructure as an ecological and educational determinant; the technological dimension, which relates screen use to urban living conditions and digital culture; and the sociopolitical dimension, which connects inequality, the right to the city, and the Sustainable Development Goals. This interdisciplinary approach provides a solid conceptual foundation for public interventions aimed at promoting healthy childhood and more equitable cities. The study demonstrates that the absence of green areas in urban peripheries indirectly contributes to increased screen time among children, reproducing socio-environmental and educational inequalities.

Based on the evidence reviewed, it is recommended that municipalities and public administrators implement integrated actions that connect urban planning, education, and health, as described below: expansion and improvement of urban green areas, incorporation of indicators such as the tree



canopy coverage index by neighborhood and the proportion of public squares with safe and accessible infrastructure for children, prioritization of the revitalization of public spaces in peripheral areas, with adequate lighting, safety, and maintenance; environmental education and outdoor schooling, integration of play in nature into early childhood and elementary school curricula, with a minimum of one outdoor activity per week per class, encouragement of interdisciplinary educational projects connecting sustainability, citizenship, and physical well-being, support for teacher training in urban environmental education and green pedagogy; promotion of digital health and media literacy, development of educational campaigns on healthy screen time, guided by the recommendations of the WHO (2022) and the Brazilian Society of Pediatrics, implementation of community media literacy programs aimed at raising family awareness about the responsible use of technology, encouragement of research on the content, type, and context of screen use, considering its educational and social dimensions, creation of municipal observatories on childhood and urban sustainability, and ensuring community participation in the design and evaluation of policies, guaranteeing social legitimacy and transparency. These measures are directly aligned with SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 10 (Reduced Inequalities), and SDG 11 (Sustainable Cities and Communities), and represent concrete pathways toward realizing the right to a sustainable city and a healthy childhood.

Despite the robustness of the literature reviewed, relevant gaps remain that deserve attention in future studies, as most leisure and environmental education policies do not prioritize children living in peripheral areas, and few cities monitor screen time as a public health variable. The integration of environmental education, green planning, and digital inclusion emerges as a promising pathway for reducing inequalities and strengthening the right to a sustainable city.



The gaps identified included the lack of methodological standardization in the definitions of "screen time" and "green infrastructure," the predominance of cross-sectional studies, with limited longitudinal or experimental evidence, the scarcity of research considering age, gender, and digital content differences, and the lack of evaluations of public policies and urban interventions aimed at children.

It is recommended that future investigations adopt mixed-methods models (quantitative and qualitative), incorporating spatial measurements (NDVI, accessibility maps), control of sociodemographic variables, and impact assessments of environmental and digital programs.

This study is based on secondary data from the scientific literature, reflecting the methodological and contextual limitations of the studies reviewed. All materials used are publicly available and did not involve direct data collection from human participants, which is why submission to the Research Ethics Committee was not applicable. It is also acknowledged that the predominance of qualitative and correlational studies limits direct causal inferences. Thus, the conclusions should be interpreted as an analytical synthesis of trends rather than deterministic proof.

It is concluded that reconnecting childhood with nature is an indispensable condition for the sustainable future of cities. Green infrastructure must be understood as a socio-environmental right and an instrument of territorial justice, capable of promoting health, equity, and belonging. Addressing the increase in children's screen time requires structural actions that go beyond behavioral campaigns and address the material conditions of everyday urban life. Cities that guarantee universal access to safe green spaces promote not only leisure but also education, citizenship, and intergenerational sustainability.

In summary, the study reinforces that childhood is the mirror of the city: where trees are lacking, opportunities to grow, play, and dream are also lacking.



Reversing this logic is the greatest challenge, so that the principles of the 2030 Agenda can be translated into tangible and transformative public policies.



REFERENCES

BARBOSA, A. F.; LIMA, M. R. A redução da desigualdade social no Brasil com base na Agenda 2030 da ONU. *Revista Humanidades e Inovação*, Palmas, v. 7, n. 16, p. 228–242, 2020.

BARRETO, M. de J.; AZEVEDO, R. S.; ALENCAR, C.; LIMA, A. A. C. Os impactos do tempo de tela no desenvolvimento infantil. *Revista Saúde UNIFAN*, Feira de Santana, v. 3, n. 1, p. 58–66, 2023.

BERNARDINI, S. P.; CARMO, C. G. C. do. A qualidade dos espaços públicos de lazer na urbanização contemporânea: o caso das periferias do município de Campinas. *Ambiente Construído*, Porto Alegre, v. 21, n. 2, p. 243–262, abr./jun. 2021. DOI: 10.1590/s1678-86212021000200524.

CARVALHO, C. C.; AMORIM, M. C. C. Infraestrutura verde: conceitos, tipologias e terminologia no Brasil. *Revista Nacional de Gerenciamento de Cidades*, v. 7, n. 45, p. 1–17, 2019.

CARVALHO, M. S. Desenvolvimento sustentável e Agenda 2030: reflexões sobre a relação sociedade e natureza. *Revista Brasileira de Educação Ambiental (RevBEA)*, São Paulo, v. 15, n. 6, p. 113–130, 2020. DOI: 10.34024/revbea.2020.v15.11091.

CASTRO, M. F. de; CRUZ, M. A. R. da. A Agenda 2030 para o desenvolvimento sustentável da ONU e o caso brasileiro. *Direitos Fundamentais & Justiça*, Belo Horizonte, ano 12, n. 38, p. 165–193, jan./jun. 2018.

COSTA, F. R.; SOARES, M. L.; MEDEIROS, R. A. Psicologia infantil: a importância do brincar no desenvolvimento da criança. *Revista Multidisciplinar em Educação e Meio Ambiente*, v. 4, n. 2, p. 89–102, 2022.

FERNANDES, J. P.; SOUZA, L. H. Infraestrutura verde: conceitos e aplicações. *Revista de Estudos Urbanos e Regionais*, v. 12, n. 3, p. 56–70, 2020.

FERNANDES, R. L. A.; MELO, F. C. Áreas verdes e desigualdade socioespacial. *Revista Brasileira de Gestão Urbana (Brazilian Journal of Urban Management)*, Curitiba, v. 12, e20200215, 2020. DOI: 10.1590/2175-3369.012.e20200215.

FRAGA, A. A. C.; ALVES, J. L. Conjuntura dos indicadores dos Objetivos de Desenvolvimento Sustentável em relação ao ODS 11 – Cidades e Comunidades



Sustentáveis. *Brazilian Journal of Development*, Curitiba, v. 7, n. 12, p. 114371–114383, dez. 2021. DOI: 10.34117/bjdv7n12-289.

HIRSCH, T. B.; SILVEIRA, R. L. L. Direito à cidade e a função das praças públicas na periferia urbana: um estudo de caso na cidade de Santa Cruz do Sul-RS-Brasil. *Ágora (St. Cruz Sul, Online)*, Santa Cruz do Sul, v. 26, n. 2, p. 170–194, jul./dez. 2024. DOI: 10.17058/agora.v26i2.19635.

LIMA, G. F.; FERREIRA, R. S. A importância do brincar para o desenvolvimento da criança. *Revista Educação e Prática Docente*, v. 3, n. 1, p. 45–58, 2021.

OLIVEIRA, D. F. A.; GARCIA, F. L. F.; BARROS, H. C. L. Relação infância e natureza: a percepção de crianças acerca do meio ambiente e cuidado ambiental. *Revista Brasileira de Educação Ambiental (RevBEA)*, São Paulo, v. 18, n. 5, p. 314–324, 2023.

OLIVEIRA, L. M.; SANTOS, A. P. Desigualdades socioespaciais urbanas: impactos nas percepções da dimensão humana da cidade. *Revista Cidades*, Presidente Prudente, v. 17, n. 2, p. 65–84, 2020. DOI: 10.36409/cidades.v17i2.888.

OLIVEIRA, L. A. M.; SANTOS, C. R.; FERNANDES, P. M. Os fatores associados à relação entre tempo de tela e aumento de ansiedade em crianças e adolescentes durante a pandemia de COVID-19: uma revisão integrativa. *Revista Brasileira de Enfermagem Pediátrica*, Recife, v. 4, n. 1, p. 112–124, 2022.

PEREIRA, S. T.; ALMEIDA, D. R.; SOUZA, E. C. A natureza do brincar: experiências do brincar a partir de elementos naturais. *Revista Interdisciplinar de Educação Ambiental*, v. 9, n. 2, p. 33–49, 2022.

RODRIGUES, R. A. Competência municipal em ações de saúde ambiental para cumprimento do ODS 3 da Agenda 2030 da ONU. *Revista Brasileira de Políticas Públicas e Internacionais*, João Pessoa, v. 6, n. 2, p. 17–36, 2021. DOI: 10.22478/ufpb.2525-5584.2021v6n2.59289.

SANTANA, M. I.; RUAS, M. A.; QUEIROZ, P. H. B. O impacto do tempo de tela no crescimento e desenvolvimento infantil. *Revista Saúde em Foco*, São Paulo, n. 14, p. 169–179, 2021.

SANTOS, É. P.; MENDES, J. C. Infraestrutura verde: uma estratégia para o planejamento urbano sustentável. *Revista Nacional de Gerenciamento de*



Cidades, Tupã, v. 9, n. 70, p. 154–170, 2021. DOI: 10.17271/2318847297020213101.

SILVA, A. P.; LIMA, F. R.; COSTA, J. A. Consequências do tempo de tela na vida de crianças e adolescentes. *Revista Saúde e Desenvolvimento Humano*, São Paulo, v. 9, n. 2, p. 45–58, 2020.

SILVA, É. P.; RAMOS, K.; SERPA, P. R. O brincar na natureza para o desenvolvimento da criança. In: *Educação e meio ambiente: possibilidades e desafios em pesquisa*. v. 2. São Paulo: Editora Científica, 2023.

SOUZA, F. L.; NASCIMENTO, Í. A.; SILVEIRA, M. R. Prevalence of excessive screen time and associated factors in a school from a city in the northeast of Brazil. *Brazilian Journal of Health Review*, Curitiba, v. 5, n. 2, p. 4898–4912, mar./abr. 2022.

VASCONCELOS, H. A.; GÓES, E. M. O parque público e a cidade: entre a desigualdade socioespacial e a mercantilização. In: *Congresso Luso-Brasileiro para o Planejamento Urbano, Regional, Integrado e Sustentável (PLURIS 2021 Digital)*, 9., 2021, [s.l.]. Anais [...]. 2021.

XIMENES, D. S. S.; MAGLIO, I. C.; FRANCO, M. A. R. A infraestrutura verde nos espaços públicos como elemento de resiliência socioambiental pós-pandemia. *Labor & Engenho*, Campinas, v. 14, p. 1–16, 2020.