Urban Planning (ISSN: 2183–7635)
2022, Volume 7, Issue 4, Pages 510–522
https://doi.org/10.17645/up.v7i4.5776

Article

Seeing Streetscapes as Social Infrastructure: A Paradigmatic Case Study of Hornsbergs Strand, Stockholm

Jing Jing

Department of Urban Planning and Environment, KTH Royal Institute of Technology, Sweden; jjing@kth.se

Submitted: 9 May 2022 | Accepted: 26 October 2022 | Published: 22 December 2022

Abstract
Urban streets are an integral part of the public realm. Streets are commonly planned following normative design principles focused on the connectivity of road networks and urban morphology. Beyond their function as mobility infrastructure, streetscapes' aesthetic, social, and cultural qualities also have an important impact on the experience of the overall urban environment and human well-being. This study explores how urban design and planning can facilitate the design, management, and use of streetscapes that consider their role as social infrastructure. A paradigmatic case study of Hornsbergs Strand in the City of Stockholm is performed, incorporating spatial and temporal aspects. The case study area is chosen because it is both an attractive and "overcrowded" public space frequently discussed in the Swedish media. Data sources for the study include reviews of public documents such as Stockholm's city planning strategies, local media reports, a report from a resident workgroup, as well as walk-through observations and semi-structured expert interviews. The results highlight the potential of urban design strategies to develop streetscapes as social infrastructure through both permanent design measures and temporary design interventions. The tendency of the change in people's perception and attitude toward the place over time illustrates that design interventions are a continual process. The implications for public policy, urban development and investment in social infrastructure employing place strategies and design interventions are discussed.

Keywords
physical activities; place value; public space; social interaction; streetscape; Sweden; temporal design intervention; well-being

Issue
This article is part of the issue "Localizing Social Infrastructures: Welfare, Equity, and Community" edited by Ebba Högström (Blekinge Institute of Technology), Lina Berglund-Snodgrass (Swedish University of Agricultural Sciences), and Maria Fjellfeldt (Dalarna University).

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1. Introduction

Urban streets are an integral component of neighbourhoods where people spend time every day (Dover & Massengale, 2013; Mehta, 2013). As cities continue to evolve, the design of streets also changes to blend in social ideas to better address broader social issues such as personal well-being, social cohesion, and mobility justice (Hanson, 2000; Jacobs, 1961; Prytherch, 2021; Tonkiss, 2014). The Covid-19 pandemic has accelerated ongoing urban trends including re-designing streets for improved walkability, bikeability, and ultimately social and health outcomes (Honey-Rosés, et al., 2020; Mehta, 2020). Building wider, safer, and better-connected bike lanes and sidewalks are prevailing strategies taken in many cities, such as Milan (Salmoirago, 2020), Paris (Dragonetti, 2020), Boston (City of Boston, 2021), and many more. Urban densification, remote-working lifestyle, and smart mobility are major trends in current urban development strategies worldwide, which can lead to less access to public spaces for collective civic life. Therefore, there is a broad need to better understand the theoretical and practical account of such developmental trends' impact on urban streets and specifically on the potential of streetscapes to deliver greater social and health values beyond the transport function.

There is a growing body of urban design and planning studies that recognise the social and health values of streets (Carmona, 2019; Jacobs, 2020; Mehta, 2013; Whyte, 1980), citing their economic, cultural, and environmental values (Barry et al., 2002; Smith et al., 2017; Tiwari, et al., 2011; UN-Habitat, 2013). The social and health values delivered through civic life in the streets are often interlinked. For example, regularly walking in local neighbourhoods offers people opportunities to see and meet neighbours and acquaintances and build social connections, meanwhile, the walking exercise keeps people physically active and provides mental comfort (Roe & Aspinall, 2011; Tschentscher et al., 2013). A common but more subtle quality of these values that can be provided by streets is the opportunity for social interactions, both in the passive form (e.g., seeing and being seen in public spaces) and/or in the active form (e.g., meeting people, having conversations, participating in activities). Considering these values, it is possible to reconceptualise streets as part of "social infrastructure" (Klinenberg, 2018). Latham and Layton (2019) elaborate that "an infrastructure approach to public life" helps to highlight the materiality of public spaces and their affordances for socialising and connections. More importantly, social infrastructure is a tangible concept that stresses the processes behind making places, including policy, investment, design, management, maintenance, and more, which facilitate shared use and collective experience (Latham & Layton, 2019).

The present study employs a paradigmatic case study (Pavlich, 2010) to investigate the linkage between urban design and planning and the quality of social infrastructure to build social capital. The streetscapes of Hornsbergs Strand (HBS), the main street in a popular inner-city neighbourhood in the City of Stockholm, are studied. Stockholm is known as one of the fastest-growing capital regions in Europe undergoing densification (Bastian & Börjesson, 2018). The street studied is situated between public and private realms at the waterfront within a new housing development scheme, making the context of the study interesting and emblematic of other urban development seen globally. The overall aim of the study is to improve the understanding of how urban design plays a role in enabling streetscapes to perform as social infrastructure and directly impact the levels of social interactions and overall well-being. The study explores key questions such as (a) what physical design components contribute to the quality of the streetscapes, (b) what aspects of urban design affect the management of the streetscapes, and (c) how different social groups (local and non-local residents) use and experience the streetscapes. Using mixed methods, including literature review (Hart, 2018), walk-through observations (Mehta, 2019), and expert interviews (Bogner et al., 2009), the study focuses on how changes in design, management, and use of the streetscapes, both spatial and temporal, can contribute to the social and health values of streetscapes as well as the quality of overall neighbourhood environment.

2. Theoretical Framework: The Conceptual Connection Between Social Infrastructure, Social Capital, Streetscapes, and Their Urban Design Components

2.1. Social Infrastructure, Social Capital, and Streetscapes

As sociologist Eric Klinenberg (2015, 2018) articulates, social infrastructure is closely connected to, but distinct from, the concept of social capital (Putnam, 2000, p. 19), which refers to "connections among individuals—social networks and the norms of reciprocity and trustworthiness that arise from them." Klinenberg (2018) draws from the concept of social capital, but further emphasises that social infrastructure is what conditions social capital to grow. This view is essentially in line with Putnam's (1993, 2000) stand on social capital as a geographic concept, where the relationships of people are shaped by the places in which they live. Hence, it can be said that both social infrastructure and social capital share an environmental approach to social relationships. Latham and Layton (2019) discuss that the idea of social infrastructure builds upon extensive work on infrastructure across social sciences, in part what can be imagined as infrastructure. Stressing the structure and system, which is required for a society to function socially, economically, culturally, and politically, social infrastructure can be best understood as a useful concept that emphasises places that are open to the public and facilitate activities to build connections between people. Furthermore, people who facilitate the processes are also part of the social infrastructure (Latham & Layton, 2019; Prytherch, 2021; Simone, 2004). The development of bonding social capital and bridging social capital (Putnam, 2000) is believed to be positively associated with society's prosperity and community well-being (Kawachi et al., 2008; Spokane et al., 2007) and negatively associated with urban melancholy such as loneliness and social isolation (Coll-Planas et al., 2017; Nyqvist et al., 2016). Bonding social capital is often characterised by "within," "get-by," "strong ties," and more negative results (e.g., exclusion) whereas bridging social capital is associated with "between," "get-ahead," "weak ties," and more positive outcomes (Claridge, 2018). Both forms of social capital are needed in various contexts. Access to social resources to support individuals and groups to uplift their experienced social-economic or health-related hardships lies at the core of all forms of social capital. Social infrastructure impacts the potential growth of social capital and is thus consequential for human well-being.

Examples of social infrastructure are not limited to libraries, parks, sidewalks, gyms, local groceries, and community places. In fact, traditional infrastructure such as bridges, streets, and tunnels can well be social

infrastructure if they were designed, managed, and used to facilitate activities that are social in nature. The core of social infrastructure is whether an environment affords the qualities for social interactions. Klinenberg (2016) has reported that neighbourhood sidewalks matter as much as residential density, commercial activity, and other well-maintained public spaces to social interactions, perceived social support, and even chance of survival. He found that neighbourhoods with depleted social infrastructure suffered the highest mortality rate during the Chicago heat wave in 1995 (Klinenberg, 2016). The New York metro system is another example Klinenberg (2018) discusses as one of the largest social infrastructures in which different people encounter each other in public space and learn to work out their differences and collective life together. Latham and Layton (2019) argue that social infrastructure is multi-layered, complex, and taken for granted using the example of libraries. The social infrastructure consists of properties such as existing in established networks and relationships, being durable over time, requiring learning, embodying standards, becoming visible upon breakdown, and being able to be changed incrementally (Latham & Layton, 2019). Understanding and acknowledging these properties is crucial for making social infrastructure function. This is certainly also the case for sidewalks and metro systems.

This study on streetscapes builds upon current knowledge by capturing how urban design can help contribute to developing the concept of social infrastructure. Streetscape (street + -scape) is known as the view of a street and the work of art depicting the view of a street (Streetscape, n.d.). In this sense, the term streetscape emphasises the design both in terms of the physical components and the processes that shape the street. The Victoria Transport Policy Institute (2018) refers to "streetscape" as the design and conditions of roadways that impact street users and residents contributing to the shaping of a community's aesthetic quality, identity, economic activity, health, and social cohesion. In that definition, streetscapes emphasise the landscaping and design efforts of the streets, recognising that streets are more than urban structures used for transport. Streetscapes essentially afford public spaces where people meet and interact with each other and, in turn, many benefits may derive from the use of public spaces. For this reason, it is necessary to understand what aspects of urban design enable streetscapes to deliver those affordances.

2.2. Urban Design Components That Condition the Quality of Streetscapes

Urban design is a collaborative and multidisciplinary process that shapes the physical environmental setting for activities and behaviours. It has multiple dimensions, such as morphological, visual, social, temporal, and perceptual (Carmona, 2021; Ewing & Handy, 2009). Urban design theories and practices not only address each of these dimensions but also the interactions between them. It involves meeting the different interests of various stakeholders who participate in the processes of making environments and places. At an aggregate level, it can be said that urban design considers the relationships between design, management, and use of an environment. Applying environmental psychology theories, urban design literature recognises that many factors within an environmental setting may affect people's perceptions, attitudes, preferences, and decisions to use an environment.

Taking public space studies as an example, physical characteristics that are known as important for the users of public space encompass accessibility, connectivity, diversity (land use, activities, and people), safety, and permeability (Gehl, 2013; Mehta, 2013; Pafka & Dovey, 2017; Townshend & Madanipour, 2008). Streets designed with lower traffic flow and speed limit, good walking paths, the presence of nature, seating furniture, shops, and public open space are found to support higher levels of social interactions and a sense of community (Francis et al., 2012; Mehta, 2019). De Vries et al. (2013) report that the physical and visual experience of the streetscape greenery influences the physical activities in public spaces and further affects stress, mental well-being, and perceived overall health. Amin (2013) and Jacobs (1961) emphasise that shared use of spaces builds pragmatic interactions and practical relationships between people, which in turn forms the basis of a sense of trust that is fundamental to social capital. Mehta (2009) extensively discusses the importance of the sense of enclosure of streets for street users. He stresses that "the proportion of the height of buildings, walls, trees, and other vertical edge elements to the street space is critical in creating a sense of enclosure" (Mehta, 2009, p. 41), according to some scholars (e.g., Alexander et al., 1977; Cullen, 2013), whereas others (e.g., Gehl, 2013; Whyte, 1980) suggest ground floor frontage and activities in the streets are more influential. Based on three case studies in the metropolitan area of Boston, Mehta (2009) has further examined detailed physical, land-use, and management characteristics of neighbourhood main streets that support social interactions. These characteristics include seating (fixed or removable), the width of sidewalks, articulated building facades at street level, tree cover, canopies, awnings and overhangs, street furniture, stores with good permeability, personalised street frontage, and community gathering places that allow neighbours, friends, and strangers to meet and connect. Mehta (2009) stresses that the seating close to businesses, especially food stores, not only makes people stay longer in the streets but is also an important characteristic for generating liveliness of the street.

3. Methods

3.1. Study Area

The present study examines the street section between the intersection of Mariedalsvägen and HBS and the first

section of the east side of the street of Kristinebergs Strand (marked in yellow in Figure 1). The street of HBS is a part of the 9-km-long waterfront walking passage of the island of Kungsholmen, which is a part of the Kungsholmen district of Stockholm City. This choice considers that the street studied has been part of the 53,001-unit New Hornsberg programme since 2007 (Holst & Pemer, 2014). The housing scheme is also known as a part of the urban expansion programme Northwest Kungsholmen 2002 (Holst & Pemer, 2014). Although only low-rise residential complexes were originally proposed, high-rises have been built in reality and the density of the area has consequently increased.

The New Hornsberg area is considered a popular inner-city neighbourhood primarily for its location and networks of public spaces (Hemnet, 2020). The area is built on the waterfront and a part of the core urban area, which can be reached by multiple public transportation modes, including subway, bus, and ferry (only during the summer season). A city park, Hornsbergs Strandspark, is at the centre of the site, adding to the network of local parks and playgrounds. Other amenities within walking distance are connected to the street studied, such as a tennis hall, sports fields, a large supermarket, several coffee shops, restaurants, barbershops, beauty salons, pharmacies, gyms, etc. Furthermore, the area is one of the most popular outdoor public bath areas in the inner-city area (Sessler, 2021). This is an advantageous environmental characteristic for the context of the study because the public bath is suggested to be the prime site for observing social interactions, social cohesion, and conflict (Wiltse, 2007). Overall, the physical and social contexts of the study area satisfy the research strategy of scrutinising a paradigmatic case study (Pavlich, 2010), placing a case alongside a phenomenon and charting the elements of the case to elucidate the phenomenon to which it belongs.

3.2. Data Collection

The data collection is comprised of a literature review (Hart, 2018), walk-through observations (Mehta, 2009), and two semi-structured expert interviews (Bogner et al., 2009). They were performed iteratively from April to September 2021. The choice of public documents for review considers both top-down planning and bottom-up perspectives. The top-down planning documents reviewed consist of the area development literature by the city planning office (Holst & Pemer, 2014), the guideline document of the city's parks and natural areas by the Stockholm City Management Office (City Manager's Office, 2017), the programme design and management of Living Stockholm (Traffic Office, 2017, 2021), the landscape design of the summer street HBS by

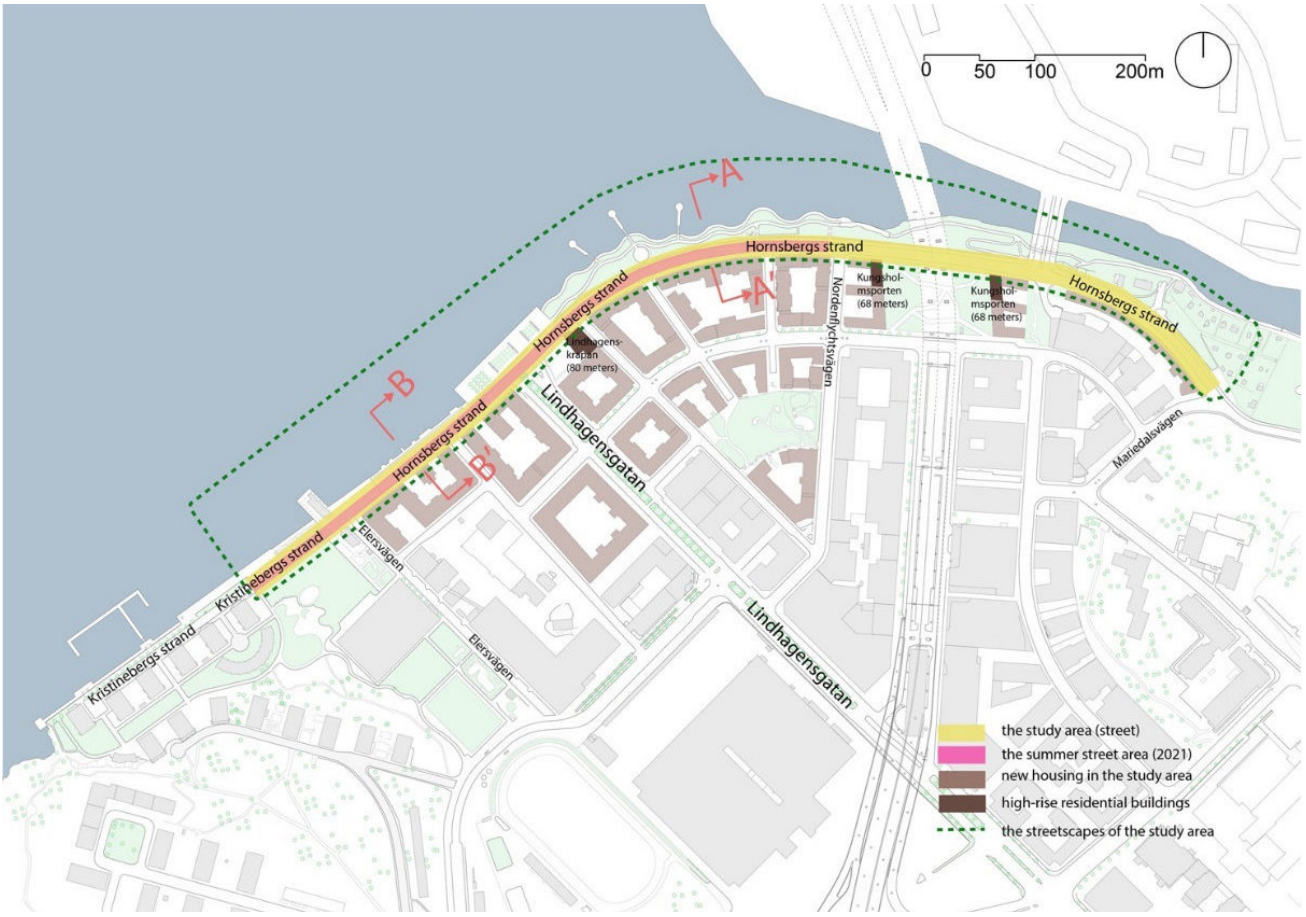

Figure 1. The case study area: HBS, Stockholm. Source: Author's and Gaudy Orejuela's work.

the architecture office, as well as Stockholm City's urban development strategies—Vision 2040 (City of Stockholm, 2020), Stockholm's Comprehensive Plan 1999 (City Planning Office, 2000), the City Traffic Administration's Urban Mobility Strategy (Firth, 2012), and its complementing document Strategies for Public Space (Traffic Office, 2018). Bottom-up "voices" includes the reports about the Hornsberg neighbourhood in the local newspaper and Swedish media (e.g., Brandt, 2021; Jonsson, 2019; Sessler, 2021), and the survey from the local community (Samverkansgruppen, 2021). These legitimate documents are considered important as they represent how the case study is situated at the local and city level.

Inspired by ethnographic studies, the walk-through observations were conducted in a participating/street user manner (Mehta, 2009; Spradley, 2016), aiming to empirically record the physical environments, social activities, and behaviours that take place in the study street. A series of 25 unstructured walk-through observations were made at a slow pace during May–September. Stops are made in each street section for about three to five minutes and each walk took about 20–45 minutes. In total, five walks were taken between 10:00 and 12:30, fourteen during 14:30–18:30, and six from 20:00 to 22:00. Photographs and field notes were used during the walks to capture the locations, physical environments (i.e., street frontage, the width of the sidewalk, traffic flow and speed, seating, street trees and other street furniture, etc.) and the activities and behaviours taken place at the site.

Two semi-structured expert interviews were conducted in person and followed up via email. Interview 1 was with the project manager of the Living Stockholm Programme on July 6th, 2021, and Interview 2 was done the following day and with the architect who was part of the design team for the summer street HBS/Living Stockholm. The interviews are qualitative, complementary to other data sources, and considered as "crystallisation points" to understand "the practical insider knowledge" (Bogner et al., 2009) on the design, management, and use of the case study. The interviews aim to gain insight into the overall vision of the design interventions of the HBS streetscapes and the roles and responsibilities of different stakeholders. Interviewee 1 (project manager) was asked specific questions concerning the criteria for choosing locations for implementing summer streets and the conditions of the street HBS. Interviewee 2 (architect) was asked about design challenges, feedback, and for whom the summer street was designed. Each interview was about 60–90 minutes long, and recorded and transcribed. Both interviewees provided the documents mentioned in the interviews through follow-up email communications.

3.3. Analysis

As the research focuses on the design, management and use of the streetscapes, reflexive thematic analysis was performed on the collected empirical data (Braun & Clarke, 2019). First, by incorporating the characteristics of environments that are known to benefit the users of public spaces (see Section 2), five themes are initially generated: (a) frontage and ground floor, (b) street, (c) landscape (vegetation and urban furniture), (d) programming, and (e) user experience. Next, different data sources were triangulated and synthesised (Guion et al., 2011) such that consistency and inconsistency across different data sources were fully engaged, acknowledged, and reflected to derive the themes. As a result, the initially generated themes are confirmed, corresponding to the research questions. The first three themes address the physical design of the streetscapes; the fourth communicates project management aspects of both top-down planning and bottom-up initiatives; the fifth incorporates local and non-local residents' perspectives. Each thematic analysis reflects both permanent and temporary design measures.

4. Results

4.1. Frontage and Ground Floor

The eight housing blocks within the streetscapes of the study area were developed after the 2000s. They use a unified modern Scandinavian style, reflecting the so-called "rock city" (*stenstaden* in Swedish) style that prevails in nearby inner-city districts such as Norrmalm and Östermalm (Holst & Pemer, 2014). The residential buildings along the street studied are six to eight stories high and have balconies facing the street and waterside, except for the two high-rises: the rental family housing Lindhagenskrapan (80 m) and the rental housing Kungsholmsporten (68 m).

According to the New Hornsberg programme, there are 350,000 m^2 planned commercial premises on the ground floor (street level) for the use of businesses and services (e.g., cafés & restaurants, stores, gyms, and other services). They are mostly located along the street section west of the high-rise apartment Kungsholmsporten. Kungsholmsporten and the residential building east of it do not have ground-floor commercial spaces. The ground floor spaces within the residential buildings west of Lindhagensgatan Street are 6 m high, making a two-floor space possible for the businesses compared to average one-floor (3.3 m high) ground-floor spaces in the residential buildings that are located east of Lindhagensgatan Street. This means that the ground-floor spaces located west of Lindhagensgatan are physically conditioned to accommodate a higher intensity of use, at least they can allow a two-floor business space to be built within the given space. Furthermore, the frontage of the ground-floor spaces is made of glass windows and doors, resulting in good permeability. As observed, currently, 14 out of 22 businesses on the ground floor in the study area, between street sections HBS–Nordenflychtsvägen and HBS–Elersvägen are

restaurants (most of which are franchises). Each ground-floor space has a personalised storefront, which together form a diverse collection of businesses along the street.

The relatively high density of restaurants and cafés on the ground floor and their proximity to HBS street create an attractive atmosphere for residents and visitors. "The street is close to water, parks and restaurants, and easily accessible by public transportation…the vibes here make the visit to HBS during summer almost feel like being abroad," said Interviewee 1 (project manager). She explained that the pre-existing environmental conditions were desirable for locating the summer street programme. Interviewee 2 (architect) shared that there were multiple rounds of design adjustment concerning the ground floor since the businesses there may change from time to time and the design of the summer street needs to respond accordingly.

4.2. Street

The street section examined in the study is approximately 1,000 m long, 16–18 m wide, with an east–west orientation on flat terrain. The street is at the interface between the built (residence) and natural (water) environment, connecting to a variety of public spaces within the neighbourhood. An 8-m-wide bi-directional vehicle lane with a speed limit of 40 km/h is designed permanently. On the north side of the vehicle lane towards the water, there are a 3.4-m-wide bi-directional bike lane and a 2.5-m-wide sidewalk (up to Lindhagensgatan). On the south side of the vehicle lane, close to the residential, the sidewalk is 4 m wide. The eastern part of HBS street (up to Lindhagansgatan) has no sidewalk along the waterside. Instead, a waterfront park is connected to the north side of HBS street next to the bike lane (see Appendix 1 and 2 in the Supplementary File). Street parking is permitted only on the residential side of the street. Importantly, there is no public transportation (e.g., buses, trams) running through the HBS street, though bus/subway stations are near the street. During summer, a ferry line is open and connected to the Hornsbergs Strandpark and the street.

These permanent conditions of the transportation aspect of the streetscapes in turn satisfy the criteria of the summer street design intervention. The criteria for locating the summer street consist of no heavy traffic, trams, trains, or buses in the street; can be conveniently accessed by public transportation; possible to remove street parking; and in proximity to restaurants and commercial establishments. Interviewee 1 (project manager) further stated, "the streets must allow for rerouting car traffic, reducing the speed limit and removing parking lots to achieve pedestrian-friendliness." Interviewee 2 (architect) shared, "the summer street design measures of HBS focused on reducing car traffic in the street to help create a sense of safety and equal opportunities for different street users, such as pedestrians, cyclists, runners, etc." This suggests that the temporal design interventions in general deprioritise motor traffic and address mobility justice.

Design challenges of the summer street HBS are faced due to the specific characteristics of the site. As pointed out by Interviewee 1, "the street is one of the longest streets in the inner-city area without the presence of public transportation and therefore it is attractive to car users." To tackle this, the design team used the principle of breaking the long street into multiple sections, according to Interviewee 2. The output of this measure is a decrease in car flow and speed, which is beneficial for social interactions among pedestrians and street users. As the street is a part of the road network of the neighbourhood and city, the car traffic cannot be completely closed, said Interviewee 2. To address this, a 3.5-m-wide passage was carefully shaped by streetscaping using vegetation and street furniture, taking into account street safety and emergency conditions.

4.3. Landscape

One unique physical characteristic of the streetscapes in the present study is that the street is located along the water body—Ulvsundasjön Lake and Karlberg Canal. The location affords a perfect horizontal view of open water and sunset. Several parks including Hornsbergs Strandspark, KristinebergsS, Brovaktarpark, playgrounds, and an outdoor gym are connected through the street and are part of the streetscapes. These public spaces afford a variety of activities such as walking, picnicking, playing, fishing, sunset viewing, swimming, sunbathing, relaxing, etc. Streetlamps are designed on both sides of the street: taller lamps along the residential side, and lower lamps on the waterside. According to the design proposal, trees were to be placed on the north side of the street, on the bank (Holst & Pemer, 2014, p. 99). They, however, do not exist in the current condition of the street. Other permanent street furniture, such as benches, objects that distribute traffic flow and provide seating (Figure 2), and recycling bins are placed in the street on the waterside and a public toilet is located inside the Hornsbergs Standspark, which directly connects to the street.

The summer street intervention of HBS is an ongoing design-feedback process, meaning that the specific design measures are constantly evolving. HBS street has been chosen as one of the five permanent summer streets under the programme Living Stockholm since 2017. The exact street area adopted as the summer street may vary from year to year (Traffic Office, 2021). In general, a large section (about 800 m) of HBS is used as the summer street area. In 2021, the summer street extended westward including one section of Kristinebergs Strand Street to decrease street parking and improve the safety of activities taking place within the streetscapes. During the summer street period, increased flowers and trees, street furniture, and speed-reducing and car-traffic-blocking objects are added to the street to create more public spaces for civic

Figure 2. Street furniture (permanent): On the left, people sit and lean towards the street furniture placed in between the bike lane and the walking passage, and, on the right, people sit on the waterfront deck beside the pedestrian lane.

life. Taking the summer season of the year 2021 as an example, 57 sets of trees and flowers, three picnic table sets, 20 benches, three pop-up parklets, 11 speed bumps, 18 traffic blocks, and 5 recycling bins, etc., were added to re-purpose the street. Interviewee 2 (architect) also shared that the flowers used in the summer street were consistent with the city's yearly flower programme; the trees were specifically chosen for the site. Pine trees were used in HSB as they were resistant to wind and sun exposure and require less water. Furthermore, as outdoor food service is permitted by the city, a considerable portion of the sidewalks and the street (the vehicle lane) is used for outdoor food services (see Figure 3). The city provides a design toolbox for the local shop owners to set up their outdoor service areas. Interviewee 1 (project manager) said that safety, accessibility, and comfort were the design principles for the outdoor catering space. She mentioned that they also put picnic table sets in the street so that people could bring their own food to the site and did not have to go to the local restaurants. This reflects a social sustainability intention towards the design of the streetscapes.

Trade-offs or conflicting interests in the use of streetscapes among different user groups are faced as a by-result of the temporary interventions at HBS. For instance, on the one hand, the use of vegetation and street furniture as traffic blocks and speed reducers creates a safer and nicer environment for street users to meet, encounter, and have conversations. On the other hand, placing street furniture in the street may attract people to gather. This could make it more time-consuming for the residents who need to use the street to park their cars in the garage, said Interviewee 2 (architect). This phenomenon is not shown in other seasons on the same street.

4.4. Programming

The HBS street is spatially planned as one of the major local streets for transport mobility incorporating the Northwest Kungsholmen urban expansion programme and the housing programme New Hornsberg housing programme. According to the Master Plan of Stockholm 1999 (City Planning Office, 2000), the Hornsberg area is one of the five industrial-and-harbour areas within the city of Stockholm that are planned to build housing, offices, and amenities. This implies that the street studied has a dual nature of being both vital transport infrastructure and social infrastructure that is open for public and shared use at the neighbourhood and city levels.

The summer street intervention is a part of the Living Stockholm initiative that is led by the city's transportation office. Consistent with Stockholm's development plans, including the Attractive Public Space Strategy (Traffic Office, 2018), Urban Mobility Strategy (Firth, 2012), Greener Stockholm (City Manager's Office, 2017), and Vision 2040 (City of Stockholm, 2020), the programme was started in 2015 aiming to improve joyful, attractive, and safe public space for the city's residents and visitors. The Living Stockholm programme experiments with different design interventions in both inner-city areas and city peripheries. The programme grows from two summer streets to 34 summer places (Traffic Office, 2021). Furthermore, the summer street programme focuses on cross-sectoral collaborations, including stakeholders such as the culture administration board, district administration boards, property owners, businesses, schools, citizens, and more. Summer street usually lasts around three months (mid-May to late August) each year, though the duration of the summer street period may change according to the city's decision. In 2021, for instance, it was extended to support the recovery of the city in the pandemic context.

In addition to top-down permanent and temporary programmes planned and implemented in the streetscapes of HBS, some bottom-up initiatives are also emerging especially during summer since more public spaces are reclaimed. These include street performances (singing and dancing), student graduation ceremonies, pop-up bike repair services, etc. These outcomes

Figure 3. The outdoor catering service in the summer street HBS: (a) Street section A, (b), (c), and (d) examples of the outdoor catering space in the street.

of the summer street are envisioned in the programming. "Good city environment stimulates entrepreneurship that we value very much in our society," said Interviewee 1 (project manager). "The summer street may have increased the attractiveness of the area as it becomes a vibrant place for people both who live in the area and other neighbourhoods to visit and gather," said Interviewee 2 (architect). However, in reality, the tension in the use of the streetscapes during summer emerges. Issues like loud music at night and littering in the street create friction between the visitors and the residents. In response, the city and police provision increased street maintenance and security resources to support programme management. Overall, the programming of Living Stockholm is essentially a tool to experiment with opportunities to improve the city environment. This consists of leadership, collaborations, design interventions (permanent and temporary), management, and marketing.

4.5. Residents and Visitors

The attractiveness of HBS is evident due to its popularity (Sessler, 2021). Increased opportunities for social interactions and public life are visibly supported by the design of the streetscapes through both permanent and temporary measures (see Figure 4). Those inviting environments within the streetscapes conditioned by permanent design, such as waterfront, public baths, parks, walking/cycling passages, sidewalks, and ground floor spaces are complemented by the temporal summer street intervention. The measures of slowing down traffic, adding seating and activity furniture, and increasing vegetation in the street may have effectively attracted more residents and visitors to the site during the summer season than in other seasons. As mentioned in Section 4.4, this in turn gives rise to the ongoing debate regarding the tension in the use of such public space through the expression of "overcrowding" pronounced in the media (e.g., Jonsson, 2019).

The perception, attitude, and use of the streetscapes of HBS by different street user groups seem to be a gradually changing process. "It took a while for people to realise that the summer street has changed the car traffic route or removed some of the parking lots…people finally realised it," explained Interviewee 2 (architect). Interviewee 1 (project manager) also mentioned their efforts to continue to inform the street users about the summer street/Living Stockholm. A survey (Samverkansgruppen, 2021) carried out by the local

Figure 4. A snapshot of HBS during summer: (a) (Sun)bathing, (b) overloaded recycling bins, (c) jet ski on the water, (d) the parklet in the street, (e) people having conversations in the street, and (f) the eastern part of the waterfront park. Sources: (a) Kadhammar (2020), (b) Zimmerman (2020), (c) Sällström (2019), (d) and (e) author's photos, and (f) Lindman and Johansson (2014).

collective workgroup reports that 90% of residents have had a positive experience of the area and 79% of the residents are more positive towards the summer street programme, especially during the period of July–August than that of May–June. The majority of the residents appreciate the city's efforts in the summer street programme, including the spatial extension of the summer street, the installation of speed bumps, and the application of geo-fencing for e-scooters (Samverkansgruppen, 2021). However, objections to the decrease of street parking lots, concerns about loud music, littering, drug use, jet-skis on the water and other disturbing behaviours remain among the residents. This suggests that the design interventions are of value for the residents in general and the core of the friction between the residents and the visitors lies in the seasonal use of the public spaces provided within the streetscapes.

5. Discussion

The study looks at how the design, management, and use of streetscapes deliver social and health benefits by facilitating increased social interactions and civic life. The case study of HBS highlights the potential of urban design and planning to unlock streetscapes' potential to serve as social infrastructure, through both spatial and temporal design interventions. The temporal design intervention to reclaim public space through the experiment of the summer street has played a crucial role in making the value of streetscapes more tangible. The results corroborate findings from previous studies on streetscapes' contribution to the overall environmental quality of neighbourhoods including aesthetics, identity, economic activity, social cohesion, health, and well-being, beyond transport mobility (e.g., Mehta, 2009; Prytherch, 2021; Spokane et al., 2007).

Notably, the physical characteristics of the streetscapes of HBS are purposefully designed to afford social interactions and social connections among people. These characteristics, conditioned by permanent design, consist of a highly integrated street network at the neighbourhood and city level (highly accessible), well-designed sidewalks and bike lanes, clear street signage, interlinked natural and built environments, well-connected to a variety of public spaces (e.g., parks, promenade passages, public bath, sports field, cafés and restaurants, stores, etc.) and public transport, street-facing balconies, diverse ground floor businesses and services, etc. The temporary design that was carried out through the summer street programme, such as reducing car traffic, reducing the speed limit, removing street parking lots, and installing vegetation and street furniture provides support for different social groups to have equal access to the street (Koch & Latham, 2012). The use of trees and flowers not only effectively blocks or slows down the traffic and improves road safety, but also embodies care in streetscaping. The added street furniture and "greens" signal and invite people to use and stay in the street for longer periods and sit, lean on, rest, or just stand next to them (Mehta, 2009).

Some differences are seen in the current case study compared to the American case studies (Mehta, 2009). First, the outdoor seating as part of the stores was not used by the street users unless they were store customers. This implies that there may be a sense of control in terms of the boundary street users draw between the public and private realms within the streetscapes. Second, the objects close to the waterside were more used by the street users than those next to the stores. Importantly, the interactions between permanent and temporary design are beneficial for the improvement of the overall neighbourhood environment, but the relationship between those measures needs to be carefully thought through in the site-specific context. This is to say that both measures are needed, and one cannot be replaced by the other.

In the case of HBS, the temporary design interventions have complemented the permanent design of the streetscapes and made the area more attractive according to the media report (e.g., Hemnet, 2020), the interviewees, and the resident's survey report (Samverkansgruppen, 2021). Some unintended consequences of such attractive urban environments may occur, i.e., friction between visitors and residents. This is not a unique problem, but rather a common urban phenomenon (for other contexts, see, e.g., Loukaitou-Sideris & Ehrenfeucht, 2011). The nature of this urban phenomenon often lies in the use of the public space, especially the perception, attitude, preference, awareness, and behaviour of various social groups. The study showcases that temporary design interventions are particularly valuable. It demonstrates pathways to activate public social life by enabling streetscapes to serve as social infrastructure. It also highlights trade-offs in decision-making and the role of individuals and organisations. There is a tendency that changes in design, perceptions, attitudes, and use of place take time to process and establish themselves, such as the public opinion reflected in media reports (e.g., Brandt, 2021). Through design feedback and evaluations, the summer street programme can improve its design measures, scale, and impact continuously.

As the research was carried out during the period of the Covid-19 pandemic, there are some limitations to the study. First, the universal social distancing rule may influence the levels of how people perceive themselves, others, and the environment, especially when considering different social groups, e.g., younger and older adults. This might have affected the observation data. Second, the study used observed social interactions as a proxy of well-being excluding subjective measures. Future studies therefore could involve subjective data (e.g., interviews, surveys) in a post-pandemic context to further investigate the impact of streetscapes on social interactions and well-being. Third, the expert interview chose to focus on the project/programme management and design aspects. Further interview data involving stakeholders, such as street security and maintenance officers, housing association board members, ground floor business owners, etc., may enrich the empirical data. Comparative case studies of different cities could also further scrutinise the role of urban design in enabling streetscapes as social infrastructure in other social, cultural, and economic contexts. Nevertheless, the methodological approach of the study makes the findings relevant and holds explanatory power for understanding the significance of streetscapes in attractive urban environments and the role of urban design in enabling streetscapes to serve as social infrastructure.

6. Conclusion

The present study has analysed the impact of urban design measures on the social and health values of streetscapes at the neighbourhood level. By reclaiming public space and turning local car-centred streets into pedestrian-friendly streets, the potential of streetscapes to perform as social infrastructure is demonstrated. Public policy, urban development, and investment should adopt urban design strategies for streetscapes. This should take into account their potential for being social infrastructure as an effective pathway to promote well-being. The temporal urban design interventions discussed in the study are viable tools for improving the quality of streetscapes and the overall urban environment. They are also effective means to engage public participation and citizen dialogue. These benefits should be considered to promote investment in permanent and temporary design interventions for streetscapes. The context of the case study presented, specifically its location in an urban beach/waterfront area and mixed land use within a new housing development, makes its lessons emblematic and relatable to urban development projects in other similar contexts. It is recommended to further test the tools demonstrated in the case study in other places in Sweden and internationally to help advance the theory of social infrastructure and improve practices that enable social infrastructure.

Acknowledgments

I thank the interviewees for their engagement and efforts in taking the time to help others learn about their practices. The same gratitude goes to Martin Emanuel, Rebecka Gronjord, and Hans-Olov Blom, who helped to facilitate the interviews. I appreciate the academic discussions with Theodore Eisenman on the conception of streetscapes, urban green, and well-being at the early phase of the study. I am also grateful for the invaluable feedback from the three anonymous reviewers, the thematic issue's editors, and Tiago Cardoso. I acknowledge the funding support from KTH and Riksbyggen's Jubileumsfond "Den Goda Staden" (2020).

Conflict of Interests

The author declares no conflict of interests.

Supplementary Material

Supplementary material for this article is available online in the format provided by the author (unedited).

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About the Author

Jing Jing is a PhD candidate at the School of Architecture and the Built Environment at KTH Royal Institute of Technology. Her doctoral project examines the impact of the built environment on loneliness with a focus on public space. Prior to this, she has worked as a professional architect and urban designer and has led over a dozen urban development projects. Her work is published in scientific and popular journals, books, and exhibitions.