

Creating Urban and Workplace Environments for Recovery and Well-being

New Perspectives on Urban Design and
Mental Health

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11

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Strategies, pathways, and implications

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Introduction

By 2050, 70% of the world population will live in cities. While urban living offers advantages such as access to healthcare and other facilities, individuals in urban areas face higher risks of mental illness compared to those in rural areas. Urbanisation is associated with social and environmental stressors, including poverty and pollution, which contribute to these mental health challenges (Gruebner et al., 2017).

Balancing the negative effects caused by the stressors, also known as recovery, is essential for achieving healthy urban living and requires interdisciplinary efforts. Urban design plays a crucial role in this endeavour by creating high-quality urban public spaces that are integral to residents' daily lives. Effective urban design considers factors such as visual aesthetics, functional needs, environmental qualities, and experience enhancement (Cook, 1980), involving diverse product types in different scales ranging from local monuments to new towns (Lang, 2006).

Human recovery is a multifaceted process encompassing passive, active, and pro-active dimensions, all of which are closely related to situational conditions (Pauleit et al., this volume, Chapter 1). To effectively evoke a recovery process, urban environments should enable individuals to reduce stress, change stress (shift from mental to somatic stress), and take breaks from stress. This implies that urban design should incorporate affordances that protect against environmental stressors, such as the heat island effect, pollution, and noise; facilitate both physical and psychological comfort; and encourage active behaviours and social interactions.

Associations have been built between urban design and recovery benefits, including mood enhancement, as well as mental fatigue and stress reduction (Weber & Trojan, 2018). However, the extensive range of variables involved in research and the lack of a framework for understanding the effects of urban

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design on recovery may pose a barrier for designers and policymakers, impeding their ability to translate knowledge into practices and policies aimed at fostering recovery.

Therefore, this chapter will develop a conceptual framework, with the aim to identify multi-scale urban design qualities and strategies that relate to recovery, present pathways linking multi-scale urban design and recovery, and offer implications for future research, practice, and policymaking.

Multi-scale urban design: Qualities and impacts

Based on the scope of design objects, urban design can be categorised into macro and micro scales. These two scales are also referred to as neighbourhood/city scale and street/eye-level scale in research and design practice (Gerike et al., 2023; Roe & McCay, 2021; Zang et al., 2020).

Macro-scale urban design, which operates at the level of urban form, involves design aspects like land use, street network, and density. These design factors play an important role in determining place qualities, such as destination diversity and accessibility (Table 11.1), all of which are related to behaviour-related outcomes, such as mobility patterns and use of a public space (Flowers et al., 2016; Marshall & Garrick, 2010; Nubani & Wineman, 2005). These behavioural outcomes of macro-scale urban design, in turn, exert an influence on psychological perceptions of the environment. For example, a neighbourhood being able to provide more destination diversity and easier access to the destinations can attract more walking activities with potential social interactions, thus influencing perceived fascination and vibrancy of the neighbourhood (Jacobs, 1961). Additionally, macro-scale urban design, including urban street networks planning, can create a resilient urban form, strengthening a city's ability to handle disasters and adverse events (Sharifi, 2019).

Table 11.1 Macro and micro urban design qualities.

| | <i>Quality</i> | <i>Definition</i> |
|-------------|----------------|---|
| Macro scale | Diversity | The richness of destination types. |
| | Accessibility | The possibility to access diverse destinations. |
| Micro scale | Imageability | How distinct, recognisable, and memorable a place is. |
| | Enclosure | The degree to which a public space, defined by vertical elements, can be room-like. |
| | Complexity | The visual richness of a public space. |
| | Transparency | To which degree one can perceive beyond the edge of a space, such as building facade. |
| | Human scale | The details of public space design match human size and needs. |

Micro-scale urban design plays an essential role in shaping both behaviours and perceptions in an urban space. While macro-scale design factors like street network structure and land-use patterns may not be directly perceived, eye-level design elements, such as building typology, furniture, facilities, and greenery, are immediately noticeable. These design variables contribute to perceived qualities – imageability, enclosure, complexity, transparency, and human scale (Table 11.1) – that are associated with walkability, as well as social, psychological, and physical well-being (Ewing & Handy, 2009; Ewing et al., 2013).

Multi-scale urban design: Qualities and impacts

The conceptual framework linking multi-scale urban design factors and strategies to recovery is presented in Figure 11.1. The framework was developed by synthesising earlier conceptual frameworks (Bornioli & Subiza-Pérez, 2023; Frank et al., 2019) and recent empirical findings.

Recovery includes three essential processes: containment, passive recovery, and active/pro-active recovery. Containment serves as the foundational process, requiring an environment to mitigate stressors, such as air pollution and traffic noise, and ensure safety as well as climate and thermal comfort. While containment itself does not directly promote recovery, it establishes the prerequisite conditions for a recovery experience. Passive recovery, on the other hand, allows individuals to obtain recovery benefits by exposure to environments with inherent recovery potential, without requiring additional efforts. Active recovery involves individuals actively interacting with cultural and social environmental factors to obtain recovery benefits. Such active interactions require spaces to provide resources for activities such as physical exercises and social interactions, as well as for building personal connections, such as place attachment and sense of belonging (Bornioli & Subiza-Pérez, 2023).

Multi-scale urban design can influence recovery processes through pathways in three domains: exposures, behaviours, and personal connections. Exposures contribute by either establishing preconditions for environments to foster recovery (containment) or providing resources conducive to passive recovery. This involves both mitigating negative environmental factors and amplifying positive ones, which are shaped by urban design.

Behaviours have been identified as one crucial pathway through which the built environment influences health (Frank et al., 2019). Active behaviours, including walking, physical activities, and social interactions, are essential strategies for active/pro-active recovery. Therefore, urban design should be able to afford these behaviours by offering adequate resource support.

Personal connections, such as place attachment and sense of belonging, are functional and emotional connections between individuals and places. These connections specially contribute to eudaimonia well-being derived from self-actualisation and meaning (Bornioli & Subiza-Pérez, 2023), as well as memory support and positive emotions (Scannell & Gifford, 2017). Building these connections requires individuals to contribute their own content, including

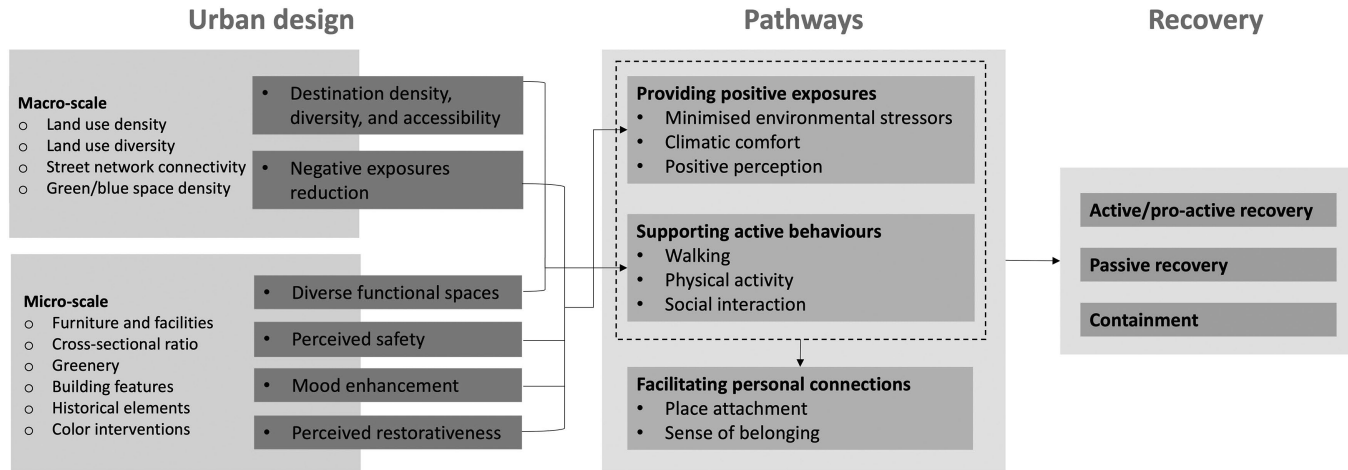


Figure 11.1 A conceptual framework linking macro- and micro-scale urban design to recovery through diverse pathways.

memories and meanings, to the environment (Liu et al., 2020; Ratcliffe & Korpela, 2016). The content itself typically emerges from individuals' interactions with their surroundings, shaped by environmental exposures and behaviours.

Subsequent sections will elucidate the key aspects of multi-scale urban design related to the pathways that are essential to foster recovery processes, grounded in existing empirical evidence.

Macro-scale urban design strategies to support recovery

Urban design at a macro scale encompasses considerations related to urban form, such as land use, street networks, and density, and their consequent impacts on users. To facilitate recovery, macro-scale urban design can focus on two key aspects: enhancing the diversity of destinations within an area and ensuring their accessibility, thereby promoting more active behaviours, and planning urban structures that effectively mitigate the influences of environmental stressors.

Promoting diversity and walking accessibility of destinations

Diverse and accessible destinations can provide diverse 'third spaces' (places separated from home and work) and help individuals connect with local social networks and services, encouraging more social and physical activities (Fonseca et al., 2022; Hajrasouliha & Yin, 2015; Oldenburg, 1999) and reducing social isolation (Kenyon et al., 2002).

Diversity of destinations can be achieved by enhancing land-use mix and the variety of destination types. McConville et al. (2011) measured land-use diversity by counting the number of non-residential land types within a 0.5-mile and 0.25-mile radii of participants' homes, including banks, bus stops, libraries, rail stations, offices, parks, recreation centres, retail stores, schools, and sports facilities. They found a positive correlation between land-use diversity and non-leisure walking. Improving accessibility involves increasing destination density, which reduces travel distance. However, McConville et al. (2011) found that a higher concentration of certain types of destinations, such as bus stops, grocery stores, offices, and retail stores, significantly promote walking. Some research (Yue et al., 2017) argued that destination diversity, a measure reflecting neighbourhood vitality, than density, plays a more essential role in enhancing pedestrian numbers than density.

Street network design is the other aspect to enhance neighbourhood accessibility. A highly connected street network is characterised by a grid pattern, high intersection density, and shorter block lengths. According to *Space Syntax Theory* (Hillier et al., 1993), a street network with high connectivity should have a relatively shallow average topological depth from any street to any other street – in other words, a highly connected street network provides users with easy access to diverse destinations. Such networks encourage behaviours beneficial for recovery, like walking, as they reduce travel distance and offer multiple route options, thereby increasing opportunities and motivations for walking

(Marshall & Garrick, 2010; Wineman et al., 2012). Additionally, highly connected street networks are linked to positive health outcomes, including lower risks of obesity, diabetes, heart disease, and depression (Marshall et al., 2014; Sarkar et al., 2013). These benefits have been explained by active behaviours encouraged by accessible neighbourhood street networks. Recent research also finds that network connectivity is associated with brain activities crucial for stress processing, possibly due to travelling and social behaviours influenced by network design (Dimitrov-Discher et al., 2023).

Reducing negative exposures

Reducing negative environmental exposures, such as pollution, noise, and extreme heat, is crucial for facilitating recovery in urban areas. Green-and-blue space design plays an essential role in mitigating these negative exposures. While macro-scale design characteristics of green and blue spaces, such as density and size, are associated with increased walking, heightened physical activity, and reduced impacts of stressful life events, along with lower risks of depression, anxiety, and mood disorders (Cohen-Cline et al., 2015; Krellenberg et al., 2014; Mytton et al., 2012; Nutsford et al., 2013; van den Berg et al., 2010), these benefits often depend on the micro-scale qualities of these spaces rather than their distribution and size alone. However, a higher amount of green areas reduces impermeable surfaces, mitigates the urban heat island effect, and ensures thermal comfort (Gunawardena et al., 2017). Urban green spaces are also able to purify the air and absorb noise, reducing the negative impacts of these stressors on residents (Gascon et al., 2015; Guo et al., 2019).

Street network design can also contribute to recovery by influencing mobility shares that are related to traffic-related stressors and safety. Neighbourhoods with grid street networks not only encourage more active mobility modes, such as walking and cycling, but are also associated with reduced driving (Marshall & Garrick, 2010, 2011, 2012). This reduction in driving can decrease the negative impacts of traffic-related pollution and noise, as well as lower the incidence of traffic accidents.

Micro-scale urban design strategies to support recovery

Micro-scale urban design closely relates to individuals' experiences in places, involving a wide range of design variables related to all outdoor space interfaces. To promote recovery, the design should provide resources supporting physical activity and social interactions while enhancing perceived qualities related to safety, mood enhancement, and perceived restorativeness.

Creating functional urban public spaces

Public spaces should incorporate diverse functional areas, such as playgrounds, pavilions, sports fields, and health trails, which serve as vital platforms supporting activities beneficial for recovery. The utilization of these spaces is often



Figure 11.2 Mainkai Street in Frankfurt during the road closure experiment.

driven more by their functional utility than by their aesthetic appeal (Rasidi et al., 2012). Therefore, to enhance functionality, these spaces should be equipped with inclusive, well-maintained, and human-scale amenities that prioritise user comfort and cater to diverse needs. Essential amenities may include seating and secondary seating (e.g., planters, riverbanks, and grass), lighting, and sanitation facilities. These elements not only enhance the physical experience of the space but also contribute to its social and psychological benefits by encouraging prolonged and varied engagement.

For instance, Mainkai Street in Frankfurt (Figure 11.2), along the Main River, is a significant local recreational destination. It offers diverse functional spaces and amenities like outdoor cafés, accessible grass areas, footpaths, riverbanks, and benches, which support plenty of active and stationary activities, including walking, jogging, reading, and social interactions. In 2020, a road closure experiment was carried out, and motorised traffic was excluded from the street. During this time, more benches, movable furniture, club activities, and extended outdoor dining were introduced on the street, resulting in a more pedestrian-friendly scenario: pedestrian volume significantly increased, as well as the types and amount of stationary activities and physical activities (Pandit et al., 2021).

Moreover, interactive design elements like ground murals can also enhance functionality of public spaces, as demonstrated by the 40 West Artline project in Lakewood, USA, which introduced interactive ground paintings, such as hopscotch, along a 4-mile pedestrian path to encourage active engagement and foster a dynamic walking experience.

In addition to all positive behavioural outcomes, the effective usage of urban public spaces also fosters stronger user engagement, providing conditions for developing personal connections with the environment, including place attachment and a sense of belonging.

Improving perceived safety

When individuals feel safe in an urban environment, they are more likely to engage with the space, fostering a sense of comfort and security that supports their recovery process. Conversely, environments perceived as unsafe may provoke stress and anxiety, hindering recovery by discouraging engagement with public spaces. Micro-scale design elements have a stronger impact on perceived safety than macro-scale design (Harvey et al., 2015). Enclosure, the quality that makes urban spaces ‘room-like’ (Ewing & Handy, 2009), evokes a sense of here-ness (Cullen, 2012) and is considered as a quality associated with perceived safety. In urban design, cross-sectional ratio (height-to-width ratio) of a space and vegetation are considered as two essential factors that influence the sense of enclosure (Harvey et al., 2015). While more enclosed streetscapes (having greater cross-sectional ratios and more trees) are perceived as safer (Harvey et al., 2015), excessive enclosure of an urban public space, such as a square or a green space with limited visibility beyond solid vertical interfaces, can hinder



Figure 11.3 Berger Strasse in Frankfurt.

perceived safety. This is because such environments can be related to threats and offenders, indicating a blocked escape and evoking a sense of fear (Herzog & Chernick, 2000; Nasar et al., 1993; Tabrizian et al., 2018). Therefore, urban spaces are suggested to reduce solid wall proportions to enhance perceived safety, such as increasing ground floor facade transparency to increase ‘eyes on the street’ (Jacobs, 1961; Navarrete-Hernandez et al., 2021).

In addition to enclosure, appropriate lighting in urban public spaces is crucial for night-time safety perception (Zhao & Huang, 2021). The presence of vegetation in urban spaces also directly enhances perceived safety, probably due to the positive association between greenery and a sense of happiness (Seresinhe et al., 2019), given the inner link found between perceived safety and happiness (Mouratidis, 2019).

Improving mood states and perceived restorativeness

Enhanced mood states and perceived restorativeness are key psychological benefits of micro-scale urban design promoting recovery. Perceived restorativeness refers to individuals’ evaluations of an environment based on restorative qualities proposed by the *Attention Restoration Theory* (ART; Kaplan, 1992): fascination, being away, extent, and compatibility – these qualities require urban spaces to be engaging and immersive enough to provide a break from daily stress.

Eye-level vegetation plays a crucial role in enhancing mood and perceived restorativeness. The quantity and percentage of greenery in view have been shown to positively influence these psychological outcomes (Jiang et al., 2014; Lindal & Hartig, 2015; Nordh et al., 2009; Zhao et al., 2019). Moreover, vegetation diversity is necessary not only for enhancing space preference but also for creating rich multisensory experiences. These sensory interactions with natural elements, including visual, auditory, and olfactory aspects, are crucial in facilitating passive recovery processes, benefiting individuals both physically and psychologically (He et al., 2022; Michels & Hamers, 2023).

Building facade details, such as silhouette, colour, and ornamentation, contribute to visual complexity in urban spaces and foster effortless attention and involuntary exploration, thereby enhancing perceived restorativeness (Ensari & Akbay, 2018; Lindal & Hartig, 2013; Lyu & Yang, 2023). Ground floor facade design is particularly important for contributing to place fascination, as the transparency of the facades connects indoor and outdoor spaces, generating curiosity (Barros et al., 2021). For example, one crucial aspect contributing to the vibrancy of Berger Strasse in Frankfurt, Germany (Figure 11.3), is the high level of ground floor facade transparency. The large windows of various shops arouse curiosity, allowing people to observe activities inside the buildings. Additionally, the extension of ground floor spaces, such as dining and retail areas, blurs the boundary between indoor and outdoor spaces, facilitating the integration of activities across these spaces.

Cultural and historical elements in urban spaces, such as old buildings and landmarks, enhance place imageability, a quality contributing to fascination.

Interacting with these elements might evoke a sense of being part of history, fostering a sense of being away, as well as personal connections, such as place attachment and belonging (Bornioli et al., 2018).

Colour interventions also have an impact on place perception related to mood and perceived restorativeness. Street art, such as ground murals, increases visual complexity and imageability of a street environment, thereby enhancing the fascination and evoking a sense of being away (Gu et al., 2021, in press). Notable examples include the superblocks in Barcelona and Superkilen in Copenhagen, where colourful ground murals have transformed previously less-appealing urban spaces into vibrant, fascinating areas. The design features of these interventions, such as colour schemes and pattern complexity, have impacts on users' psychological responses. For example, green-coloured murals promote relaxation more effectively than red ones (Gu et al., 2021), and intricate, playful designs elicit greater happiness than simple line designs (Batistatou et al., 2022).

The presence of social landscapes, such as benches, tables, and secondary seating, enriches 'Third Places', increasing perceived complexity, enjoyment, and neighbourhood vitality while triggering a sense of being away (Barros et al., 2021; Hassan et al., 2019; Park et al., 2013). Urban design that supports social interactions not only promotes recovery through user participation but also creates beneficial scenarios for those exposed to them.

Good practice examples

Superblocks, Barcelona, Spain

The superblock project in Barcelona exemplifies the promotion of recovery through multi-scale urban design strategies. The initiative aims to encourage sustainable mobility and create vibrant, healthy neighbourhood life. At a macro scale, the project reconfigured the existing street network to restrict motor vehicle traffic within superblocks, prioritising pedestrians and slow-moving cyclists. The redesign increased green space coverage, as well as public space diversity and density. As a result, these actions significantly reduced air pollution and noise levels within these blocks.

At a micro scale, the project focuses on creating high-quality, functional spaces. Movable planters, colourful ground markings, and furniture were introduced to define areas supporting both active and stationary activities. These spaces, varied in size and layout, offer safe, engaging environments for social interactions and children's play (Figure 11.4a).

Post-implementation, local businesses saw a 30% increase, with over 60% of people reporting significant improvements in walking comfort. Residents and workers within the superblocks noted enhanced perceived well-being, tranquility, quality of sleep, and social interactions. The city plans to establish over 500 additional superblocks, with the Health Institute BCNecologia predicting an increase in residents' life expectancy by 200 days and a reduction in nitrogen dioxide emissions from 47 mg/m³ to 36 mg/m³.



Figure 11.4 a) Application of ground colour interventions, movable furniture, and plants to create liveable and pedestrian-friendly neighbourhood in the super-block project, Barcelona. b) Application of ground painting and objects with diverse culture characteristics for multiculture communication in the Superkilen project, Copenhagen.

Playful City, Copenhagen, Denmark

Promoting active urban living for health is a key development aim of Copenhagen. The city consistently advocates for green mobility, particularly walking and cycling, while also creating playful spaces that support active behaviours.

At a macro scale, the city has followed a transit-oriented development since the 1950s. It enhances its cycling network by considering the total distances and density, as well as introducing unidirectional cycling lanes, improving the accessibility by cycling. Additionally, the city increases the density of recreational facilities, focusing on both new projects and the optimisation of existing public spaces.

At a micro scale, the focus is on human-scale design qualities. The Harbor Bath project, for instance, transforms an industrial dock into a vibrant public space with swimming pools, sunbathing platforms, diving boards, and seating areas, integrating sport and leisure needs. The Superkilen project uses diverse ground paintings, as well as over 60 culturally significant objects and landscapes, to create a lively, multicultural exchange space supporting social interaction and playful experiences for residents and visitors (Figure 11.4b).

Conclusion and implications for research and policies

The chapter proposes a conceptual framework linking multi-scale urban design to recovery with presenting distinctive pathways. The framework is supported by an exploration of existing literature. The framework encourages future research to validate the suggested associations, aiding administrations and planners in implementing policies and strategies for creating cities fostering recovery. Key future research directions include:

- **Empirical validation.** More evidence is needed to validate the pathways – exposures, behaviours, and personal connections – between multi-scale urban design and recovery.
- **Culture differences.** Conduct comparative studies to determine whether certain urban design aspects' impacts on recovery are universal or context-sensitive.
- **Quantifying design factors.** Develop improved methods to capture and quantify multi-scale urban design characteristics.
- **Innovative methodologies.** Integrate virtual reality and physiological measures to study the impact of multi-scale urban design on recovery.

The framework also suggests the following aspects associated with recovery for policymakers to consider:

- **Active city.** Encourage green mobility and active behaviours, especially walking and physical activities. Ensure facility density and accessibility through macro-scale planning, and ensure design quality at a micro scale.

- **Green city.** Enhance urban resilience and create high-quality, accessible, and diverse green spaces for everyday life.
- **Happy city.** Strengthen social coherence by involving the public in conception, design, decision-making, and evaluation processes, and encourage diverse daily activities through public organisation.

This chapter emphasises the role of urban design in fostering recovery. However, achieving urban environments that benefit recovery still calls for transdisciplinary collaboration across multiple sectors, including urban planners, public health officials, architects, environmental psychologists, and community stakeholders. Such collaboration is essential not only during research and conceptualisation but also throughout implementation and maintenance. Integrating diverse perspectives ensures that urban design interventions are holistic, inclusive, and sustainable, creating spaces that are functional, aesthetically pleasing, and beneficial for recovery.

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