

## (Wo)Man-Made Public Space. The Design Changes Needed to Create Gender-Inclusive Cities

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### Abstract

Women experience limitations in public space regarding their safety, comfort, and accessibility, which might be mitigated by urban design. This article addresses the question: How can public space become more gender-inclusive through the implementation of design principles focused on meeting the needs of women? It draws on existing literature combined with empirical observations and interviews, to establish a framework of eight design principles (safety cues, informal surveillance, legibility, spatial appropriation, representation, diversity, slow modes and ease of use) to make public spaces more gender-inclusive. The principles are applied in an exemplary design case focused on a public street in the city centre of Heerlen, Netherlands, which currently faces many of the issues that are especially limiting to women. Active public spaces, meaning spaces that encourage user engagement and interaction, often already contain some elements outlined in the framework, leading to easier fulfilment of the design principles. The application of the principles is limited to one design case, and the focus is restricted to women's experiences. When applying the principles in other cases or typologies, the implications of the proposed design guidelines need to be carefully considered.

**Keywords:** Feminist urbanism, public space, gender-inclusive, urban design principles, Netherlands

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## 1. Introduction

The fight for gender equality has been fought in many facets of our society, most famously through feminist activism in the 20th century, and includes the right to the city (Beebejaun, 2017). When it comes to the design and use of public space, not everyone experiences the same degree of freedom or comfort. Public spaces are often designed for an anonymous standard user. As underscored by existing literature this standard user is usually an able-bodied, white, heterosexual man (Kern, 2019, p.89). It is hypothesised that by designing public spaces for a standard user, the needs of users outside this standard profile are frequently neglected. Sex and gender are often a determinant of how someone uses and feels in (public) space; different bodies have different needs and follow different gendered roles. However, current practice for public space design rarely considers sex or gender as an effective element of the way public space is used. As a result, it is argued that women are restricted in their behaviour in public space.

Internationally, research has consistently shown that women feel less safe than men in public space, adjust their behaviour more often, and avoid certain places or activities out of fear or discomfort (Vera-Gray and Kelly, 2020). Despite their adjusted behaviour, defined by Vera-Gray and Kelly as 'safety work' (2020), women are more likely than men to experience street harassment. For instance, a 2018 survey of people living in Amsterdam found that more than half of the female population (51%) had experienced verbal or non-verbal sexual intimidation in the street, compared with 30% of men (Beek and Smeets, 2019, p.4). Other studies illustrate that women spend more time feeling anxious in public space, affecting their psychological well-being and comfort (Weisman, 1992, p.69). Moreover, research has demonstrated that the way people relate to space is influenced by their gender and the associated upbringing. For example, girls' spatial range of activities is smaller than boys (taking up less space), they stay closer to home, and they are less likely to actively manipulate their environment. (Franck and Paxson, 1989, p.127). These behavioural patterns are instilled in girls from an early age as they are taught to be careful and 'decent' while playing (Young, 1980, p.153). As a consequence of this upbringing women feel less comfortable in space, spending more time assessing safety cues and territorial control (Weisman, 1992, p. 69). Hence, due to different types of socialisation, women and men end up feeling and acting differently in public space. Consequently, when public space is designed without women's experiences, this reinforces spatial, sociocultural, and psychological limitations on use, for example, through a lack of public toilets, good seating options, and accessible pavements and lighting, making public spaces less accessible to them.

This research explored how women experience limitations in their behaviour in public space, and how this might be mitigated through design. The issues of safety, comfort, and accessibility emerged as consistent themes in the reviewed literature. In addition, field research comprising observations and interviews, were conducted in Heerlen (Netherlands); to validate these themes in a contemporary European context. Heerlen is the fourth least safe city in the Netherlands (Lare, 2019), facing issues of shrinkage (Verwest and Dam, 2010, pp.35-46), vacancy, and an ageing population (Stadsregio Parkstad Limburg, n.d.). In addition, the former industrial city has strong ties to stereotypical gender roles, rooted in its history, making it a relevant case study for this research. Eight key principles for gender-inclusive design were distilled from the evaluated literature and were subsequently applied to a design case to answer the

question: How can cities become more gender-inclusive through the implementation of design principles focused on meeting the needs of women?

This article will first elaborate on the three themes followed by an overview of the design principles. Next, the methods are described, followed by the results of the field research and analysis of the case study location. Lastly, an example of the implementation of the design principles is provided in an exemplary design case.

## 2. Literature Review and Design Principles

The relevant literature spans the fields of urban geography, feminist urbanism and public space research. The scope of the review focussed on the way the design of public space affects women, as well as gender-based differences in the use of public spaces. Within the reviewed literature the themes of safety, comfort and accessibility were recurring and used to structure this section. This section provides an evidence-based framework for the implementation of eight design principles (written in cursive throughout the article) presented at the end.

### 2.1 Safe space

Women are often limited in their behaviour in public space due to perceived feelings of unsafety, which, rather than actual crime rates, dictate their actions and have fostered specific survival or coping strategies in them. For example, research by Gardner (1995) and Madriz (1997) both outlined seven strategies women used in response to men's intrusions (as cited in Vera-Gray and Kelly, 2020). The strategies used by women are broadly separated into 'avoidance behaviours' and 'self-protective behaviours', which "can both be seen in the changes women make to where and how they move in public" (Vera-Gray and Kelly, 2020, p. 269). Similar results are found in research by Valentine, who adds that "by adopting such defensive tactics, women are pressured into a restricted use and occupation of public space" (1989, p.386). These forms of gendered 'safety work' (Vera-Gray and Kelly, 2020) are shaped by women's differential experiences in public space; their personal space and privacy are often invaded by unwelcome interactions like whistles, comments, or unwanted touching and assault from strange men (Weisman, 1992 p.68; Kern, 2019, p.89; Beek and Smeets, 2018, p.4). According to Valentine, not being able to choose with whom they interact, as a result of these invasions, "profoundly affects [women's] sense of security in public" (1989, p.386). Women's perception of safety in public space is generally far lower than that of men, which goes beyond urban design in that it is "related to their sense of physical vulnerability to men, particularly to rape and sexual murder" (Valentine, 1989, p.385). Dutch national census data shows that 23% of men compared to 40% of women sometimes feel unsafe in public space (Portegijs and Brakel, 2018). While crime rates offer one measure of safety, it is women's perception of safety, influenced by past experiences, that shape their behaviour. Consequently, perceived safety is a more meaningful measure for designing inclusive spaces.

The perceived feeling of safety in public space is generally linked to certain cues, including signs of incivility like vandalism, litter, or graffiti, which signal that inappropriate behaviour is permitted in that space, as also argued by Wilson and Kelling's Broken Window thesis (1980). Meanwhile, signs of neat litter-free streets are perceived as safer (Valentine, 1989, p.388). Design and maintenance are important parameters in the

perceived safety of public space, yet spaces that are considered unsafe are usually approached by hardening the environment through additional security such as lighting, cameras, signs, and police controls (Danes, 2016, p.9). While research shows that this can be effective in some cases, such as installing cameras to prevent property crime and lighting to prevent violence, there is no stable or well-determined effect of security measures on the perception of safety (Custers and Dubbeld, 2008, p.34). Moreover, 'too much security' and policing can foster insecurity and fear (Zedner, 2003; Barker, 2013). Instead, offering spaces that are soft and humane invites respectful behaviour. *Safety cues (#1)* incorporated through design features can convey a sense of security and are 'welcoming', for instance; an open door on a nice day, and display or sales tables on the street (Danes, 2016, p.9). Thus, a more effective way to increase the perception of safety in public space is through the presence of local shopkeepers, acquaintances, or other people, who carry out *informal surveillance (#2)* over that space (Jacobs, 1961). Furthermore, while the presence of safety cues and informal surveillance help the perception of safety, Valentine states that "the social relations within a space and the group(s) who control that space socially are more important influences on how safe women feel than its design" (1990, p. 301). Her research found that public spaces were perceived as dangerous when the behaviour of the controlling group was unpredictable and uncontrollable. In addition, women's sense of security was strongly tied to how well they knew the place and the people in it, concluding that familiar, and thus more predictable, places were experienced as safer and more comfortable (Valentine, 1989). Public spaces feel safer when they are predictable, as such they should be easily *legible (#3)*. Spaces that include 'soft' corners, offer visibility into doorways and are free of obstructions at the eye level are often experienced as more legible (Valentine, 1990). In addition, spaces become more legible if people can recognize and orient themselves in them through the presence of unique buildings and landmarks, for example monuments, brightly coloured buildings or murals. The recognisability of entrances and exits and the presence of clear signage, street names, and maps also help people recognize and feel in control of space. Enhancing the visibility within a space aids in recognition of space throughout the day and at night and can be achieved by using light colour paints and white lighting that mimics the light of day (Kalms, 2019) Likewise, spaces become more orderly and legible by avoiding narrow walkways or tunnels, sharp corners, and thick vegetation (Valentine, 1990).

## 2.2 Comfortable space

Feeling safe is the first and foremost condition for a comfortable use of public space. However, even if women feel safe, they still deal with physical and psychological discomfort while using public space and are often inconvenienced (World Bank, 2020). For example, women move out of the way of traffic more often, are touched without permission more often, and avoid eye contact and stiff body posture when approached (Mozingo, 1989; Weisman, 1992). Women tend to subconsciously look for more social or territorial cues on whether their presence in public space is allowed or welcomed (Danes, 2016, p.11). As a result, they may be less likely than men to occupy or appropriate public spaces in which these cues are not present. Furthermore, women tend to look for more private spaces to occupy, like seating out of the path of traffic, where they do not feel 'on display', away from possible intrusions on their privacy (Mozingo, 1989). Yet, even after taking these precautions, they endure more frequent intrusions of

their personal space, making them feel uncomfortable or distressed. It is therefore not surprising that women tend to form groups in public (Mozingo, 1989, p.45).

The different way in which women and men behave in public space can in part be attributed to the relationship they have to their bodies, and the way they are socialised based on their gender (Young, 1980, p.153). Girls are taught from an early age to behave in a restricted manner when in public. They are taught to be careful not to get hurt or dirty and to limit their movements by walking and sitting 'like a girl'.

Consequently, as adults, women move less freely, keep their arms closer to their bodies, cross their legs, and stand in more enclosed ways (Young, 1980; Mozingo, 1989). These restrictive behaviours stem from a learned psychological discomfort with using their body in a certain way and limit women from moving comfortably through, and appropriating, space, as confirmed by Mozingo's study in San Francisco (Mozingo, 1989).

*Space appropriation* (#4) is defined by Graumann as "the act or process of taking something as one's own or making something one's own" (cited in Rioux, Scrima and Werner, 2017). This can be achieved by being present in and exploring space through occupation, using objects, manipulating or altering spaces, as well as by recognizing or ascribing meaning to places (Rioux, Scrima and Werner, 2017, p.61). Space appropriation is the process of forming a connection between user and space. The right to take up space and the right to private space are issues women historically and presently deal with as Weisman states that they are "taught to occupy, but not control space" (1992, p.24). Additionally, women express a stronger need for a sense of security and a desire for control over their surroundings in public spaces to feel at ease. (Danes, 2016, p.10). Women spending time alone in public space may be presumed to be available to men, be it through being gazed at, interrupted, touched, or other means of proprietor interaction coming from men. Kern states that, "to enjoy being alone requires respect for personal space, a privilege that women have rarely been afforded" (2019, p.88). This demonstrates why women feel they need an excuse for being in public (Franck and Paxson, 1989, p.130), be it reading, eating, or talking to friends; as long as it signals that they are occupied.

Research indicates that women tend to be more attracted to places frequented by other women (Danes, 2016, p.2). By recognizing themselves in public space, women feel more comfortable appropriating it; the extent to which that appropriation is possible plays a big part in how accommodating a space is to women. The degree of control over space and female *representation* (#5) within a space can in part be facilitated by offering *diverse* (#6) options of use and interactive spaces, for example, by including moveable furniture (Project for Public Spaces [PPS], 2008) or providing public spaces for practising music or art. Designing designated spaces to appropriate gives users the opportunity to influence the way space looks or functions, giving them a sense of control. Designing spaces in such a way that they allow appropriation by a wide user audience means that a range of activities and options of use need to be incorporated into that space. The more people feel comfortable and familiar with using a space, be it only temporarily, the more inclusive it becomes. Making spaces with a great variety of options for activities and seating creates spaces that are sociable and have a higher level of publicness. Additionally, Franck and Paxson argue that this does not mean endless options need to be available everywhere, but rather suggest a balance in which diverse

options of use are tolerated and encouraged, stating that “no single public space can or should meet the needs of all users at all times” (1989, p.131).

### 2.3 Accessible space

Safety and comfort are two key conditions for the accessibility of space. Furthermore, how accessible a space is has to do with how well people can access, move through, and stay within it in addition to the types of functions it includes. First of all, access to public space is linked to the mobility patterns of women and men, which differ in a few ways. The most notable distinction found is that women tend to travel less by car compared to men. The works of Franck and Paxson state that this is possibly due to families owning only one car typically used by the main breadwinner, often the man, for commuting to work. (Cichoki, 1981; Pickup, 1984, cited in Franck and Paxson, 1989, p.127). Similar patterns are found in Dutch women’s travel behaviour as women tend to work closer to home and travel by car 29% of the time compared to men who travel by car 41% of the time (Centraal Bureau voor de Statistiek, 2019b). Another distinction is found in women’s larger involvement with other people while travelling. They also have more secondary purposes, especially related to childcare, regardless of their mode of transport (Frank and Paxson, 1989, p.127). In addition, Dutch census data shows that women are more involved in ‘service, personal care, and shopping or errands’ (Centraal Bureau voor de Statistiek, 2019a). While women and men spend a similar amount of time in traffic, women’s journeys are more complex, cover less distance (32 km/day compared to men’s 42 km/day) and are more often carried out by foot or public transport (Centraal Bureau voor de Statistiek, 2019b). It can therefore be argued that women are more reliant on these modes of travel, thus prioritisation of public transport and *slow modes* (#7) of traffic is an important principle in creating gender-inclusive cities.

Second of all, women are more actively involved in care work; they visit spaces with children or elderly persons more often and spend more time walking with a wheeled object (a stroller, buggy, wheelchair, or shopping trolley) (Moonen, 2022). In addition, they are more likely to develop balance issues as they get older which can lead to tripping or falling due to uneven pavements, steps lacking handrails, and visually indistinct edges (Danes, 2016, p.3). Consequently, these obstacles, as well as exceptionally steep or crowded spaces limit women’s *ease of use* (#8) while moving through public space, particularly while using a wheeled object. Research by Jensen et al. defines these factors, among others, as design qualities that influence the walkability of streets (2017, p.80). The same research found that, compared to less walkable streets, the streets that were classified as more walkable had almost twice as many female visitors (Jensen et al., 2017, p. 86). In addition, Scarponi et.al. (2023) assessed the walkability for women based on the criteria usefulness, comfort, safety and attractiveness, in which safety proved the most relevant factor influencing women’s walking experience (Scarponi et.al., 2023). The walkability of streets as well as the informal surveillance over them increases when a human scale is applied, for example by creating small blocks with a limited building height, as described by Sim in his book *Soft city* (2019, p.77). Besides walkability, women’s spatial orientation and their sense of direction differ and, as a result, they rely on a different method of wayfinding. The main difference is that women rely on landmarks to orient themselves while men also use geometric information (i.e., the position of the sun) (Lawton, 2010, p.329). By

incorporating landmarks as well as street signs and maps, different forms of wayfinding are accommodated.

A third point to consider is that women follow certain gender-specific social norms and trends (including fashion choices such as skirts or heels (Mozingo, 1989, p.47)) and need more toilet breaks (Mueller, et al, 2005). Besides the previously mentioned factors, this means their prolonged stay in public spaces depends on the availability of basic amenities like public restrooms and childcare facilities. However, freely accessible, clean public toilets are rarely incorporated in public space (RTL Nieuws, 2017), which not only limits women, but also parents of young children from visiting public spaces.

Incorporating these basic amenities, on top of including varied seating options in shaded and sunny areas, in more and less private space, and in proper lighting are important to create the right conditions for prolonged stay.

Lastly, where commercial functions are welcomed and necessary for the informal surveillance of the space (Jacobs, 1961), having to pay to be in public can be a limiting factor. As women are less likely to be financially independent (Portegijs and Brakel, 2018, p.42); this has a greater impact on their access to public space. Hence, a mix of commercial functions (terraces, shops, café's, carnivals, and markets) and non-commercial functions (parks, plazas, libraries) needs to be incorporated to generate activity throughout time and attract a diverse user audience. Good examples of non-commercial public spaces that should be available in any city are parks, squares, and libraries. These spaces welcome users without fee, allow people to bring their own means of entertainment, food, and drinks and offer the right amenities for them to remain in that space for an extended period. By creating flexible spaces that allow for temporary functions, spaces become more diverse. Attracting different user demographics, for example through events and activities, allows a broader audience to familiarise themselves with a place.

#### *2.4 Design principles*

Based on the literature study, eight design principles are defined, which illustrate design choices that can be implemented to enhance the relatively abstract concepts of safety, comfort and accessibility of space. The principles are interrelated and not mutually exclusive, thus some of the suggested design choices benefit more than one principle, and some principles strengthen others.

*Safety cues (#1)* are signs that indicate the public space is safe, and that people's presence in it is welcomed and accepted. Neat litter-free and unbroken spaces, public greenery and water, and welcoming signs (i.e. terraces, display tables) signal that a space is safe. In addition, attracting a diverse user audience makes it more likely for people to recognize themselves, signalling that their presence is welcomed and accepted, enhancing both the comfort and the accessibility of that space.

*Informal surveillance (#2)* is achieved by increasing the number of 'eyes on the street' (Jacobs, 1961), or the number of people engaging with and staying in space. This can be achieved by circulating people through space for example by strategic placement of flagship stores or touristic hotspots, incorporating a mix of functions, and ensuring facades are active (meaning people are engaging with them) throughout time. Designing spaces with a human scale, as described under legibility, and placing residential entrances on public streets also increases the number of eyes on the street.

*Legibility (#3)* is about how well space can be recognized and manoeuvred. Ensuring human scale, visibility of entrances and exits and an overview on eye-level make space more organised and clearer. Incorporating landmarks, signage and maps and ensuring continuity in street furniture make space easier to recognize overall. Additionally, choosing light coloured paint for facades and lighting mimicking the light of day make it easier to recognize space at night.

*Spatial appropriation (#4)* can be encouraged by creating a public space with diverse seating options and activities that offer a comfortable option to everyone. In addition, providing options for artistic expression (busking spots or legal-graffiti walls for example) and encouraging personalisation of space (for example by allowing planters near front doors) help make spaces easier to appropriate. Creating a sense of belonging in space, which can be done through spatial appropriation, but also through representation, makes people feel more comfortable to use it.

*Representation (#5)* can be achieved by encouraging events focused on groups that are currently limited from using the space and thus lack recognition. In addition, actively fighting street-harassment and preventing sexualized images of women in advertisement and public art.

*Diversity (#6)* means space is visited by a diverse user audience because it offers a range of choices and options of use that cater to their needs and interests. Incorporating a range of seating options, signs and maps at multiple heights and both commercial and non-commercial indoor and outdoor public spaces provides users with different options of use, making space more accessible. Ensuring mixed functions within space, providing a range of activities and events and encouraging temporary use all aid in attracting a diverse user audience.

*Slow modes (#7)* refer to the prioritisation of public transport, pedestrians and cyclists over car traffic, for example by using zebra-crossings instead of traffic lights or offering adequate bicycle parking. Furthermore, implementing flexible public transportation at night and ensuring short routes to and from public transport stops. Lastly, Spaces should be designed to be walkable by ensuring a human scale, and providing accessible pavements and wide tunnels, alleys and walking paths.

*Ease of use (#8)* has to do with how well people can use space and can be improved by using accessible materials and measurements, incorporating ramps and rails at stairs and steep slopes and providing resting spots along long slopes or stretches of pavement. It should be noted that the measurements in this case should not follow the standard user but should instead be adjusted so they are accessible for a range of users. In addition, when designing tunnels or alleys, they should be as wide and short as possible, ensuring there is adequate visibility on and in the space. Lastly, the availability of amenities in public space, like water-tap points, toilets and childcare facilities, as well as the presence of playgrounds for different ages are important design choices that make space more accessible.

Most of the design principles are strengthened by a public space that is active, meaning people interact with and use the space, and that offers a diverse set of activities and options of use. Vice versa, by implementing the design principles, public spaces become more active and enjoyable to a wider user audience. It should be noted that most design choices related to the principles do not have specific quantities associated with them; instead, careful analysis and observation of the location should be leading in the choices on how to implement the principles defined in this article. Not all principles need to be



applied in all locations, and not all locations have the same needs or face the same issues. The principles are a guideline in taking a more gender-sensitive approach in the design process, leading to more inclusive spaces overall.

### 3. Methods

This article draws on the research conducted for the author's masters' thesis, titled '(Wo)man-made public space; The design changes needed to create gender-inclusive cities' (Moonen, 2022). It established a framework of eight design principles for gender-inclusive design based on the literature review. While this article demonstrates the benefits of the design principles on the gender-inclusivity of public spaces, it is important to note that the literature review predominantly draws on American sources from the late twentieth century. Consequently, the influence of technological advances (e.g. mobile phones), or cultural differences were not considered in the formulation of these principles.

To contextualise and validate the framework within a contemporary European context, observations and interviews were conducted in the city centre of the case study location Heerlen. This approach aimed to further develop the framework and gain insight into the daily functioning of Heerlen. The observed locations were selected based on a spatial analysis, which considered historical, building, public space and traffic analysis of the case study location and found six key locations. Of these six locations, the location of an exemplary design case was selected based on the results of the observations and interviews and its performance relative to the established framework of design principles. Specifically, two locations were identified as underperforming compared to the other four. Consequently, these lacking locations were chosen as the exemplary design cases, wherein the existing baseline situation was redesigned in accordance with the framework to achieve a more gender-inclusive space.

More details on the methods used in the observations and interviews are outlined in this section, and the results are discussed in the next section. All observed locations are referred to with a letter, and all other locations are referred to with a number, both are related to the letters and numbers used in the figures throughout this article.

#### 3.1 Observations

Based on the spatial analysis, six locations along the two main axes of the city centre were selected for observations, to understand the daily functioning of these spaces. The observations followed the methods of counting and tracing as described by Gehl and Svarre in their publication *How to study public life* (2013), and were conducted in the following locations (see figure 1 under mobile interviews);

A: Bongerd

B: Pancratiusplein

C: Trainstation, centre side

D: intersection Saroleastraat & Dautzenbergstraat

E: Promenade, park (South-West side)

F: Promenade, playground (North-East side)

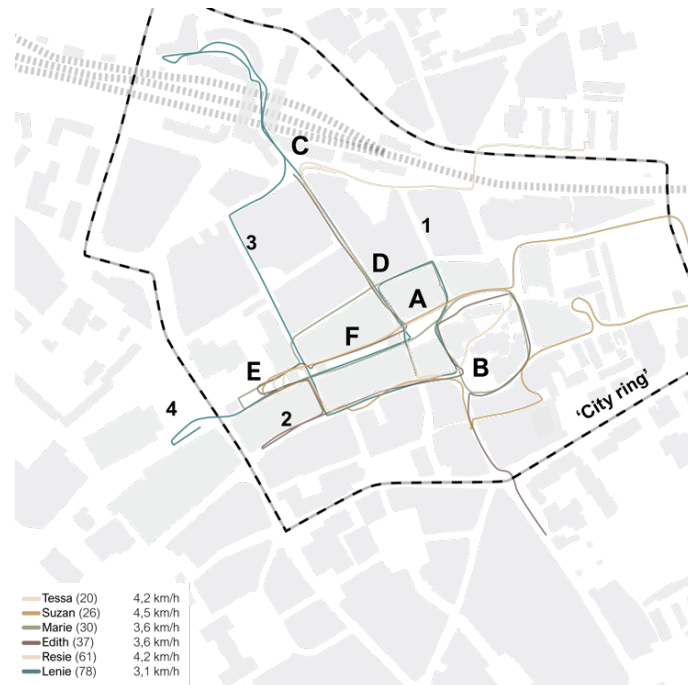


Figure 1. Interview routes.

Observations took place in one week at the end of June 2021, in three different time blocks, namely, morning (10:00-13:00h), afternoon (14:00- 17:00h), and evening (19:00- 22:00h). It should be noted that the observations were conducted during the COVID-19 pandemic in a period with relatively few restrictions, which might have caused fewer people to visit the space or some people to behave differently to keep their distance from other users.

### 3.2 Counting

During the counting method, each location was observed for a 10-minute interval in every time block on a weekend day (Saturday evening, Sunday morning, and afternoon), Tuesday (market day) and Wednesday (weekday).

Data was collected on gender, age, and company, as well as visitors' involvement in certain activities. A more detailed overview can be found in (Moonen, 2022, pp.80-85). The visitor's age is estimated and categorised as youth (0-25), adults (25-65), and elderly (65+) and their company are based on whether they are alone, in a same-sex duo, different-sex duos, or groups of more than 3. Lastly, people on bikes, with dogs, involved in care work, or using a wheeled object are counted. Care work is defined as adults supervising minors of middle-school age or younger. The use of a wheeled object, which includes strollers, wheelchairs, baby buggies, and luggage on wheels, is counted as the person controlling the wheeled object.

### 3.3 Tracing

The tracing method, as described by Gehl & Svarre (2013, p.28), was only conducted on the weekday, observing each location for 5-minute intervals during the aforementioned timeslots. During these intervals, the walking paths of pedestrians were traced on-site using printed maps and were later digitised for legibility (Moonen, 2022, p.86).

### 3.4 Mobile interviews

Mobile interviewing (Chaumont & Zeilinger, 2012, p.7) was used to conduct respondent interviews with six women of various ages and backgrounds to form a more comprehensive understanding of their experience in the research area. The women were recruited in advance and selected to represent a healthy mix of users varying in level of education, occupation, age, and whether they were from the city or not. The interviews were semi-structured taking a pedagogical stance emphasising respondents' personal opinions and experiences and used a mix of generative questions on the themes safety, comfort and accessibility and tour questions focused on the location (Tracy, 2020). The interviews were audio recorded and later transcribed to text, and the walking pace and routes were tracked using a smartwatch as indicated in figure 1. All interviews lasted roughly 30 to 45 minutes.

This study was conducted as part of my masters' thesis, due to the limited scale of the study, ethical approval was not requested. Prior to the interviews informed consent was verbally obtained from all participants and the research objectives, recording and information processing methods were explained. Pseudonyms have been used to preserve anonymity and quotations have been translated from Dutch to English.

## 4. Case Study: Heerlen (Netherlands)

To give a more concrete example of how the principles defined in the theory section can be applied to the design of public space a case study and exemplary design case have been developed. The case study focussed on the city centre of Heerlen (Netherlands), which historically developed through its booming coal mining industry (Langeweg, 2011). The strong focus on the mining industry led to a monotone, male-dominated job structure that made it difficult for other industries to establish themselves in the region (Schaap, 2011), causing a rise in unemployment and substance-abuse when it collapsed in 1965 (Kasper et al., 2013, p.16). After this collapse the region was rebranded as Parkstad (Park-city), and most reminders of the mining period were removed, leaving Heerlen's inhabitants feeling scared and discontent with the loss of identity it entailed (Hermans, 2016, p.112). Heerlen's renewal started in 2002 with the project 'Operatie hartslag' (Operation Heartbeat) (Verouden, 2004), aimed at restoring the city to a clean, unbroken and safe state. Subsequently, in 2013, the focus shifted to establishing a distinctive urban identity and rejuvenating the city centre through the IBA (Internationale BauAustellung) Parkstad program, (IBA Parkstad, n.d.). Despite these efforts, Heerlen remains the fourth least safe city in the Netherlands (Lare, 2019), has a below average economy (in comparison to the Netherlands) (Stadsregio Parkstad Limburg, n.d.) and faces issues of shrinkage (Verwest & Dam, 2010, pp.35-46) and, vacancy (Stadsregio Parkstad Limburg, n.d.) that create additional challenges for the design of public space.

### 4.1 Spatial analysis and observation

The spatial analysis and observations were conducted to gather insight into the functioning of the city centre in order to determine a suitable location for the exemplary design case. Based on the historic development of the city two streets can be appointed the main streets. The first is the *Saroleastraat (D)* which connects the old centre to the train station. The second is the *Promenade*, built during the height of the mining industry, which was originally designed to connect the city centre to the newly

built shopping mall *T'loon*. The city centre is defined by a city ring with a high traffic intensity within which most commercial activity is confined. Taking the *Bongerd* (A) as the central point and looking at the fastest routes of arrival by foot from a (bike)-parking or public transport stop indicates that the *Saroleastraat*, *Promenade* (E,F) and *Bongerd* (A) are expected to be the most used pedestrian routes, as indicated in figure 2. Analysis of the building functions indicates most retail and restaurant functions are clustered around these three streets and the *Oranje nassastraat* (I). Most vacant buildings are located along the edge of this retail cluster, as indicated in figure 3.

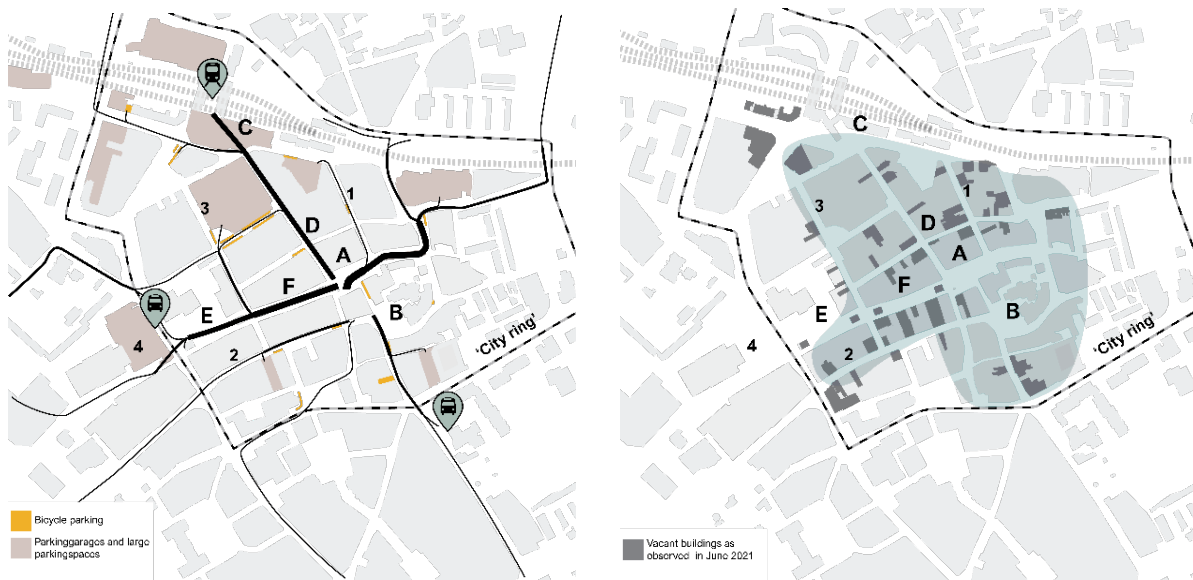


Figure 2 (left). Mobility and walking routes.  
Figure 3 (right). Commercial centre and vacancy.

From the observations it became evident that the *Saroleastraat* (D) indeed functions as the main street of Heerlen, attracting the most visitors while the other main street, the *Promenade* (E, F), surprisingly attracted the least visitors. However, the tracing method indicated that more visitors stayed in the *Promenade* (E) for an extended period than in any other observed location. There were usually more women visiting the observed locations, except at night when the percentage of women dropped to under 50% in all locations. Fewer women visited the locations alone, and more women were involved in care tasks or in the use of a wheeled object (Moonen, 2022, pp.81-85).

#### 4.2 Interviews

The goal of the interviews was to form a more comprehensive understanding of women's experience in the case study location in relation to the themes of safety, comfort and accessibility. During the interviews, the women were asked to visit certain places they liked or places they visited often. Examining their walking patterns, indicated in figure 1, it was noticeable that most women kept to the city's main streets (*Promenade* (E, F) and *Saroleastraat* (D)), as well as part of the *Honingmanstraat* (3) and *Geleenstraat* (2). In regards to safety, most women indicated they did not feel comfortable using certain

spaces alone out of fear of being approached or because of the presence of strange men, instead they felt more comfortable in busier spaces, with more 'eyes on the street', as they considered those spaces to be livelier. In addition, all women except Lenie (aged 78), mentioned using tactics of avoidance to ensure their safety, Tessa (aged 20) mentioned: "I really avoid [the supermarket north of the train station (C)] in the evening, there are really strange people there too, people who actually approach you or something. Suppose I go shopping, then I have to go there, but then I always walk via the bus terminal because otherwise, I have to pass those people". In addition, most women mentioned some strategy for self-defence, Marie (aged 30) mentioned sometimes holding keys between her fingers or pretending to be on the phone. While most women deemed these types of behaviour normal, they offer an example of the routine safety work carried out by women on a daily basis.

In general, more active places within the city, often those places with a higher level of informal surveillance, were experienced as more enjoyable and safer. By contrast, spaces that had a lot of vacant buildings or times where shops and amenities were closed were experienced as less enjoyable and less safe. For example, Edith (aged 37) mentioned; "when things [restaurants or shops] are open it feels safer, because if there is a lot of vacancy or if it is quieter in the street, then I'm also more observant of the condition of the street". The proximity of the police station also aided in respondents' perceived safety. For example, as Suzan (aged 26) stated that "you can always just go somewhere [when you feel unsafe] and the police station is close by and so on. But there are also always people on the street that you can go to if something is really going on." She elaborated that this was true for her, since she knew many people living in the city, but that this might not be true for other people who are less familiar with the city. In terms of comfort, most women agreed there is a need for more green space in the city and all of them walked towards a temporary green space along the Promenade (E). In addition, most women indicated they felt more comfortable in familiar places and would prefer additional seating options. When asked what strategies the women had for choosing where to sit, Lenie (aged 78) stated "I would, for example, sit on a bench on which my back faces the tree like that one [intersection Honingmanstraat (3) & Promenade (E, F)], but a three-person bench not, because then there is too much space left over, another person could easily come to sit next to you". This confirms the need for privacy and control over who sits next to her.

One issue that was remarked upon often related to lighting or lack thereof, as Tessa (aged 20) stated that she was "not too fond about this place [Promenade (F)] at night, I don't feel very comfortable in it. Just because like, there's usually weird people sitting on the benches, and at night it's empty and the trees make it dark and there is barely any light. So it's not a very nice place to walk at night. Also, [my friend her] bike was stolen here once." This indicated the lack of legibility and informal surveillance, in part caused by the large number of vacant or inactive buildings, and the importance of social relations in a space, both making the Promenade less comfortable to use.

Lastly, regarding accessibility, none of the women indicated they have had trouble accessing the city, though all of them mentioned some minor nuisances they faced when using the city. For example, Edith (aged 37) stated "What I don't like are those cobblestones, that are used here and there. As a woman, I don't like that, because it already prevents me from putting on heels, for example, so I always go to the city in flat

shoes. And it's not nice with the baby buggy either", illustrating the importance of surface-materials to women and caregivers.

Mapping the opinions the women expressed during the interviews indicated generally well-liked areas (Saroleastraat (D) – Bongerd (A) – Pancratiusplein (B)) and generally disliked areas (Burgemeester van Grunsvenplein (4) – Promenade (E, F) - Geleenstraat (2)). The generally liked areas were visited most, as observed in the counting method, had more (commercial) functions to interact with and a higher level of informal surveillance. On the other hand, the disliked areas overall attracted less visitors, and had less interactive features. In addition, the facades looked messy and incoherent and there was a lack of adequate lighting in the space, making it less legible.

## 5. An Exemplary Design Case: Promenade, Heerlen

It is evident from the historic development and spatial analysis that the Promenade (E,F) should function as one of the main streets of Heerlen, and provides one of the primary routes of access to the city centre. However, observations and interviews indicated that it is underused, and perceived as uncomfortable and unsafe, especially at night.

Therefore, the Promenade (E,F) was selected as the exemplary design case. The design case was developed as part of this research and primarily showcased how the eight design principles can be implemented in different spatial typologies. In addition, it follows the existing ambitions defined by the municipality and IBA Parkstad. The municipal plans for Heerlen's centre state the ambition to create a compact commercial centre and develop a greener housing space along the south side of the Promenade (E, F) (BoschSlabbers Landschapsarchitecten, 2018). In addition, the IBA Parkstad project has the ambition to further develop Heerlen's urban character, for example through graffiti art or urban sports (IBA Parkstad, 2017, p.36). These ambitions, along with the framework of design principles, inform the concept and spatial design.

The proposed design includes both urban and green spaces, forming an example of how the design principles can be applied to different types of public space. To briefly elaborate on the implementation of the design principles an isometric illustration, depicting the semi-urban location F, has been included in figure 4. An example of the implementation in other typologies can be found in the original thesis (Moonen, 2022).

The exemplary design case showcases how different interventions can contribute to a more gender-inclusive public space. The design interventions have been indicated with a number in figure 5, and are elaborated here in relation to the eight design principles.

*Legibility* is ensured by creating an overview at eye level by limiting the height of seating elements (3) and planting to 90 centimetres and ensuring trees are trimmed below 2.5 metres. In addition, using lighting that mimics the light of day (12), and incorporating signposts (14) and landmarks (5&2) to function as points of orientation, make the space easier to navigate. Ensuring *diversity* in seating heights and types (3), in events and activities, and in playground typology (4) attracts a *diverse* user audience, ensuring more people feel welcome or at ease in the city.

Encouraging temporary use and *space appropriation* may be achieved by including semi-private space (9) in front of shops and offering *diversity* in seating options and seating heights (3). In addition, non-commercial spaces for urban sports (2) and artistic expression like busking (6) or graffiti art (5) are facilitated. *The informal surveillance* is enhanced by replacing inactive shop windows with small businesses (10), creating a mix of

functions to ensure activity over time and circulating people through space through strategic placement of hotspots (11). Other *safety cues* are represented by incorporating welcoming signs like terraces (9), lighting (12), wastebaskets (13), playgrounds (4), and green space. Implementing a human scale (1) and making spaces more walkable, attracts more users, benefitting the *informal surveillance* while also prioritising *slow modes* of traffic.

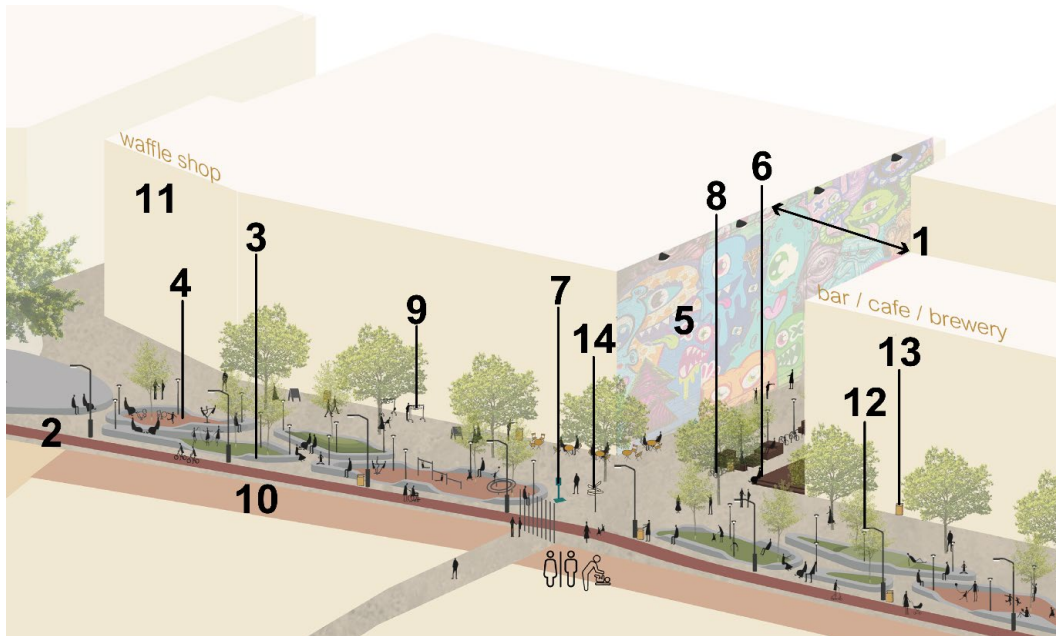


Figure 4. Isometric of location B as depicted in figure 4. The following design choices have been highlighted: (1) splitting up large blocks, (2) bike path, (3) diverse seating, (4) playgrounds, (5) graffiti wall, (6) platform, (7) amenities, (8) bike parking, (9) semi-private space, (10) small retail space, (11) strategic placement hotspot, (12) lighting, (13) wastebasket, (14) sign-post (Moonen, 2022).

To further encourage the use of *slow modes* of traffic sufficient bicycle parking (8) is provided, and a multifunctional broad bike path (2) is included. The bike bath is intended for bikes at night, increasing the number of people in space. In addition, by prohibiting cyclists during the day, the path increases the *ease of use* for people using a wheeled object or wearing heels. Furthermore, the *ease of use* and prolonged stay within the space is increased by ensuring wide tunnels and alleys (1), providing basic amenities (7) like public restrooms and water-tap points, seating (3) along long stretches of pavement and playgrounds (4) for different ages. Lastly, encouraging events focused on minorities, actively fighting street harassment and prohibiting the sexualization of women in public art, while also providing positive examples of women in street names, statues or other public art contribute to the *representation* of women. However, these are mostly achieved through less tangible interventions and policy making. The design interventions mentioned in this article discuss only a small part of the overall design. Hence, for more information on the design as a whole, the reader is referred to the original thesis (Moonen, 2022).

## 6. Conclusion

Public spaces are often designed according to a male standard user. As a result, women experience limitations regarding safety, comfort and accessibility when using public space. This research identified these limitations and explored how they can be mitigated through gender-inclusive urban design. By combining existing literature with observations and mobile interviews, this study developed a framework of eight design-principles: safety cues, informal surveillance, legibility, spatial appropriation, representation, diversity, slow modes and ease of use. Most of the design principles are strengthened by an active public space that offers a diverse set of activities and options of use. Vice versa, by implementing the design principles, public spaces become more active and enjoyable for a broader user audience.

This article contributes to existing literature by offering a practical, evidence-based framework that translates feminist urbanism theory into actionable urban design principles. While existing literature focussed on the gendered nature of public spaces and has demonstrated women's safety-concerns, this study advances the debate by providing clear design solutions aimed at addressing the issue.

It bridges the gap between theory and practice by demonstrating the practical implementation of the design principles through a case study and exemplary design case set in the Dutch city of Heerlen, which faces challenges such as a shrinking population, high vacancy rates, and limited economic activity. Based on a spatial analysis and observation of the city, it became evident that the Promenade (E, F) was designed as one of its central axes, but is now underused and deteriorating. Using the Promenade (E, F) as an exemplary design case, this article has demonstrated how the design principles can be applied in practice in the context of a mid-sized European city. In doing so it showcased how the implementation of the proposed framework may contribute to transforming public space into a more vibrant, safe, and inclusive environment that better serves all its visitors, particularly women.

The research was limited to women's experiences in urban places; the experience of women in places with a different typology, or the experiences of men were beyond the scope of this research. To ensure that all spatial needs can be considered in future public space design, it is recommended that similar studies are conducted on the experiences of people of different genders, ethnic backgrounds, religions, sexualities, and social classes, all carried out in the same spatial typologies, to assess the differences in behaviour and experience. Moreover, the exemplary design relies heavily on the creation of an active public space in a central location, however, not all spaces can be active, and neither should they be. Therefore, more research is needed to define how other spatial typologies (i.e., a suburb, larger city, village) can be designed to be safe, comfortable, and accessible. Lastly, the defined framework should be considered a guideline and not a set of rules, and it is important to remember that public space design alone does not make a space gender inclusive. Considering women as equal participants of public life should therefore be at the basis of decisions on the planning and design of public space.

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