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ORIGINAL PAPER
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INCLUSION OF OLDER PEOPLE IN URBAN PUBLIC SPACES: EVALUATION AND REVITALIZATION GUIDELINES BASED ON RESIDENTIAL AREAS IN ŁÓDŹ

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ABSTRACT

Motives: In response to the growing need to adapt urban environments to the requirements of an ageing population, this study examines the quality of the residential environment in selected housing estates in Łódź (Teofilów, Dąbrowa and Karolew).
Aim: The aim was to identify spatial barriers affecting the everyday functioning of older residents and to formulate revitalization guidelines to improve the accessibility and usability of shared spaces.
Results: The findings reveal both strengths and deficiencies of the studied areas, ranging from well-maintained green spaces to neglected pedestrian routes and limited functional accessibility. Particular attention was given to mobility-related needs of older residents and the potential for strengthening their social participation through appropriate spatial design. The proposed guidelines emphasize the potential of these estates to serve as inclusive everyday living environments, where physical quality is aligned with social integration and a sense of place.

Keywords: inclusion, older people, universal design, public space, Łódź

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INTRODUCTION

Developed societies, including Poland, are undergoing profound demographic changes associated with population ageing. Increasing life expectancy and improved living conditions contribute to a rising share of older adults in cities. Consequently, their presence in public space grows, along with a shift in their social role, from passive observers to active users of the urban environment. Although various initiatives aim at older people activation, insufficient adaptation of physical spaces remains a significant challenge.

Deficiencies in urban infrastructure are particularly visible in the accessibility and functional performance of public and semi-public spaces. Contemporary design solutions, despite visual attractiveness, often disregard the specific needs of older adults, such as the lack of backrests on benches, insufficient shade, limited access to public toilets, uneven pavements, high curbs, narrow passages or inadequate lighting. Urban noise further reduces comfort and negatively affects physical and mental health.

A particularly problematic situation is observed in housing estates built between the 1950s and 1970s, which today accommodate a large proportion of older residents. Although originally planned with generous green areas and clear functional structures, many of these estates now suffer from spatial degradation, lack of systematic revitalization, and uncontrolled transformations. Sidewalks are frequently obstructed by parked cars, greenery is poorly maintained, and small architectural elements are damaged or missing. As a result, these spaces lose their integrative and recreational function and increasingly become barriers to daily activity, especially for older people. At the same time, their spatial layout, green areas and functional structure offer substantial potential for adaptation.

The aim of this article is to analyse spatial exclusion of older adults in urban public spaces and to identify strategies to counteract this phenomenon. The study focuses on selected housing estates in Łódź, a city characterised by extensive residential areas from the 1960s–1980s. The research evaluates the existing infrastructure, the quality and functionality of green spaces, and the degree to which these spaces meet the needs of older adults. The results constitute the basis for developing design conclusions and revitalization recommendations aimed at strengthening social inclusion of older adults in urban environments.

LITERATURE REVIEW

The changing demographic structure of cities, and in particular the increasing share of older people in the urban population, poses new challenges for urban planning, landscape architecture and spatial policy in the field of designing older adults-friendly environments (Buffel et al., 2012; Kaczmarek, 2022; Lievesley, 2012; Moulaert & Garon, 2016). This process is not a local phenomenon, but is observed globally, especially in developed countries, where a systematic increase in the share of the population over 65 years of age is projected. These changes entail the need to redefine existing models of designing and managing urban space so that they respond to the needs of this increasingly numerous group of users (Martinez-Fernandez et al., 2012; Padeiro et al., 2022; Wang et al., 2021). In the urban planning context, it becomes necessary to move away from universal spatial models towards flexible solutions that take into account the diverse physical, perceptual and social capacities of older people (Buffel et al., 2012; Clarke et al., 2012; Peace et al., 2006).

The issue of inclusion of older people in urban space has already been addressed many times in the literature (Clarke et al., 2012; Liougas et al., 2025; Marin & Zaidi, 2007; Urra-Uriarte et al., 2024), yet significant gaps in the implementation of solutions at the local scale are still observed, especially in post-war residential areas. Despite the growing number of studies and the declared interest in this issue among decision-makers and planners, activities of an ad hoc nature still dominate, disconnected from a long-term strategy for sustainable urban development. In such areas there is often a lack of systematic transformations

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of public and semi-public spaces that would take into account the specific needs of older adults, and modernization is limited to cosmetic changes that do not correspond to real barriers in the use of these places.

According to the concept of age-friendly cities, developed, among others, by the World Health Organization (2007), urban spaces should be designed to enable older people to function as long as possible in an independent and safe way (Buffel et al., 2012; Czaplicka et al., 2024; van Hoof et al., 2018; Fitzgerald & Caro, 2016; Senetra et al., 2024). This concept comprises eight key domains, such as: outdoor spaces and buildings, transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information, and community support and health services. The adaptation of the physical environment to the needs of older adults is therefore only one element of a broader strategy aimed at building an inclusive and sustainable society based on accessibility and equal opportunities (Li & Woolrych, 2021; Noorlailahusna & Suziana, 2023; World Health Organization, 2025).

Researchers emphasise that the quality of public spaces has a direct impact on the well-being of older people, their independence, mobility and participation in social life (Hoehner et al., 2003; Leyden, 2003; Noorlailahusna & Suziana, 2023). High urban and landscape quality can foster everyday physical activity, neighbourly contacts and participation in local events, which is particularly important in the context of preventing isolation and social exclusion (Alcock et al., 2014; Cattell et al., 2008; Jaszczak et al., 2024; Sugiyama et al., 2008). Numerous studies indicate that older adults often give up using public spaces precisely because of their low user comfort, lack of safety or excessive distances between everyday functions (van Hoof et al., 2018; Pacione, 2003).

Elements such as benches with backrests, shading, access to public toilets, safe crossings or an aesthetically pleasing environment can significantly improve the comfort of using space. Their presence also increases the time spent in a given place, facilitates rest and recovery, and offers the possibility of observing the surroundings, which for older adults plays an important social and psychological role. Conversely, the lack of such amenities leads to marginalisation and limitations of older adults activity, which may contribute to their social isolation. Many authors also point out that barrier-free architecture should be the standard, not the exception, yet it is still too often treated as an additional cost or a secondary element in the design process (Dempsey et al., 2011; Steinfeld & Maisel, 2012; O'Sullivan, 2011).

The literature also highlights the importance of the urban heritage of housing estates from the 1950s, 1960s and 1970s which, despite their current neglect, are characterised by adaptive potential (Gyurkovich et al., 2021; Labus, 2013). These estates were built according to specific modernist principles, assuming access to greenery, the presence of services within walking distance and shared spaces integrating residents (Dempsey et al., 2011; Hall, 1988). In many cases, the urban structure of these areas remains legible and functional, yet physical degradation, lack of proper maintenance and changes in property ownership have led to their marginalisation in urban spatial policy (Miszewski et al., 2025). Nevertheless, these estates, as coherent urban units, have considerable potential for transformations that support the integration and activation of older adults.

The problem of insufficient adaptation of public spaces to the needs of older people is particularly visible in the context of revitalisation (Burns et al., 2012; Lewis et al., 2022; Pacione, 2003). In many cases, these activities focus mainly on aesthetic or technical aspects, overlooking user and social aspects (Healey, 2007; Roberts, 2017). Revitalisation understood merely as the modernisation of technical infrastructure, without taking into account the needs of local communities, may lead to deepening exclusion (Tsenkova, 2009). Properly planned revitalisation should be based on an understanding of residents' needs, taking into account their age, lifestyle and expectations regarding shared spaces (Evans, 2005).

At the same time, as Gehl (2010) and Degen & Rose (2012) note, urban space should be designed

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with regard to the everyday practices and behaviours of residents, which is crucial for building a sustainable and inclusive urban environment. Design based on the observation of daily life and actual ways of using space (life between buildings) makes it possible to create places that truly respond to the needs of different user groups, including older people (Gehl, 2010). In line with this approach, public space should foster social interactions, be safe, aesthetically pleasing and functional, while remaining flexible in use.

The concept of universal design also applies to the design of housing estate spaces. It assumes creating solutions that are accessible to the widest possible group of users, regardless of age, physical fitness level or sensory limitations (Burns et al., 2012; Steinfeld & Maisel, 2012). Universal design does not mean creating "one-size-fits-all" spaces in a compromising way, but rather intelligently combining function and form so as not to exclude anyone. In practice, this means designing step-free routes, using colour contrasts, appropriate signage, non-slip surfaces, benches with armrests and other elements that support the mobility of people with reduced physical capacity.

In Poland, this topic has only recently begun to gain importance, but is increasingly appearing in the context of local spatial policies, particularly in cities with an ageing demographic structure. The growing number of local and national programmes, such as revitalisation programmes, older adults policies or accessibility strategies, provides a potential basis for implementing inclusive design at the level of housing estates (Karśnicka et al., 2023; Lechowska, 2018).

An important complement to this discussion is participatory research, which shows that effective adaptation of public spaces requires dialogue with the users themselves, including older people (Bovaird & Löffler, 2003). Their experiences and needs constitute a valuable source of knowledge for designers and decision-makers responsible for shaping the urban environment. Participation not only increases the effectiveness of design, but also strengthens older adults' sense of agency, integrates the local community and enhances identification with the place of residence (Fung, 2006; Jian et al., 2025).

Researchers point to the need for an integrated approach to the design and revitalisation of housing estate spaces in cities, which would take into account not only technical and aesthetic aspects, but above all social and functional ones (Carmona, 2014; Evans, 2005). Properly considered design interventions can significantly improve the quality of life of older people and support their active participation in the life of the urban community. However, the success of such actions depends on the genuine inclusion of older adults in planning processes and on treating them not as beneficiaries, but as full participants in urban life.

MATERIALS AND METHODS

Study area

The research was conducted in the city of Łódź, one of Poland's largest urban centres, currently facing challenges related to population ageing (Fig. 1), depopulation and the need to adapt its post-war housing resources. Three large-panel residential estates located in Bałuty, Górna and Polesie districts were selected for analysis (Fig. 1). These areas exhibit the highest share of older residents in the city.

Site selection was based on demographic and spatial analyses as well as field reconnaissance, including observations of everyday behaviours and direct on-site surveys. Transport accessibility, urban structure and the potential of semi-public and green spaces for inclusive functions were also considered. The chosen estates differ in size, spatial layout and accessibility, enabling comparative evaluation.

Teofilów Estate (Bałuty District) is one of the largest residential estates in Łódź, located in the western and partly south-western part of the city. The analysed area covers approximately 85 hectares and is delineated by the following streets: Aleksandrowska (north), Kaczeńcowa (west), Rojna (south), and Wici (east). The estate was constructed between 1964 and 1977 based on modernist planning principles, characterised by large-panel buildings, extensive communal spaces and substantial estate greenery. Teofilów is well connected to the rest of the city: tram tracks run along Aleksandrowska Street, and several bus lines serve

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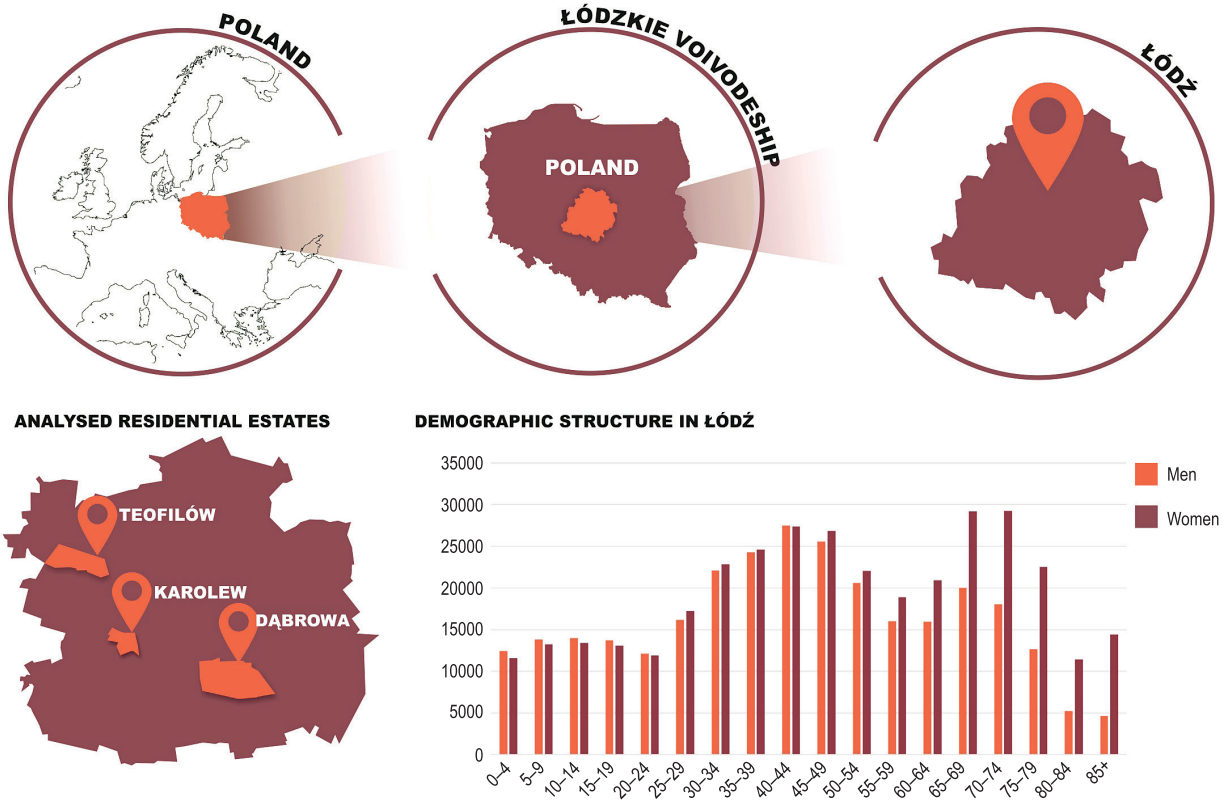

Fig. 1. Research area and demographic structure of Łódź (2024)
Source: own elaboration of authors based on Central Statistical Office (2025).

the central part of the estate. The Łódź Żabieniec railway station is also located nearby, improving overall accessibility. Teofilów is distinguished by a clear functional layout, wide spacing between buildings, and a high proportion of green areas, all of which create favourable conditions for revitalisation initiatives focused on the needs of older residents.

Karolew Estate (Polesie District) located in the western part of the city, is an example of a housing estate built in the 1960s and 1970s in the immediate vicinity of a major transport hub, the Łódź Kaliska railway station. The analysed area covers approximately 65 hectares and is bounded by Maratońska Street (south), Bandurskiego Avenue (north), and Waltera-Janke Street (east). The estate's spatial layout follows an axial structure, with large open spaces between buildings and clearly defined green and recreational areas. Karolew is very well served by public transport, with five tram lines and nine bus lines operating within or near the estate. Despite gradual physical degradation, the estate's urban and infrastructural structure retains significant adaptive potential in relation to contemporary needs, including those of older adults. Its spatial configuration allows for targeted interventions such as green micro-spaces, rest areas or small-scale architectural elements that foster social interaction among residents.

Dąbrowa Estate (Górna District) is located in the southern part of Łódź and is one of the largest and most densely populated large-panel estates in the city. The analysed area covers approximately 91 hectares and is bounded by Dąbrowskiego Street (north), Gojawiczyńskiej Street (east), Śląska Street (south), and Niższa Street (west). Dąbrowa was developed

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in the 1960s and 1970s according to the model of a self-contained housing unit, comprising extensive residential complexes accompanied by service and social facilities. The estate is connected to the rest of the city by a tram line and several bus routes, providing relatively good transport accessibility. Despite numerous transformations and instances of physical degradation, the estate features clearly defined courtyards, squares and green pockets, which constitute potential sites for revitalisation interventions. The high proportion of older residents within the demographic structure of Dąbrowa makes it a particularly relevant area for analysing spatial inclusion of older adults.

Methods and research stages

The research methodology was based on a multi-stage process combining field analysis, assessment of technical infrastructure and qualitative evaluation of social aspects. The main stages of the study are outlined below.

Analysis of green areas

The first stage consisted of a detailed inventory of green spaces within the three selected estates (Teofilów, Dąbrowa and Karolew). The analysis covered parks, small green squares, recreational areas and semi-private greenery between residential buildings. The aim was to assess the current condition and potential of these areas to support recreation and rest, particularly for older adults.

The analysis was qualitative and based on:
- direct field observations of vegetation (tree cover, shrubs, lawns), existing infrastructure and actual use patterns, including by older adults;
- evaluation of the size and spatial distribution of green areas, their condition, aesthetics and functional qualities;
- identification of existing and potential older adults-friendly functions (e.g., shaded areas, rest points);
- assessment of possibilities for introducing comfort-enhancing elements such as benches, shelters, walking paths or shaded seating zones.

Analysis of transport accessibility

The second stage evaluated transport accessibility in relation to the mobility needs of older residents. This included the location and availability of bus and tram stops, the frequency of service, and access from central points within each estate. The proximity and accessibility of railway stations were also assessed.

The purpose of this stage was to determine to what extent the transport system supports older adults' independence, daily activity and social participation. The analysis enabled an assessment of whether older adults have realistic opportunities to use public transport as a primary mode of travel.

Analysis of the accessibility of public spaces

This stage focused on qualitative field observation of public spaces most frequently used by older adults. The assessment included:
- identification of key places of everyday use, such as service points, markets, pavilions, parks, squares and public transport stops;
- evaluation of rest areas (benches, shelters), their location, shading, exposure to weather, noise levels and general surroundings;
- observation of behavioural patterns, including preferred and avoided places;
- analysis of social functions of public spaces and their role in older adults integration;
- comparison of the estates in terms of the availability and quality of rest areas, public transport access and older adults-friendly infrastructure.

Additional factors affecting comfort, such as greenery, noise exposure, physical barriers, poorly ocated seating or insufficient benches near building entrances, were also considered.

Analysis of pavement conditions

This qualitative study involved direct field observations and a visual technical assessment of pavements along the most frequently used pedestrian routes. The analysis covered:

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– type and condition of paving on sidewalks, estate pathways and routes leading to service points, stops and building entrances;
– physical barriers such as high curbs, damaged paving slabs or obstructive infrastructure placed along pedestrian routes;
– availability of mobility-supporting features (lowered curbs, tactile surfaces, unobstructed routes for wheelchairs or walkers);
– extent of vehicular encroachment on pedestrian space, especially illegal parking.

Research included transect walks through central and peripheral parts of each estate, photographic documentation and field notes on surface quality, functionality and pedestrian barriers.

Analysis of lighting in relation to older adults safety

Lighting quality in public spaces was assessed through evening field observations to identify well-lit, poorly lit and potentially unsafe areas. The evaluation focused on pedestrian routes, public transport stops, inter-block spaces and areas near service and recreational facilities. The assessment included:
– distribution and regularity of lighting poles;
– estimated light intensity (good/moderate/low);
– identification of poorly lit zones affecting older adults' sense of safety or spatial orientation;
– comparison of lighting levels between main routes and less frequented inter-building spaces;
– technical condition of lighting fixtures (e.g., non-functioning or flickering lamps).

Observations were carried out after dusk in key locations such as stop areas, market zones, entrances to residential buildings and pedestrian alleys.

Analysis of pavement conditions in relation to older adults mobility

This qualitative assessment was based on direct field observations and a visual technical evaluation of pavements along the pedestrian routes most frequently used by older residents. The analysis covered:
– the type and condition of surfaces on sidewalks, estate pathways and routes leading to service points, public transport stops and building entrances;
– physical barriers such as high or poorly profiled curbs, damaged or uneven paving slabs, and infrastructural elements obstructing pedestrian routes (e.g., poles);
– availability of mobility-supporting features, including lowered curbs at crossings, tactile paving at stops and pedestrian crossings, and unobstructed routes suitable for wheelchairs or walkers;
– the extent of vehicular encroachment into pedestrian space, particularly illegal parking that restricts movement.

The study was conducted in both central and peripheral parts of each estate, enabling the identification of local issues and variations in pavement quality significant for older adults. Research methods included transect walks along selected routes, photographic documentation of problematic areas and field notes regarding surface functionality and pedestrian barriers.

Analysis of lighting and perceived safety among older adults

Lighting conditions in public spaces were evaluated through evening field observations aimed at identifying well-lit, poorly lit and potentially unsafe areas for older adults after dark. The assessment focused on pedestrian routes, public transport stops, inter-block spaces, and areas surrounding service and recreational facilities. Observations included:
– the distribution, spacing and regularity of street lighting;
– estimated illumination levels (good/moderate/low) assessed on-site without measuring equipment;
– identification of poorly lit areas that may reduce older adults' sense of safety or hinder spatial orientation;
– the relationship between lighting quality and spatial function, considering differences between main pedestrian routes and less frequented inter-building areas;

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– the technical condition of lighting fixtures (e.g., non-operational, flickering or dim lamps).

The study was conducted after dusk across the three estates, focusing on key locations for older residents such as public transport stops, market and service areas, entrances to residential buildings and pedestrian alleys.

Criteria for Developing the Recommendations

The process of developing recommendations for each housing estate was based on a set of unified diagnostic criteria used to assess the quality of shared urban spaces. These criteria included: the condition of pedestrian infrastructure, the availability of small architectural elements, the level of safety and lighting quality, the legibility of the spatial layout, the presence and functional performance of green areas, and the potential of public spaces to support social interaction. Together, these criteria enabled a comparable assessment of the three analysed estates and facilitated the identification of areas requiring improvement. The formulation of the recommendations was also informed by measurable field observations, including:

– the frequency of spatial barriers;
– the number and spatial distribution of mobility obstacles (e.g., damaged pavements, missing ramps, insufficient seating);
– the quality and accessibility of pedestrian routes;
– the degree of use and functional connectivity of green spaces;
– the intensity of traffic-related conflicts caused by parking;
– the visibility and logical structure of pedestrian paths and crossings.

Incorporating these criteria and observations ensured transparency in the evaluation process and enabled the recommendations to be tailored precisely to the functional and spatial characteristics of each estate.

RESULTS

Analysis of green areas in relation to their potential for renewal

The assessment of green spaces in the three selected housing estates Teofilów, Dąbrowa and Karolew allowed the identification of both their potential and the challenges associated with adapting these areas to the needs of older residents (Fig. 2).

Teofilów is considered one of the greenest estates in Łódź. Its main streets are lined with mature tree avenues that form natural green corridors. Numerous shrubs and well-maintained lawns are present between residential buildings, resulting in a generally good overall condition of greenery and the absence of neglected spaces. Although the green strips between buildings are narrow and limit the creation of large recreational areas, they offer opportunities for introducing small rest zones such as benches or compact leisure modules. Slightly worn but still valuable shaded squares located along the main streets serve as popular meeting places for older residents. Additionally, former asphalt sports fields, currently unused or underused, represent significant potential for redevelopment into quiet recreational spaces, removed from traffic and everyday noise.

Dąbrowa contains several larger green areas with potential for conversion into older adults -friendly designed greenery. They are located both between residential blocks and along the main pedestrian routes. The most attractive zones are at the estate's edges, where shaded paths and mature tree stands have been preserved. However, the overall condition of greenery is weaker than in Teofilów. Insufficient maintenance, irregular care of vegetation and a limited amount of small architectural elements reduce the functional and aesthetic value of these spaces. Many green areas do not encourage active use or rest, which restricts their social role. This highlights the need for targeted revitalisation to restore usability and improve comfort for older residents.

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Fig. 2. Green areas in relation to their potential for renewal in the analysed estates
Source: own elaboration.

Karolew presents the most significant limitations regarding public green space. The estate's structure, characterised by a large share of private plots, educational and medical facilities, and industrial areas, leads to fragmentation and reduced accessibility of green areas. Some open zones with potential for redevelopment are effectively excluded from public use due to the presence of high-voltage transmission lines. Nevertheless, small courtyards and green enclaves between buildings serve limited recreational functions. Notably, bottom-up community initiatives, such as the neighbourhood garden on Wróblewskiego Street, created by residents using recycled materials and their own plants, demonstrate strong local engagement and the need for accessible green meeting spaces. These grassroots actions highlight a valuable social foundation for future revitalisation projects.

The analysis of green areas in the three housing estates reveals clear differences in their quality, level of maintenance and overall potential for revitalisation in relation to the needs of older adults (Table 1).

Table 1. Comparative assessment of potential of green areas for renewal

Criterion	Teofilów	Dąbrowa	Karolew
Extent of green areas	Large	Medium	Small
Condition and maintenance	Good	Low	Low
Accessibility for residents	High	High	Limited (private areas / institutional land)
Shading (comfort for older adults)	High (tree-lined avenues, shaded squares)	Moderate	Variable
Revitalisation potential	High (e.g., former sports fields)	High (alleys, peripheral zones)	Low (few available areas, fragmented space)
Local community initiatives	Limited	None	Present (community garden)

Source: own elaboration.

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Analysis of accessibility in relation to public transport

Public transport accessibility in Teofilów is assessed as very good. Bus stops are evenly distributed across the estate, enabling residents to reach them within 5–10 minutes on foot. The well-designed spatial layout and recent modernisation have reduced parking-related problems, with a sufficient number of parking spaces available. Main pedestrian routes run parallel to the primary road arteries and provide convenient access to service and commercial areas, even from the more peripheral parts of the estate (Table 2).

Public transport on Dąbrowa also functions efficiently, with bus stops located along the main thoroughfares. The primary roads have been renovated, improving vehicular comfort and travel conditions. However, chaotic parking remains a significant issue. Cars frequently occupy sidewalks and green strips, which hinders pedestrian movement and negatively affects the estate's visual quality. The streets most commonly used by residents include Dąbrowskiego, Broniewskiego, Felińskiego and Zapolskiej. A charac-

Table 2. Comparative assessment of public transport accessibility in the analysed housing estates

Criterion	Teofilów	Dąbrowa	Karolew
Proximity of stops	Very good (5–10 min walking distance)	Good, though less evenly distributed	Good, particularly in the western part
Types of public transport	Tram and bus	Bus	Tram, bus, rail
Transport-related issues	No major problems	Illegally parked cars, damaged greenery	Lower accessibility in the eastern part
Quality of pedestrian space	Well-developed pedestrian network	Partly obstructed by parked cars	Complex layout hindering orientation
Access to major transport hubs	Moderate	Moderate	High (proximity to Łódź Kaliska station)

Source: own elaboration.

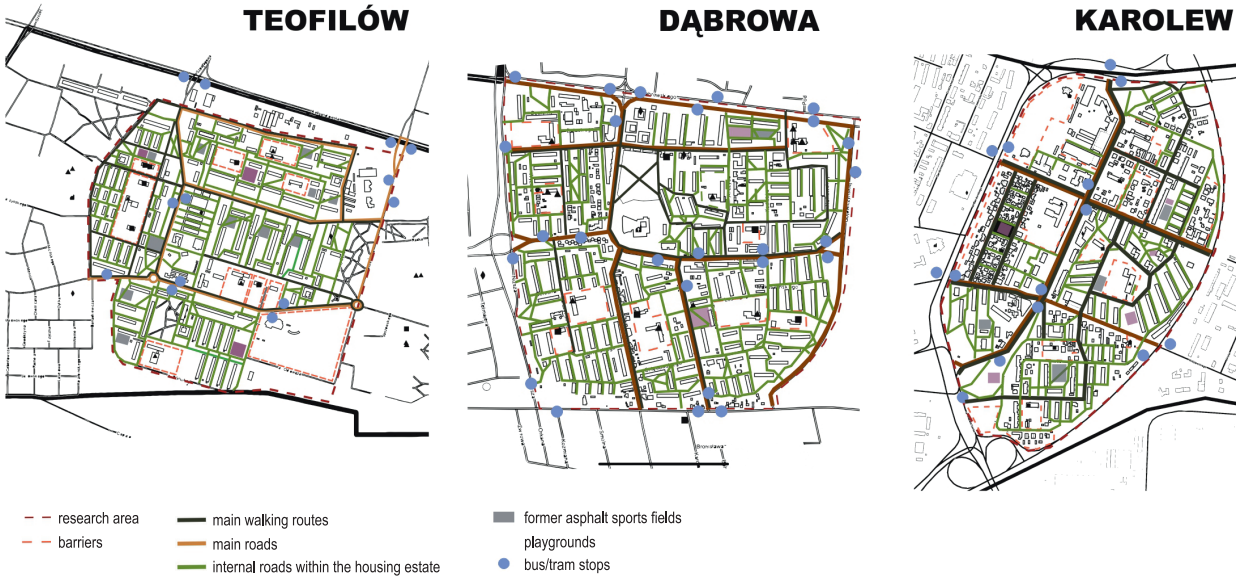

Fig. 3. Public transport accessibility in the analysed estates
Source: own elaboration.

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teristic feature of the estate is the central park, which serves as a commonly used pedestrian shortcut, especially for residents of the eastern part of Dąbrowa.

Karolew is located near the city centre, adjacent to the Atlas Arena, one of the main cultural venues in Łódź. A tram line runs directly through the estate, providing fast connections to other parts of the city. The nearby Łódź Kaliska railway station further enhances its accessibility, especially on a metropolitan and regional scale.

Accessibility, however, varies within the estate. The western part is significantly better connected, offering bus stops and multiple access points. The eastern part, situated closer to the railway tracks, has fewer connections, requiring residents to cover longer distances on foot. The urban layout is complex: estate streets do not form a regular grid, and the buildings are arranged in varied configurations, which may be challenging for unfamiliar users and may impede intuitive navigation for older adults.

All three housing estates exhibit generally good public transport accessibility, yet they differ in spatial organisation and user experience. Teofilów offers the most orderly and evenly distributed transport infrastructure. Osiedle Dąbrowskiego benefits from advantageous location, but chaotic parking significantly disrupts pedestrian spaces. Karolew, despite excellent location and access to multiple modes of transport, is hindered by a complex urban layout and uneven distribution of stops (Fig. 3).

Analysis of accessibility in relation to public spaces

On Teofilów, older residents most often use the commercial-service area centred around the market on Rydzowa Street, which functions both as a shopping and social hub. Although several benches are located near Rydzowa and Rojna Streets, they are frequently occupied by public transport users. Outside the market area, seating is scarce and often poorly located, exposed to full sunlight or adjacent to parking lots, which reduces comfort. Benches are largely absent near building entrances, limiting opportunities for short rest in close proximity to homes (Fig. 4). Local service pavilions play a supplementary role but do not attract older adults to the same extent as the main market.

Fig. 4. Public spaces chosen by older people in the analysed estates
Source: own elaboration.

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Dąbrowa offers very few resting places in commercial areas. Benches at bus stops seat only a few people and do not meet the needs of the sizable older people population. At the popular "Pionier" shopping centre, benches are few and placed in full sun. Better conditions are found in the park on Broniewskiego Street, which provides numerous shaded benches and chess tables, encouraging social activity among older adults. Smaller shaded squares between Rydla and Dąbrowskiego Streets are also valued by older adults. A well-designed shaded seating area near the service buildings across Dąbrowskiego Street further supports everyday use by older residents (Krzesińska vel Rosiak, 2022).

On Karolew, older adults commonly use commercial areas such as the pavilions on Bratysławska Street, the "Karolinka" market on Wróblewskiego Street, and the service complex on Wioślarska Street (TOYA building). These locations offer services tailored to older residents. Along the estate's main pedestrian routes, metal benches with backrests enable short breaks while walking or shopping. Older residents often use shops outside the estate, supported by good public transport. Compared to the other estates,

Table 3. Comparative assessment of public spaces accessibility in the analysed housing estates

Criterion	Teofilów	Dąbrowa	Karolew
Main meeting places	Market at Rydzowa St.	Park at Broniewskiego St.; small squares	Service pavilions; "Karolinka" market
Bench availability	Uneven; lacking near buildings	Insufficient in service areas; better in parks	Regularly placed along main routes
Bench usability	Often in sun; near parking lots	Best in parks and shaded squares	Metal benches with backrests; some shaded
Availability of shade	Limited	Present mainly in parks	Moderate
Overall functionality for older adults	Low outside the market area	Medium; concentrated in selected spaces	High along main pedestrian routes

Source: own elaboration.

Fig. 5. Pavement condition in the analysed estates
Source: own elaboration.

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Karolew provides the most balanced seating infrastructure, particularly in areas with high pedestrian activity.

The three estates differ markedly in terms of accessibility and comfort for older residents (Table 3). Teofilów concentrates older adult activity around the market, but lacks adequate resting places elsewhere. Dąbrowa has insufficient seating in service areas, though this is partly offset by its well-designed park and shaded neighbourhood squares. Karolew offers the most consistent and older adults-friendly infrastructure, including benches with backrests and well-distributed service points.

The pavement assessment shows clear differences between the estates in terms of accessibility and safety for older adults (Fig. 5). Teofilów represents the highest standard: recent upgrades have improved key pedestrian routes and introduced mobility-friendly solutions. Dąbrowa displays the greatest number of architectural barriers, such as aged surfaces, high curbs and numerous obstacles on sidewalks significantly reduce pedestrian comfort for older adults. Karolew occupies an intermediate position: some areas offer good conditions, but the absence of comprehensive modernisation and frequent parking on sidewalks negatively affect everyday mobility for older residents (Krzesińska vel Rosiak, 2022).

Lighting analysis in relation to older adults safety

In Teofilów, lighting improvements accompanied surface modernisation. Main estate roads are well and evenly illuminated, ensuring safe movement after dark. In inter-block areas, lighting is intentionally dimmer and poles are spaced further apart, which may reduce perceived safety among older adults. Daytime-use zones, such as school and preschool areas, remain poorly lit and appear neglected after dusk.

In Dąbrowa, good lighting is found primarily along main roads. Internal streets and inter-block spaces feature sparsely spaced lamps, some in poor technical condition and emitting insufficient light. These areas may be difficult for older adults to navigate safely, especially during the autumn-winter months.

Karolew provides good lighting along its main roads and public transport stops, particularly in the western part of the estate, which offers the highest level of safety after dark. The eastern and southern parts, with garages and less frequented paths, are less illuminated. Although estate streets and inter-block passages contain point lighting, their number and spacing do not always ensure adequate visibility, creating barriers for older pedestrians (Table 4).

The lighting assessment (Fig. 6) shows that Teofilów offers the safest evening environment, particularly along its main pedestrian and vehicular routes. Modern fixtures provide good illumination, although dimmer lighting between buildings may reduce older adults' sense of safety.

Dąbrowa shows the lowest lighting standard outside main roads. Point-based and often malfunctioning lamps, combined with the lack of systematic upgrades, make many internal areas difficult and uncomfortable for older adults to navigate after dark.

Karolew presents a mixed picture: the western part is well lit and generally safe, while southern and eastern sections remain insufficiently illuminated.

Table 4. Comparative assessment of lighting in the analysed housing estates

Criterion	Teofilów	Dąbrowa	Karolew
Lighting of main roads	Very good	Good	Good
Lighting between buildings	Moderate, diffuse	Weak, point lighting	Weak to moderate
Technical issues	No major faults	Frequent malfunctions, low light output	Locally insufficient illumination
Lighting in service areas	Good but subdued	Point lighting, insufficient	Good in western parts
Perceived evening safety	High along main routes; lower in inter-block areas	Low in side areas	Varied – high in the west, lower on the periphery

Source: own elaboration.

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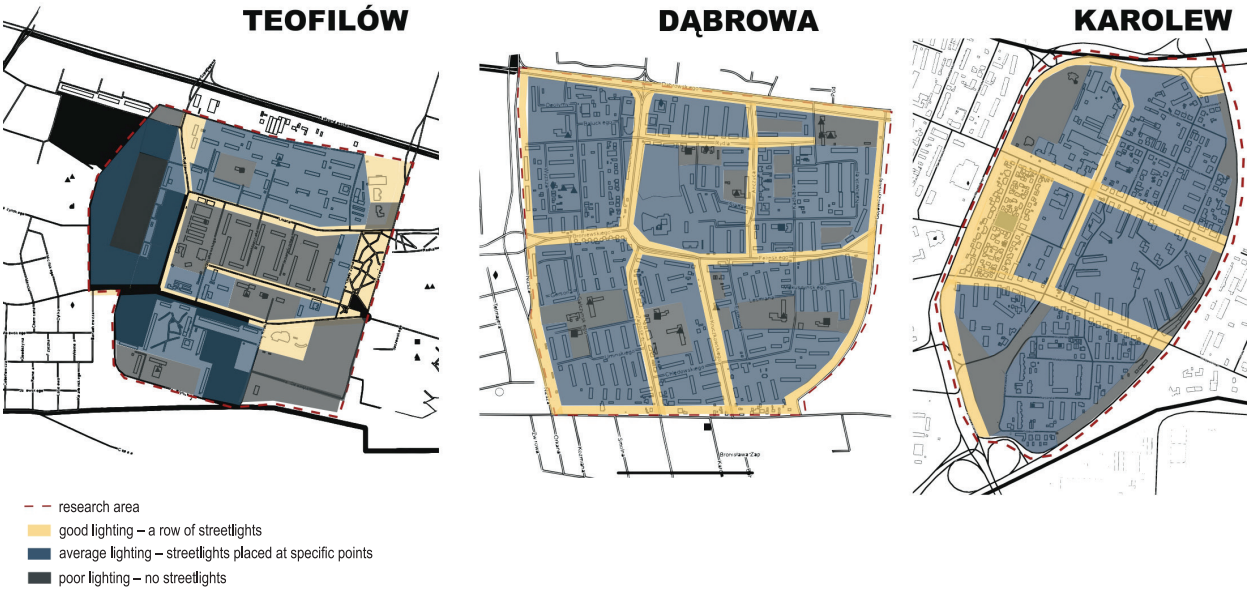

Fig. 6. Lighting in the analysed estates
Source: own elaboration.

Point lighting between buildings does not always ensure adequate visibility, which may discourage evening activity among older residents (Krzesińska vel Rosiak, 2022).

Recommendations for future revitalisation actions considering the needs of older adults

The revitalisation of public spaces in the studied housing estates should be based on an integrated approach that combines infrastructural improvements with social activation and a precise diagnosis of local needs. Older adults, being particularly sensitive to the quality of their surroundings, should be treated not only as beneficiaries but also as active participants in planned interventions.

General recommendations for all estates

1. Individualised design strategies. Each estate has a distinct spatial structure, circulation layout and functional potential. Revitalisation should therefore rely on tailored solutions responsive to local conditions rather than universal, standardised models.

2. Linking infrastructure with social initiatives. Improvement of the physical environment (pavements, lighting, benches, accessibility features) should be accompanied by actions fostering social interaction, such as community gardens, neighbourhood spaces or small meeting areas supporting intergenerational exchange.

3. Inclusion of older adults in the planning process. Public consultations involving older residents are essential, as they provide valuable insights into everyday barriers, mobility challenges and expectations regarding public space. Their participation enhances the social acceptance and long-term sustainability of revitalisation projects.

4. Prioritising accessibility and comfort. Revitalisation efforts should eliminate architectural barriers and ensure adequate shading, seating, public toilets and well-lit, safe pedestrian routes. These elements directly influence the quality of life of older adults and support their ability to function independently in urban space.

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Estate-specific recommendations

The Teofilów offers a strong foundation for older adults-friendly interventions due to its good-quality infrastructure and well-maintained green areas. Recommended actions (Fig. 7) include expanding existing rest zones, introducing small recreational modules and neighbourhood meeting points, and implementing pilot participatory initiatives with older adults, such as planning workshops. The square at Aleja Salomei Brynickiej is an example of a space with high revitalization potential, which is currently not an attractive area for older people. Maintaining and upgrading current infrastructure, renewing benches or improving small green squares, could significantly enhance spatial quality without requiring costly investments. Analysis of bench distribution (Fig. 4) indicated that this is important, among other things, on the footpath (between Strzałkowskiego Street and Aleja Urody Życia). What is more, this is a place where older people often walk, and the potential for revitalizing this space has been identified as high (Fig. 2).

Dąbrowa faces several infrastructural challenges, including chaotic parking and poor pavement quality, which require comprehensive repair measures, particularly to improve pedestrian conditions (Fig. 8). Peripheral green areas should be better utilised by introducing older adults-oriented amenities such as benches, pergolas and shaded walkways (e.g. green area at Broniewskiego Street and at Gojawiczyńskiej Street). Developing a system of "green corridors" could facilitate comfortable movement between residential buildings and public transport stops. Improving the overall aesthetics of the estate and reducing car pressure through reorganised parking zones is also essential.

Given its fragmented spatial structure and functional limitations in the eastern part, Karolew requires small, targeted interventions such as pocket green

Fig. 7. Areas suitable for implementing the recommendations in the Teofilów estate
Source: own elaboration.

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Fig. 8. Areas suitable for implementing the recommendations in the Dąbrowa estate
Source: own elaboration.

Fig. 9. Areas suitable for implementing the recommendations in the Karolew estate
Source: own elaboration.

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spaces, shaded seating niches and neighbourhood gardens (Fig. 9). Analyses showed that there are green areas with trees on Bratysławska Street and Wileńska Street that are not used by older people. This is directly due to the lack of infrastructure conducive to rest. Supporting existing community initiatives, including the Wróblewskiego community garden, may serve as an effective model for activating older residents. Simplifying and organising pedestrian routes, especially in the eastern part, and improving wayfinding could enhance orientation for older adults. Collaboration with neighbouring institutions, such as schools and healthcare facilities, could further strengthen socially oriented revitalisation efforts.

DISCUSSION

The comparative analysis of the three housing estates in Łódź demonstrates that their revitalisation potential is closely linked to existing environmental resources, the quality of green space management and the degree of spatial fragmentation. These differences reflect broader trends observed in the literature on green infrastructure in post-war housing estates, where historic urban layouts, municipal policies and levels of community engagement determine the use of green spaces by older adults (Haaland & van den Bosch, 2015; Kabisch et al., 2015).

The study confirms that the quality of the residential environment for older people is shaped not only by the availability of green areas or public infrastructure, but by the combined effect of physical conditions, transport accessibility, technical standards and maintenance quality. This aligns with WHO (2025), emphasising that age-friendly cities require an integrated approach involving greenery, mobility and safety.

The analysis of green spaces revealed significant variation in accessibility, quality and degree of development. This reflects findings from European studies showing that even cities with extensive green networks often fail to tailor these areas to the needs of older adults (Haaland & van den Bosch, 2015; Kabisch et al., 2015). The differences observed also support the conclusion that the actual usability of green spaces depends less on their overall size and more on maintenance, clarity of layout and appropriate facilities (van den Berg et al., 2007; Sugiyama et al., 2008). An important observation is that estates with relatively modest green resources may demonstrate strong social potential, as illustrated by bottom-up initiatives such as community gardens or informal recreational spaces. Similar phenomena have been documented in London, Stockholm and Zurich, where local initiatives strengthened social inclusion and a sense of belonging among older residents (Barthel et al., 2010; Soga et al., 2017). These findings highlight that social capital can compensate for infrastructural deficiencies and that revitalisation efforts should reinforce existing social networks.

The findings confirm that ease of movement within the city, particularly the accessibility and quality of public transport stops, is one of the strongest determinants of mobility among older adults (Cervero, 2009; Marquet & VIiralles-Guasch, 2015). Proximity to stops is only part of the issue; more significant were their technical condition, clarity of information and the quality of inter-estate pedestrian connections. Long or steep ramps and the absence of lifts proved to be major exclusionary factors, consistent with research on mobility barriers among individuals with reduced physical capacity (Corburn, 2015). Additionally, the spatial fragmentation of building layouts and obstacles resulting from outdated technical infrastructure can substantially limit real transport accessibility, regardless of the estate's nominal location.

Another important aspect is the substantial variation in the accessibility of public spaces such as squares, small parks, pedestrian routes and resting areas. The results show that older adults respond strongly to the absence of seating, interruptions in pavement continuity, steep approaches, architectural barriers and excessive distances between resting points. These observations align with the concept of "walkable urban environments", which emphasises that continuity and legibility of pedestrian networks are key considerations in designing environments for older residents (Ignaccolo et al., 2020; Nieuwenhuijsen

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et al., 2024). The study also highlights a marked shortage of resting places, echoing findings from Italy and Spain, where research indicates that most people over 65 require benches at intervals of 80–120 metres. In estates with dispersed layouts or highly degraded infrastructure, the lack of such points restricts mobility and, in extreme cases, results in older residents withdrawing from outdoor activities altogether.

The analysis of pedestrian surfaces clearly demonstrates that their technical condition directly affects both the perceived safety and the level of everyday activity among older adults. Damaged pavements, uneven surfaces, concrete slabs with numerous joints and subsidence pose a genuine risk of falls – an observation consistent with epidemiological data indicating that up to 30% of falls among older people in public spaces result from defective infrastructure (Rubenstein, 2006). European studies further confirm that pavement quality has a stronger influence on daily activity levels than environmental variables such as weather or distance (Llopis-Castelló et al., 2020). The results from Łódź also correspond with findings from Helsinki, where improvements in pavement conditions increased walking activity among older adults (Laatikainen et al., 2019). At the same time, fragmented surface repairs and the lack of coherent pavement continuity reflect systemic shortcomings in infrastructure management, an issue that should be addressed as a priority in local revitalisation programme.

The analysis of lighting quality revealed significant disparities between the examined areas, particularly pronounced in estates with dispersed building layouts. Insufficient lighting of transitional zones, small squares and secondary pedestrian routes reduces the sense of safety and leads older residents to avoid these spaces after dusk. These findings align with numerous studies showing that older adults are especially sensitive to lighting conditions, and that inadequate illumination can limit their social participation and mobility during late afternoon and evening hours (Welsh & Farrington, 2008).

Evidence from Oslo, Rotterdam and Glasgow further demonstrates that improving lighting can increase the use of public spaces among older adults by as much as 20–40% (Van Cauwenberg et al., 2018). Conversely, fragmented lighting systems and shadowed pedestrian corridors often create underused "dead zones," a phenomenon also observed in the analysed estates in Łódź. The findings therefore reinforce the central role of lighting as a key component of a older adults-friendly residential environment.

CONCLUSIONS

The revitalisation of public spaces in the context of an ageing society requires a holistic approach that integrates the quality of the physical environment with measures supporting social inclusion and the activation of local communities. Each of the analysed housing estates in Łódź possesses a distinct set of spatial and social assets which can contribute to the development of friendly, accessible and inclusive urban environments for older residents. Comparative analysis of the three estates demonstrates that variations in the quality and accessibility of space result from an interplay of structural, environmental and social factors. These findings correspond with international research on green infrastructure and urban ageing, highlighting the need for comprehensive and context-specific revitalisation strategies to fully utilise the potential of residential areas as settings that foster active, healthy and socially integrated ageing.

The most important conclusion emerging from this study is the need for project-specific, localised revitalisation approaches that reflect not only the existing spatial conditions but also the level of community engagement and the everyday practices of residents. This aligns with the principles of adaptive urban planning, which emphasise flexibility and responsiveness to locally identified needs (Dawidowicz et al., 2023), especially within ageing urban communities (Ahern, 2011; Meerow & Newell, 2019).

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