

SECURITY MEANS AGE-FRIENDLINESS. ANALYSIS OF OLDER PEOPLE'S NEEDS REGARDING THE SAFE INFRASTRUCTURE OF OPEN RESIDENTIAL SPACES. A CASE STUDY OF POLAND, THE EU MEMBER COUNTRY

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ABSTRACT

Motives: In the era of ageing population and threats arising from economic and geopolitical circumstances there is a need to adapt housing estates to different social groups, especially older persons as a particularly vulnerable group.

Aim: The research objective of the article was to study the relevance of selected elements of infrastructure in open residential spaces regarding the safety in the eyes of older people in the face of various threats, such as pandemics and military conflicts.

Methods: A questionnaire was developed to investigate the level of significance of selected elements of infrastructure based on in-depth literature research. The questionnaire survey was conducted twice on two random population samples (October 2021 and March/April 2022) in five chosen Polish cities (capitals of voivodeships).

Results: Changes in the perceived importance of factors associated with residential safety were identified in the face of two types of threats. Urban planning solutions that contribute to a sense of security were identified in different gender and age groups. Public open spaces in cities should be accessible, user-friendly, and safe; they should promote social interactions with other residents, be aesthetically appealing, and encourage social activation.

Keywords: older people, open residential spaces, age-friendly city, user-friendly space, threats, security

INTRODUCTION

Number of people older than 60 in the global population continues to increase steadily (He et al., 2016). It is projected to increase from 12% to 22%

in 2050. The share of people older than 80 is expected to triple and reach 2.1 billion by 2050 (Wang et al., 2022; World Health Organization, 2018). Rapid population ageing is a process that began in the last years of the previous millennium, but global

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research efforts aiming to improve the older adults welfare and safety have been initiated only after 2000. The World Health Organization (WHO) has been leading international action plans targeting the older population, and it has recommended that older people's needs in the area of health protection, financial welfare, social and cultural activity, and the living environment be regularly analysed and monitored (World Health Organization, 2007). The United Nations has implemented the "Decade of Healthy Ageing (2021–2031)" initiative to promote global cooperation between various organisations to ensure that older people and ageing are included in the Sustainable Development Goals (World Health Organization, 2021). This initiative was introduced to tap into the potential of the older population, to recognize older adults as equal members of society, and to ensure that older citizens age with dignity in a healthy and friendly environment. Buildings and streets without architectural barriers promote the mobility and independence of disabled citizens, regardless of their age. In safe residential districts, people aged 60+ can enjoy outdoor recreational activities and interact with other community members. Older people's needs and problems should be surveyed to design effective programs and measures that improve the quality of life of older persons, their families, and local communities.

The need to monitor older people's needs became particularly evident during the COVID-19 pandemic. This health crisis revealed gaps in legal and social welfare systems of different countries, and it exposed the inequities in access to safe outdoor spaces for vulnerable populations, including older adults (Batsis et al., 2021; Levinger et al., 2022). In cities, public open spaces, including in residential estates, should be accessible, aesthetically appealing, and safe; they should promote social interactions with other residents and encourage social activation (Bierwiazzonek, 2016). Social, economic, environmental, infrastructural, and biological threats (such as the COVID-19 pandemic), as well as threats arising from extreme weather events, natural disasters, military and economic conflicts, can undermine urban residents' sense

of security in public space. These threats pose new challenges for urban planners and managers, and they necessitate new solutions to ensure that cities are safe and healthy living environments. Therefore, the needs of city residents should be monitored, and new methodological approaches should be developed with the use of smart tools to ensure that cities are age-friendly and safe for residents of all ages.

The COVID-19 pandemic and the military conflict in Ukraine have emerged as new threats that undermine urban residents' sense of security. These have discouraged many city dwellers, in particular older citizens, from using public open spaces. Therefore, the following research question was formulated: which solutions in open residential spaces exert a positive and a negative effect on perceptions of public safety? The results obtained will provide an answer to the next strategic question: Should outdoor spaces for older people be modified in the face of new threats? The main aim of this study was to examine older persons' needs regarding safety of residential open spaces to determine the age-friendly residential areas (AFRA). The purpose was to determine the impact of two different threats on the perceived importance of functional and landscape attributes associated with a sense of security in residential estates. The detailed goal was to identify solutions that provide city dwellers with a sense of security in public open spaces in residential estates.

The study involved empirical qualitative research methods (literature review and a questionnaire survey conducted on a random group of the 55+ population). The questionnaire survey was conducted twice on two random population samples. The first survey was conducted in October 2021 during the third wave of the COVID-19 pandemic, and the second survey was conducted at the turn of March and April 2022. The respondents were 585 older adults residing in the capital cities of five Polish voivodeships. The double randomized study aimed to identify changes in urban residents' sense of security after the outbreak of the military conflict in Ukraine.

To the best of the authors' knowledge, this is the first study to examine the impact of two different

threats on city dwellers' sense of security. In the literature, the safety of public urban space has been evaluated in the context of functionality (Buckner et al., 2019), neighbour relations and a sense of community (Yu et al., 2019), smart solutions (Ivan et al., 2020), the physical and social environment (Kano et al., 2018; Wong et al., 2015), as well as the quality of life and equality based on the core indicators proposed by the WHO for measuring the age-friendliness of cities (World Health Organization, 2015a). However, older people's sense of security in the face of a global pandemic or a military threat has not been examined to date, and the undertaken research is innovative.

The research hypothesis states that older persons' sense of security differs across age groups. An attempt was made in the study to determine whether the type of threat influences the perceived importance of functional and landscape attributes of open spaces in residential estates.

LITERATURE REVIEW

The literature review focused on the profile of older people in Polish, their observed lifestyles (in terms of safety), their financial status and economic situation. This information is very important and should always be analysed before conducting a study, as it is the factor that most influences people's ability to be active, their life choices and their perception of reality, including certain elements of their environment, and thus the regulation of their needs.

Lifestyle and sense of security of older people in Poland

An analysis of the literature indicates that lifestyles and needs of older adults differ depending on lifetime habits, health, exposure to culture, and sense of security. Leisure activities of older people are largely shaped by their previous lifestyles, including habits that have been ingrained in early adulthood and in years when they were professionally active (Czerniawska, 1998). The habits that were shaped

during the reminiscence bump (between the ages of 15 and 27) (Draaisma, 2010) influence decision-making processes in late adulthood (Niezgoda & Jerzyk, 2013).

Lifestyles of older population also differ across countries (Gorgol, 2016; Punyakaew et al., 2019; Rzepko et al., 2017). The lifestyles of older persons in Poland differ significantly from the lifestyles of older adults in other EU countries, in particular in Western Europe and the Nordic countries. Above all, Polish older adults have very low awareness of the health benefits of physical activity, and their lifestyles are influenced by different cultural and historical factors, as well as insufficient access to social support and healthcare services. Many adults aged 60+ have physical disabilities, but access to physiotherapy is limited, which is why the majority of Polish older adults engage in passive recreation, mostly at home (Gorgol, 2016).

However, a 2019 study revealed that a growing number of Polish older persons remain professionally active, enrol in educational programs, and pursue active recreational interests (Dawidowicz et al., 2020). 44% of retired adults remain professionally active (Figurska et al., 2022). Older people value independent living, but the COVID-19 pandemic significantly decreased activity levels of older people (Zych, 2020). Older persons are gradually returning to pre-pandemic activity levels, which can be partly attributed to the "Active+ 2022" government program that channelled PLN 38 million to projects aiming to mobilize older adults (Ministerstwo Rodziny i Polityki Społecznej [Ministry of Family and Social Policy], 2022).

Financial status of Polish older adults

In a study by Figurska et al. (2022), more than 90% of the surveyed Polish older citizens declared to have a satisfactory financial status despite the fact that Polish incomes were considerably below the EU average in 2018 and 8% of older adults were at risk of poverty. The average old-age pension in Polish regions is presented in Figure 1.



Fig. 1. Average old-age pension in Polish voivodeships (in PLN)
Source: own elaboration based on Główny Urząd Statystyczny [Statistics Poland] (2020).

Eurostat does not provide information about the absolute income poverty of older people, but data about relative income poverty in this population group are available. Relative income poverty is determined based on the at-risk-of-poverty rate which is set at 60% of the national median annual income in a given country. In 2018, around 16% of older persons in Poland and the EU-28 lived in such households (Statistics Poland, 2020). Even if a similar proportion of older people in Poland and the EU were at risk of poverty, the disposable incomes of Polish older citizens were significantly lower in comparison with the more affluent Western European countries such as Luxembourg, Germany, and France. Therefore, the relative poverty rate is greater among Polish older people than older adults residing in Western Europe.

Legal support for older people during the pandemic

During the COVID-19 pandemic, legal support for Polish older persons was based on the recommendations of the Commissioner for Human Rights (Table 1) (Kubicki & Szweđa-Lewandowska, 2022) and the measures initiated by the Polish government (access to health care services, including telehealth services, introduction of “older-people-only” hours in retail and service outlets) (Website of the Republic of Poland, 2020).

In the event of a military conflict, older citizens are not entitled to special protection pursuant to the provisions of domestic or international humanitarian law. These laws, including European Civil Protection and Humanitarian Aid Operations (2023), apply equally to all social groups, and provide assistance

Table 1. Recommendations of the Commissioner for Human Rights on support for older people during the COVID-19 pandemic

Types of support	Recommended support services
Right to live with dignity	The needs and opinions of older people should be considered in the process of developing and implementing public policies.
Right to information	Effective methods and information channels should be developed to reach older people living in one-person households. Many of these older persons have physical disabilities, visual impairments, and a limited ability to perform basic daily life activities.
Right to healthcare	Older citizens should have access to general practitioners and specialists, including mental health practitioners because older people living in one-person households are at a high risk of depression.
Right to social inclusion	At the local level, older adults should receive support from personal assistants to promote integration within the older people community, and to build strong links between older citizens and their family members, public service employees, and volunteers. Alternative recreational activities and community-building measures should be promoted at home during the lockdown. Computer literacy courses should be organised to teach digital skills to older adults.
Right to equal treatment	Older adults should have guaranteed access to public services, including healthcare, as well as support services to eradicate discrimination on grounds of age, gender, disability, ethnicity, race, and sexual orientation, including all cross-cutting issues when the barriers associated with more than one trait (such as age and disability) overlap and additionally limit access to goods and services. Older citizens living in one-person households and disabled older adults should receive help from personal assistants in performing daily life activities, such as shopping, transport to healthcare facilities, vaccination centres, and public administration facilities.

Source: own elaboration based on Kubicki & Szweida-Lewandowska (2022).

to civilians and former combatants (wounded soldiers, refugees, prisoners of war). However, humanitarian laws recognize the special needs of vulnerable populations. Unlike other socially vulnerable groups, such as women and children, older people are classified based on the provisions of the Universal Declaration of Human Rights. There are three main acts of international humanitarian law: International Humanitarian Law (IHL) which protects civilians, the Refugee Law (RL) which protects civilian refugees, and the Human Rights Law (HRL) which applies in situations of conflict and natural disaster. These contain provisions that directly address the rights and needs of older adults in a crisis and their protection as members of the civilian population (Krill, 2001). The IHL does not define a chronological age at which a person is classified as a older citizen. Several provisions, including hospital care and evacuation of civilians from occupied territories, directly address older persons. According to the RL, older refugees are eligible for retirement income under national retirement laws of the host country (Nicholson & Kumin, 2017). Pursuant to the provisions of the

HRL, older people are entitled to basic human rights, including the right to non-discrimination.

The fact that very few legal acts directly address older persons is not a weakness of international law, but it results largely from the lack of awareness about the specific needs and problems of the older population, as well as the failure to observe the provisions of international law, in particular by the parties to the conflict.

Various United Nations (UN) agencies implement programs and measures that promote dignified ageing. However, these measures differ in scope and effectiveness. Most UN agencies do not have specific policies or operational procedures addressing the older adults, and examples of operations where older adults were a party to the conflict are difficult to find. However, the WHO and the United Nations Development Program (UNDP) provide support networks for the older people, and in 2002, the WHO developed a policy framework to inform discussion and the formation of action plants that promote healthy and active ageing (World Health Organization, 2002).

MATERIALS AND METHODS

Empirical qualitative and quantitative research methods were used to verify the research hypothesis and answer the research question. The adopted methodology was based on a review of the literature, including Statistics Poland and Eurostat data (social and economic factors), and the results of a questionnaire survey. The survey questionnaire was developed by members of the research team who relied on their expert knowledge as investigators in a research project based on the results of previous studies examining older people's activity levels (Dawidowicz et al., 2020; Figurska et al., 2022), urban landscape components (Senetra et al., 2015), and the functional and spatial indicators of residential estates in cities (Dawidowicz & Dudzińska, 2022). The results were processed statistically in a comparative analysis. The respondents were divided into groups based on age and type of residential estate. The survey involved 585 older people aged 55+ residing in the capital cities of five Polish voivodeships. Two population samples were selected randomly, and survey data were collected with the use of the Computer-Assisted Personal Interviewing (CAPI) methodology. The study involved two surveys that were separated by a period of six months. The first survey was conducted during the third wave of the COVID-19 pandemic in October 2021. The second survey was conducted at the turn of March and April 2022, two months after the outbreak of the military conflict in Ukraine.

Survey questionnaire

The questionnaire for surveying older people's needs regarding safe residential infrastructure in cities was developed based on an analysis of Polish and international literature published in the last 20 years. The following key words were used in the literature search: age-friendly city/district, age-friendly residential communities, and age-safe city. The following Polish legal acts were also analysed: Act of 27 March 2003 on spatial planning and development (Journal of Laws, 2021, item 741, as amended) and the

Construction Law of 7 July 1994 (Journal of Laws, 2020, item 1333, as amended).

Four main categories of factors that contribute to the safety of urban dwellers in residential estates were identified: (1) Technical protective infrastructure without architectural barriers and safe shelters, (2) Safe transport solutions, (3) Social support and welfare (social infrastructure), and (4) Perceptions of the neighbourhood. These categories comprised 16 criteria: architectural solutions and assistive technologies, basic recreational infrastructure, civil defence infrastructure and sanitation infrastructure, traffic routes, availability of transport and transport information, age-friendly parking, signposts, reference points, landmarks, retail and service outlets, healthcare facilities, social welfare, social relations and social participation, cleanliness and sanitation, neighbourhood safety, and good/bad neighbourhood.

The importance of each criterion was ranked with the use of dedicated indicators. The questionnaire was designed to collect the opinions of older citizens residing in differently sized cities and belonging to different social groups. The questionnaire contained eight questions, mostly closed-ended, single-choice.

In the first two questions, the respondents were asked to indicate their gender and age in the following age intervals: 55–59, 60–75, 76–89, and 90+ years. This division is consistent with the WHO classification, where the population of older adults is divided into pre-seniors (55–59) and three life-stage subgroups: the young old (60–74), the old (75–89), and the old-old (90+) (Olejniczak, 2015; World Health Organization, 2002). The study involved older adults who enjoy full civil rights, including the right to sell or buy real estate.

In the third question, the respondents were asked to describe other household members, choosing from six options: spouse, partner, parents, children, living alone or with other household members. In nearly 5 million Polish households (39% of all Polish households), at least one household member is 60 or older. The above applies to 50% of rural households and a third of urban households (Twardzik, 2017).

The fourth question was designed to elicit information about older people's activities, and the following options were provided: full-time employment, part-time employment, business owner, skill development courses, senior organisations (such as universities of the third age), caring for grandchildren, volunteer work, and other types of activity. Polish older citizens are characterized by low levels of activity, and age-friendly cities promote the active ageing strategy to help older persons lead independent lives in their place of residence, motivate older people to become physically and professionally active, and encourage older citizen participation in social and professional activities to improve their quality of life (Labus & Szewczenko, 2017; Tomczyk & Klimczuk, 2016).

In the fifth question, the respondents were asked to rank the importance of technical and protective infrastructure, and buildings without architectural barriers on a five-point scale (from very important to unimportant). The following infrastructure components were assessed: assistive technologies (lifts, automatic doors, number of street lamps and other light sources, surveillance), architectural solutions (ramps, handrails, no thresholds or curbs), recreational infrastructure (benches, picnic areas, outdoor gyms, playing fields, cycle paths), basic sanitation infrastructure (public toilets, waste bins), and safe shelters (basements, shelters). The respondents could also list other solutions that enhance older adults' mobility in residential estates.

The sixth question concerned safe transport solutions in residential estates. The respondents were asked to rank the importance of local traffic solutions. The following elements were evaluated: route directions, traffic signs, information boards, signposts, audible traffic signals, condition of sidewalks, curbs and ramps, parking space (including age-friendly parking), taxi stops, public transport stops, and public transport timetables. The respondents were asked to assess the safety of narrow streets, including streets with narrow lanes and dense vegetation, dense development, spaces with limited visibility, reference points and landmarks (large and characteristic buildings and structures).

In the seventh question, the respondents were asked to rate the importance of the following social infrastructure components: proximity of a police station, fire station, and hospital emergency department (social services); proximity of friends, family members, and other older people; emotional attachment to one's place of residence; easy access to healthcare facilities and pharmacies (health and life protection); volunteer organisations or community clubs; availability of retail and service outlets.

The last question was designed to validate the results. The respondents were asked to evaluate cleanliness, sanitation standards, and public safety in their neighbourhoods.

Several key strategies were adopted to minimise bias in this research. Firstly, random sampling was used, meaning that the selection of respondents for the study was done randomly, minimising the risk of bias. Secondly, respondents were divided into different age groups and by settlement type, which took into account the diverse perspectives of the respondents.

Additionally, the research questionnaire was carefully constructed with clear questions, eliminating potential ambiguity. The survey was conducted in two phases, allowing for potential changes in respondents' answers over different time periods.

The survey took into account various aspects of security and infrastructure, eliminating bias through a comprehensive approach. In addition, literature and legislation were referred to in the development of the questionnaire, ensuring the objectivity and reliability of the results.

Study area

The survey was conducted in Poland to determine older people's perceptions of residential safety in the face of two major threats: the COVID-19 pandemic and the war in Ukraine which led to a massive influx of Ukrainian refugees into Poland. Poland has an area of 312,696 km², and it is the 69th largest country in the world and the 9th largest country in Europe. Poland has a population of 37,019,327 (Statistics Poland, 2021), and it is the 38th most populous country in the world and the 5th most populous country in Europe.

According to Statistics Poland (2021), citizens aged 65+ will account for more than 23% of the Polish population by 2030 (most older citizens will live in cities). In 1990, a mere 13.9% of Poland's population were aged 65 and more. According to demographers, population ageing is inevitable. Life expectancy will most likely continue to increase, which will increase both the total number and the percentage of older citizens.

The survey targeted older adults residing in Olsztyn, Gdańsk, Warsaw, Cracow, and Poznań, which are large or medium-sized cities in geographically distant Polish regions (Fig. 2). All five cities are voivodeship capitals. The basic geographic and demographic characteristics of the surveyed cities are presented in Table 2.



Fig. 2. Poland on a map of Europe (left) and the location of the surveyed Polish cities (right)
Source: own elaboration.

Table 2. Basic geographic and demographic characteristics of the surveyed cities

City	Area (km ²)	Population	Population density (persons/km ²)	Older (retired) population*	Share of older population in total population (%)*
Gdańsk	263.44	486,022	1845.0	119,075	24.5
Kraków	326.85	802,800	2,456.2	144,504	18.0
Olsztyn	88.33	170,622	1911.0	25,875	16.0
Poznań	261.91	546,859	2,031.4	109,372	20.0
Warsaw	517.20	1,863,056	3,602.0	465,764	24.5

* In Poland, the retirement age is 60 years for women and 65 years for men.
Source: own elaboration.

RESULTS AND DISCUSSION

Identification of residential infrastructure components that affect the residents' sense of security

Infrastructure components that enhance older people's safety in the place of residence are the key criteria that contribute to a sense of comfort and wellbeing (Bierwaczon, 2016). Safety and wellbeing are determined by various factors, and older persons have different needs and expectations than other age groups. Older people's wellbeing is influenced by mobility limitations, fitness levels, health status (physical and mental), individual needs, and financial capabilities. These factors were divided into four main groups which are consistent with the determinants of an age-friendly city proposed by the WHO (2007) (Table 3).

The first group of factors was subdivided into architectural structures that facilitate mobility and basic recreational infrastructure (Table 4). Buildings and streets without architectural barriers enhance the mobility and independence of older citizens and disabled residents. Solutions that improve walkability and mobility promote outdoor recreation. Such solutions enable older persons to participate in active recreation and social activities, and they facilitate daily activities that are necessary for independent living (World Health Organization, 2007).

Solutions that guarantee the residents' safety also play a very important role in periods of unrest and possible military conflicts. In Europe, conflict and violence have escalated to the highest levels in decades (acts of terrorism, war), which increased the demand for civilian safety facilities, both inside and outside cities. However, civil defence infrastructure has been largely defunct for many years, and many

Table 3. Groups of factors that ensure older people's safety in open residential spaces

Groups of safety factors			
1) Protective infrastructure, infrastructure without architectural barriers, safe shelters	2) Safe transport solutions	3) Social support and welfare (social infrastructure)	4) Perceptions of the neighbourhood (Cleanliness and sanitation)

Source: own elaboration.

Table 4. Protective infrastructure, infrastructure without architectural barriers, safe shelters

Category	Description	Factors
1A) Architectural structures	Architectural solutions for wheelchair users; stairs with handrails; even surfaces; sidewalk barriers; low curbs, stairs and sidewalks adapted to the needs of disabled users.	1. Absence of architectural barriers. 2. Tall sidewalk curbs that obstruct mobility and walkability.
1B) Assistive technologies	Automated and smart solutions, including lighting, lifts, ramps, wide passageways, automatic doors and windows, surveillance.	1. Adequate number of street lamps and other light sources.
1C) Basic recreational infrastructure	Sports and recreational areas.	1. Benches and rest areas. 2. Picnic areas (barbecue and fire pits). 3. Cycle paths. 4. Sports facilities (outdoor gyms, playing fields).
1D) Civil defence infrastructure	Safe shelters.	1. Shelters, tunnels, basements, underground stations, underground passageways.
1E) Sanitation infrastructure	Infrastructure for maintaining clean and hygienic public spaces.	1. Disabled toilets. 2. Sewage systems. 3. Waste collection systems.

Source: own elaboration.

of the existing facilities pose a considerable burden (Banaszkiewicz & Semik, 2019).

The second group of factors includes solutions that promote the safe and comfortable mobility of older people (Table 5).

In a study of Swedish older people (Consortium, 2012), public transport was regarded as expensive, unsafe, and difficult to access due to insufficient route information. Older adults had a preference for private transport as drivers or passengers. Walking was the second most preferred transport option. Cycling and public transport were evaluated as the least comfortable options. These results indicate that older residents should have access to safe and comfortable parking spaces in residential estates.

Comfortable transport solutions are addressed by the Smart City concept. These solutions make cities friendly for the residents, and they promote older people's mobility. Smart cities rely on advanced technologies, which could pose certain difficulties for the older persons. However, smart solutions are increasingly accessible and easy to use (Skouby et al., 2014). In modern cities, smart mobility solutions such as digital information boards, integrated timetables, free transport, and audible traffic signs are being

introduced to promote older people's activities and social participation.

The condition of transport infrastructure also plays a very important role in this group of factors. Well-designed ramps, sidewalks, public transport stops, and the availability of taxi services facilitate older people's mobility. Infrastructure components that improve the safety of urban travellers are equally significant. Inadequate street lighting and dense development that limits visibility can discourage older citizens from venturing outside (Gehl, 2011). Traditional urban development, where the city is divided into regular blocks, is most conducive to older people's mobility because urban structures can be easily identified in space, which promotes orientation, social contact, and community integration (Komar, 2014).

The second group of factors also contains reference points and landmarks. These factors are particularly important for older adults who are often affected by visual impairment and limited spatial orientation skills. Visible and adequately signposted streets, stops, traffic routes, and pedestrian passageways are essential for safe transport. In turn, landmarks facilitate orientation in space, and they affect social behaviour

Table 5. Safe transport solutions

Category	Description	Factors
2A) Pedestrian routes	Passages, sidewalks, footpaths.	<ol style="list-style-type: none"> 1. Distance between buildings. 2. Condition of sidewalks, curbs, and ramps. 3. Vegetation density. 4. Sunlight access in streets and residential estates.
2B) Availability of transport and transport information	Access to bus stops, information about routes, and timetables; access to taxi stops; transport for older citizens and disabled citizens, including free/ community transport options.	<ol style="list-style-type: none"> 1. Adequate access to information about public transport (timetables, routes, delays, changes). 2. Free transport for older citizens. 3. Public transport stops (bus, tram, metro). 4. Taxi stops.
2C) Age-friendly parking	Parking spaces for older citizens and disabled persons in the vicinity of buildings.	<ol style="list-style-type: none"> 1. Public parking. 2. Age-friendly parking.
2D) Signposts, reference points, landmarks	Traffic signs that are visible for older drivers; reference points; landmarks (buildings, structures, and natural landmarks).	<ol style="list-style-type: none"> 1. Landmarks that facilitate orientation (such as church towers, tall buildings, old trees). 2. Warning signs and audible traffic signals (including at pedestrian crossings). 3. Route directions, traffic signs, information boards, signposts.

Source: own elaboration.

by eliciting emotional and aesthetic responses (Czarnecki, 1960), both positive and negative. On the micro scale, contemporary urban landmarks consist mostly of buildings and architectural complexes, as well as street furniture. Natural landmarks include tall trees and landform features. Prominent landmarks are the focal points in urban space that enhance the clarity and legibility of urban design. Landmarks are distinctive elements of space that highlight the importance of a given location (Bala, 2016; Sorrows & Hirtle, 1999).

Social support and welfare are the third group of factors that contribute to older citizens' safety in urban space (Table 6). Independent living influences older adults' wellbeing and life satisfaction. Easy access to retail and service outlets enables older people to keep up with their daily routines. Shops located on the ground floor with easily accessible entrances are best suited to the functional capacity of the older adults (World Health Organization, 2007). Older people's clubs mobilise older adults to remain active and socially involved. Volunteer work

also enhances wellbeing, promotes a sense of security, and prevents the social marginalization of older citizens (Dovey, 2016).

Easy access to healthcare facilities, emergency rooms, and rescue services plays a fundamental role in building a sense of security in the place of residence (Morris et al., 2012). Surveillance systems in public open spaces also enable the older people to feel safe and comfortable in the residential environment. Surveillance systems affect general perceptions of safety and opinions about different city districts.

Cleanliness and sanitation are the last group of the factors that affect older citizens' sense of residential security (Table 7). Older persons are discouraged from visiting public spaces that produce unpleasant odours, are not regularly cleaned and maintained in good order. Noise pollution is one the greatest environmental problems in cities, exerting a particularly detrimental effect on older people (Szczepeńska et al., 2015). Noise contributes to health problems, sleep disorders, loss of productivity, and physiological stress.

Table 6. Social support and welfare (social infrastructure)

Category	Description	Factors
3A) Retail and service outlets	Local shops (grocery stores and other), basic services (such as repair shops).	1. Proximity to retail and service outlets.
3B) Healthcare	Outpatient clinics, hospitals, emergency rooms.	1. Access to healthcare facilities and pharmacies.
3C) Social security	Access to emergency services in the residential estate (City Guard, Police, security guards).	1. Rapid Police and City Guard response to calls for service.
3D) Social relations and social participation	Good neighbourly relations contribute to local safety; local volunteer services (shopping, cleaning, etc.).	1. Local volunteer services (shopping, cleaning, etc.). 2. Community or district clubs. 3. Social bonds, proximity of friends and family.

Source: own elaboration.

Table 7. Perceptions of the neighbourhood (cleanliness and sanitation)

Category	Description	Factors
4A) Cleanliness and sanitation	Urban spaces are free of waterlogging, animal faeces, and waste.	1. The residential estate is clean and well-maintained.
4B) Neighbourhood safety	The areas surrounding the residential estate are safe.	1. Sense of security in the neighbourhood.
4C) Good/bad neighbourhood	Subjective assessment of the neighbourhood.	1. Perceptions of the neighbourhood (good/bad).
4D) Sources of noise.	Sources of residential noise.	1. Sources of residential noise, such as busy streets.

Source: own elaboration.

RESULTS OF THE QUESTIONNAIRE SURVEY

The questionnaire survey was conducted twice, during the COVID-19 pandemic and after the outbreak of the war in Ukraine, on a population sample with the same size and age distribution. A total of 585 respondents participated in the survey, and 77% of the participants were women. The age structure

of the population sample was as follows: 55–59 – 14%, 60–75 – 68%, 76+ – 18%. Most female (75%) and male (43%) respondents belonged to the young-old group (60–75) (Fig. 3).

Most respondents (68%) lived in apartments, and the remaining participants (31%) inhabited single-family homes, semi-detached houses, or terraced houses (Fig. 4).

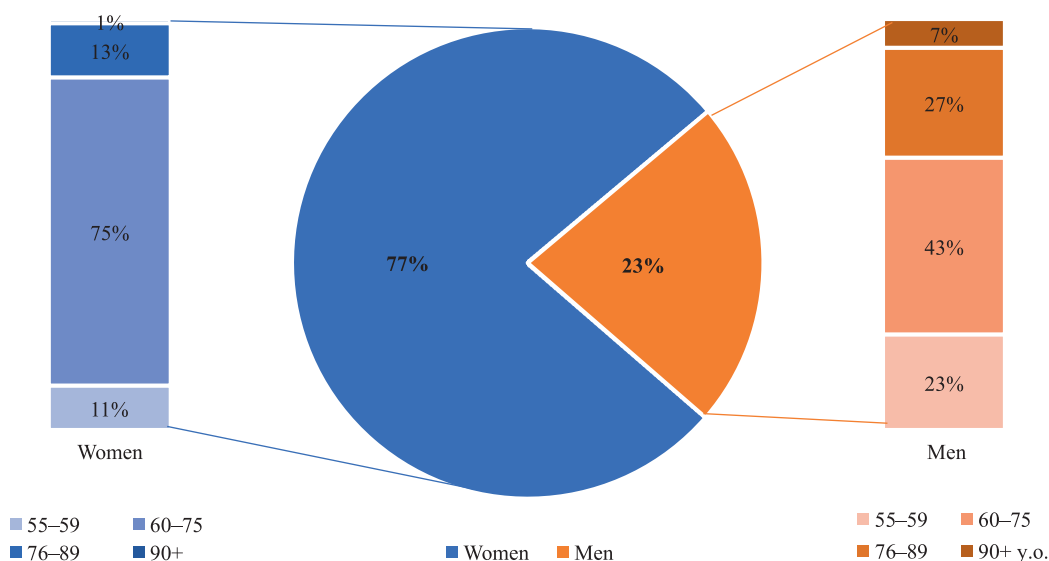


Fig. 3. Age and gender of the surveyed pre-seniors and seniors
Source: own elaboration.

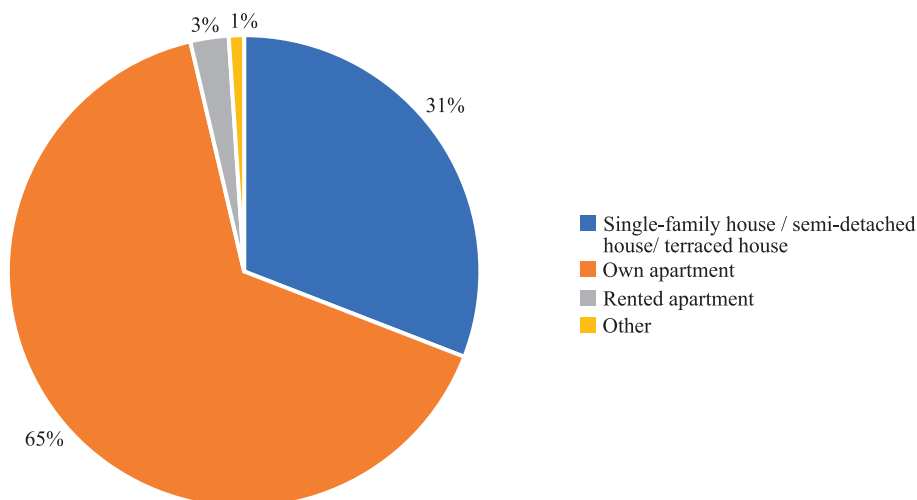


Fig. 4. Types of dwellings occupied by the respondents
Source: own elaboration.

Most respondents lived with spouses (55%) or alone (47%), whereas the smallest proportion of the surveyed older people lived with parents (2%) or partners (3%) (Figure 5). Cohabitation patterns differed between the genders. Most women lived alone (55%), whereas most men lived with wives (69%). Both female and male respondents were least likely to live with parents (1% and 4%, respectively) or partners (3% and 5%, respectively). Considerable differences were also observed between older citizens living in apartment blocks and single-family homes. The majority of apartment dwellers lived with spouses (42%) or alone (47%), whereas most respondents residing in single-family homes lived with their spouses (71%). The answers in Figure 5 do not sum up to 100% because the respondents could give more than one answer (such as living with a spouse and children).

In the question regarding older adults daily activities, most respondents declared that they belonged to senior organisations (41%), were not professionally active and were not enrolled in educational programs (30%). In the surveyed group, 13% of the respondents were business owners or were employed part-time. Only 10% and 8% of older people worked as volunteers or attended courses to improve their professional qualifications, respectively

(Fig. 6). The answers do not sum up to 100% because the respondents could choose more than one answer.

Most women were members of senior organisations (43%) or were not involved in any type of professional or educational activity (34%). Very few older females were business owners or were employed part-time (4% and 5%, respectively). In turn, most male respondents were professionally active (35%) or belonged to senior organisations (33%), whereas the smallest percentage of retired men improved their professional qualifications (6%) or were involved in volunteer work (7%).

Similarly to the previous question, older citizens residing in apartments and houses also differed in the type of undertaken daily activities. In addition to membership in senior organisations, 28% of apartment dwellers were not involved in any type of professional or educational activity, whereas 29% of house dwellers took care of their grandchildren.

In the following question, the respondents were asked to evaluate the extent to which residential infrastructure components contribute to their safety. The responses given by the residents of the analysed cities largely overlapped, and they were pooled. The study revealed that the size and geographic location of cities had no influence on the perceived importance of infrastructure components that

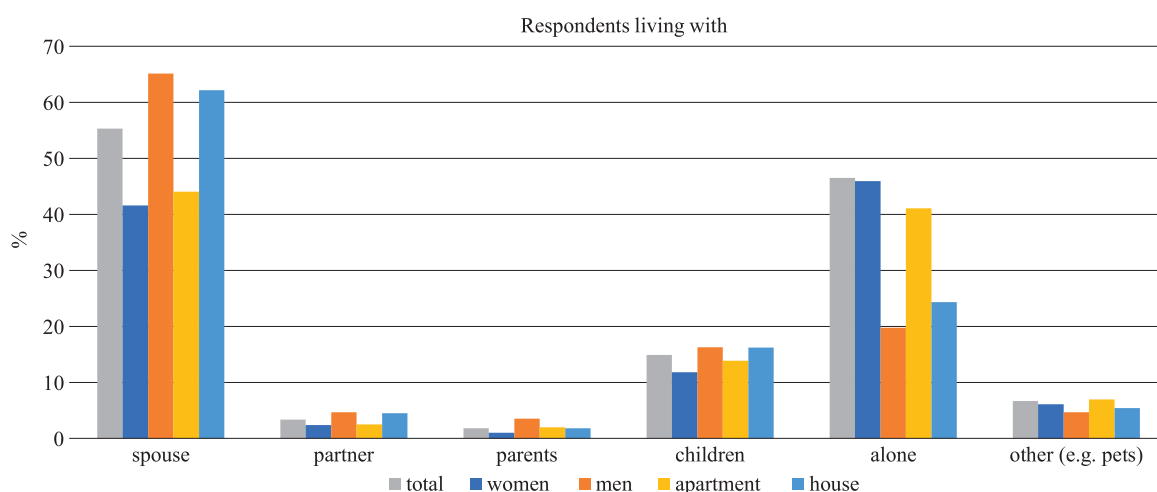


Fig. 5. Household members indicated by the surveyed pre-seniors and seniors
Source: own elaboration.

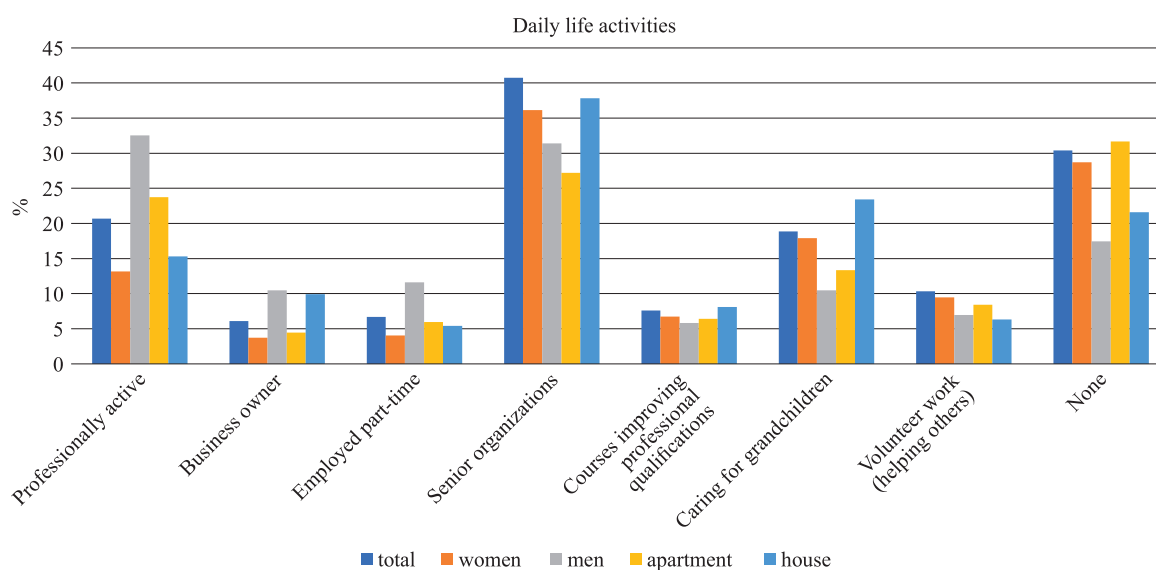


Fig. 6. Daily life activities of the surveyed pre-seniors and seniors
Source: own elaboration.

enhance older people's safety in residential estates. In contrast, the respondents' sense of security was significantly influenced by the type of potential threat. The differences in the participants' opinions regarding the importance of residential infrastructure components between the first (during the COVID-19 pandemic) and the second (after the outbreak of the war in Ukraine) survey are presented in Figure 7. The changes in older people's perceptions of safety in open residential spaces are presented in Table 8.

The greatest increase in perceived importance was observed in civil defence infrastructure (up by 14 places in the ranking) such as basements, underground tunnels, and shelters (47%), basic recreational infrastructure such as picnic areas (barbecue and fire pits) (up by 7 places in the ranking, 43%), and sanitation infrastructure (up to 9 places in the ranking). These three infrastructure categories were regarded as particularly important in the face of a threat. The greatest decrease in perceived importance was noted in the presence of community and district clubs (21%) and perceptions of the neighbourhood (19%). No considerable differences in the perceived importance of infrastructure components were noted between the genders in the first survey, but they were observed in the second

survey. However, the identified differences were not significant. In the second survey, both male and female respondents attached greater importance to civil defence infrastructure (49% and 43%, respectively) and picnic areas (44% and 42%, respectively). Women were more likely to recognize the importance of sanitation infrastructure (17%), whereas warning signs and audible traffic signals were regarded as less important (16%). Men attached greater importance to sports facilities (27%) and taxi stops (25%), and less importance to community and district clubs (27%), free transport for older citizens (26%), and vegetation density (17%).

The perceived importance of infrastructure components that contribute to older people's sense of security did not differ significantly between apartment dwellers and respondents residing in houses. However, these groups differed in their perceptions regarding the importance of distance between buildings (20% and 10%, respectively) and the presence of community and district clubs (15% and 12%, respectively). In the second survey, a much greater decrease in importance of warning signs and audible traffic signals was noted among apartment dwellers than older citizens residing in houses (17% and 1%, respectively). The greatest



Fig. 7. Differences in the perceived importance of residential infrastructure components that contribute to the safety of pre-seniors and seniors (before and after the outbreak of the war in Ukraine)
 Source: own elaboration.

difference was observed with regard to local volunteer services which importance decreased by 17% among apartment dwellers and increased by 6% among house residents.

The most significant differences were observed between age groups, which could be attributed to health factors as well as generational differences. In the pre-senior group (55–59), the greatest increase

in perceived importance was noted for safe shelters (+78%), taxi stops (+26%), and picnic areas (+21%), whereas vegetation density (-27%) and perceptions of the neighbourhood (-11%) were regarded as far less important in the second survey. The importance of public transport stops (0%) and the condition of sidewalks, curbs and ramps (+1%) did not change significantly between the surveys.

Table 8. Perceived importance of selected infrastructure components that contribute to pre-seniors' and seniors' sense of security

No.	Hierarchy of factors in survey I*	Hierarchy of factors in survey II*	Changes in perceived importance***
1	Rapid Police and City Guard response to calls for service	Traffic routes. Sunlight access in streets and residential estates	↑3
2	Neighbourhood safety	Traffic routes. Condition of sidewalks, curbs, and ramps	↑6
3	Access to healthcare facilities and pharmacies	Access to healthcare facilities and pharmacies	→
4	Traffic routes. Sunlight access in streets and residential estates	Public transport stops (bus, tram, metro, etc.)	↑1
5	Public transport stops (bus, tram, metro, etc.)	Access to retail and service outlets	↑1
6	Access to retail and service outlets	Sources of noise, such as busy streets	↑3
7	Traffic routes. Distance between buildings	Rapid Police and City Guard response to calls for service	↓6
8	Traffic routes. Condition of sidewalks, curbs, and ramps	Neighbourhood safety	↓6
9	Sources of noise, such as busy streets	The residential estate is clean and well-maintained	↑2
10	Social relations and social participation. Social bonds, proximity of friends and family	Social relations and social participation. Social bonds, proximity of friends and family	→
11	The residential estate is clean and well-maintained	Architectural solutions	↑6
12	Basic recreational infrastructure. Benches and rest areas	Traffic routes. Distance between buildings	↓5
13	Age-friendly parking	Sanitation infrastructure	↑9
14	Good/bad neighbourhood	Adequate access to information about public transport (timetables, routes, delays, changes)	↑1
15	Adequate access to information about public transport (timetables, routes, delays, changes)	Route directions, traffic signs, information boards, signposts	↑1
16	Route directions, traffic signs, information boards, signposts	Civil defence infrastructure	↑14
17	Architectural solutions	Age-friendly parking	↓4
18	Warning signs and audible traffic signals (including at pedestrian crossings)	Basic recreational infrastructure. Cycle paths	↑5
19	Traffic routes. Vegetation density	Basic recreational infrastructure. Sports facilities (outdoor gyms, playing fields)	↑6
20	Assistive technologies	Taxi stops	↑6
21	Social relations and social participation. Community or district clubs	Basic recreational infrastructure. Benches and rest areas	↓9
22	Sanitation infrastructure	Basic recreational infrastructure. Picnic areas (barbecue and fire pits)	↑7
23	Basic recreational infrastructure. Cycle paths.	Assistive technologies	↓3
24	Free transport for older citizens	Warning signs and audible traffic signals (including at pedestrian crossings)	↓6
25	Basic recreational infrastructure. Sports facilities (outdoor gyms, playing fields)	Traffic routes. Vegetation density	↓6
26	Taxi stops	Bad/good neighbourhood	↓12
27	Landmarks that facilitate orientation (such as church towers, tall buildings, old trees)	Landmarks that facilitate orientation (such as church towers, tall buildings, old trees)	→
28	Social relations and social participation. Local volunteer services (shopping, cleaning, etc.)	Free transport for older citizens	↓5
29	Basic recreational infrastructure. Picnic areas (barbecue and fire pits)	Social relations and social participation. Local volunteer services (shopping, cleaning, etc.)	↓1
30	Civil defence infrastructure	Social relations and social participation. Community or district clubs	↓9

*I – the first survey was conducted during the third wave of the COVID-19 pandemic in October 2021

**II – the second survey was conducted at the turn of March and April 2022 (two months after the outbreak of the war in Ukraine)

*** – changes in perceived importance: ↑ the importance of the criterion increased, ↓ the importance of the criterion decreased, → the importance of the criterion did not change.

Source: own elaboration.

Table 9. Ranks calculated for the analysed factors during the COVID-19 pandemic and after the outbreak of the war in Ukraine, separately for age groups

Cat.	Factor	Total		55–59		60–75		76+	
		Rank I*	Rank II**	Rank I*	Rank II**	Rank I*	Rank II**	Rank I*	Rank II**
1A	Architectural solutions	3	3	3	3	3	4	3	4
1B	Assistive technologies	3	3	3	3	3	3	3	4
1C1	Basic recreational infrastructure. Benches and rest areas	4	3	3	3	4	3	4	3
1C2	Basic recreational infrastructure. Picnic areas (barbecue and fire pits)	2	3	2	3	2	3	2	3
1C3	Basic recreational infrastructure. Cycle paths	3	3	3	3	3	3	2	3
1C4	Basic recreational infrastructure. Sports facilities (outdoor gyms, playing fields)	3	3	3	3	3	3	2	3
1D	Civil defence infrastructure	2	3	1	3	2	3	1	3
1E	Sanitation infrastructure	3	3	3	2	3	4	2	4
2A1	Traffic routes. Distance between buildings	4	3	4	4	4	3	4	3
2A2	Traffic routes. Condition of sidewalks, curbs, and ramps	4	4	4	4	4	4	4	4
2A3	Traffic routes. Vegetation density	3	3	3	2	3	3	3	3
2A4	Traffic routes. Sunlight access in streets and residential estates	4	4	4	4	4	4	4	4
2B1	Adequate access to information about public transport (time tables, routes, delays, changes)	3	3	3	3	3	3	3	3
2B2	Free transport for older citizens	3	2	3	2	3	2	2	3
2B3	Access to public transport stops (bus, tram, metro)	4	4	4	4	4	4	4	4
2B4	Taxi stops	3	3	3	3	3	3	2	4
2C	Age-friendly parking	4	3	4	4	4	3	4	4
2D1	Landmarks that facilitate orientation (such as church towers, tall buildings, old trees)	2	2	3	2	2	3	3	2
2D2	Warning signs and audible traffic signals (including at pedestrian crossings)	3	2	4	3	3	2	2	2
3B	Access to healthcare facilities and pharmacies	3	3	3	3	3	3	3	3
3C	Rapid Police and City Guard response to calls for service	4	4	4	4	4	4	3	4
3D1	Social relations and social participation. Local volunteer services (shopping, cleaning, etc.)	4	4	4	4	4	4	4	4
3D2	Social relations and social participation. Community and district clubs	4	4	4	4	4	4	4	4
3D3	Social relations and social participation. Social bonds, proximity of friends and family	2	2	2	2	2	2	4	2
4A	Cleanliness	2	2	3	2	3	2	2	2
4B	Neighbourhood safety	4	3	3	3	4	3	3	4
4C	Good/bad neighbourhood	3	3	4	3	3	3	4	3
4D	Sources of residential noise, such as busy streets	4	4	4	4	4	4	4	4

*I – the first survey was conducted during the third wave of the COVID-19 pandemic in October 2021

**II – the second survey was conducted at the turn of March and April 2022 (two months after the outbreak of the war in Ukraine).

Source: own elaboration.

The young-old (60–75) attached greater importance to picnic areas (+51%) and civil defence infrastructure (+36%). The significance of perceptions of the neighbourhood (-19%), neighbourhood safety (-12%), and rapid Police and City Guard response to calls for service (-12%) decreased in the second survey. No significant differences were observed in the impor-

tance of residential cleanliness, social bonds, and independent living in the place of residence (0% each).

In turn, people aged 76+ were significantly more likely to recognize the importance of civil defence infrastructure (+79%), picnic areas (+30%), and sanitation infrastructure (+19%). The greatest decrease was noted in the perceived importance of the distance

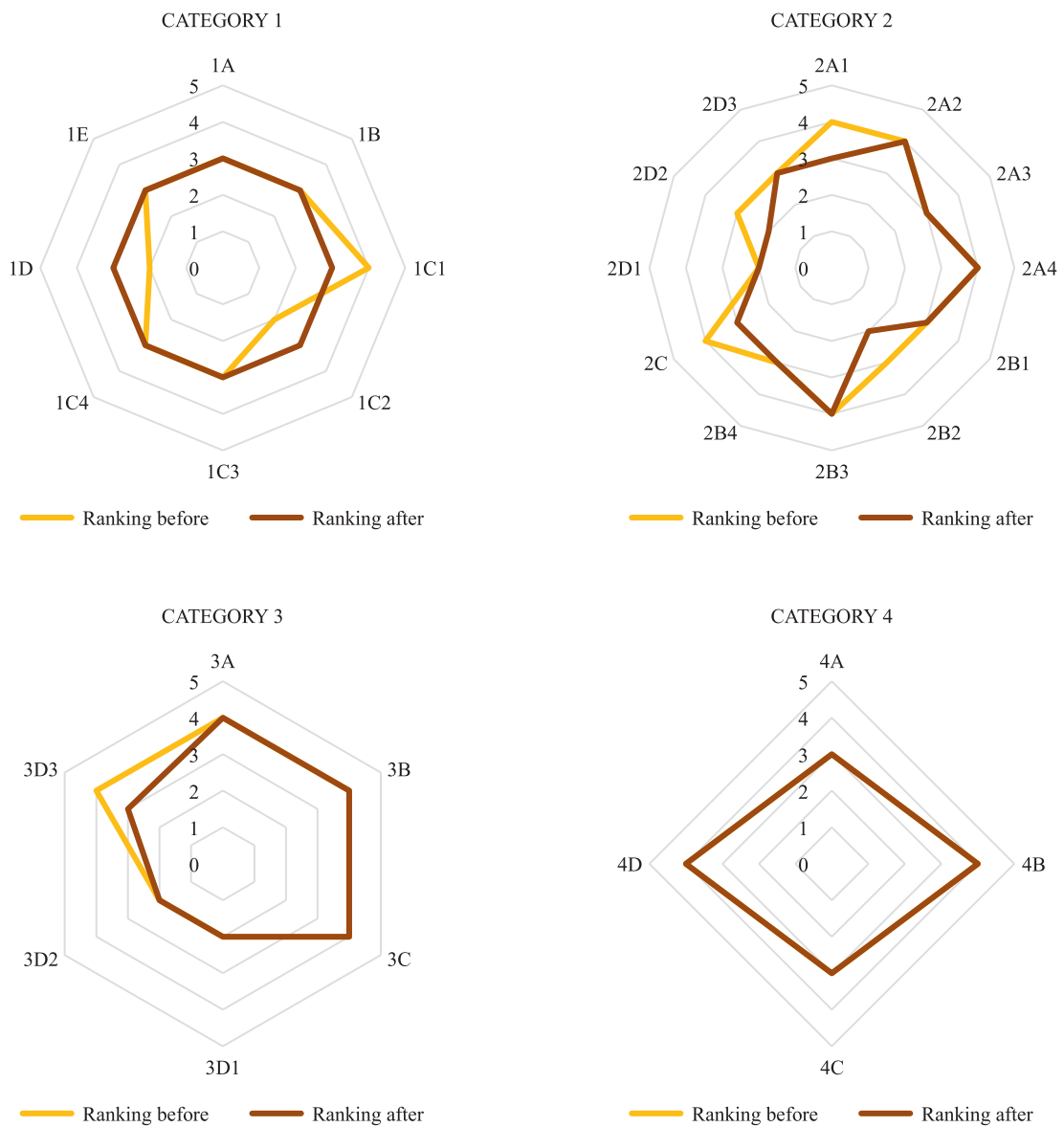


Fig. 8. Ranking of the analysed factors before and after the outbreak of the COVID-19 pandemic and the war in Ukraine
 Source: own elaboration.

between buildings (-24%), perceptions of the neighbourhood (-23%), and the presence of benches and rest areas (-19%). The importance of public transport stops (0%) did not change, whereas only a minor decrease was observed as regarding the importance of public transport and transport information (-1%), as well as route directions, traffic signs, information boards, and signposts (-1%).

The analysed factors were ranked based on cumulative frequency series and median values – before and after the outbreak of the COVID-19 pandemic and the war in Ukraine, respectively. Ranks were calculated for the entire population sample and each age group (Table 9). Factors which perceived importance increased in the second survey are marked in green, and factors which importance decreased in the second survey are marked in red. A similar comparison was

conducted for male and female participants, as well as older citizens residing in apartments and single-family houses, but significant differences were not found between these groups.

The analysed factors in each of the four groups of infrastructure components that contribute to older people's sense of security in the place of residence were ranked based on their perceived importance in the survey (Fig. 8). Category 1 factors (Technical protective infrastructure, infrastructure without architectural barriers, and safe shelters) and Category 2 factors (Safe transport solutions) are ranked in Figure 9. Category 3 factors (Social support and welfare) and Category 4 factors (Perceptions of the neighbourhood) are ranked in Figure 10.

The data presented in the figures point to the highest increase in the ranking of safe transport

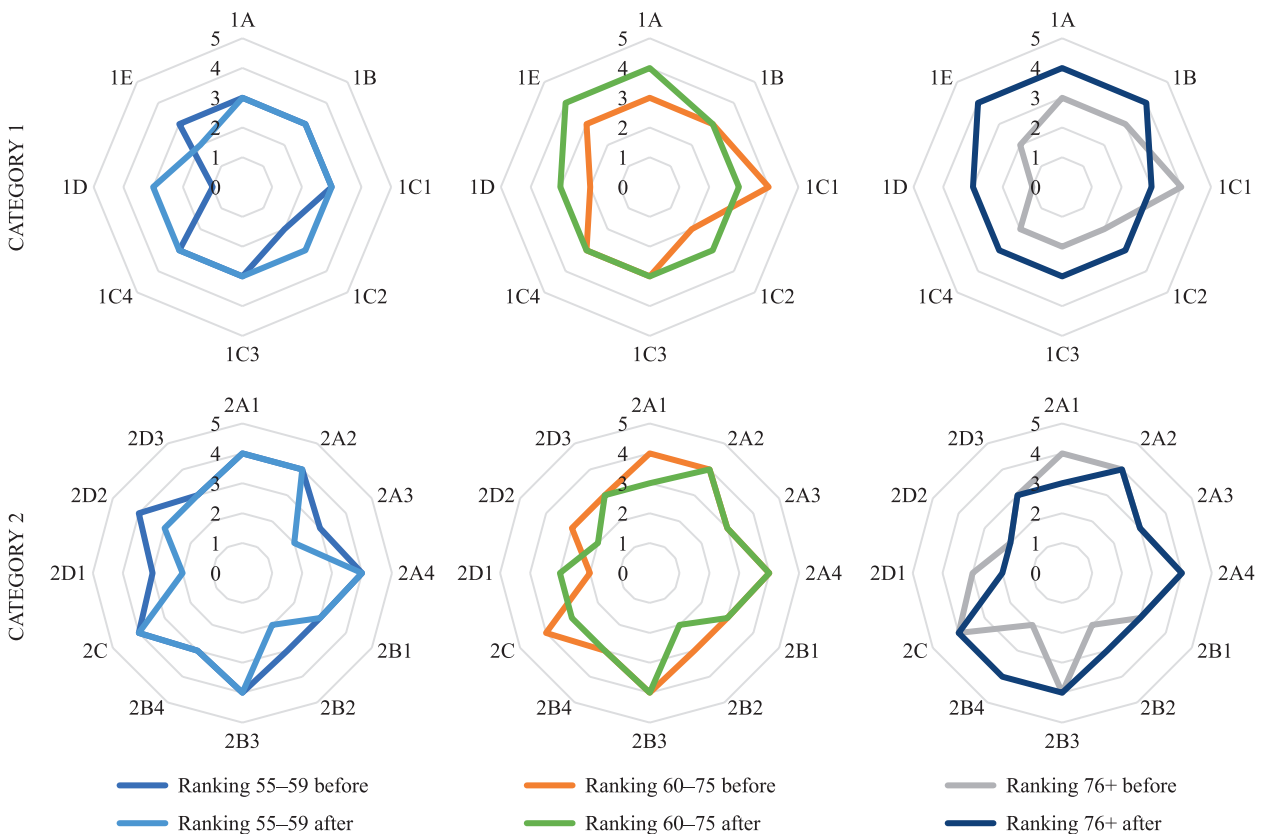


Fig. 9. Ranking of category 1 and category 2 factors before and after the outbreak of the COVID-19 pandemic and the war in Ukraine, in different age groups

Source: own elaboration.

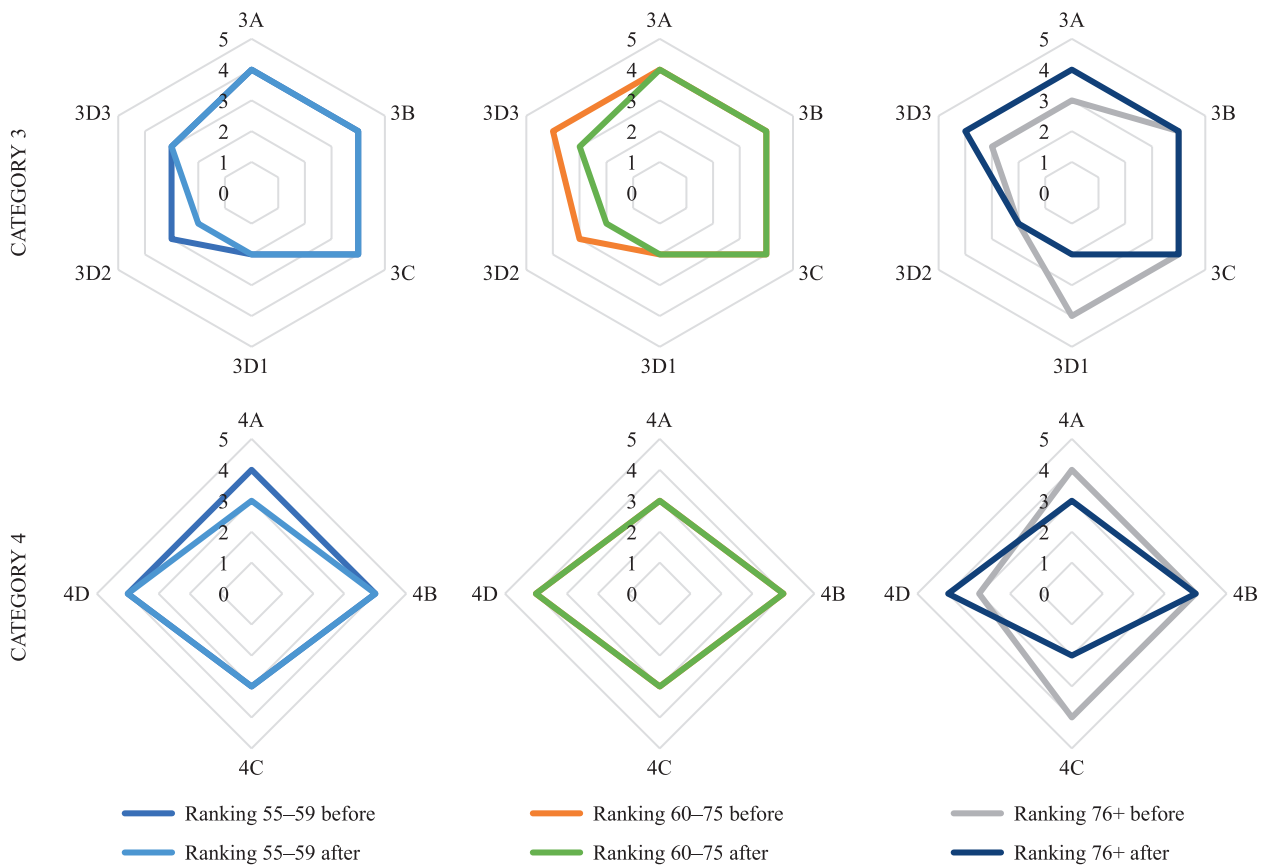


Fig. 10. Ranking of category 3 and category 4 factors before and after the outbreak of the COVID-19 pandemic and the war in Ukraine, in different age groups
Source: own elaboration.

solutions (category 2), followed by social infrastructure (category 3). A minor decrease was observed in the importance of technical protective infrastructure, infrastructure without architectural barriers, and safe shelters (category 1). No significant changes were noted in the ranking of category 4 factors (perceptions of the neighbourhood). Certain differences in the perceived importance of the analysed factors were observed between age groups. The opinions voiced by the oldest group differed from those expressed by the remaining respondents (greatest differences in the perceived importance of the analysed factors before and after the outbreak of the COVID-19 pandemic and the war in Ukraine).

CONCLUSIONS

The results of the study were used to develop a list of factors which contribute to older people's sense of security in public open spaces in residential estates. The list is innovative and universal, and it was compiled based on a review of domestic and international literature. The identified factors can be applied in all countries to expand the scope of research conducted at the national, regional, and local level. These factors were classified into four categories. Older persons participated in two questionnaire surveys, and their responses were used to classify the perceived importance of the analysed factors in different age groups. Most differences were associated with the participants' age, which confirms the research

hypothesis. These findings can be attributed to health factors in age groups and potential generational differences. No significant differences were observed between respondents residing in different cities, between genders, or between participants living in different types of housing. The results were used to determine the influence of two different threats on the perceived importance of infrastructure components that increase safety in residential estates. During the COVID-19 pandemic, the respondents attached the greatest importance to category 4 factors (perceptions of the neighbourhood, cleanliness and sanitation) and category 3 factors (social support and welfare). After the outbreak of the war in Ukraine, the participants attached equal importance to category 4 factors, whereas category 1 factors (technical protective infrastructure, infrastructure without architectural barriers, and safe shelters) emerged as the second most important category.

The results of the study indicate that older people's sense of security in public open spaces in residential estates should be identified in the context of various threats. The opinions and perceptions of older adults should be analysed in various age groups.

A considerable limitation in carrying out such surveys is the lifestyle of older citizens. It is much easier to reach those who prefer an active lifestyle with surveys than those who are less active (homemakers). Therefore, preference surveys should be extended to include a larger random sample of people with low activity levels in order to validate the results obtained.

The major limitation during these studies proved to be the availability to older people during the pandemic period. Therefore, studies performed during a time of threat (e.g. pandemic and armed conflict) should be validated by repeating them during a quieter period without the direct influence of these threatening factors (stabilisation period). Perhaps then the hierarchy of factors will change due to re-evaluation. However, given that emerging threats are pulsating phenomena, the results of the research should be taken into account and hooked into the time of threats as important influences (biases) on the results obtained. In peacetime we do

not need shelters, but this does not mean that they are unnecessary elements of infrastructure. In view of this, all preferences and needs that may be affected by any hazards should still be taken into account even despite their current existence, in the event that these hazards emerge or return.

The functional and landscape components of residential estates that enhance older people's sense of security should also be studied in the international context. Such attempts will be made in successive stages of research.

Author contributions: authors have given approval to the final version of the article. Authors contributed to this work as follows: conceptualization: M.C., A.D., M.D., & A.S.; methodology: M.C., A.D., M.D., & A.S.; validation: M.C., A.D., M.D., & A.S.; formal analysis: M.C., A.D., M.D., & A.S.; data curation: M.C.; writing – original draft preparation: M.C., A.D., M.D., & A.S.; writing – review and editing: M.C. & A.D.; visualization: M.C.; project administration: M.C., A.D., M.D., & A.S.; funding acquisition: M.C., A.D., & A.S.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

Funding: The research grant was funded by the National Science Center, Poland. Agreement number: UMO-2019/35/B/HS4/01380. Project title: The concept of identifying age-friendly housing estates in the aspect of infrastructural and landscape determinants.

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