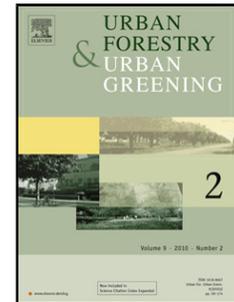


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## The role of urban green spaces in care facilities for elderly people across European cities

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### Highlights:

- Facilities with garden use green spaces more often than facilities without garden
- Access to green spaces is a main reason to visit green spaces
- Gardens are important for active recreation and socialization
- Gardens are lacking possibilities for nature observation
- More efforts are necessary to consider age-sensitive amenities

### Abstract

Urban green spaces (UGS) are increasingly acknowledged for their importance for the well-being of urban populations. However, studies are lacking the consideration of the demand and use of UGS by different population groups and connecting UGS with social infrastructure. In an era of worldwide urbanization and ageing, this European study sheds light on the role of UGS for care facilities for elderly. 126 care facilities from 17 cities in Austria, Germany, Norway, Poland, Romania and Slovenia took part in an online survey. Administrations of care facilities gave insights on the (1) importance of gardens

related to care facilities for the quality of life for the seniors, (2) importance of UGS outside of care facilities for the quality of life for the seniors and (3) the consideration of natural and age-friendly designs and management of ecosystem disservices of UGS. The results emphasize not only the importance of UGS for the quality of life of seniors residing in care facilities, but also for the staff and visitors. UGS contribute to physical activities, recreation, and social interactions. The study found that in particular facilities with an own garden are highly aware of the benefits UGS provide. The study holds important lessons for urban green space planning, management and design not only to focus on the quantitative supply of UGS, but also to consider age-sensitive amenities in and access to UGS of high quality for seniors.

**Keywords:** social infrastructure, urban green space design, urban green space access, healthy ageing, urban green space management, quality of life

## 1 Introduction

A recent review of international studies demonstrated the importance of human-environment interactions taking place in urban green spaces (UGS) such as parks, community gardens or urban forests (Kabisch et al., 2015). However, the review showed that there is a lack of studies focusing on such interaction in relation to specific population groups (ebd.). It is crucial for urban planning to know the demand for UGS by different population groups, so that the planners can provide a high living quality for all strata of the population. Especially the demand and use of UGS by the elderly should be known for an integrative UGS management, planning and design.

Ageing populations are found in almost all countries around the world due to decreases in the mortality and fertility rates (United Nations, 2015a). Between 2015 and 2030 the proportion of people aged 60 years and older is predicted to increase worldwide by 56% from 901 million to 1.4 billion (ebd.). At the same time, a continued increase in urbanization is projected and about 90% of the world's population will live in cities by the end of the 21st century (United Nations, 2012), therefore the older population will increase faster in urban areas compared to rural areas (United Nations, 2015a).

Due to the rapid urbanization and demographic ageing, the World Health Organization (WHO) elaborated the Global Age-Friendly Cities Guide emphasizing UGS as an important age-friendly feature (WHO, 2007). The 2030 Agenda for Sustainable Development emphasizes in

the eleventh goal the need to provide accessible and inclusive UGS for older persons besides women, children and persons with disabilities (United Nations, 2015b). A study in Denmark showed that factors reducing mobility such as age and health status influenced which nearest green spaces were used most (Schipperijn et al., 2010).

From a planning perspective, good access to UGS has positive health impacts since older people living within a walking distance to green spaces can increase their longevity (Takano et al., 2002). Especially longer visits in green areas can lead to health improvements such as reduction in headaches and stress, and physical activities lead to larger improvements comparing to passive recreation (Hansmann et al., 2007). In addition, passive recreation (e.g., relaxing, enjoying the sun, and encountering other people (Kabisch et al., 2015)) in UGS contributes to human well-being (Irvine et al., 2013; van den Berg et al., 2010). UGS such as parks can, in particular, foster social interactions between different kinds of individuals, for instance between children and adults (Refshauge et al. 2012) or immigrant and local residents (Peters et al. 2010). Besides children and people with lower economic status, elderly people especially feel less lonely and experience more social support when living in green areas (Maas et al., 2009).

In general, private gardens, such as green backyards or related to department buildings, are argued to provide major benefits for human well-being and health since they are at the immediate proximity to the home (Cameron et al. 2012). When there is a lack of private green spaces, people may visit a park or natural area to compensate this lack. Such likelihood increases when UGS are easy to reach (Maat & de Vries, 2006). Since the intensity of physical activities such as related to gardening, walking or leisure depends on age and the capacity of the individual (Dallosso et al., 1988), it can be assumed that elderly with health impairments prefer to use private green spaces if available or green spaces with good access when no private UGS is available.

Besides access and from a design perspective, the attractiveness of UGS influences the degree of their use (Sugiyama et al., 2010) and species or structural diversity can in particular influence health and well-being as well as frequency of green space visits (Hegetschweiler et al., 2017). Indeed, a study in Australia found that distance to neighborhood open spaces is not the only factor influencing recreational walking by adults, but attractiveness of open spaces can be considered as the most important driver for recreation walking (Sugiyama et al. 2010). Naturalistic-ecological designs of UGS, such as features related to trees, water, and birds, are valued by visitors (Giles-Corti et al., 2005; Jim & Chen, 2006; Pretty et al., 2006). Amenities such as walking paths, benches, barbecue places, and toilets increase the attractiveness of UGS

and invite for longer stays (van Herzele & Wiedemann, 2003). An appropriate design of UGS is crucial to accommodate different age groups who often have different preferences (Balram & Dragicevic, 2005; Ostoić et al., 2017). For instance, elderly need frequent benches and shade to rest when taking outdoor walks (Rodiek & Fried, 2005). Seniors do as well prefer even and soft pavements of urban park pathways which are lighted and along waterbodies (Zhai & Baran, 2017). Easy accessible green spaces, which have a pond and provide shadow, encourage seniors in particular visiting UGS during heat periods (Arnberger et al., 2017). For elderly people specific garden designs can be offered such as dementia gardens to support a safe usage of the garden (Department of Health and Human Services, 2014). To create a secure place for elderly, walking circuits with way-finding cues, non-slip paving or furniture where the seniors can rest should be provided (ebd.). For an inclusive UGS management it is in particular in the face of ageing population and urbanization crucial to identify and counteract ecosystem disservices (e.g., allergenic potential of plants, vegetation overgrowth, increased costs of vegetation management) to provide positive experiences in their nearby environment (Lyytimäki & Sipilä, 2009).

The globally ageing process is continuing, in particular the share of the “oldest old” (80 years and older) will increase and triple from 125 million in 2015 to 424 million in 2050 (United Nations, 2015a). In EU-27, between 2010 and 2060 people aged 80 and older will increase from 5% to 12% (EC, 2014). The older a person gets, the more likely this person will live in a care facility. In Europe, 1.7% of people aged 65-84 years were living in care facilities related to health care and institutions for retired or elderly in 2011. The number was seven times higher for seniors aged 85 and older (excluding Ireland and Finland due to lack of data) (Eurostat, 2015). Care facilities provide a place to live when the elderly are too weak or ill to care of themselves. Types of care facilities for elderly people differ between the degrees of care they provide. They can include homes for elderly people or assisted living (focusing on independent living), retirement homes (small need for care), and nursing homes (high need for care). Day-care centers provide support for elderly people during the day.

Due to health impairments and lack of mobility, we assume that a high living quality in care facilities for elderly is crucial for the seniors and UGS can contribute. In general, examples from Europe show urban planning often lacks a link between UGS and social infrastructure (Davies et al., 2015). This lack might also occur due to limited research on UGS and social infrastructure. Existing studies have investigated UGS in schools (Dyment & Bell, 2008a; 2008b; Iojă et al., 2014a; Kweon et al., 2017; Waliczek et al., 2001) and hospital gardens

(Cooper-Marcus, 2007; Nejati Rodiek & Shepley, 2016; Whitehouse et al., 2001). Existing studies on UGS in care facilities for dementia patients (Hernandez, 2008; Rappe & Topo, 2007) are helpful but only provided limited insights into the role of UGS inside and outside of care facilities for seniors with different health statuses.

To fill this research gap this study examines the role of UGS for seniors residing in care facilities for elderly people across European cities. Two types of UGS are investigated including gardens of care facilities and green spaces outside the facility (e.g., parks, forests). To examine their different roles in terms of living quality and management, three hypotheses have been created:

1) Gardens related to care facilities for the elderly are important for the quality of life for the seniors.

1.a) Gardens in care facilities for elderly people provide benefits in terms of physical activities.

1.b) Gardens in care facilities for elderly people provide benefits in terms of passive recreation.

1.c) Gardens in care facilities for elderly people provide benefits in terms of social interaction with different groups of individuals.

2) UGS outside of care facilities for the elderly are important for the quality of life of the seniors.

2.a) UGS outside of care facilities for elderly people are particularly visited by facilities without gardens to compensate the lack of garden and to contribute to the quality of life for the seniors.

2.b) UGS outside of care facilities for elderly people with gardens are less used than own gardens due to health impairments of the seniors.

2.c) The visit of UGS outside care facilities by facilities with and without a garden is dependent on the access.

3) The management and design of UGS for seniors living in care facilities for elderly people consider a natural and an age-friendly design and ecosystem disservices.

3.a) Facilities having a garden consider natural and age-friendly designs and amenities and are confronted with managing ecosystem disservices.

3.b) Facilities without a garden visit UGS outside care facilities of high quality with age-friendly design and amenities and are confronted with managing ecosystem disservices.

## 2 Case study background

The study addresses administrators of care facilities for elderly people in cities across Europe. The case study countries represent cities from different geographical parts of Europe including Germany, Poland and Austria from Central Europe, Romania and Slovenia from Southeastern Europe and Norway from Northern Europe. The cross-country design is adopted to account for the differences in availability, user demands, and planning priorities of UGS across Europe (Kabisch et al., 2016a).

We choose cities more than 100,000 residents as a basis for selecting case study cities in each country, because elderly living in large cities is expected to receive large benefits from UGS (Maas et al., 2006). Three cities were selected from each country. A study on 386 European cities found a dramatic decline of UGS when urban population density increases (Fuller & Gaston, 2009). Hence, in each country we selected the city with the highest (hence likely worse supply of UGS) and lowest population density (hence likely better supply of UGS) among the eligible cities. In addition, the third case study city refers to the city where a partner research institution is located. In Romania we included the city with second highest population density city because Bucharest is both where the partner research institution is located and the city has the highest population density. Moreover, the Romanian city with the second lowest population density was chosen because there were few care facilities in the city with the lowest density. As Slovenia has only two cities with a population larger than 100,000 residents, both cities were selected. Fig. 1 visualizes the location of the case study cities.

Since the objective of the study is to get a comprehensive picture on the role of UGS in care facilities for elderly people, we did not pre-select specific types of the facilities within the city. Therefore, a database including all publically advertised and listed care facilities for elderly people in the case study cities was developed. The database is based on an internet search of existing care facilities for the elderly using publicly available databases (e.g. national databases). For the database the names, postal and email addresses, telephone numbers of the facilities, and types of care provided were noted. The latter allows a reflection of the response representativeness.

### **3 Methods**

Influenced by the substantive research objective to gather a comprehensive picture on the role of UGS in care facilities for the elderly, the focus of the study is on quantitative methods using a standardized questionnaire. Using a standardized questionnaire assures equal conditions for the respondents in each country (Kelle, 2006). A questionnaire was developed mirroring the hypotheses. To test if important options and questions were missing or were not comprehensive, a pilot survey was conducted in each country. Surveyed administrations of care facilities in pilot study cities commented and suggested on the questionnaire design, both on the included questions and on important questions that were missing. After incorporating the comments from the pilot study, a final questionnaire was development, which was used across the case study cities of the six countries. The questions for each of the three hypothesis are provided in the appendices A (hypothesis 1), B (hypothesis 2), and C (hypothesis 3). The questionnaire includes mainly closed questions and if suitable an open answer field for further information.

Taking into account the advantages of an online survey such as to reaching a high number of pre-defined groups and people in distant locations in a short amount of time and with low financial input (Wright, 2005), the questionnaire was administered online. Email invitations, including the link to the questionnaire, were sent to the administrators of 458 facilities. Within the survey invitation, we also stressed that the administration can share the survey with employees who deal with activities related to UGS. The survey took place between May and October 2016. In total, 126 questionnaires were completely filled (Austria: 28 (response rate: 25%); Germany: 33 (response rate 28%), Romania: 14 (response rate: 19%), Slovenia: 8 (response rate : 50%), Poland: 11 (response rate 25%), Norway: 32 (response rate: 34%)) resulting in a total response rate of 28%. Overall, 92% of the responding care facilities have a garden, which can be used by the seniors; 2% have a garden, which cannot be used by the seniors (e.g., front yard) and 6% have no garden at all. The data were analyzed with SPSS 22 (IBM Corp., Armonk, NY, USA) using mainly basic descriptive statistics to get a comprehensive picture of the role of UGS for care facilities for elderly across Europe.

### **4 Results**

#### **4.1 Representativeness of the responded sample**

To test the representativeness of the survey, the share of types of care provided by the care facilities for elderly people according to the database were compared with the share of

participated facilities (see Fig. 2). The survey can overall be considered as representative. However, within the countries some differences between the share of different types of care facilities contacted and participated are observed. For instance, in Romania and Poland compared to the total share a bigger portion of facilities providing assisted living and a smaller share of nursing homes filled the survey. In total, the results reflect a broad picture of different kinds of care facilities for elderly people.

## **4.2 Importance of care facilities' gardens for the quality of life for elderly people (hypothesis 1)**

62% of care facilities have a useable garden state that over 50% of their residents can use. The sizes of the facilities' gardens differ between countries. In total, most of the gardens (32%) are between 101-500 m<sup>2</sup>. The highest share of small gardens <100 m<sup>2</sup> can be found in Bucharest, Romania, (22%). The biggest garden is situated in Munich, Germany (30,000 m<sup>2</sup>).

All facilities with gardens disagree with the statement that the garden has no importance at all for seniors in terms of physical activities, passive recreation and social interactions. In total, physical activities (66%) and social interactions (63%) are the most important benefits provided by gardens to the quality of life for the seniors (see Fig. 3). Gardens' importance for supporting physical, mental, and social health of the residents is evident by the fact that 64% of the care facilities use the garden for therapies and 17% plan to use it for therapies in the future. Only 13% stated that they do not use the garden for therapies. Overall, the next sections show that gardens of care facilities contribute to the living quality for the seniors in manifold ways (see hypotheses 1).

### **4.2.1 The role of the garden for physical activities**

The majority of facilities considered walking as one of the three most important physical activities done in the garden by the seniors (95%). Contact with nature through gardening/picking plants is the second most important activity (64%). Weight training (7%) and dancing (5%) are in all countries assessed as being less important physical activities. Corresponding to walking as most important physical activity, footpaths and circular walks (77%) are dominant amenities promoting physical activities. Possibilities for gardening/picking plants (73%) are the second most important physical activities promoted by amenities that can

also support a closer contact to nature for the seniors. One facility from Germany reported for instance that they provide own beds for gardening if the seniors would like. Amenities for sports activities are less important (22%). Although the promotion of physical activities was on average assessed more important than recreation and social interactions, more facilities provide no amenities for physical activities (13%) than for recreational activities (2%). In particular, in Romania (44%) a large share of facilities provide no possibilities for physical activities.

#### **4.2.2 The role of the garden for social interactions**

Most intensively, seniors use the garden on a daily basis with other seniors (32%), alone (31%), and with nurses (26%). In addition, individuals from outside keep company with the seniors in the garden several times a week such as relatives and visitors (44%), volunteers (33%), and physiotherapists (33%). Facilities from Germany and Norway added that playing with children is another important activity for physical activities. However, 50% of the seniors use the garden less than a few times per month with children. Statements by the facilities confirm the importance of the garden for the seniors for social interactions. A Romanian facility suggests that relatives of the elderly came in particular to use the gardens with their family member. The value of the garden for therapeutic activities such as gymnastics is emphasized by a facility from Poland. A facility from Austria reports that visitors from the outside use the garden and its terrace café. Another facility from Poland summarizes: “In the garden the seniors can have intimate meetings with the visitors without a third party but under the watchful eye of the staff in case medical help is needed.”

#### **4.2.3 The role of the garden for passive recreation**

Most important activities within the category passive recreation are a mix of profiting from nature and personal interactions such as enjoying the sun (90%), chatting (60%), and observing nature (56%). Looking at variations between the countries the ranking of the three most important activities is similar. Only in Romania, eating and having a barbecue together (42%) and reading (33%) are more important than observing nature (25%). Overall, less important activities are related with meditation (4%), making music (3%), education (2%) and drawing (1%).

Benches (99%) have major importance for passive recreation in all countries. The majority of the facilities also provide shelter to protect from wind or rain (52%). Although the majority of the facilities stated that observing nature is an important recreational activity, only few facilities (34%) provide amenities to observe wild animals (e.g., feeding points for birds). However, over the half of the care facilities (52%) have pet animals or a petting zoo supporting nature observation as well. In general, animals play an important role for the seniors. Facilities from Austria, Germany, and Norway reported that they have for instance small animal parks, a chicken farm, and birds in cages in the garden or rabbits in the summer months. One Norwegian facility reported also that pet visits were important, recreational and social, that seniors spend their time in the garden together with animals. Less important amenities for passive recreation are religious and spiritual elements (10%) in the garden corresponding to low importance of meditation. Outdoor toilets are only found in Germany (3%).

### **4.3 Importance of UGS outside care facilities for the quality of life for elderly people (hypothesis 2)**

By asking facilities with and without own gardens on the use of UGS outside the facilities by the seniors the results revealed significant differences related to the frequency (see sections 4.3.1 and 4.3.2) and reasons of UGS visits such as access (see section 4.3.3) between facilities with and without gardens and between seniors of various health status.

#### **4.3.1 The use of UGS outside care facilities by facilities without own gardens**

90% of the facilities having no garden do substitute this lack in different ways. The substitution is mainly through providing indoor plants (70%) or greened balconies/terraces (60%). Only 10% of the participated facilities have greened the building (e.g., green walls, green roofs) and show nature movies. The visits of UGS outside the facility are provided by 50% of the facilities (see hypothesis 2.a). Main UGS visited are public parks (100%) or lakes and rivers (40%).

#### **4.3.2 Difference between the use of garden and external UGS by facilities with gardens**

Compared to facilities without a garden (50%), more facilities with a garden (67%) provide visits to UGS outside the facility for the seniors (Spearman's  $Rho_{rs} = 0.186$ ;  $p < 0.5$ ) (see hypothesis 2.a). In fact, also positive correlations between the frequency of use of the facilities'

gardens and UGS outside the facility are found such as by seniors with strong mental impairments and their use of the garden for recreation and visit of UGS outside ( $r_s = 0.386$ ;  $p < 0.01$ ).

However, the frequency of use between the facilities' gardens and UGS outside facilities depends on the health status of the seniors (see Table 1) (see hypothesis 2.b). The majority of the healthy seniors use the facilities' own garden on a daily basis; UGS outside the care facility are mostly used a number of times monthly. Healthy, sprightly seniors use the facilities' gardens mostly for physical as well as for recreational activities followed by seniors with strong mental impairments. Seniors with strong physical impairments use the garden more seldom. Although the results suggest that seniors with health impairments use the garden less frequently, the results show further, that seniors despite physical or mental impairments use the garden. One facility from Poland reported that seniors use the garden regardless of the weather and their mobility and employees help residents use the garden, including those who are bedridden.

Such as the frequency of use of the facilities' gardens, the frequency of visiting UGS outside the facility strongly depends on the health status of the seniors. In particular, healthy seniors visit UGS from a number of times monthly to several times a week. Seniors with strong physical impairments have difficulty in leaving the care facility to visit UGS and in particular, this group of seniors never visits UGS outside the facility. Moreover, the most common reasons why seniors do not visit UGS outside the facility are physical (68%) and mental (54%) constraints.

From a planning perspective, the seniors living in facilities with their own garden visit a variety of UGS comparable to the facilities without gardens. Urban parks (91%) are the most frequently visited UGS. In total, urban forests (27%) and lake- or riversides (17%) are the second and third most often visited UGS types. However, the ranking and degrees of the different UGS types visited by facilities without garden vary among the countries. For instance, in Austria community and allotment gardens (25%) are the second most important UGS type visited, meanwhile in Romania this category does not exist.

#### **4.3.3 The role of access to UGS outside care facilities**

That the UGS visited must have a good access can be seen from the fact that most of the seniors living in facilities with or without gardens reach the UGS by foot without any aid (facilities with garden: 63%; facilities without garden: 80%) or with walking aids (facilities with garden: 58%; facilities without garden: 60%) (see hypothesis 2.c). Public transport (22%) is of medium

importance for all countries from facilities with own gardens and of higher importance for facilities without gardens (80%). Regarding individual motorized transport, the facility (with garden: 28%; without garden: 20%) or visitors (facilities with garden: 21%; facilities without garden: 20%) provide private cars to reach UGS outside the care facilities. Several facilities in Norway added that taxis and electric bikes are important transportation modes for the seniors.

Although good access to UGS can be argued to be of importance from a planning perspective, since the majority of seniors reach the UGS by foot, good access is not the single most important reason to visit UGS outside the care facility. In this regard, results show differences between the facilities with and without gardens. For facilities with gardens, good access to UGS (65%) is the second most important reason to visit UGS, 40% of facilities without gardens consider good access as a major reason. For facilities without gardens, invitations by relatives or the staff to visit UGS (80%) is even more important than access. In contrast, not for all facilities with gardens is the invitation by individuals (36%) of importance. In particular, for care facilities without a garden, the main reasons to visit UGS outside the facility are contact with nature and observing nature (100%) and recreation (100%). In addition, intergenerational contact (89%) and a break from daily life in the care facility (80%) are major reasons and all more important than good access to the UGS. For facilities with garden contact with nature and observing nature (67%) and the retreat from daily life in the care facility (67%) are only slightly more important than good access. Interestingly, even though physical activities such as gardening or walking are more important than recreation in the gardens of the facilities, the majority of facilities visit UGS outside the facilities for recreation (55%) rather than for promotion of physical activities such as sports (10%) or gardening (3%). In terms of social interactions, in particular the intergenerational contact (50%) is a reason to visit UGS for facilities with gardens.

#### **4.4 The design and management of green spaces of facilities for elderly people (hypothesis 3)**

##### **4.4.1 Natural and age-friendly designs and amenities of UGS**

The majority of the care facilities consider age-sensitive designs and amenities in their gardens (87%), except in Romania where 42% of the facilities did not implement an age-sensitive garden design or amenities (see hypothesis 3.a). The most important characteristic of an age-sensitive garden is its access without barriers so that it is also accessible for seniors with physical disabilities (see Fig. 4). To protect the privacy of the seniors and to avoid direct access

to streets the majority of the facilities put up fences and sight protection. Except for Germany (32%) and Poland (25%), most of the facilities provide also non-trip, non-slip paving to prevent seniors from slipping and falling. However, only between 38% (Slovenia) and 13% (Poland) provide handrails to support the seniors' walking safety. In addition, practicing grounds for gait training for seniors with limited mobility play a less important role. In addition, amenities play a minor role to support mental health. Only 31% provide a dementia garden and even less (23%) a sensory or scent garden. Although observing nature is rated as one of the most important recreational activities for seniors in the garden (see section 4.2.3), less than half of the facilities provide a natural garden. This result is supported by the fact that rarely mowed meadows with a range of plant species are found less often (21%) compared to lawns (78%). Moreover, ornamental flower beds (91%) and decorative garden elements (e.g., rose arches and decorative stones) (50%) are found more often than snack gardens (e.g., with fruit trees, berry bushes) (39%) and vegetable beds (28%). In particular, green elements characterize the care facilities' gardens such as trees (91%) and bushes (89%). Blue elements such as fountains (28%) and ponds and lakes (21%) are also placed in some gardens.

For facilities having no garden the supply of age-sensitive designs and amenities of UGS outside the care facilities are of less importance and only one administrator in Norway states this as an important reason to visit UGS outside. For facilities without a garden and not organizing visits to outside UGS this aspect is no reason at all not to visit green spaces (see hypothesis 3.b).

#### **4.4.2 Challenges of UGS management**

Garden management is not perceived as challenging. The highest agreements among the participated facilities have been achieved in the need of volunteers and employees taking care for the garden (median: 2; 1: I don't agree at all; 4: I fully agree) and the challenge of high maintenance costs associated with the garden (median 2). Especially in Romania (42%) and Poland (38%) the facilities fully agreed to the need of volunteers and employees taking care for the garden. Environmental risks and ecosystem disservices are not considered as challenges for garden management (see hypothesis 3.a). The highest, but still low, agreements have been achievement in the consideration of risks for the seniors to stumble or slip in the garden due to roots or mud to which 4% somehow agree and 3% fully agree. Unpleasant smells, sounds or negative feelings when being in the garden are not reflected as important environmental risk.

Environmental risks and ecosystem disservices found in UGS outside the facility are no challenge for facilities having no garden, regardless if they visit or do not visit green spaces outside the facility (see hypothesis 3.b).

## 5 Discussions

### 5.1 The role of green spaces for the quality of life for seniors

The results of the survey show that gardens of care facilities for the elderly are highly important for the quality of life for the residents, especially in terms of physical activities and social interactions (hypotheses 1). Comments by the administrators like *“the possibility of using gardens, the inclusion of nature, is essential in the context of care”* (Austria), *“the garden is a wonderful place to enjoy the sun, to use it together with everyday companions or to talk and walk with relatives”* (Germany), *“we are passionate about the life in the garden”* (Romania), and *“there is no doubt that the garden is the very important area in the closest surrounding of the seniors”* (Poland), confirm these findings and thus hypothesis 1.a. Thus, UGS can significantly support the well-being of elderly, which is under threat due to fundamental social changes along ageing such as losing close relationships and independency (WHO, 2015). Our findings confirm further that facilities provide gardens of high quality. They supply a range of amenities for social interactions and recreational activities. However, the results suggest that aesthetics are more important than natural garden designs, although observing nature was stated as main benefit for seniors. An increase in natural meadows instead of ornamental plants can contribute to nature observation. A study in Norway suggests that people with a strong attitude towards wildlife observation prefer densely vegetated landscapes for recreation (Bjerke et al., 2006).

Interestingly, and in contrast to our expectations (hypothesis 2.b), green spaces outside facilities play only a minor role for facilities without garden. Thus, facilities with a garden use UGS outside the care facility more intensively than facilities without a garden (hypothesis 2.a). Moreover, facilities without a garden compensate mostly with indoor plants rather than with visits of UGS, which only partly confirms hypothesis 2.a. Only one facility (from Poland) answered that there is a lack of the garden passing on the wish by the seniors to have a garden where they could sit and rest. Thus, our study suggests neglecting the compensation hypotheses in terms of compensating the lack of private gardens in care facilities for elderly by visits of UGS outside facilities. This is line with a study by Maat & de Vries (2006), who found that the

availability of private green spaces increases the probability of using parks. In contrast, people with less access to green spaces and a green residential environment do not compensate the lack. The authors argue that a reason for that might be that people attracted by a green environment select their residential home according to their preferences for green spaces (Maat & de Vries 2006). Our findings suggest that it needs peers (e.g., staff and relatives) who are aware of the importance of UGS for the quality of life for seniors and support them to benefit from UGS. Thus, our study complements a study dealing with seniors with dementia syndrome (Rappe & Topo, 2007) and highlights the important role of motivating and supporting seniors to visit UGS. Since the use of UGS is particularly lacking in facilities without gardens, such peers can increase the use and appreciation of UGS by these facilities. Moreover, access to UGS can provide benefits to the staff as well. A study on hospital staff break areas found that direct access to nature has more restorative potential in health care workplaces compared to indoor plants or window views (Nejati Rodiek & Shepley, 2016).

A lack of awareness can be considered as a main social empowerment failure for greening cities due to a lack of knowledge and information about the significance of UGS (Kronenberg, 2015). To make the significance of UGS visible it is argued that municipal accounting systems can show the opportunity costs when not investing in UGS and its related ecosystem services (Schäffler & Swilling, 2013). In this study, financial burdens are mainly associated with management challenges for the facilities. A monetary assessment of the value of UGS for the care facilities might also support to offset costs of, for instance building and maintaining gardens and staff needed to visit UGS with benefits through UGS use by the seniors. For instance, since the use of gardens by people with dementia can reduce aggression (Detweiler et al., 2009), it can be assessed if and to which degree using gardens can reduce the amount of medication and thus the costs. Thus, public-health departments can be more willing to support greening initiatives when they consider greening as a cost-effective public-health intervention (Donovan, 2017).

## **5.2 Implications for green space management and design for elderly**

So far, ecosystem disservices are not challenges for the facilities' gardens and UGS outside the facility (hypotheses 3.a and 3.b). In this regard, further research should investigate if trade-offs related to ecosystem disservices for seniors can occur when the garden is less maintained (see section 5.1). Elderly can have a relatively low preference for densely vegetated green spaces due to mobility constraints (Bjerke et al., 2006). In this regard, very accessible UGS near the

care facilities can play a more important role for nature observation than managing a garden to avoid dense vegetation (see hypothesis 2.c). The present study shows that urban parks are the single most important type of UGS visited on foot outside of facilities for the elderly. Further research should analyze accessibility of urban parks from the facilities, their qualities and include the network within parks, access through walking aids as well as the distribution of amenities within the parks. In terms of UGS design, facilities in Germany and Norway complained of a lack of toilets or benches in the UGS, as well as long distances between benches. Similar concerns are raised by the WHO (2007) and also studies in China found that the availability of benches among other things can support senior walking in urban parks (Zhai & Baran, 2017). Regarding an age-sensitive design of the facilities' gardens, our results suggest that more types of age-sensitive amenities should be considered, in particular to support physical activities, as well as mental impairments such as dementia. Dementia is a major reason for moving to a care facility (Rappe & Topo, 2007). Over 46 million people live with dementia worldwide and the number will increase to 135 million by 2050 (Prince et al., 2015). Although the health benefits of therapeutic gardens for dementia are vastly investigated (e.g., Hernandez, 2008; Rappe & Topo, 2007) less than one-third participated facilities with garden implemented special gardens for dementia.

### **5.3. Differences between regions and facilities**

Descriptive differences between the countries mainly occurred in Romania. In particular, in terms of the quality of the facilities' gardens such as providing amenities for physical activities and age-sensitive garden design seem in Romania play partly a less important role. This can be explained by the assumption that southeastern EU countries may lack comprehensive UGS management policies focusing on economic growth rather than on UGS after their opening up to the market economy in 1990 (Ioja et al., 2014b; Ostoić et al., 2017). Thus, most care facilities for elderly in this study were built in the post-communist period when UGS were not considered as an important space for these facilities. In Romania the majority of facilities is aged between one and ten years (64%) and only one facility (being the oldest one) is aged between 31-40 years. In contrast, the share of oldest facilities aged 50 years and older within each country are found in Central (Austria: 21%, Germany: 30%) and Northern Europe (Norway: 22%).

No statistical correlations (e.g., Chi Square, Spearman Correlation) between characteristics of care facilities (e.g., age of facility, location in the urban core or suburban areas) or their characteristic in terms of case study selection (e.g., country, low or high population density)

and the existence of gardens or visits of UGS outside the facility could be found. This suggests that the role of UGS for care facilities in terms of garden supply and use of UGS do not differ significantly between cities and countries on a site scale. In contrast, studies on a city scale found statistical correlations to explain differences between availability of UGS and geographical specifics in Europe (Kabisch et al., 2016a; Fuller & Gaston, 2009). This proves that results from large-scale studies on UGS cannot be transformed to a site scale (Kabisch et al., 2015).

Overall, it has to be mentioned that our data are cross-sectional in nature and that not all facilities participated in the survey limiting the generalizability of the findings, in particular for facilities having no garden which might be underrepresented. However, since we have no information on the existence of gardens of the total sample we have to assume a potential bias. Based on the descriptive statistics done no causal relationships can be drawn. However, our study gives a comprehensive overview of the role of gardens and UGS for seniors living in care facilities in Europe. In particular, for explaining the contribution of UGS to well-being and health of different ageing groups contextual analyses, such as done in our study by researching qualities and use of UGS by the elderly, may provide more useful indications than statistical analysis (Kabisch et al., 2016b).

## **6 Conclusions**

Preparing for an ageing population is crucial to achieve sustainable development (UN, 2015a). This European study sheds light on the role of UGS for care facilities for elderly people using data from 126 care facilities in 17 cities from six countries. The paper contributes to the international discourse on urbanization and age-sensitive urban development with a special focus on UGS. The results emphasize the importance of gardens and UGS outside the care facilities for the quality of life of seniors living in care facilities for the elderly as well as for staff and visitors. The study shows differences in the use of UGS outside of facilities between facilities with and without own gardens. The study finds that, in particular, facilities with own gardens make use of the benefits that UGS provide. Facilities provide gardens focusing less on natural designs, but on qualities supporting physical activities, recreation, and social interactions for their residents. More efforts are necessary to consider age-sensitive amenities and access to UGS for seniors, in particular with mental impairments such as dementia. Altogether, this study is a first attempt to provide a comprehensive overview of the role of UGS

for seniors living in care facilities in Europe and can provide as a basis for follow-up in-depth research.

### **Acknowledgment**

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**Appendix A:****Questions related to hypothesis 1: Gardens related to care facilities for the elderly are important for the quality of life for the seniors.**

- 1) Does your care facility for elderly people have a garden?
- 2) What is the estimated proportion of seniors who can use the garden?
- 3) How big is the whole garden area of the care facility for elderly people approximately?

Hypothesis 1.a) Gardens in care facilities for elderly people provide benefits in terms of physical activities.

- 4) How important do you rate the garden for the quality of life for the seniors in terms of its use for physical activities (e.g., walking, gardening)?
- 5) Regarding your experiences what are the 3 most important physical activities done by most of the seniors in the garden?
- 6) Which amenities belong to your care facility's garden to support physical activities for the seniors?

Hypothesis 1.b) Gardens in care facilities for elderly people provide benefits in terms of passive recreation.

- 7) How important do you rate is the garden for the quality of life for the seniors in terms of its use for passive recreation (e.g. reading, sleeping, meeting people)?
- 8) Regarding your experiences what are the 3 most important activities done by the most of the seniors in the garden in terms of its use for passive recreations?
- 9) Which amenities belong to your care facility's garden to support recreational activities for the seniors?

Gardens in care facilities for elderly people provide benefits in terms of social interaction with different groups of individuals.

10) How important do you rate is the garden for the quality of life for the seniors in terms of social interactions?

11) How often do the seniors use the garden in seasons with good weather with different groups of individuals?

## **Appendix B:**

### **Questions related to hypothesis 2: UGS outside of care facilities for the elderly are important for the quality of life of the seniors.**

Hypothesis 2.a) Green spaces outside of care facilities for elderly are visited by facilities without garden to compensate the lacking garden and to contribute to the quality of life for the seniors.

1) Do you consciously substitute the absence of the garden or the green space which cannot be used by the seniors (e.g., for relaxing, getting in touch with nature)?

2) How often do different groups of the seniors visit green spaces outside the care facility in seasons with good weather?

3) If the seniors visit green spaces outside the care facility, which kind of green areas are visited usually?

Hypothesis 2.b) Green spaces outside of care facilities for elderly with garden are less used than the own garden due to health impairments of the seniors.

4) How often do different groups of the seniors use the garden of the facility for physical activities in seasons with good weather?

5) How often do different groups of the seniors use the garden of the facility for passive recreation (e.g. reading, sleeping) and social activities? (e.g., talking with each other)

6) Do seniors visit green spaces outside the care facility?

7) How often do different groups of the seniors visit green spaces outside the care facility in seasons with good weather?

8) If the seniors visit green spaces outside the care facility which kind of green areas are visited usually?

Hypothesis 2.c) The visit of UGS outside care facilities by facilities with and without garden is depending on the access

9) How do the seniors reach the green spaces outside the care facility usually?

10) If the seniors visit green spaces outside the care facility, what are the motives for their visit?

11) If the seniors do not visit green spaces outside the care facility, what are the reasons?

### **Appendix C: Questions related to hypothesis 3**

Hypothesis 3.a) Facilities having a garden do consider natural and age-friendly designs and amenities and are confronted with managing ecosystem disservices

1) Thinking of your care facility's garden, which kind of vegetation and water elements can be found?

2) Is your care facility's garden or a part of it based on age-sensitive designs and amenities?

3) Do you use the garden as a medium for therapies to improve and secure the physical, mental and social health of the seniors?

4) How far do you agree with the following statements related to ecosystem disservices?

Hypothesis 3.b) Facilities with missing garden visit green spaces of high quality with age-friendly design and amenities and are confronted with managing ecosystem disservices.

6) If the seniors visit green spaces outside the care facility, is an age-friendly design and amenities and a lack of ecosystem services of importance?

7) If the seniors do not visit green spaces outside the care facility, are reasons therefore related to a lack of age-friendly design and amenities and appearance of ecosystem services?

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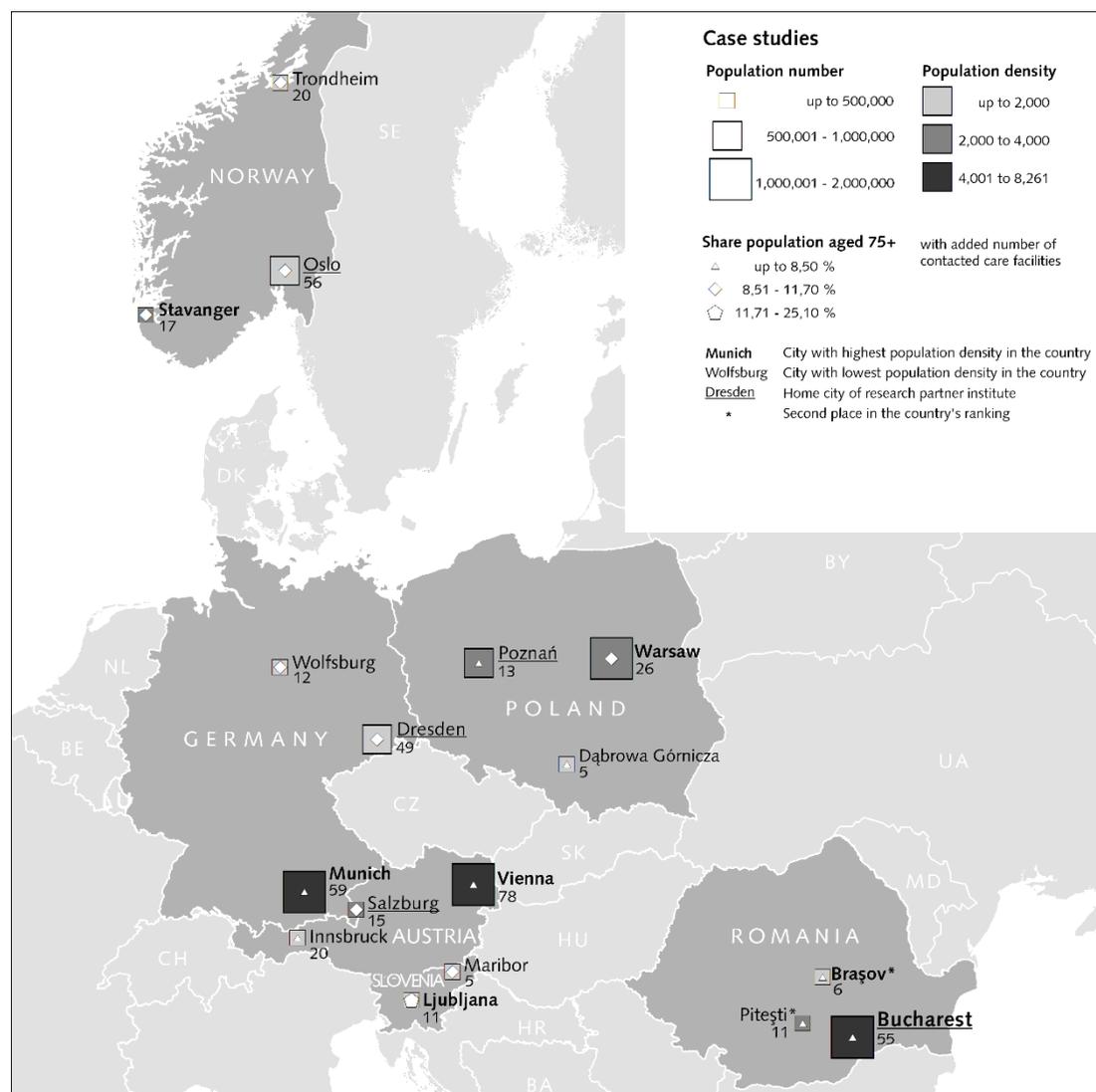
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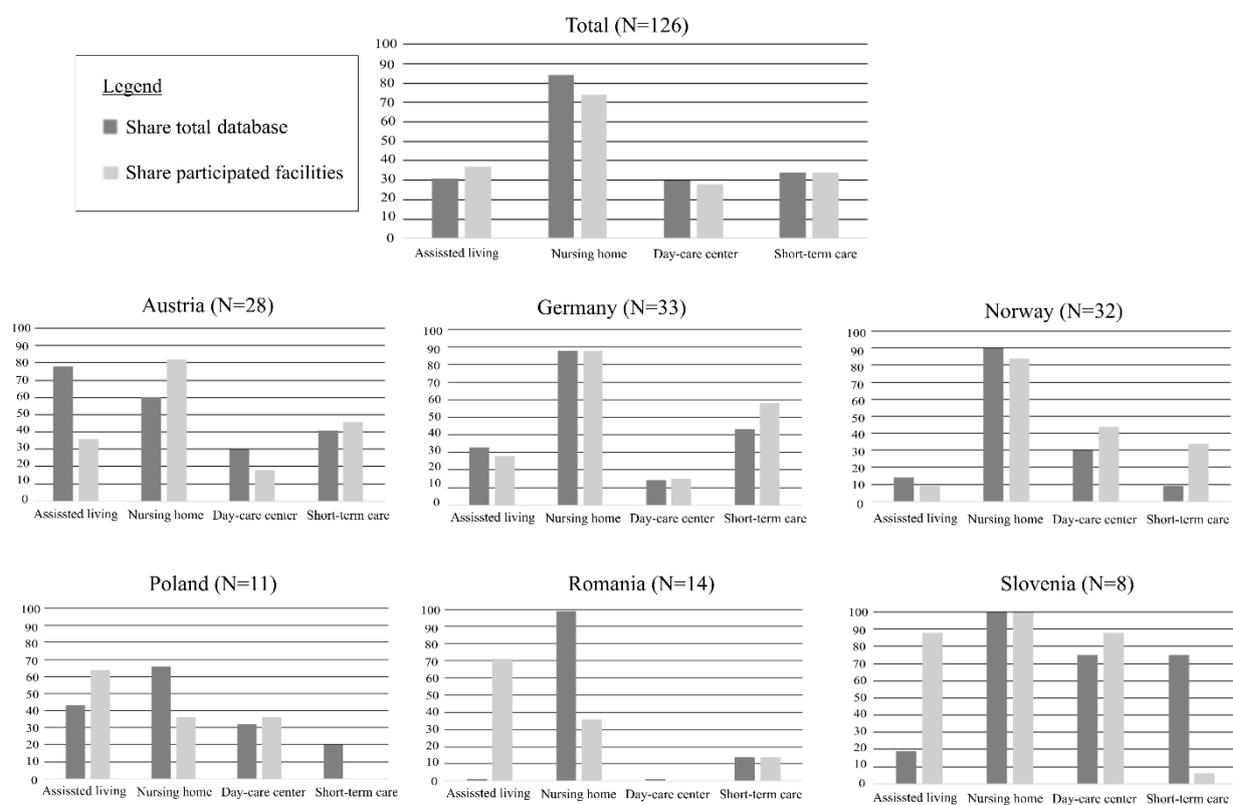
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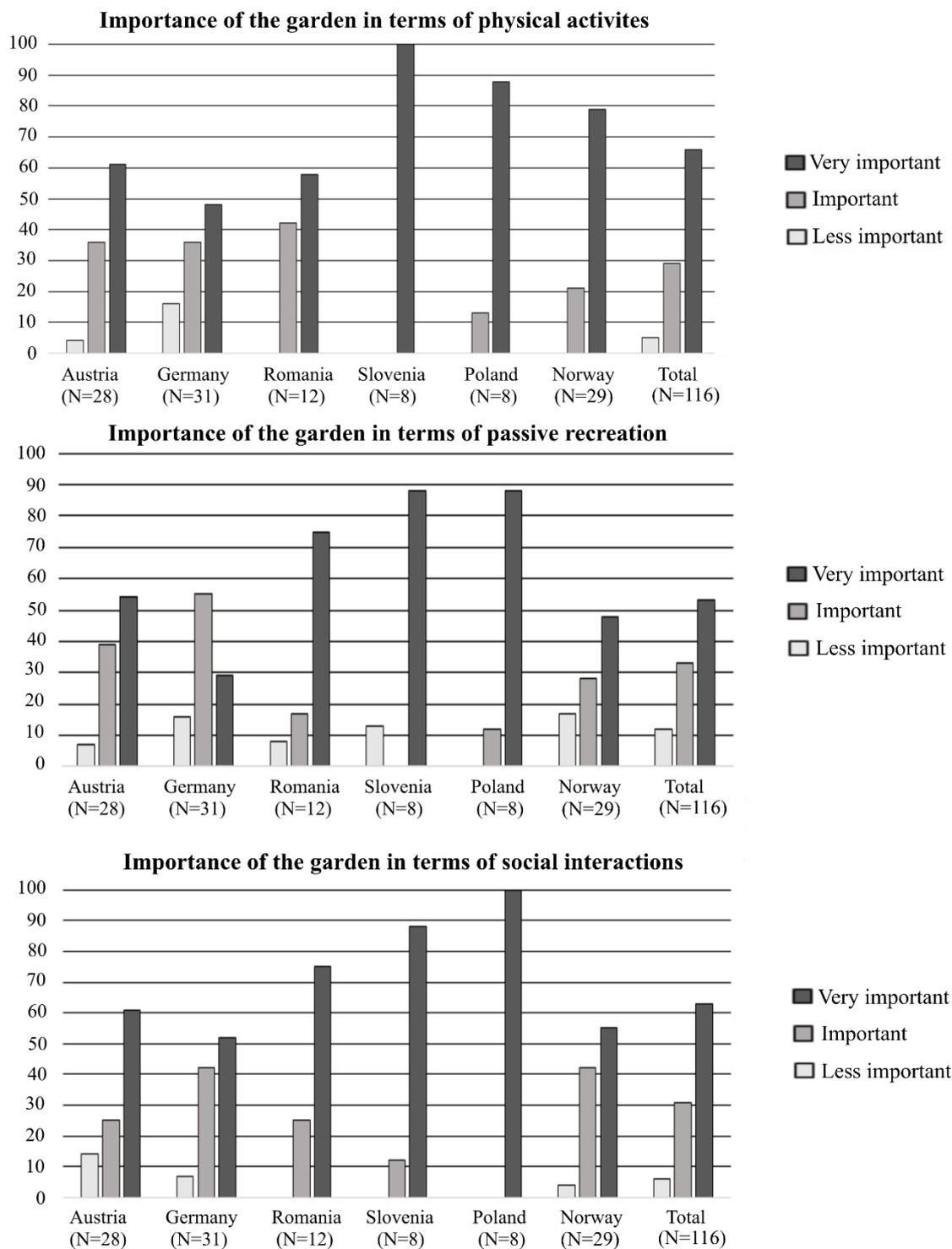
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**Fig. 1:** The case study cities, their population number, density and share of population age 75+

**Fig. 2:** Study representativeness in terms of care provided

**Fig. 3:** Importance of the garden for physical activities, passive recreation and social interaction for seniors residing in care facilities for the elderly (in %)



**Fig. 4:** Consideration of age-sensitive designs and amenities in the care facilities' gardens (in %, n=116; more than one answer possible)



**Table 1:** Frequency of UGS use at seasons with good weather by seniors living in care facilities with garden

Total in %	Daily	Several times a week	A number of times monthly	More seldom	Never
<b>Frequency of use of the care facility's garden for physical activities</b>					
<b>Healthy seniors (N=109)</b>	56	30	8	1	5
<b>Strong mental impairments (N=114)</b>	21	49	20	6	4
<b>Strong physical impairments (N=113)</b>	9	41	32	12	6
<b>Frequency of use of the care facility's garden for recreational activities</b>					

<b>Healthy seniors (N=109)</b>	59	28	6	4	3
<b>Strong mental impairments (N=114)</b>	24	47	19	8	2
<b>Strong physical impairments (N=113)</b>	15	39	30	11	5
<b>Frequency of use of UGS outside the facility</b>					
<b>Healthy seniors (N=74)</b>	16	26	37	20	2
<b>Strong mental impairments (N=76)</b>	4	15	25	50	6
<b>Strong physical impairments (N=74)</b>	2	11	24	47	16