Erasmus University Rotterdam
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Bachelor Thesis BSc International Bachelor Economics and Business Economics
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The Attractiveness of Urban Green Zones and its Effect on Elderly Well-being

A cross-sectional comparison between Rotterdam and Ridderkerk

This paper examines the effects of urban green zoning on elderly well-being. Previous studies found that urban green spaces are positively associated with residents' physical, mental and social health. Moreover, urban green spaces are found to help counteract the urban heat island effect. This study compares the urban green spaces and the overall age-friendliness of Rotterdam and Ridderkerk to see if there were noticeable differences between the well-being of residents from a city and from a village. A survey was conducted among 236 residents from both municipalities. This paper concludes that proximity to urban green spaces is not proven to have a positive effect on the well-being of elderly, as was assumed. Instead, the frequency of visiting and the personal satisfaction of the urban green spaces are the factors regarding urban green spaces that have a positive influence on elderly well-being. Furthermore, residents from Ridderkerk are not significantly more satisfied with the level of age-friendliness and urban green spaces than residents from Rotterdam. Nevertheless, this paper finds that urban green spaces have a positive impact on the age-friendliness of a municipality, and are hence an important feature when improving the age-friendliness of a municipality.

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1. Introduction

The world is increasingly becoming more urban. Since 2008, over half of the world's population live in cities or urbanized regions (WHO, 2020). Moreover, the global population is ageing. Nearly all countries are experiencing an increase in both the number and proportion of elderly in their populations (United Nations, 2020). These two global trends are expected to be major forces defining the 21st century (WHO, 2007).

According to research of the Dutch Central Bureau of Statistics (CBS), the population of the Netherlands is expected to increase by 1 million inhabitants, to a total population of 18.3 million inhabitants (CBS, 2019). The research states that this growth will especially be realised in the Dutch cities and municipalities surrounding these cities (CBS, 2019). On the contrary, the smaller villages and villages near the borders of the country will likely experience a decrease in number of inhabitants (CBS, 2019). This contradistinction is visualized in Figure 1 [Appendix A] (CBS, 2019). Furthermore, this research suggests that the Dutch population will continue to age; Currently approximately 19 percent of the population is in the 65+ age category, and this will expand to a quarter of the total population by 2035 (CBS, 2019). Whereas most aging will occur in smaller municipalities, also the cities will recognize an aging population (CBS, 2019). Thus, this population forecast predicts that urbanization and an aging population will take on leading roles in the Netherlands.

Whereas cities are generally perceived as places of opportunities for the young and working population, the CBS population forecast implies that cities might have to alter its perception and environment to be and remain attractive to an aging population. The World Health Organization (WHO) provides a solution to the trend of urban ageing: age-friendly cities. According to the WHO, "*An age-friendly city or community is a place in which people want to grow older*" (WHO, 2020).

This thesis will examine the differences on age-friendliness between a city – Rotterdam – and its southern neighbour – Ridderkerk. In 2018, Ridderkerk was a municipality of which 24.1% of its inhabitants were elderly, whereas Rotterdam's elderly percentage was 15.2% (CBS, 2019). The varying focuses of these municipalities – focused on the well-being of elderly versus targeting the young working adults – could explain the difference between the percentages. Nevertheless, by 2035 the elderly percentages of Ridderkerk and Rotterdam seem to converge: They increase to 27.1% and 19.9%, respectively (CBS, 2019). Therefore, to facilitate the increasing number of elderly inhabitants in their needs, Rotterdam should become more age-friendly. One aspect on which Rotterdam could act on this is urban green zoning.

Urban green zoning is the designation of land to be used towards the preservation of nature or natural elements in the urban environment. These urban green spaces include, but are not limited to, roadside greenery, playgrounds, green roofs, green trails, parks, riversides, and natural wildlife areas (WHO, 2017). Urban green spaces have a positive influence on residents' overall quality of life, as they promote a healthy lifestyle, provide opportunities for social interaction in the neighbourhood and diminish certain environmental externalities of the urban environment, such as the heat island effect, air pollution and noise (WHO, 2017). This in turn contributes to the age-friendliness of a city as it is associated with considerable health impacts for the elderly and allow residents to age actively.

Accordingly, the research question of this thesis will be

> *What is the relation between elderly's well-being and urban green zoning and how does urban green zoning contribute to a municipality's perceived age-friendliness?*

To research this question, a set of hypotheses will be examined:

> *H1: Proximity to urban green spaces will improve elderly's well-being*
> *H2: Urban green spaces improve the municipalities perceived age-friendliness*
> *H3: Residents in Ridderkerk are more satisfied with UGS than in Rotterdam*

The rationale of this study is to give Rotterdam a different perspective on the function of its city. Cities like Rotterdam are usually seen as hothouses of innovation, productivity and creativity, but to be sustainable, Rotterdam must provide the services to support all residents' well-being (WHO, 2007). Villages, such as Ridderkerk, typically have a substantially lower number of residents compared to cities, and could therefore possibly focus better on the needs of all residents. Moreover, as a substantially higher percentage of the residents in villages are elderly, compared to this percentage in cities, villages are usually more directed towards the elderly and age-friendliness.

This research paper will start with a literature review regarding literature on age-friendliness and previous studies on the link between elderly's well-being and urban green zones. This will be followed by the data & methodology section, which will discuss the analysis of this research. Analysis will be done according to a survey sent out to inhabitants of both municipalities. Subsequently, the results section will discuss the descriptive and the inferential statistics based on the survey results. Finally, the paper will end with a conclusion, which summarizes the main findings of this research, but also discusses any limitations discovered during the process.

2. Literature review

The age-friendly city

The WHO addresses the trend of global population ageing by taking action locally, yet tries to connect these actions into one global network (WHO, 2020). In 2010, the WHO established the '*WHO Global Network for Age-friendly Cities and Communities (GNAFCC)*', which consists of all cities, communities and network affiliates who promote healthy ageing and invest in urban environments that are inclusive and accessible for the elderly (WHO, 2020). This network is spread over 41 countries and 1000 cities and communities [Figure 2, Appendix A], and facilitates the exchange of members' experiences and knowledge on improving the age-friendliness of its cities and communities (WHO, 2020). Even though membership of the GNAFCC is not a guarantee to providing inhabitants with an age-friendly environment, it shows the commitment to listen to the needs of elderly inhabitants and marks the start on implementing age-friendly improvements (WHO, 2020).

The GNAFCC offers several documents, which should guide cities and communities into becoming age-friendly, such as *'Global Strategy and Action Plan on Ageing and Health', 'Global Age-friendly Cities: A guide'* and *'Measuring the Age-friendliness of Cities: A guide to using core indicators'* (WHO, 2019). The first is a framework for the required global action to ensure that people across all age groups are given the opportunities to live a healthy life and healthily grow old (WHO, 2017). This framework is a more general approach to healthy ageing and is not necessarily focused on the small scale (such as cities and communities); it is rather targeted at all member states of the WHO. The global strategy entails five objectives, of which one is aimed at developing age-friendly environments (WHO, 2017). This objective cultivates healthy ageing by promoting a healthy lifestyle, removing barriers and improving accessibility, and supporting inhabitants with maintaining intrinsic capacity across the course of life (WHO, 2017). The second document goes further into detail on how to develop an age-friendly environment on a local level: the age-friendly city. According to the WHO, an age-friendly city should encourage active ageing by providing and improving opportunities related to health, security and social participation (WHO, 2007). By perfecting these opportunities, a city can enhance the quality of life of its aging inhabitants (WHO, 2007). Thus, this document serves as a guide for cities who are starting to create an age-friendly environment for its inhabitants. The third document is a guide to assess the current age-friendliness of the city and sets forth a framework to evaluate the city's progress on this manner (WHO, 2015). This framework [Figure 3, Appendix A] allows the local government to select suitable indicators, depending on the areas that are in need of improvement (WHO, 2015). The document focuses on developing and selecting possible indicators, in order to provide strategic directions (WHO, 2015).

The eight domains of an age-friendly city

The age-friendliness of a city is based on eight age-friendly domains, acknowledged by the WHO. The first domain is 'outdoor spaces and buildings', which is a domain that is intertwined with the health, well-being and satisfaction of life of elderly people (Handler, 2014). This domain manages that outdoor public spaces must be accessible, clean, safe, and free of obstructions in order to be inclusive for all inhabitants (WHO, 2007). The second domain is 'transportation', which is a domain connected to the social inclusion of elderly. Transportation must be affordable, reliable, and well-connected, so that the community and health services remain accessible to the elderly (WHO, 2007). The third domain is 'housing', which is fundamental to inhabitants' basic life needs. The WHO states that housing must encourage ageing in place and integration in the community, must be modified to the needs of older people, and must remain affordable (WHO, 2007). In other words, the elderly must be allowed to safely and comfortably grow older within the community (Handler, 2014).

'Social participation' and 'respect and social inclusion', are the fourth and fifth age-friendly domains, affecting the inclusion, integration, and relationships of elderly within the community (WHO, 2007). To achieve this, ageist attitudes and preconceptions of elderly that restrict full inclusion must be adjusted (WHO, 2007). By participating in social activities in the community, inhabitants feel more connected, respected and cared for by each other, and less isolated (WHO, 2007). This opens up opportunities for the sixth domain, 'civic participation and employment', because once negative attitudes against older age have been abandoned, the value of elderly's contributions to society can be appreciated (WHO, 2007).

Vital to active ageing is staying well-connected to good quality 'communication and information' – the seventh domain (WHO, 2007). This is an important form of social inclusion, because it allows elderly inhabitants to make informed decisions, meet personal needs, and act in their own best interests (Handler, 2014). The last domain is 'community support and health services', which addresses the overall support and service that needs to be provided to the elderly community (WHO, 2007). Health and social services must be accessible to the entire community as they, next to housing, are fundamental to inhabitants' basic life needs. Hence, services must be publicly provided to make these needs accessible to all.

Many of these domains assess similar values that, if adhered to, create social inclusion for the elderly community. Values which are especially re-occurring are the importance of accessibility of public spaces, health and social services, and affordability to create social inclusivity and hence age-friendly cities. Cities and neighbourhoods that adhere to these domains and values will create an environment in which its inhabitants are allowed to age actively.

Designing cities for ageing communities

ARUP – an independent firm working on specialist cases regarding shaping and designing built environments – acknowledged the trend of global urbanization and its supplementary developmental challenges (ARUP, 2020). ARUP recognizes eight key aspects of city development, which it considers to be the determinants of a successful city. Three of these aspects are especially important in designing age-friendly cities. The first, City resilience, discusses the protection of cities against environmental and social shocks, such as an ageing population (ARUP, 2020). The second aspect, City life, considers that environmental design can induce a greater life satisfaction among inhabitants (ARUP, 2020). The third aspect, City regeneration, considers that the city's spaces should be designed in such a way, that people want to live there (ARUP, 2020).

In addition to the acknowledgement of these key aspects, ARUP does extensive research on environmental design and city development, and even has written a report – *Cities Alive* – regarding the design of cities with respect to an ageing population (ARUP, 2019). By addressing the trend of urban ageing, ARUP hopes to contribute positively to all parties involved globally that have to deal with this trend, such as policy makers (ARUP, 2019). The approach ARUP takes on an age-friendly environment is based on the framework designed by the WHO, and specializes on the domains 'outdoor spaces and buildings', 'social participation', 'civic participation and employment' and on general service provision (ARUP, 2019). Based on these domains, '*Cities alive'* addresses four central needs that impact the ageing community and should be considered when designing an age-friendly environment.

The first central need for an age-friendly built environment is 'autonomy and independence' (ARUP, 2019). This need acknowledges the transitions people can experience in their physical and mental strengths, and advocates for public services and aspects of the built environment, that enhances the mobility of elderly in the city (ARUP, 2019). In other words, current aspects of the built environment that discourage or limit the elderly's sense of autonomy should be adjusted to an age-friendly alternative. For example, ARUP refers to a survey conducted in the United Kingdom that 52% of elderly inhabitants claim to be limited in their mobility in the city due to a lack of publicly availably toilets (ARUP, 2019). If aspects like these would be improved on, the elderly's degree of mobility would increase, which opens up a broader range of possibilities within reach for the elderly (ARUP, 2019). 'Health and well-being', the second central need, addresses the importance of ageing in place, as attachment to one's neighbourhood and surroundings coincides with elderly's daily life and the routines that keep them healthy (ARUP, 2019). Moreover, ARUP addresses the need of an outdoor environment that encourages and provides possibilities for physical and recreational activity (ARUP, 2019).

The presence of urban green spaces in a community enables active recreation and allows residents to experience nature, which both increase the quality of life (ARUP, 2019). Therefore, the integration of natural spaces within the built environment are needed as a result of their positive impacts on elderly's health and well-being (ARUP, 2019). The third central need 'social connectedness' addresses how the built environment can influence how and where inhabitants interact with each other (ARUP, 2019). Furthermore, by including the perspective of older inhabitants in designing public spaces, a message of recognition and support will be sent to the elderly community (ARUP, 2019). As last, the central need 'security and resilience' acknowledges the impact the built environment has on street safety and climate control (ARUP, 2019). Thoughtful environmental design entails minimizing or eliminating any potentially hazardous obstacles and thereby preventing unnecessary accidents (ARUP, 2019). Examples of such obstacles could be obvious, such as skewed pavements, or latent, like not enough shade during hot weather.

Urban green spaces

Many of these central needs can for a certain degree be tackled through the use of urban green zones. Therefore, this section will discuss the positive externalities of urban green zones.

The article 'Nature and Health' (2014) acknowledges the benefits that contact with nature has on people's health. From a theoretical perspective, natural aspects in the built environment are positively associated with a person's health through four pathways: The individual's physical activity, social contacts, stress reduction, and the city's air quality (Hartig, Mitchell, de Vries, & Frumkin, 2014). The type, quality and amount of urban green zones throughout the municipality are factors contributing to the weight of this positive association, that are under the municipality's control (Hartig, Mitchell, de Vries, & Frumkin, 2014). Factors contributing to this positive association, which are mainly controlled by the residents themselves, are the frequency, duration and affordability of visits to urban green spaces (Hartig, Mitchell, de Vries, & Frumkin, 2014). If these factors are positively present in the lives of residents, and hence residents experience more interaction with urban green spaces in their daily lives, residents should theoretically benefit from improvements on overall physical fitness, subjective well-being and other general health benefits (Hartig, Mitchell, de Vries, & Frumkin, 2014).

Effect on physical, mental and social health

A paper written by researchers Sugiyama and Thompson studied the associations elderly have of aspects of urban green spaces and how that affects their choice for walking recreationally or walking for transport (Sugiyama & Thompson, 2008). The paper concluded that the aspects 'pleasantness' and 'lack of nuisance' were of most importance in elderly's choice for walking

recreationally, and hence, to stimulate active lifestyles in the city, this paper proposes to enhance these aspects in urban green spaces (Sugiyama & Thompson, 2008). The paper '*The effect of street-level greenery on walking behavior: Evidence from Hong Kong'* examines the effect of urban greenery at various eye-sights on walking behaviour among approximately 90 thousand participants (Lu, Sarkar, & Xiao, 2018). Whereas usually streets are preferred for walking for transport and parks for walking recreationally, this study found that street greenery on eye-level would induce inhabitants for both types of walking (Lu, Sarkar, & Xiao, 2018). Moreover, among approximately six-thousands of these participants, the relation between residential green and walking times are examined (Lu, Sarkar, & Xiao, 2018). Both street greenery as parks motivate the residents to walk more, although longer walking times were associated with only street greenery (Lu, Sarkar, & Xiao, 2018). Hence, to motivate walking behaviour overall, street greenery on eye-level is a viable option, which will also improve the 'pleasantness' aspect of urban green zones.

Similar to the street-level greenery's effect on walking behaviour, a closer proximity to urban green spaces could also encourage physical activity. A study conducted by four researchers from the Gerontology Research Center and Department of Health Sciences of the University of Jyväsklyä found an inverse relationship between the proximity to urban green zones and the development of walking difficulties (Eronen, von Bonsdorff, Rantakokko, & Rantanen, 2013). Living in close proximity – particularly within walking distance – to urban green zones is associated with a lower risk of developing walking difficulty by 14% among the 261 elderly respondents over a three and a half year period (Eronen, von Bonsdorff, Rantakokko, & Rantanen, 2013). Furthermore, a Danish survey established that there is an inverse relationship between the proximity to urban green zones and increased stress levels (ARUP, 2019). The study stated that if there were no urban green zones within a proximity of one kilometre from the person's house, stress levels were generally observed to have increased by 42% (ARUP, 2019). Therefore, according to these studies, urban green zones should be in close proximity to residents and hence scattered across the city.

Turning to the effects of urban green spaces on mortality rates, a Swiss study examined this relationship under 4.2 million adults from the Swiss National Cohort research database in an approximately eight-year period (Vienneau, et al., 2017). The study concluded that the risk of mortality would be significantly lower if residential green were present within a 500-meter buffer from the place of residence (Vienneau, et al., 2017). This study mentions two previous studies – *Green space and mortality following ischemic stroke* (2014) and *A cohort study relating urban green space with mortality in Ontario, Canada* (2012) – which suggest that the lack of air pollution in green zones is the main confounding variable between residential

green and decreasing mortality rates (Vienneau, et al., 2017). With this in mind, the Swiss study controlled for environmental exposures to examine their roles as mediators in the association between green zones and risk of mortality (Vienneau, et al., 2017). The study found that less than 10% of the green zones' protective effect on mortality were mediated by air pollution and traffic noise (Vienneau, et al., 2017). Thus, in contrast to the findings of the two other studies, the findings from this Swiss study indicate that the relationship between residential green and mortality is largely independent of environmental exposures, such as air pollution. The Swiss study also mentions a study – *Exposure to Greenness and Mortality in a Nationwide Prospective Cohort Study of* Women (2016) – which had similar findings regarding the small protective effect of environmental exposures on the relationship between green zoning and mortality rates (Vienneau, et al., 2017). The mentioned study found that physical activity, social engagement, and depression were significant partial mediators in the relationship between urban green zones and decreasing mortality (James, Hart, Banay, & Laden, 2016). Thus, this study suggests that by improving urban green zoning, social engagement will increase as well as physical and mental health improvements will be made, which in turn have a positive influence on declining mortality rates (James, Hart, Banay, & Laden, 2016).

To this point the focus has been on the potential health benefits of urban green spaces. However, the relationship between urban green zones and its effect on mental health also has been extensively studied. For example, a survey was conducted in Wisconsin to study this relationship and found that higher levels of residential greenery were linked to less stress, depression and anxiety amongst residents (Beyer, et al., 2014). The Wisconsin study differentiated possible improvement aspects of urban green zones into three categories: tree canopy, Normalized Difference Vegetation Index (NDVI), and greenspace (Beyer, et al., 2014). The researchers studied what a hypothetical 25% expansion of these aspects would entail for changes in people's scores on the Depression Anxiety Stress Scale (DASS) (Beyer, et al., 2014). The last aspect was found to be of most influence: More overall greenspace was linked to a reduction of 1.379 points in the depression category, 0.427 less points regarding anxiety and 0.735 less points regarding stress (Beyer, et al., 2014).

The study '*Long-term exposure to residential green and blue spaces and anxiety and depression in adults: A cross-sectional study'* also examines this relationship, and especially focuses on medication use to battle anxiety and depression (Gascon, et al., 2018). The study reports that increasing urban green spaces within a maximum buffer of 500 meters are associated with diminished use of benzodiazepines (Gascon, et al., 2018). However, no significant associations were recognized regarding the use of antidepressants (Gascon, et al.,

2018). Nevertheless, the study *'More green space is related to less antidepressant prescription rates in the Netherlands: A Bayesian geoadditive quantile regression approach'* found that residential green was inversely related with the prescription rates of antidepressants (Helbich, Klein, Roberts, Hagedoorn, & Groenewegen, 2018). Accordingly, the ratio of antidepressant prescriptions to land coverage used for green zones diminishes as municipalities assign more land to the use of urban green zoning (Helbich, Klein, Roberts, Hagedoorn, & Groenewegen, 2018).

To further understand the possible role of urban green spaces on residents' health, the effect on social health will be examined. McKenzie and Harpham (2006) found that social capital and mental illnesses are inversely related as well. Urban green spaces provide opportunities for social participation and inclusion in the neighbourhood, which in turn help battle loneliness, isolation and depression: Common issues for the elderly. A study in Berlin researched the visitation patterns of urban green spaces under elderly residents and found that residential green was more frequently visited by elderly residents with close social networks, than elderly who experience more isolation (Enssle & Kabisch, 2020). Thus, this study advocates that urban green spaces should enable the creation and maintenance of social networks, in order to promote social interaction and to battle elderly isolation (Enssle & Kabisch, 2020).

Negative perceptions

Whereas urban green spaces are of positive influence on residents' social participation, issues of safety and overall personal perceptions could complicate visitation frequencies. A qualitative study conducted under older residents in Vancouver acknowledged that residents' individual perceptions of urban green spaces could differ greatly from each other, and how these perceptions influenced whether residents would visit neighbourhood parks (Finlay, Franke, McKay, & Sims-Gould, 2015). For instance, two interviewed residents discussed their perception on the same neighbourhood park (Finlay, Franke, McKay, & Sims-Gould, 2015). The 76-year old woman mentioned feeling unsafe, because she thinks homeless people living in this park could possibly attack her, whereas the 68-year old man frequently visits this park as he does not feel threatened (Finlay, Franke, McKay, & Sims-Gould, 2015). This difference in the perception of the park's safety could be due to women generally feeling more vulnerable in public than men, which could lead to gender inequality in the use of urban green spaces (Gargiulo, et al., 2020). A study conducted in Barcelona explored women's perceptions on possible safety hazards and distinguished the environmental and social factors that influence these perceptions (Gargiulo, et al., 2020). Unsafe situations could arise due to possible actions of crime or accidental risks, such as getting lost or injured (Gargiulo, et al., 2020). Certain

safety factors that have a negative relationship with the perceived safety of urban green spaces are vegetation density and the presence of parking spaces, industrial areas, abandoned areas, or vandals (Gargiulo, et al., 2020). Safety factors that are of positive influence are lighting, visibility, (high) user density, and the presence of streets or residential areas (Gargiulo, et al., 2020). By taking these perceptions into account and actively trying to diminish negative safety factors, women, but also vulnerable older people, should feel safer when visiting urban green spaces.

The Vancouver study also mentions that familiarity and perceived accessibility play a positive role in visitation patterns of neighbourhood parks by elderly (Finlay, Franke, McKay, & Sims-Gould, 2015). Residents who are more familiar with these parks and its frequent local visitors, generally feel safer and will more frequently visit (Finlay, Franke, McKay, & Sims-Gould, 2015). The recognition of familiar faces gives residents a level of security, which in turn improves the social cohesion in a neighbourhood (de la Barrera, Reyes-Paecke, Harris, Bascuñán, & Farías, 2016). Moreover, familiarity of urban green spaces entails knowing the accessibility and design of the neighbourhood parks (Finlay, Franke, McKay, & Sims-Gould, 2015). Certain features – within the parks and the walkways towards them – enable and motivate the elderly to visit urban green spaces, and these include frequently dispersed benches, bathrooms, smooth paths, reasonably timed crosswalks and trees for shade (Finlay, Franke, McKay, & Sims-Gould, 2015).

Environmental effect

Aside from the positive effects of urban green spaces on the individual health status of residents, urban green zones have positive influences on the city's environment as well. Urbanization has (indirect) negative impacts on the environment, such as air pollution, traffic emissions, noise and higher temperatures (Hunter, et al., 2019). Green spaces in the urban environment help to counteract these impacts and accordingly are valuable to maintain a high quality of life in the city (Hunter, et al., 2019).

The latest mentioned impact is also known as the urban heat island effect, and is caused by heat that is trapped in the city's built environment, leading to higher temperatures in cities than surrounding rural areas (Hughes, Hanna, & Fenwick, 2016). Waste heat arises due to the high density of people and buildings in the city; Since the heat has nowhere to go, it will linger between the (isolated) buildings (National Geographic, 2011). The urban heat island effect has several negative externalities, some due to the heat itself and some due to the measures taken to tackle the heat. For example, water quality suffers, as warm water diffuses with colder local streams, which affects several aspects of the aquatic environment (EPA, 2019). Moreover, heat

islands can intensify the effects of heat waves, which are becoming commonplace in Dutch summers (EPA, 2019). In order to tackle the city's heat, overall electricity demand will increase due to residents trying to cool down their apartments (EPA, 2019). Especially in climates where heatwaves and high temperatures are more occasional than year-round, energy resources could be strained due to sudden and unexpected increased energy demands (EPA, 2019). Therefore, urban heat islands should where possible be prevented, for the sustainability of the city and the safety of vulnerable groups, such as the elderly whom are at a high risk to succumb to heat waves (Hughes, Hanna, & Fenwick, 2016).

During a heatwave in the 30th week of 2019 in the Netherlands, approximately 300 elderly people more passed away than the weekly average during summer months (CBS, 2019). Older adults are more prone to succumbing to heat stress as their bodies generally face more difficulty in regulating the heat and changes in temperature (CDC, 2017). Moreover, other underlying medical conditions or their prescription drugs could affect the way their body responds to the heat (CDC, 2017). The Dutch heat wave lasted from the 22nd until the 27th of July, and even though it was of short duration, the impact was quite severe (CBS, 2019). For the first time in Dutch history, temperatures rose above 40 degrees Celsius (KNMI, 2019). Heatwaves like this one, are one of the effects climate change has on the Dutch climate. Rising sea levels, drought, more extreme weather events, longer pollen season and corresponding allergy days, and diminishing chances of natural ice skating rinks are other effects listed by the Royal Netherlands Meteorological Institute (KNMI) that impact the livability – and traditions – of the Netherlands (KNMI, 2020). The KNMI acknowledges the urban heat island effect and the urbanization trend in the Netherlands, and expects heat to become one of the major problems the Netherlands will be facing in 2050 (KNMI, 2020). Hence, the need for urban green spaces in the city will increase significantly to provide opportunities to the elderly and other vulnerable groups to avoid the heat.

The Austrian Institute of Landscape Development, Recreation and Conservation Planning conducted a study among nearly 200 elderly residents who live in Viennese neighbourhoods prone to the urban heat island effect to research heat-avoiding behaviours (Arnberger, et al., 2016). The study found that the design of urban green spaces is of most importance when avoiding the heat, since this entails whether trees are widely dispersed and offer plenty of shade (Arnberger, et al., 2016). Moreover, 90% of the respondents claimed to visit urban green spaces, provided they are accessible within a five-minute walk, full of trees, include aquatic features – i.e. a pond – and would be cooler than their homes (Arnberger, et al., 2016).

Summary

To address the needs of elderly residents in an increasingly urbanizing world, several parties acknowledge aspects in city life that can be structured to cater to the needs of the elderly. The WHO refers to eight age-friendly domains, which determine a city's age-friendliness. The domains 'outdoor spaces and buildings', 'social participation' and 'respect and social inclusion' can all be directly tackled through the use of urban green spaces. Moreover, ARUP specifies four central needs – 'autonomy and independence', 'health and well-being', 'social connectedness' and 'security and resilience' – that need to be taken into consideration when designing the age-friendly city. Anew, the design of urban green spaces offers a lot of room for the implementation of these needs.

Especially the connection between urban green spaces and 'health and well-being' has been extensively studied. The aforementioned empirical findings show the nature benefits of urban green spaces on the lives of residents and especially frequent visitors. Overall, residential green in the neighbourhood motivates residents to walk more, which might be an important mediator in the relationship between urban green spaces and its association with lower risks of walking difficulty and lower mortality rates. Moreover, urban green zoning is associated with positive mental health benefits, such as less stress, anxiety and depression, and even lower medication prescriptions to battle these issues. Furthermore, urban green spaces partially offset the negative effects of climate change, which is important for the health of all residents in the city. The central needs 'social connectedness' and 'security and resilience' have been recognized in studies researching the association between urban green spaces and social health. Urban green spaces provide opportunities for social inclusion, considering they are perceived as safe. Factors positively influencing the perceived safety of urban green spaces are lighting, visibility and closeness to residential areas. Finally, most researchers have addressed 'autonomy and independence' as they acknowledge the importance of accessible urban green spaces. Accessibility indicates that urban green spaces must offer frequently dispersed benches, public toilets, and plenty of shade. Furthermore, pathways leading up to parks should be safe to walk, entailing they are smooth, free of obstruction and have safe crosswalks.

3. Data & Methodology

Data source

The discussed previous studies offer insights into what aspects of the urban green spaces in Rotterdam should be improved on. To research the specific needs of elderly in Rotterdam – and whether or not these needs differ to elderly living in Ridderkerk – a survey [Appendix D] had been distributed to residents of these two municipalities. Moreover, to compare the needs of the current elderly (65+) to prospective elderly (45-64), the survey was sent out to residents aged 45 and above.

To gather participants for this cross-sectional comparison, the survey was distributed via WhatsApp and Facebook. Through WhatsApp, participants consisted mainly of old neighbours, acquaintances and family members living in either of these municipalities. Moreover, WhatsApp facilitated the possibility of snowball sampling, as invitees could easily forward this survey to others. Snowball sampling entails that the candidates involved might know other possible candidates who fit the research criteria, which, hence, expands the reach of the survey (Naderifar, Goli, & Ghaljaie, 2017). Through the use of multiple municipality-specific Facebook Groups, a large proportion of the residents of either municipality could be targeted. The combination of these two Social Media outlets allowed for a diverse group of residents to participate in this study. In total, 369 people had started the survey. Nevertheless, approximately a third of them had not completed the survey and merely reached approximately a quarter to half of the survey. Hence, these results were neglected altogether and only the survey results of the 236 people who had completely finished the survey were used.

The survey consisted of 15 questions regarding the respondents' personal experiences with urban green spaces and the age-friendliness of their municipalities. The first block of questions regarded the demographics of the respondents; These allowed for control variables to be made. The second block of questions regarded respondents' visitation patterns with respect to the urban green spaces in their municipalities. Variables regarding the frequency of visiting, proximity to urban green spaces, and types of activities partaken in when visiting were derived from this block. The following block of questions regarded the level of satisfaction of the urban green spaces among the residents. The respondents had to answer two sets of statements regarding urban green spaces: One entails how urban green spaces would ideally be like, and the other entails how respondents experience the urban green spaces in their municipalities currently. This comparison allowed to see which aspects of the urban green spaces the residents find important, and hence, which aspects should be improved on. Moreover,

respondents were faced with a trio of questions regarding the overall satisfaction and importance of urban green spaces in their municipalities. Subsequently, in the next block, participants were faced with two additional independent sets of statements. The first set of statements discussed how residents view the costs, management and possible profitability of urban green spaces in their municipality. The second set of statements concerned the age-friendliness of the municipalities and preferences regarding residency when at older age. Finally, respondents had to give a grade for their own well-being, the urban green spaces and the age-friendliness of the municipality in which they live.

Data analysis

The survey data was exported into Excel in order to group all information down into numerical categories, before it was exported into Stata for the analyses. In Table 5 [Appendix C] the variables which are used in the models are written down, with regard to the survey questions they were derived from and including a description of the variables. All variables, except the variables related to the individual grades, are categorical variables. These categorical variables are noted down in the left column of Table 6 [Appendix C] and their numerical categories are noted down in the top row. The options respondents had to choose from in the survey are sorted in the corresponding row to that question and linked to a specific number. The only information left unaltered in Excel were the grades, as they were already numerical.

The aims of this research are to examine whether proximity to urban green spaces improve elderly's well-being; whether urban green spaces have a positive impact on a municipality's age-friendliness; and whether overall, residents from a village such as Ridderkerk are more satisfied with urban green spaces than residents from a city such as Rotterdam.

Methodology

Ordinary least squares regression

To model the relationship between 'urban green space'-visitation patterns and elderly-wellbeing, the following ordinary least squares regression was made:

$$Grade\_wellbeing_i = \alpha + \beta Proximity_i + \gamma Frequency_i + \delta UGS\_satisfaction_i + \eta Sex_i + \theta Age_i + \lambda Municipality_i + \varepsilon_i$$

As dependent variable, the grades given to subjective well-being were used. Sex, age and municipality were used as control variables. Furthermore, independent variables regarding residents' visitation patterns were included; These are the frequency of visiting, walking

distance to the urban green spaces from home, and the level of satisfaction by urban green spaces. In addition to these variables, α is the constant term for all individuals and ε_i is the individual error term.

Ordered logistic regression

To model the relationship between a municipality's age-friendliness and the urban green spaces within that municipality, an ordered logit model was chosen. "In ordered logit, an underlying score is estimated as a linear function of the independent variables and a set of cutpoints" (STATA, 2020). An ordered logit model was chosen as the dependent variable is an ordered categorical value. In regard to this, the model will predict what the probabilities are for each category happening. The linear function by which the ordered logit model is estimated, is as follows:

$$Age\_friendly_i = \delta UGS_{satisfaction_i} + \eta Sex_i + \theta Age_i + \lambda Municipality_i + \varepsilon_i$$

The dependent variable – 'Age_friendly' – is an ordered categorical variable, which values range from 1 to 5 on a scale of perceived age-friendliness. The values 1 to 5 indicate 'strongly disagree', 'disagree', 'neutral', 'agree' or 'strongly agree', respectively, on the matter whether residents believe their municipality is age-friendly. Moreover, the variable 'Age_friendly' was created by merging the Rotterdam-specific and Ridderkerk-specific age-friendly variables. Once more, sex, age and municipality were used as control variables. Furthermore, the independent variable used in the model is the level of satisfaction regarding the current state of the urban green spaces in the municipalities. This variable is also measured on a scale from 1 to 5, 5 being the highest level of satisfaction. ε_i is the individual error term.

A cross-tabulation of the variables 'Age-friendly' and 'UGS_satisfaction' is made to review the distribution before analyzing the model [Table 7, Appendix C]. The probability of 0.000 in the Pearson's chi-squared test determines that the two variables are independent.

The probability of observing a certain categorical outcome j is calculated as follows:

$$\Pr(outcome = j) = \Pr\left(k_{j-1} < \delta UGS_{satisfaction_i} + \eta Sex_i + \theta Age_i + \lambda Municipality_i + \varepsilon_i \leq k_j\right)$$

The coefficients β, γ, δ *and* μ are estimated together with the cutpoints k_1, k_2, …, k_{n-1}, where n is the number of possible outcomes (STATA, 2020). Moreover, k_0 is captured as $-\infty$, whereas k_n is captured as $+\infty$ (STATA, 2020).

4. Results

Descriptive statistics

Demographics

A total of 236 people has completely filled in the survey, consisting of 136 (57.6%) participants from Rotterdam and 100 (42.4%) from Ridderkerk. Moreover, the majority (n=236; 75.4%) of participants were female. Furthermore, 70 participants (29.7%) were aged 65 years or older, and the remainder 166 people were between the ages of 45 and 64 (70.3%).

Visitation patterns

Chart 1 illustrates how often, on average, respondents estimate to visit the urban green spaces within their municipality. The majority of the respondents (69%) visit urban green spaces within their municipality at least once a week. Not to mention, over a third of the respondents are very frequent visitors (37%), as they visit urban green spaces every (other) day. The bottom 11% can be classified as irregular visitors, as they visit urban green spaces coincidentally, rather than on a systematic basis. Furthermore, only 4 people have confessed to never visiting urban green spaces (2%). This could be due to not liking the outdoors in general, but could also be due to walking difficulties or other obstacles they face in their daily lives.

Chart 1 – Frequency

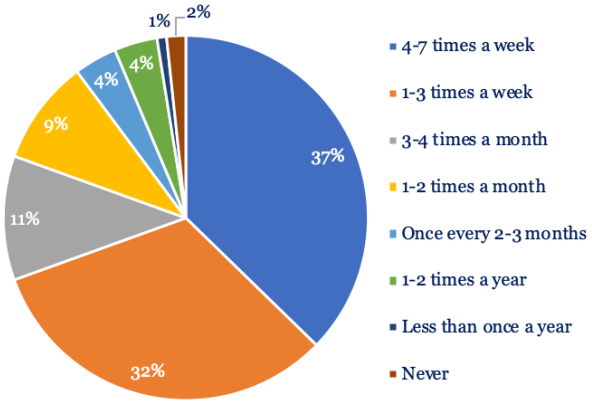
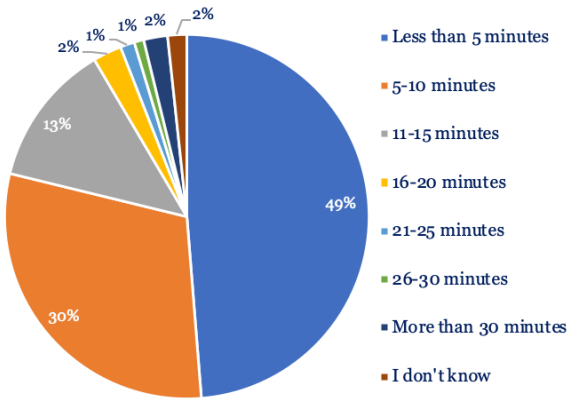


Chart 2 – Proximity



Turning to proximity, chart 2 illustrates the estimated walking distance in minutes between respondents' houses and their closest urban green zone. The same amount of people has acknowledged not knowing what the walking distance to the closest urban green space from their residence is. These could be the same 4 people who do not visit urban green spaces at all, hence their oblivion to the proximity. Nevertheless, 96% of the respondents do make an estimation and nearly half of the respondents live within a 5-minute walking distance to an urban green space. Thus, urban green spaces are quite frequently scattered across the

municipalities, as many respondents have close access to them. In figures 4 and 5, all vegetation in the two municipalities is visualized. Darker areas indicate denser vegetation and larger areas that are assigned to urban green spaces (Atlas leefomgeving, 2018). The municipalities of Rotterdam [Figure 4] and Ridderkerk [Figure 5] are highlighted by yellow and orange outlines, whereas surrounding municipalities are characterized by the red outlines.

Figure 4 – Rotterdam

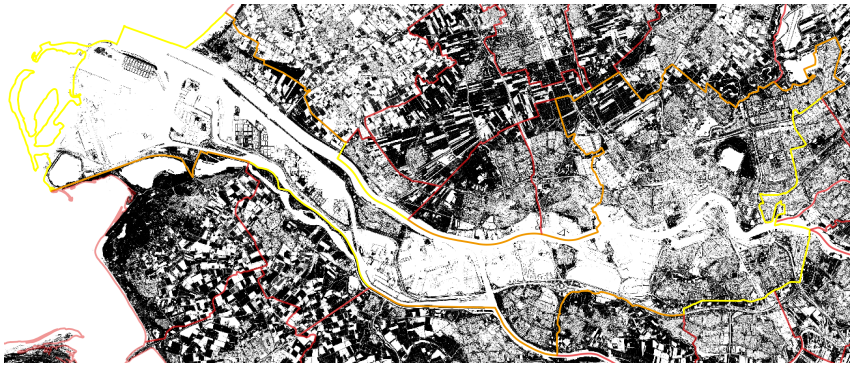
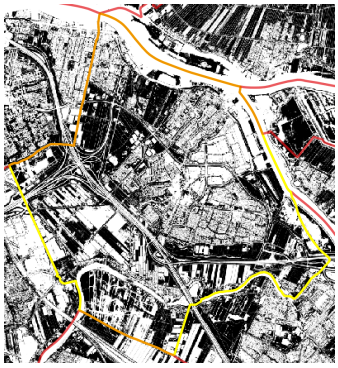
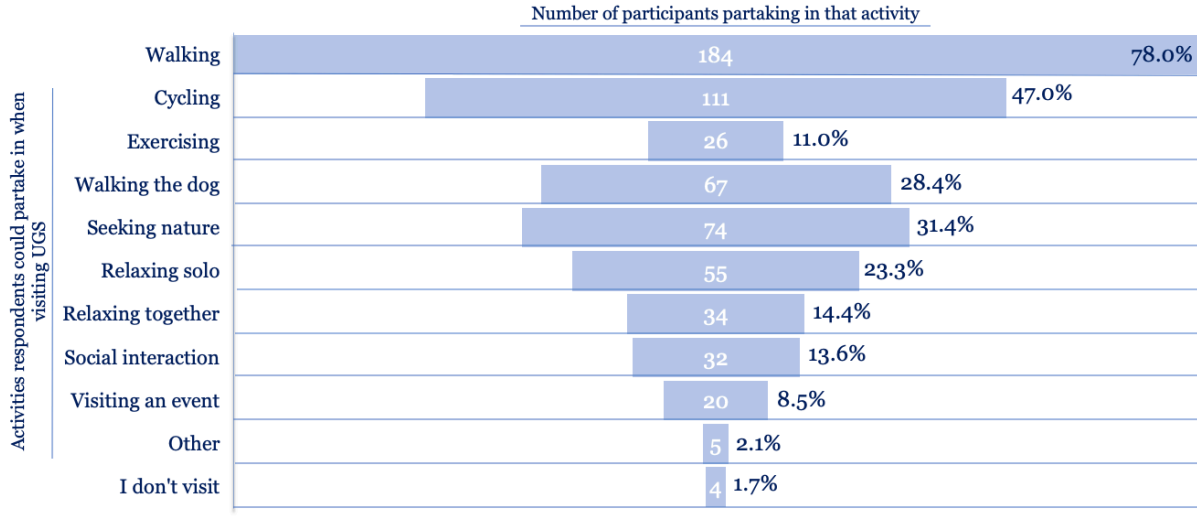


Figure 5 – Ridderkerk



When visiting the urban green spaces, respondents partake in a number of various activities. The most popular activity amongst visitors is walking for leisure (78.0%), with cycling for leisure as runner up (47.0%). Nevertheless, actually exercising – such as jogging or following a workout – is a far less popular activity (11.0%). Still, urban green spaces will indirectly have positive health benefits on visitors, as activities that require any form of physical activity are promoted. Other relatively popular activities amongst respondents are walking with their dog (28.4%), enjoying the nature (31.4%), and relaxing alone (23.3%). Respondents also had the option to fill in any other activity they might partake in, and these consisted of photographing, fishing and volunteer work at playgrounds.

Chart 3 - Activities



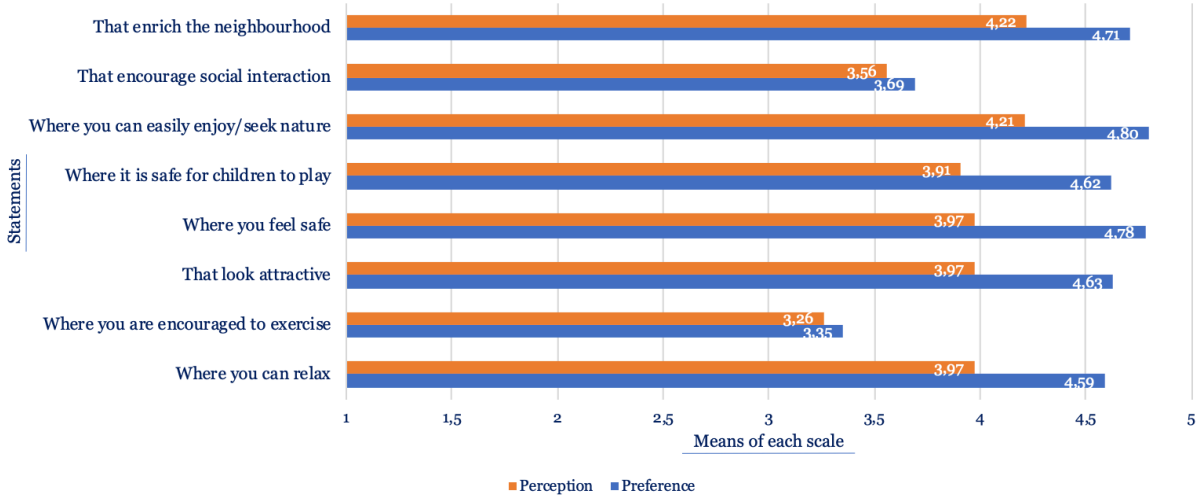
Level of satisfaction

Respondents were faced with two sets of nearly identical statements; The former started with "Urban green spaces should be places …" and the latter started with "Urban green spaces in your municipality are currently places …". In other words, the former regarded respondents' preferences for urban green spaces and the latter how urban green spaces are currently perceived. To analyse which aspects of urban green spaces are in need of improvement and which are already regarded positively, the means of the answers to these statements are visualized in chart 4. Respondents could choose a level of agreement with regard to these statements, ranging from 1 – 'strongly disagree' – to 5 – 'strongly agree'.

According to the means of their answers, respondents prefer that urban green spaces give ample opportunity to enjoy nature ($\bar{X} = 4.80$), that they are safe ($\bar{X} = 4.78$) and that they enrich the neighbourhood ($\bar{X} = 4.71$). Moreover, attractiveness of the urban green spaces ($\bar{X} = 4.63$), safety regarding children ($\bar{X} = 4.62$) and the opportunity to relax ($\bar{X} = 4.59$) are also valued positively. On the contrary, the encouragement for social interaction ($\bar{X} = 3.69$) and to exercise ($\bar{X} = 3.35$) are valued as less important aspects of urban green spaces. Nevertheless, since the means to these statements are not valued below 3 – neutral – they should not be neglected.

As expected, the perceptions of urban green spaces are slightly more negative than the preferences. According to the respondents, the most positive features of urban green spaces, currently, are their added value to the neighbourhood ($\bar{X} = 4.22$) and the opportunity to enjoy nature ($\bar{X} = 4.21$). The aspect on which urban green spaces can improve the most is safety, both in general ($\bar{X} = 3.97$) as regarding children ($\bar{X} = 3.91$). This is because the differences between the preference and the perception with regard to these statements are the largest: 0.81 and 0.71, respectively.

Chart 4 – Statements regarding the perception vs preference



Following these statements, respondents had to indicate to what measure they were satisfied with the overall availability and design of urban green spaces within their municipality. To visualize and compare these results, two distinctions are made. First, the results of all respondents from Rotterdam are differentiated to those from Ridderkerk. Then, the results from the elderly are distinguished from the results of the group aged 45 to 64. In this way, the municipalities can be compared, as well as the views of the elderly to the views of the prospective elderly in these municipalities.

The majority in all four groups acknowledge to be fairly satisfied with the quality of the urban green spaces, as seen in chart 5. Nevertheless, both groups of elderly respondents are characterized by a relatively high proportion that mentions to be very satisfied with the urban green spaces. Furthermore, nearly all respondents – 80% or above – declare that they find the presence of urban green spaces in their residential areas very important [Chart 6, Appendix B]. Moreover, not one elderly person has acknowledged to be indifferent to the presence of urban green spaces. To conclude the level of satisfaction among participants, they had to declare whether, in general, the urban green spaces within their municipality meet their wishes and demands. As seen in chart 7, the elderly living in Rotterdam are most content with the urban green spaces. Surprisingly, the group that is least content are the prospective elderly. Whether this is based on differentiating needs between the two age groups or level of acceptance that comes with age is unknown.

Chart 5 – Level of satisfaction

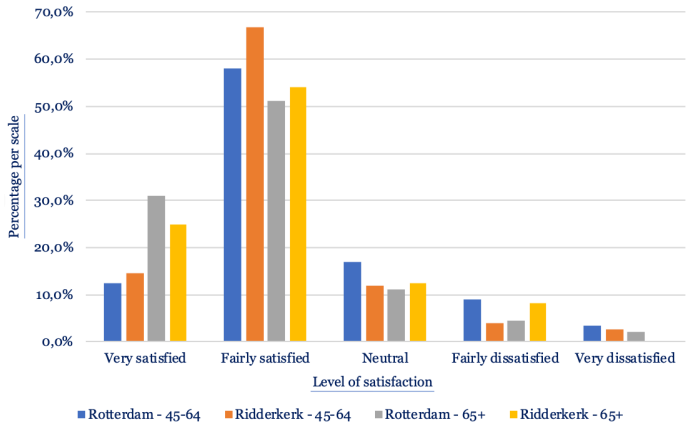
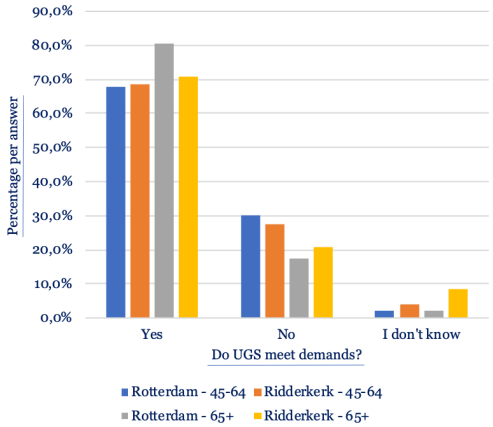


Chart 7 – Do UGS meet demands?



'Urban green spaces' and 'age-friendly' statements

The set of statements regarding urban green spaces addresses how the respondents think urban green spaces should be managed and provided for, and whether urban green spaces could be used for profitable purposes. Results have been filtered by municipality to allow for comparisons.

The distribution of the answers is very similar, which means that in general, these opinions are not very municipality related. The most strongly agreed-on statement in both municipalities was 'Urban green spaces make the municipality more attractive'. Hence, residents value having urban green spaces in their neighbourhoods highly. One of the relative contrasts between the two municipalities is regarding the view whether many other people visit urban green spaces. Half of the respondents from Rotterdam [Chart 8] strongly agree that urban green spaces are frequently visited by others, whereas only a third of the respondents from Ridderkerk [Chart 9] strongly agree on this matter. Hence, residents of Rotterdam are more aware of the value of urban green spaces to other visitors, rather than only themselves.

Chart 8 – UGS statements Rotterdam

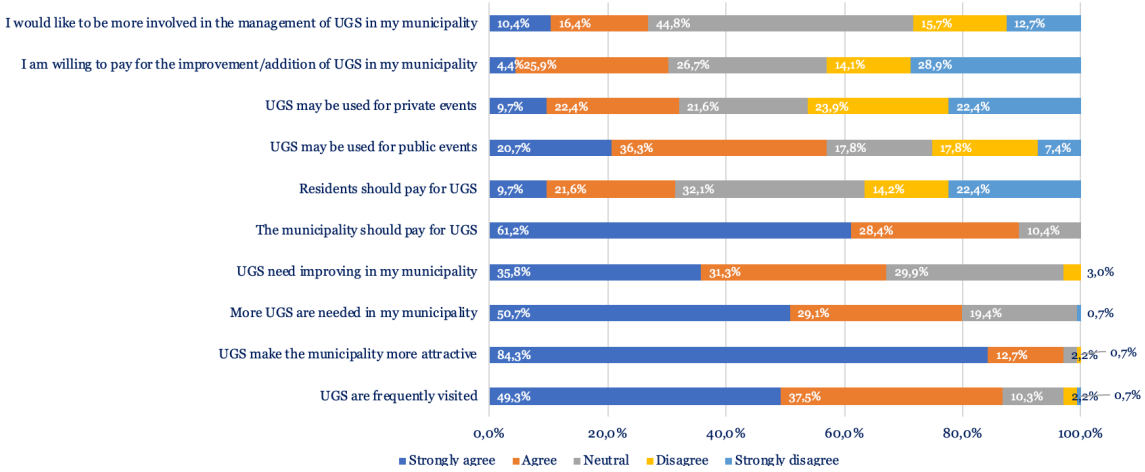
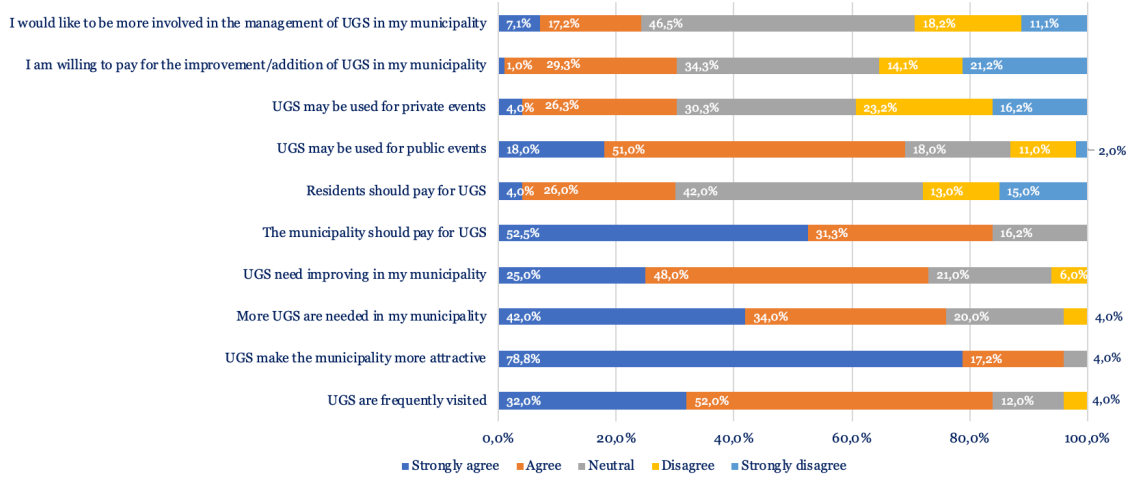


Chart 9 – UGS statements Ridderkerk



Apart from the hedonic value of urban green spaces that is recognized by the respondents, municipalities could capitalize on urban green spaces for profitable ends. Public events organized by the municipality itself scored higher in both municipalities, than private events, such as festivals. Thus, a viable option for municipalities to make a return on their investment in urban green spaces is to organize public events, which could raise money via for example food trucks.

The least popular statements in the Rotterdam set were regarding the willingness to both individually and collectively pay for the improvement or addition of urban green spaces in the municipality. Approximately 90% of the Rotterdam respondents expect the municipality to bear the costs of urban green spaces, which makes sense because that is the status quo. Regarding the management of urban green spaces, over a quarter of the Rotterdam respondents mention to be interested in becoming more involved. By volunteering to help with the management of urban green spaces, the residents can notify which aspects of the current urban green spaces are in need of improvement. With respect to this, two-thirds of the respondents claim that the current urban green spaces in Rotterdam need improvement. Nevertheless, more urban green spaces are preferred over the improvement of the current ones in Rotterdam, as approximately 80% agrees on this matter.

Turning to the age-friendly statement sets, chart 10 and 11 address how the respondents view the age-friendliness of their municipalities and whether changes in age-friendly aspects in the municipality could be of influence on their residency choices.

This time, the distributions of the answers are rather various and especially the opinions regarding residency choices vary greatly between residents from Rotterdam [Chart 10] and Ridderkerk [Chart 11]. 71% of the Ridderkerk respondents, relative to 38.5% of the Rotterdam respondents, mention preferring to live in a village than in a city when older. Moreover, nearly two-thirds of the Ridderkerk respondents and over half of the Rotterdam respondents want to continue living in their current municipalities when at older age. Therefore, with the current status quo of the two municipalities, a bigger proportion of the residents in Ridderkerk seem to be highly attached to their current place of residence than the proportion of Rotterdam residents. Statements regarding alterations to make Rotterdam more age-friendly did not affect their opinions notably. Nevertheless, alterations to the urban green spaces were given more weight to their opinions than alterations to elderly provisions.

Chart 10 – Age-friendly statements Rotterdam

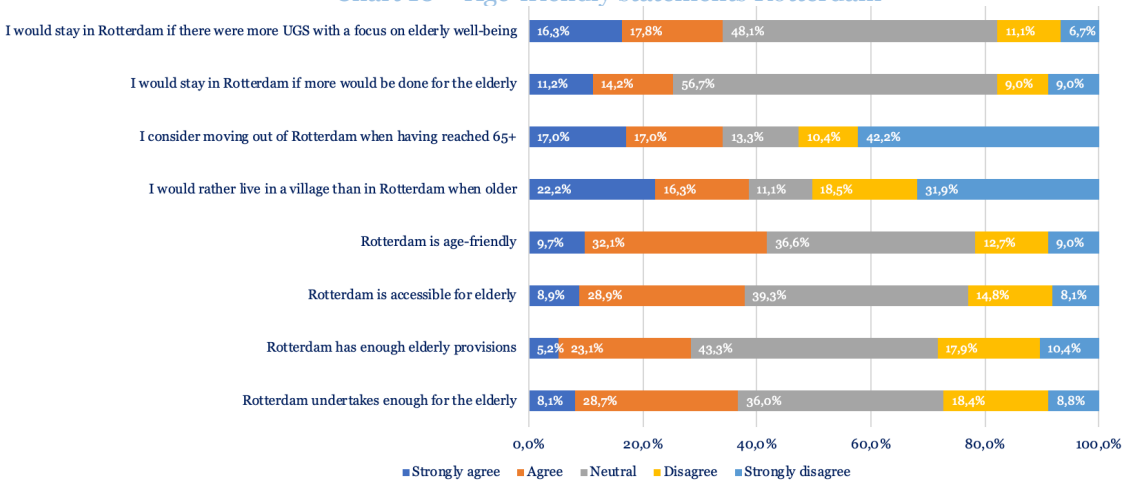
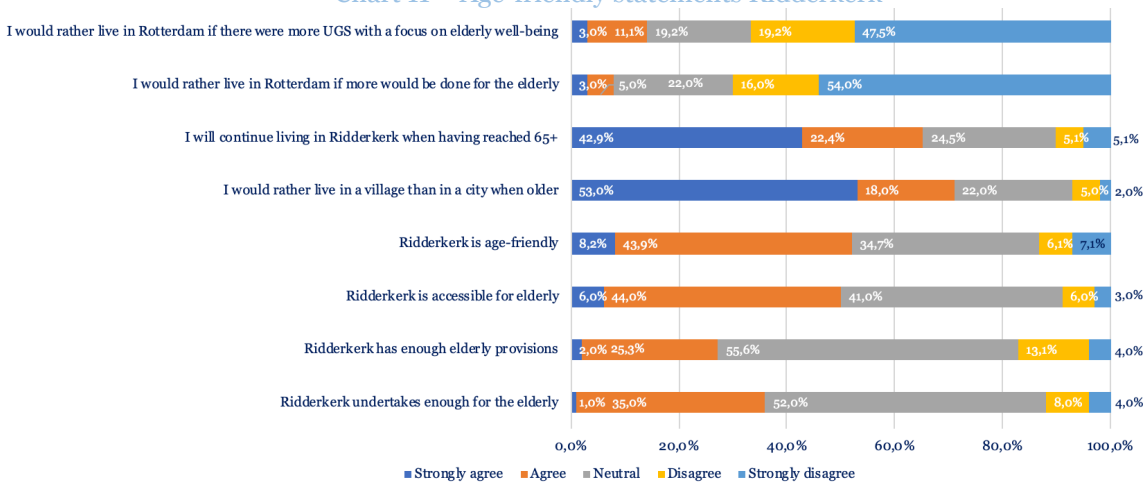


Chart 11 – Age-friendly statements Ridderkerk



Regarding statements over the current state of age-friendliness in both municipalities, respondents from Rotterdam picked 'strongly agree' more often than respondents from Ridderkerk. However, overall, a bigger proportion of the respondents from Ridderkerk collectively agree that Ridderkerk is age-friendly, compared to the proportion of Rotterdam respondents that agree that Rotterdam is age-friendly. The age-friendly aspect on which Ridderkerk scores highest is its accessibility for elderly, as 50% agree on this. Comparatively, only 37.8% of Rotterdam respondents think Rotterdam is accessible for elderly. Regarding the elderly provisions and services catered to elderly residents, over half of the respondents from Ridderkerk are either unaware or indifferent to whether there are sufficient elderly provisions. Nevertheless, the group of Ridderkerk respondents that agrees with the bottom two statements outnumber the group that disagrees with these. Comparatively, respondents from Rotterdam are precisely in disagreement whether Rotterdam has sufficient elderly provisions. Therefore, Rotterdam seems to be able to learn from Ridderkerk which age-friendly aspects it could improve on.

Grades given to subjective well-being, urban green spaces and elderly provisions

The grades for subjective well-being will be used in the model to test whether proximity to urban green spaces has a positive effect on well-being. Furthermore, the descriptive statistics of all grades – well-being, urban green spaces and elderly provisions – give a more accurate view over the opinions of the residents on the topics asked about. Anew, the two distinctions between municipality and age group have been made as well.

Strikingly, the elderly in Ridderkerk are the most positive group; The average grades given to urban green spaces, elderly provisions, and subjective well-being are 7.67, 6.96 and 7.96, respectively [Table 4, Appendix C]. Comparatively, the elderly in Rotterdam had given the following grades: 7.22, 6.59 and 7.96, respectively [Table 4, Appendix C]. Both groups included

respondents who had given a ten for the three matters. However, the group of elderly from Rotterdam included respondents who had given very low grades, such as two's and three's, whereas the lowest grades given from the Ridderkerk elderly group were only fives or sixes. This difference demonstrates a higher variation in the subjective well-being and the perceptions on age-friendly aspects in the group of elderly from Rotterdam than those from Ridderkerk.

When looking at the grades the younger groups have given, the most remarkable aspect is how critical these groups are, especially regarding the elderly provisions. The 45- to 64-year-olds from Rotterdam were the most negative group and had given the following grades to urban green spaces, elderly provisions, and subjective well-being: 6.78, 5.81 and 7.34, respectively [Table 4, Appendix C]. The 45- to 64-year-olds from Ridderkerk are far more positive and the average grades given to these matters are 7.32, 6.37 and 7.51, respectively [Table 4, Appendix C]. Overall, in all groups, the elderly provisions had been given the lowest average grades, but why the average grades for elderly provisions are significantly lower in the younger groups is quite remarkable. Since these provisions are meant for the elderly, perhaps the inexperience with how these provisions actually fulfill the demands of the elderly might be the reasoning behind this.

Results from models

Ordinary least squares regression

The results of the ordinary least squares regression, which examines the relationship between 'urban green space'-visitation patterns and elderly's wellbeing, are found in Table 8. A distinction is made between two models: The former discusses the independent variables 'Proximity', 'Frequency' and 'UGS_satisfaction', together with the control variables, and the latter only includes the significant independent variables.

The first hypothesis – *Proximity to urban green spaces will improve elderly's well-being* – is based on prior research which examined the positive relationship between proximity to urban green spaces and residents' well-being. Hence, 'Proximity' is the main variable of interest. However, as seen in the first model in Table 8, the coefficient related to 'Proximity' is not significant. Thus, proximity to urban green spaces is not proven to have a positive association on anyone's well-being in the municipalities Ridderkerk and Rotterdam. A possible explanation for the lack of effect of proximity to urban green spaces on well-being could be that nearly all residents already live in close proximity to urban green spaces. If a substantial proportion of the participants were to live further than 15 minutes away from the urban green spaces, a better effect of 'Proximity' on well-being might be detected. In addition to this, the

control variables 'Sex', 'Age' and 'Municipality' were also not significant. Hence, the municipality in which the residents live has no proven association or effect on the residents' well-being. Nevertheless, frequency of visiting and the level of satisfaction regarding the urban green spaces in the municipality are significantly and positively related to the residents' well-being.

To specifically illustrate what effect the variables 'Frequency' and 'UGS_satisfaction' have on the independent variable – 'grade_wellbeing' – a second model is made with only these significant variables. The R-squared of the second model is slightly higher and both variables are currently significant at the p-level of 0.01, so this model will give a more accurate description of the relationship of interest.

Table 8 – OLS estimates

	Model 1	**Model 2**
Variables	**Coefficients**	**Coefficients**
Grade_wellbeing (dependent variable)		
Proximity	-0.007 (0.077)	
Frequency	0.150** (0.065)	0.173*** (0.057)
UGS_satisfaction	0.605*** (0.105)	0.607*** (0.103)
Sex	0.193 (0.219)	
Age	-0.028 (0.102)	
Municipality	0.061 (0.746)	
Constant	4.127*** (0.711)	4.206*** (0.498)
R-squared *Adjusted R-squared*	0.160 0.137	0.168 0.161

N = 236

Standard errors in the parentheses

*** p < 0.01, *** p < 0.05, ** p<0.1

In the second model, 'Frequency' contributes 0.173 per scale of visiting the urban green spaces to the degree of well-being as subjectively perceived by the residents. Moreover, 'UGS_satisfaction' contributes 0.607 per scale of satisfaction to the degree of well-being as subjectively perceived by the residents. Hence, to give an example about what effect these two variables have on subjective well-being, a comparison will be made between a hypothetical person who never visits urban green spaces and is strongly dissatisfied with the current state of the urban green spaces within their municipality and a hypothetical person who visits urban green spaces four to seven days a week and is strongly satisfied with the state of urban green spaces. This model would predict that the former person would rate their own well-being as 4.813, whereas the latter person would rate their own well-being as 8.452. The main difference between the two extremes is made through the level of satisfaction, which accounts for a difference of 2.428, whereas frequency of visiting only accounts for a difference of 1.211. Hence, the level of satisfaction received from visiting urban green spaces is perceived to be the main driver behind subjective well-being. As the variables 'grade_wellbeing' and 'UGS_satisfaction' are moderately correlated (r=0.367), it could also be possible that residents' individual positive mindsets influence how they perceive aspects in their daily lives, such as the urban green spaces [Table 9, Appendix C].

Ordered logistic regression

The results from the ordered logit, which examines the relationship between urban green space satisfaction and the corresponding perceived age-friendliness, are found in Table 10. Table 10 summarizes the estimated coefficients of the independent variables together with the cutpoints. As the coefficients allow for predictions of the Y* based on the values of the variables, the cutpoints depict the range in which Y* can fall. These cutpoint ranges are depicted below:

$$Age\_friendly = 1 \; if \; -\infty < Y^* \leq 1.233$$
$$Age\_friendly = 2 \; if \; 1.233 < Y^* \leq 2.242$$
$$Age\_friendly = 3 \; if \; 2.242 < Y^* \leq 4.178$$
$$Age\_friendly = 4 \; if \; 4.178 < Y^* \leq 6.478$$
$$Age\_friendly = 5 \; if \; 6.478 < Y^* \leq \infty$$

For example, a hypothetical 65-year-old woman from Ridderkerk, who is strongly satisfied with the urban green spaces, will have an estimated Y* of 5.284, and thus is estimated to 'agree' with the age-friendliness of her municipality (= outcome 4). Nevertheless, as only one variable is significant across all p-levels, the estimations are not fully reliable. This entails that the municipality in which a participant lives has no effect or prior bias on the perceived age-

friendliness of that municipality. Still, this one variable – 'UGS_satisfaction' – is the main variable of interest, and will thus be useful to examine the relationship with age-friendliness.

Table 10 – Ordered Logit estimates

Variables	**Coefficients**
Age_friendly (dependent variable)	
UGS_satisfaction	0.786*** (0.147)
Sex	0.030 (0.285)
Age	0.234* (0.134)
Municipality	0.311 (0.246)
/ cut 1	1.233 (0.733)
/ cut 2	2.242 (0.732)
/ cut 3	4.178 (0.770)
/ cut 4	6.478 (0.824)
Likelihood Ratio Chi-squared (4) *Prob > Chi-squared*	38.23 0.000

N = 236

Standard errors in the parentheses

*** p < 0.01, *** p < 0.05, ** p<0.1

The marginal effects of outcomes 1 to 5 are found in Tables 11 to 15 in Appendix C. These marginal effects describe what the marginal effects per variable are of contributing to which outcome. To illustrate this, the variable 'UGS_satisfaction' will be taken. This variable has negative marginal effects regarding outcomes 1, 2 and 3, and hence will contribute negatively to the probabilities of 'Age_friendly' falling into these categories. Contrary to this, 'UGS_satisfaction has the highest marginal effect regarding outcome 4, and hence contributes the most to category 4: agree with the age-friendliness of the municipality.

In addition to the marginal effects of each variable, Tables 11 to 15 demonstrate what the general probabilities are of 'Age_friendly' falling into each category. This demonstrates that 'Age_friendly' has the highest probability (40.5%) of falling into category 3: Residents neither agree nor disagree with the age-friendliness of their municipality. The second highest probability was regarding falling into category 4 (36.6%).

5. Conclusion

This research examined the differences in age-friendliness between the municipalities Rotterdam and Ridderkerk. This paper researched to what extent the aspect of urban green zoning could improve a municipality's age-friendliness. Moreover, this paper tried to establish what variables are of interest between elderly's well-being and their visitation patterns regarding urban green spaces.

The first hypothesis of this research stated '*Proximity to urban green spaces will improve elderly's well-being*'. The Danish survey observed that the stress levels of residents living further than one kilometre away from urban green spaces were 42% higher than those living within a one kilometre proximity (ARUP, 2019). Contrarily, this research did not establish such a contrast in well-being between residents. As the coefficient of 'Proximity' in the OLS model was insignificant, proximity to urban green spaces is not proven to positively influence elderly's well-being, Moreover, as the control variable 'Age' was also insignificant, it is unsure whether urban green spaces could possibly have a stronger positive effect on elderlies' lives compared to younger people. Nevertheless, the OLS model illustrates that residents who visit urban green spaces more frequently, are generally perceived to have a higher well-being than residents who do not or rarely visit. Moreover, the OLS model illustrates that residents who are (strongly) satisfied with the urban green spaces within their municipality are also perceived to have a higher well-being than residents who are dissatisfied with the urban green spaces. To conclude, the first hypothesis is not accepted, as the variable 'Proximity' was found to be insignificant and therefore the evidence is not strong enough to accept or reject it.

The second hypothesis of this research stated '*Urban green spaces improve the municipalities perceived age-friendliness'*. As derived from ARUP's *Cities Alive*, urban green spaces allow for the incorporation of the central needs necessary to create an age-friendly city. Hence, urban green spaces should improve a municipality's perceived age-friendliness. The ordered logit model illustrates that the variable related to the urban green space satisfaction rates – 'UGS_satisfaction – is significant and positively contributes to the municipality's age-friendliness. Moreover, the model predicted the probabilities of a municipality falling into each category of age-friendliness based on the relationship of interest. These predictions illustrate that a municipality has the highest probability of being perceived as neither not age-friendly as age-friendly. Hence, even though 'UGS_satisfaction' positively influences a municipality's age-friendliness, this variable is not the sole basis of a municipality's age-friendliness. This is in line with the expectations, as the WHO established multiple aspects on which a municipality can improve its age-friendliness. Thus, the second hypothesis is accepted.

The last hypothesis stated '*Residents in Ridderkerk are more satisfied with UGS than in Rotterdam'*. Charts 5 and 7 in the results section show that the residents aged 45 to 64 years old of Ridderkerk are relatively more satisfied with urban green spaces than residents of Rotterdam of this same age range. Nevertheless, these same charts show that the elderly residents of Rotterdam are more satisfied with urban green spaces than elderly residents of Ridderkerk. These results signify a switch in the level of satisfaction among the age groups. This switch could possibly be due to urban green spaces in Rotterdam already fulfilling the aspects which are important in elderly's daily lives. Nevertheless, the grades given to the urban green spaces are highest in both age groups of Residents of Ridderkerk. The results from these grades contradict with the results obtained from the satisfaction scale. Hence, the third hypothesis is not accepted. Once more, the evidence is not strong enough to fully accept this hypothesis.

The main question of this research '*What is the relation between elderly's well-being and urban green zoning and how does urban green zoning contribute to a municipality's perceived age-friendliness?'*. Respondents assent with each other that urban green spaces should be safe, look attractive, enrich the neighbourhood, and are serene: They give ample opportunity to relax and enjoy nature. Therefore, the aspects on which Rotterdam, and any other municipality, could improve its age-friendliness, are safety, serenity, and attractiveness. Moreover, as deducted from the literary framework, urban green spaces should be accessible for elderly. The aspects on which urban green spaces have a positive association on residents' well-being are found to be the frequency of visiting and the satisfaction of urban green spaces. Hence, by improving the aspects which are found most important, and which are mentioned above, urban green spaces will be more attractive to visit and will more likely have a positive effect on elderly's well-being. The aspects social interaction and physical activity, as also deducted from the theoretical framework, were found to be viewed as less important by the residents. Hence, based on the findings it seems that these aspects can be given less attention to when improving urban green spaces with respect to the elderly residents.

Limitations

There were a few limitations limiting the range of this research. The main limitation was the presence of Covid-19 and its corresponding regulations. As the main focus of this research was the opinions of residents on the urban green spaces, the participants would ideally also be gathered through approaching visitors in urban green spaces in both municipalities. Due to the situation, this method of gathering participants and gathering first-hand qualitative information was unattainable. As a result, the survey was sent out through the media platforms WhatsApp and Facebook. The limitation of Whatsapp is that, as it is based on the snowball

sampling method, it could be a very slow way of collecting participants. As a result, the reach is likely to be small. Nevertheless, people will likely be more inclined to fill the survey in as the invitation appears more personal. On the contrary, Facebook allows for a larger reach, but the participants might be more likely to get bored and leave the survey without finishing. Nevertheless, by using these two means, these issues counterbalanced each other and led to quite a large and diverse sample. Another limitation of gathering participants online, however, was the difficulty of finding elderly participants, as they tend to avoid Social Media. Still, WhatsApp and Facebook allowed for a cheap and time efficient way of collecting participants.

Another limitation of this research was the comparison between these specific two municipalities. Instead of the comparison with Ridderkerk, a more drastically different village could have been chosen, one which is for example in a much more rural area of the Netherlands. The risk with this option was the difficulty in accessing and recruiting participants. Conversely, a comparison could also be made with a Dutch city that is already registered in the WHO age-friendly network (i.e. GNAFCC). Both Amsterdam and Den Haag are members of this network and could thus be possible substitutes for the comparison municipality.

Finally, as the two municipalities are quite different, the residents who choose to live there will differ in their preferences as well. Hence, what residents of Ridderkerk prefer regarding an age-friendly municipality might not be what residents of Rotterdam prefer. Thus, perceptions regarding the urban green spaces might depend on the general different preferences residents have in these two municipalities. Hence, a recommendation for further research would be to compare Rotterdam to a city of a similar size.

Despite these limitations, this research has concluded that urban green spaces have a positive impact on a municipality's age-friendliness and are therefore a key aspect to consider when improving a municipality's age-friendliness. Moreover, urban green spaces are not limited to the well-being of elderly, rather to the community as a whole. Therefore, by improving the urban green spaces, residents across all age groups will be positively affected.

To encourage healthy ageing in Rotterdam, urban green spaces are a vital component as it offers the ability to enjoy nature in an urban environment. Fortunately, the municipality of Rotterdam has instituted a project which aims to designate 20 hectares of land to urban green zoning to increase the greenness in the city (Wijbenga, 2019). A policy recommendation for the municipality of Rotterdam is to focus on the highlighted aspects – safety, attractiveness, accessibility and serenity – when completing this project.

6. Appendix

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7. Appendix

Appendix A – Figures

Figure 1 – Forecast change in municipalities' population 2018-2035

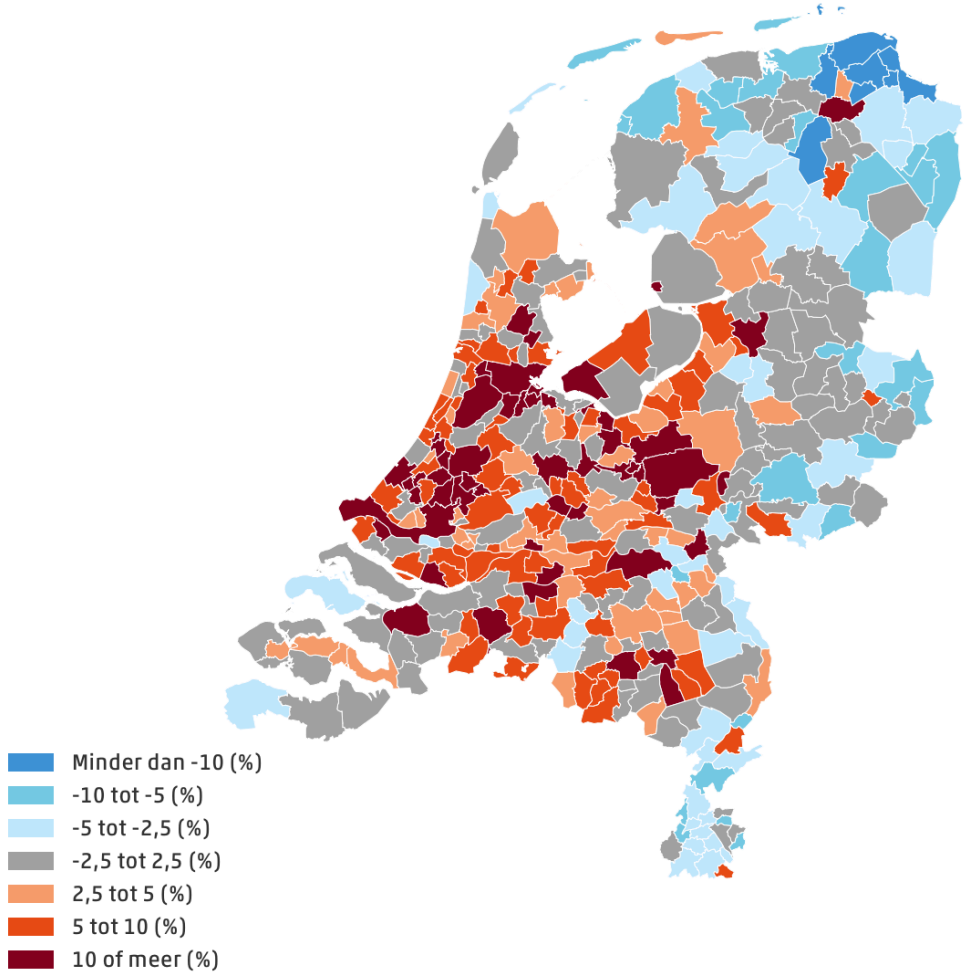


Figure 2 – Members of WHO Global Network for Age-friendly Cities and Communities

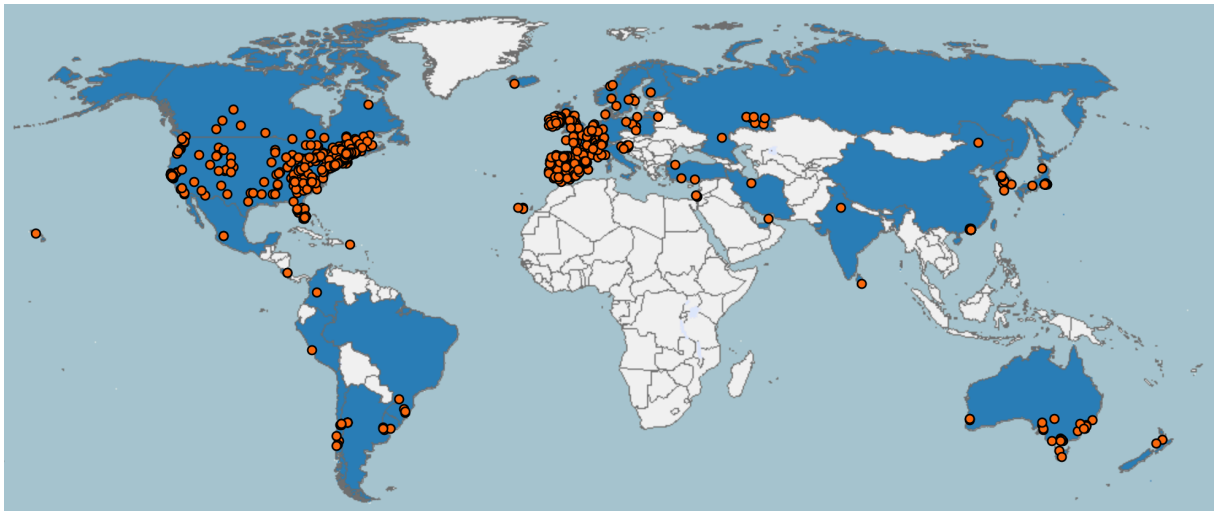
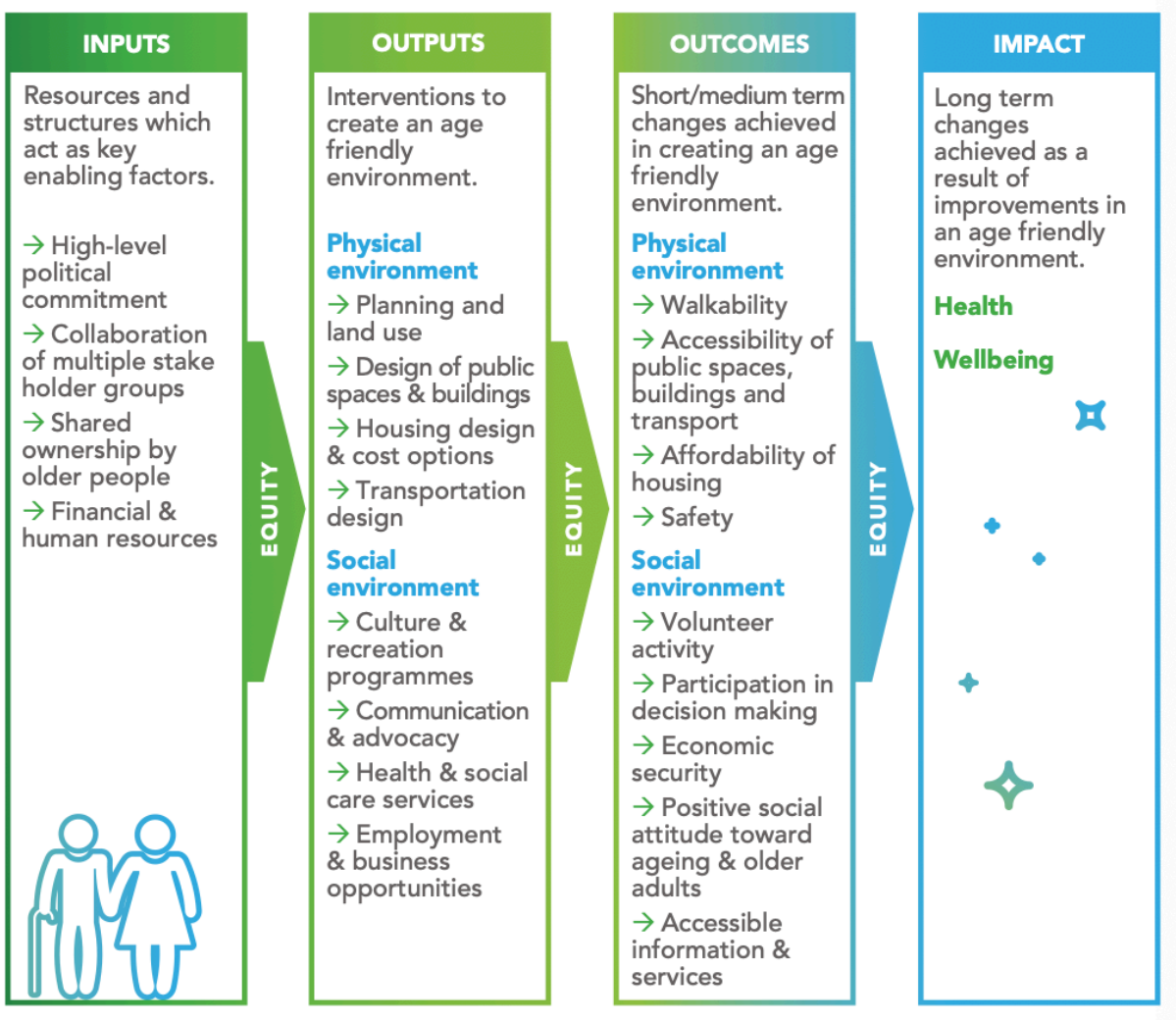
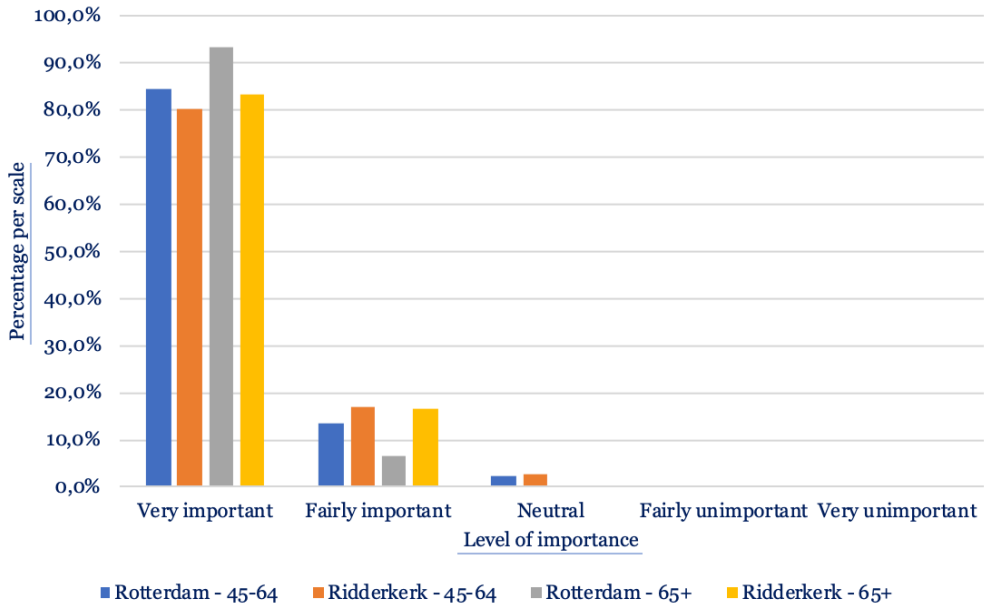


Figure 3 – A framework for selecting indicators to evaluate the city's age-friendliness



Appendix B – Chart

Chart 6 – The importance of urban green spaces within the municipality



Appendix C – Tables

Table 1 – Grades: Residents from Rotterdam, aged 45 to 64

	Min	Max	Mean	Std. dev	Variance	Count
Urban green spaces	2	10	6.78	1.36	1.86	90
Elderly provisions	1	10	5.81	1.74	3.04	90
Own well-being	2	10	7.34	1.66	2.76	90

Table 2 – Grades: Residents from Ridderkerk, aged 45 to 64

	Min	Max	Mean	Std. dev	Variance	Count
Urban green spaces	4	10	7.32	1.04	1.08	76
Elderly provisions	1	8	6.37	1.40	1.97	76
Own well-being	4	10	7.51	1.30	1.70	76

Table 3 – Grades: Residents from Rotterdam, aged 65 and above

	Min	Max	Mean	Std. dev	Variance	Count
Urban green spaces	2	10	7.22	1.82	1.82	46
Elderly provisions	3	10	6.59	1.81	1.81	46
Own well-being	2	10	7.59	2.68	2.68	46

Table 4 – Grades: Residents from Ridderkerk, aged 65 and above

	Min	Max	Mean	Std. dev	Variance	Count
Urban green spaces	6	10	7.67	1.07	1.14	24
Elderly provisions	5	10	6.96	1.14	1.29	24
Own well-being	6	10	7.96	1.17	1.37	24

Table 5 – Description of the variables used in the models

Question	Variable	Description
1	Sex	The respondent's sex
2	Age	The respondent's age
3	Municipality	The municipality in which the respondent lives
4	Frequency	How frequent the respondent visits urban green spaces
6	Proximity	The walking distance to the closest urban green space from the respondent's home in minutes
9	UGS_satisfaction	The level of satisfaction regarding urban green spaces as perceived by the respondent
13.4+14.4	Age_friendly	The level of age-friendliness regarding the municipality in which the respondent lives
15.3	Grade_wellbeing	The respondent's subjective grade for well-being

Table 6 – Variables with their corresponding numerical categories

Variable	0	1	2	3	4	5	6	7
Sex		Female	Male					
Age	-45	45-54	55-64	65-74	75-84	85+		
Municipality*		RTM	RDK					
Frequency**	Never	-1/y	1-2/y	1/3m	1-2/m	3-4/m	1-3/w	4-7/w
Proximity		30+	26-30	21-25	16-20	11-15	5-10	-5
UGS_satisfaction ***		Dissatisfied ++	Dissatisfied	Neutral	Satisfied	Satisfied ++		
Age_friendly ***		Disagree ++	Disagree	Neutral	Agree	Agree ++		

* RTM = Rotterdam, RDK = Ridderkerk

** /y = per year, /m = per month(s), /w = per week

*** ++ = Very or strongly

Table 7 – Cross-tabulation between 'Age_friendly' and 'UGS_satisfaction'

	UGS_ satisfaction					
Age_friendly	**1**	**2**	**3**	**4**	**5**	**Total**
1	3	3	7	5	1	19
2	2	2	2	15	2	23
3	1	6	18	52	10	87
4	0	3	6	57	20	86
5	0	1	3	8	9	21
Total	6	15	36	137	42	236

*Pearson chi-squared (16) = 55.5611 p=0.000

Table 9 – Correlation matrix with the variables of OLS model

	Grade_well being	*Proximity*	*Frequency*	*UGS_satisfaction*	*Sex*	*Age*	*Municipality*
Grade_well being	1.000						
Proximity	-0.065	1.000					
Frequency	0.176	-0.204	1.000				
UGS_satisfaction	0.367	-0.093	0.077	1.000			
Sex	0.058	-0.101	0.056	0.001	1.000		
Age	0.039	-0.025	-0.038	0.149	0.203	1.000	
Municipality	0.053	-0.120	0.079	0.062	-0.042	-0.108	1.000

Table 11 – Marginal effects outcome 1 in the Ordered Logit model

Variables	**Dy/dx**
UGS_satisfaction	-0.046*** (0.012)
Sex	-0.002 (0.017)
Age	-0.014* (0.008)
Municipality	-0.018 (0.015)
Probability that Age_friendly = 1	0.063

Standard errors in the parentheses
*** p < 0.01, *** p < 0.05, ** p<0.1

Table 12 – Marginal effects outcome 2 in the Ordered Logit model

Variables	**Dy/dx**
UGS_satisfaction	-0.057***
	(0.015)
Sex	-0.002
	(0.021)
Age	-0.017*
	(0.011)
Municipality	-0.023
	(0.018)
Probability that Age_friendly = 2	0.093

Standard errors in the parentheses

*** p < 0.01, *** p < 0.05, ** p<0.1

Table 13 – Marginal effects outcome 3 in the Ordered Logit model

Variables	**Dy/dx**
UGS_satisfaction	-0.090***
	(0.024)
Sex	-0.003
	(0.0327)
Age	-0.027*
	(0.016)
Municipality	-0.036
	(0.029)
Probability that Age_friendly = 3	0.405

Standard errors in the parentheses

*** p < 0.01, *** p < 0.05, ** p<0.1

Table 14 – Marginal effects outcome 4 in the Ordered Logit model

Variables	**Dy/dx**
UGS_satisfaction	0.141***
	(0.030)
Sex	0.005
	(0.051)
Age	0.042*
	(0.024)
Municipality	0.056
	(0.044)
Probability that Age_friendly = 4	0.366

Standard errors in the parentheses

*** p < 0.01, *** p < 0.05, ** p<0.1

Table 15 – Marginal effects outcome 5 in the Ordered Logit model

Variables	**Dy/dx**
UGS_satisfaction	0.053***
	(0.013)
Sex	0.002
	(0.019)
Age	0.016*
	(0.009)
Municipality	0.021
	(0.017)
Probability that Age_friendly = 5	0.073

Standard errors in the parentheses

*** p < 0.01, *** p < 0.05, ** p<0.1

Appendix D – Survey questions

Question 1

What is your gender? / *Wat is uw geslacht?*

- Male / *Man*
- Female / *Vrouw*
- Other / *Overig*

Question 2

What is your age? / *Wat is uw leeftijd?*

- Between 45 and 54 years old / *Tussen 45 en 54 jaar*
- Between 55 and 64 years old / *Tussen 55 en 64 jaar*
- Between 65 and 74 years old / *Tussen 65 en 74 jaar*
- Between 75 and 84 years old / *Tussen 75 en 84 jaar*
- 85+ / *85+*

Question 3

In which municipality do you live? / *In welke gemeente woont u?*

- Rotterdam / *Rotterdam*
- Ridderkerk / *Ridderkerk*

Question 4

How often do you, on average, visit urban green spaces in your municipality? (Such as parks, playing/sports fields, riversides, city gardens etc) / *Hoe vaak bezoekt u gemiddeld openbare groene voorzieningen in uw gemeente? (Zoals parken, (speel/sport)velden, rivieroevers, stadstuinen, etc)*

- 4-7 times a week / *4 tot 7 keer per week*
- 1-3 times a week / *1 tot 3 keer per week*
- 3-4 times a month / *3 tot 4 keer per maand*
- 1-2 times a month / *1 tot 2 keer per maand*
- Once every 2-3 months / Eens in de 2-3 maanden
- 1-2 times a year / *1 tot 2 keer per jaar*
- Less than once a year / *Nog minder dan 1 keer per jaar*
- Never / *Nooit*

Question 5

What kind of activities do you partake in when visiting urban green spaces in your municipality? [multiple answers possible] / Wat voor activiteiten onderneemt u als u openbare groene voorzieningen in uw gemeente bezoekt? [Meerdere antwoorden mogelijk]

- Walking / Een stuk(je) wandelen
- Cycling / Een stuk(je) fi etsen
- Exercising / Sportief bezig zijn (bijvoorbeeld joggen, een workout, etc)
- Walking the dog / *De hond uitlaten*
- Seeking nature / *De natuur opzoeken*
- Relaxing solo (e.g. enjoying the weather, reading a book, etc) / *Tot rust komen en relaxen (bijvoorbeeld genieten van het weer, een boek lezen, etc)*
- Relaxing together with family or friends (e.g. picknicking, BBQing, playing with kids) / *Gezamenlijk relaxen met partner/gezin/vrienden (bijvoorbeeld picknicken, bbqen, spelen met kinderen, etc)*
- Social interaction with others from the neighbourhood / *Sociale contacten onderhouden (bijvoorbeeld met kennissen uit de buurt een praatje maken)*
- Visiting an organized event / *Een evenement bezoeken*
- Other, [fill in] / *Overig, namelijk:*

Question 6

What is the distance between your house and the closest urban green space? / *Wat is de afstand van uw huis tot de dichtsbijzijnde openbare groene voorziening?*

- Less than 5-minute walk / *Minder dan 5 minuten lopen*
- Between 5- and 10-minute walk / *Tussen 5 en 10 minuten lopen*
- Between 11- and 15-minute walk / *Tussen 11 en 15 minuten lopen*
- Between 15- and 20-minute walk /*Tussen 16 en 20 minuten lopen*
- Between 20- and 25-minute walk / *Tussen 21 en 25 minuten lopen*
- Between 26 and 30-minute walk / *Tussen 26 en 30 minuten lopen*
- More than 30-minute walk / *Meer dan 30 minuten lopen*
- I don't know / *Weet ik niet*

Question 7

Urban (public) green spaces should be places … (ideally) / *Openbare groene voorzieningen zouden plekken moeten zijn (idealistisch gezien) …*

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Where you can relax	*Waar u tot rust kunt komen en kunt relaxen*	○	○	○	○	○
Where you are encouraged to exercise	*Waar u zich aangemoedigd voelt om te sporten*	○	○	○	○	○
That look attractive	*Die er aantrekkelijk uit zien*	○	○	○	○	○
Where you feel safe	*Waar u zich veilig voelt*	○	○	○	○	○
Where it is safe for children to play	*Waar het veilig is voor kinderen om te spelen*	○	○	○	○	○
Where you can easily enjoy/seek nature	*Waar u gemakkelijk van de natuur kunt genieten*	○	○	○	○	○
That encourage social interaction	*Waar u gemakkelijk sociale contacten onderhoudt*	○	○	○	○	○
That enrich the neighbourhood	*Die de woonomgeving verrijken*	○	○	○	○	○

Question 8

Urban (public) green spaces in your municipality are currently places … / *Openbare groene voorzieningen in uw gemeente zijn momenteel plekken …*

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Where you can relax	*Waar u tot rust kunt komen en kunt relaxen*	○	○	○	○	○
Where you are encouraged to exercise	*Waar u zich aangemoedigd voelt om te sporten*	○	○	○	○	○
That look attractive	*Die er aantrekkelijk uit zien*	○	○	○	○	○
Where you feel safe	*Waar u zich veilig voelt*	○	○	○	○	○
Where it is safe for children to play	*Waar het veilig is voor kinderen om te spelen*	○	○	○	○	○
Where you can easily enjoy/seek nature	*Waar u gemakkelijk van de natuur kunt genieten*	○	○	○	○	○
That encourage social interaction	*Waar u gemakkelijk sociale contacten onderhoudt*	○	○	○	○	○
That enrich the neighbourhood	*Die de woonomgev-ing verrijken*	○	○	○	○	○

Question 9

How satisfied are you with the quality of urban green spaces within your municipality? / *Hoe tevreden bent u over de kwaliteit van de openbare groene voorzieningen binnen uw gemeente?*

- Very satisfied / *Heel erg tevreden*
- Fairly satisfied / *Redelijk tevreden*
- Not satisfied or dissatisfied / *Niet tevreden en niet ontevreden*
- Fairly dissatisfied / *Redelijk ontevreden*
- Very dissatisfied / *Heel erg ontevreden*

Question 10

How much do you value having urban green spaces within your municipality? / *Hoe belangrijk vindt u openbare groene voorzieningen binnen uw gemeente / in uw woonomgeving?*

- Very important / *Heel erg belangrijk*
- Fairly important / *Redelijk belangrijk*
- Not important or unimportant / *Niet belangrijk en niet onbelangrijk*
- Fairly unimportant / *Redelijk onbelangrijk*
- Very unimportant / *Heel erg onbelangrijk*

Question 11

Generally, do the urban green spaces in your municipality meet your wishes or demands? / *Over het algemeen, voldoen de openbare groene voorzieningen binnen uw gemeente aan uw wensen?*

- Yes / *Ja*
- No / *Nee*
- I don't know / *Weet ik niet*

Question 12

To what extent do you agree with the following statements: / *In hoeverre bent u het eens met de volgende stellingen:*

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
UGS are visited frequently	*OGV worden veel bezocht*	○	○	○	○	○
UGS make the	OGV bevorderen de	○	○	○	○	○

municipality more attractive	aantrekkelijkheid van de gemeente					
More UGS are needed in my municipality	Meer OGV zijn nodig in mijn gemeente	○	○	○	○	○
UGS need improving in my municipality	De huidige OGV moeten worden verbeterd	○	○	○	○	○
The municipality should pay for UGS	De gemeente moet de kosten dragen van extra OGV	○	○	○	○	○
Residents should pay for UGS	Alle inwoners moeten betalen voor de OGV	○	○	○	○	○
UGS may be used for public events	OGV mogen voor sociale/publieke evenementen gebruikt worden	○	○	○	○	○
UGS may be used for private events	OGV mogen voor winstgevende evenementen gebruikt worden	○	○	○	○	○
I am willing to pay for the improvement /addition of UGS in my municipality	Ik ben bereid mee te betalen aan de verbetering / extra aanleg van OGV in mijn gemeente	○	○	○	○	○
I would like to be more involved in the management of UGS	Ik zou meer betrokken willen zijn bij het beheer van de OGV	○	○	○	○	○

Question 13

To what extent do you agree with the following statements: [Only for residents of Rotterdam] / *In hoeverre bent u het eens met de volgende stellingen: [Alleen voor Rotterdammers]*

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Rotterdam undertakes enough for the elderly	*Rotterdam onderneemt genoeg voor de ouderen*	○	○	○	○	○
Rotterdam has enough elderly provisions	*Rotterdam heeft genoeg voorzieningen voor de ouderen*	○	○	○	○	○
Rotterdam is accessible for elderly	*Rotterdam is toegankelijk voor ouderen*	○	○	○	○	○
Rotterdam is age-friendly	*Rotterdam is leeftijdsvriendelijk*	○	○	○	○	○
I would rather live in a village than in Rotterdam when older	*Ik zou liever in een dorp dan in Rotterdam willen wonen op latere leeftijd*	○	○	○	○	○
I consider moving out of Rotterdam when having reached 65+	*Ik overweeg om uit Rotterdam te vertrekken als de 65+ leeftijd is bereiktt*	○	○	○	○	○
I would stay in Rotterdam if more would be done for the elderly	*Ik zou in Rotterdam blijven wonen als er meer voor ouderen gedaan zou worden*	○	○	○	○	○
I would stay in Rotterdam if there were more UGS with a focus on elderly well-being	*Ik zou in Rotterdam blijven wonen als er meer OGV met een focus op het welkzijn van ouderen waren*	○	○	○	○	○

Question 14

To what extent do you agree with the following statements: [Only for residents of Ridderkerk] / *In hoeverre bent u het eens met de volgende stellingen: [Alleen voor Ridderkerkers]*

		Strongly disagree	**Disagree**	**Neutral**	**Agree**	**Strongly agree**
Ridderkerk undertakes enough for the elderly	*Ridderkerk onderneemt genoeg voor de ouderen*	○	○	○	○	○
Ridderkerk has enough elderly provisions	*Ridderkerk heeft genoeg voorzieningen voor de ouderen*	○	○	○	○	○
Ridderkerk is accessible for elderly	*Ridderkerk is toegankelijk voor ouderen*	○	○	○	○	○
Ridderkerk is age-friendly	*Ridderkerk is leeftijdsvriendelijk*	○	○	○	○	○
I would rather live in a village than a city when older	*Ik zou liever in een dorp dan in een stad willen wonen op latere leeftijd*	○	○	○	○	○
I will stay living in Ridderkerk when having reached 65+	*Ik blijf in Ridderkerk wonen als de 65+ leeftijd is bereiktt*	○	○	○	○	○
I would rather live in Rotterdam if more would be done for the elderly	*Ik zou liever in Rotterdam wonen als er meer voor ouderen gedaan zou worden*	○	○	○	○	○
I would rather live in Rotterdam if there were more UGS with a focus on elderly well-being	*Ik zou liever in Rotterdam wonen als er meer OGV met een focus op het welkzijn van ouderen waren*	○	○	○	○	○

Question 15

Generally, what grade would you give for:/ *Over het algemeen, welk cijfer geeft u voor:*

		Grade from 1 - 10
The urban green spaces in your municipality	*De openbare groene voorzieningen binnen uw gemeente*	_
The elderly provisions in your municipality	*De voorzieningen voor ouderen binnen uw gemeente*	_
Your own well-being	*Uw eigen welzijn*	_