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The Relationship between Urban Regeneration Projects and the Livability of the Elderly through Public Parks in Seoul, Republic of Korea

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Summary

In South Korea, the elderly ratio has increased rapidly, and the government has conducted urban regeneration projects to respond to an aging society and improve residents' livability. However, many elderly people do not satisfy their quality of life since Korea has the highest suicide rate of the elderly among OECD countries. Therefore, the objective of the study is to understand the relationship between the urban regeneration projects and public parks in Seoul, Republic of Korea, from the elderly's perspective. In detail, this research aims to show how the urban regeneration projects of the Seoul Metropolitan Government (SMG) influence its public parks, which are essential for a healthy elderly's life. Then, to understand how the parks impact the elderly's livability, the study analyzes how the elderly consider the parks and how they use them for their health and social relationships.

This study used a case study method, and semi-structured interviews were the main data collection method. However, it also used other primary and secondary data, including observation, government documents, and academic databases. The semi-structured interviews were conducted with the specialist on the elderly's livability and the SMG's urban regeneration and the elderly residents above 64 in the case study sites. It also mainly used ATLAS.ti and QGIS for the analysis.

There are three main findings. First, since the elderly on the site use the park not only for health but also for social relationships, the creation of small parks or park remodeling helps to improve the livability of the elderly, especially one-person households or the elderly over 80. Light physical activity is more important than vigorous exercise for the elderly over 80, and the elderly living alone have few chances to connect with nature and few social networks. Thus, even though the parks are small scale, it helps to improve their livability. Second, understanding of the interests of the elderly in the urban regeneration project is lacking, and it harms park use. From the point of view of the elderly, not only easy access but also safe and convenient facilities and appropriate amounts of trees are essential. However, some parks do not satisfy the interest. In addition, the lack of the elderly's understanding of the projects and institutional difficulties negatively affect the quality of public parks. The elderly are unfamiliar with resident participation and have difficulty understanding strategic development. Also, because of the institutional lack, it is not easy to utilize various resident participation and establish opinions of the residents and the local government.

Therefore, this study recommends that outdoor space improvement, including public parks, should be actively implemented during the urban regeneration project in areas where the elderly in one-person households and the old-old are densely populated. Also, an urban planner should actively reflect the interests of the elderly by promoting the urban regeneration project for the elderly and active resident participation.

Keywords

The elderly; Urban regeneration; Livability; Parks; Seoul

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Abbreviations

WHO	World Health Organization
OECD	Organisation for Economic Co-operation and Development
SMG	Seoul Metropolitan Government
KFSP	Korea Foundation for Suicide Prevention
MLIT	Ministry of Land, Infrastructure and Transport
KDCPA	Korea Disease Control and Prevention Agency

Table of Contents

Summary.....	ii
Keywords	ii
Acknowledgements	iii
Abbreviations	iv
List of Boxes.....	vii
List of Charts.....	vii
List of Figures.....	vii
List of Graphs.....	viii
List of Photographs.....	viii
List of Tables	viii
Chapter 1: Introduction	1
1.1 Background.....	1
1.2 Problem statement	1
1.3 Research objective.....	3
1.4 Research question	3
1.4.1 Research sub-questions	3
1.5 Significance of the research.....	4
Chapter 2: Literature review	5
2.1 Introduction	5
2.2 Urban regeneration	5
2.2.1 Definitions of urban regeneration	5
2.2.2 Urban regeneration using a park	6
2.3 Livability	7
2.3.1 Definitions of livability	7
2.3.2 Sustainability and livability.....	7
2.3.3 Relation between demographic dynamics and livability.....	7
2.3.4 Livability measurement.....	8
2.4 Age-friendly cities	9
2.4.1 Definitions of age-friendly cities.....	9
2.4.2 Characteristic of age-friendly cities	10
2.4.3 The impact of public parks on the elderly	11
2.5 Conceptual framework	13
Chapter 3: Research design and methodology	15
3.1 Introduction	15
3.2 Description of the research design and methods	15
3.2.1. Research type	15
3.2.2 Research strategy	15
3.3 Data collection, sampling selection and size	16
3.4 Operationalization	17
3.5 Data analysis.....	18
3.6 Validity and reliability.....	19
Chapter 4: Results, analysis, and discussion	20
4.1 Introduction	20
4.2 SMG’s urban regeneration projects	20
4.2.1 Jangwi-dong, Seongbuk-gu.....	22

4.2.2 Chang 3-dong, Dobong-gu.....	23
4.2.3 Jeongneung 3-dong, Seongbuk-gu	24
4.3 Sampling and data preparation	26
4.3.1 Data preparation and analysis	26
4.3.2 General characteristics of the interviewees	28
4.4 Impact of SMG’s urban regeneration projects.....	30
4.4.1 The government’s documents and observation	30
4.4.2 Specialists.....	30
4.4.3 Residents above 64.....	31
4.4.4 Interpretation of the result	33
4.5 Quality of public parks	34
4.5.1 The government’s documents and observation	34
4.5.2 Specialists.....	37
4.5.3 Residents above 64.....	37
4.5.4 Interpretation of the result	39
4.6 Livability of the elderly	40
4.6.1 The government’s documents and academic database	40
4.6.2 Specialists.....	41
4.6.3 Residents above 64.....	42
4.6.4 Interpretation of the result.....	44
4.7 Discussion.....	45
Chapter 5: Conclusions	46
5.1 Introduction	46
5.2 Conclusions: Answering the research questions.....	46
5.2.1 Answering the research sub-questions	46
5.2.2 Answering the main research question.....	48
5.3 Limitations and suggestions for further research.....	49
5.4 Policy recommendation	49
Bibliography	50
Appendix 1: Interview guidelines	55
Appendix 1.1: Interview guideline for residents above 64.....	55
Appendix 1.2: Interview guideline for the coordinators of SMG’s urban regeneration	57
Appendix 1.3: Interview guideline for the experts on the livability of the elderly.....	58
Appendix 2: Timeline	59
Appendix 3: General information of the resident interviewees.....	60
Appendix 4: Coding Scheme	61
Appendix 5: SMG’s urban regeneration projects overview	62
Appendix 5.1: Jangwi-dong Urban Regeneration Project	62
Appendix 5.2: Chang 3-dong Urban Regeneration Project	62
Appendix 5.3: Jeongneung 3-dong Urban Regeneration Project	62
Appendix 6: Field observation for SMG’s urban regeneration projects.....	64
Appendix 6.1: Jangwi-dong, Seongbuk-gu	64
Appendix 6.2: Chang 3-dong, Dobong-gu	67
Appendix 6.3: Jeongneung 3-dong, Seongbuk-gu.....	70
Appendix 7: Observation and secondary data research on the quality of public parks.	73
Appendix 8: Secondary data research on the livability of the elderly	75
Appendix 9: IHS copyright form.....	77

List of Boxes

Box 1: Examples of quotations of the urban regeneration specialist interviews.....	31
Box 2: Examples of quotations about the SMG’s urban regeneration projects and parks’ accessibility & proximity .	31
Box 3: Examples of quotations about the SMG’s urban regeneration projects and parks’ safety & security	32
Box 4 Examples of quotations about the SMG’s urban regeneration projects and the elderly’s park activities.....	32
Box 5: Examples of quotations about the SMG’s urban regeneration projects and the children’s park use	32
Box 6: Examples of quotations about negative opinions on the SMG’s urban regeneration projects	33
Box 7: Examples of quotations of the specialist interviews about the quality of public parks	37
Box 8: Examples of quotations about parks’ activities and parks’ accessibility & proximity	38
Box 9: Examples of quotations about the proximity to other amenities and parks’ activities.....	38
Box 10: Examples of quotations about the proximity to other amenities and parks’ safety & security	38
Box 11: Examples of quotations about parks’ activities and parks’ planting	39
Box 12: Examples of quotations about parks’ activities and parks’ safety & security	39
Box 13: Examples of quotations of the senior welfare specialist interviews.....	42
Box 14: Examples of quotations about parks’ activities and physical health	43
Box 15: Examples of quotations about parks’ activities and mental health.....	43
Box 16: Examples of quotations about parks’ planting and mental health.....	43
Box 17: Examples of quotations about parks’ activities and social relationships.....	44

List of Charts

Chart 1: Number of people by household type.....	29
Chart 2: Number of people by the frequency of park use	29

List of Figures

Figure 1: Ratio of the elderly population in 2020 (population over 65/total population * 100).....	2
Figure 2: Objective and subjective measurement of livability elaborated by the author	8
Figure 3: Planning and design factors related to the elderly satisfaction of park use.....	12
Figure 4: Conceptual framework	13
Figure 5: Location of the case study sites.....	16
Figure 6: Jangwi Urban Regeneration Project Site	21
Figure 7: Chang3-dong Urban Regeneration Project Site.....	21
Figure 8: Jeongneung 3-dong Urban Regeneration Project Site.....	22
Figure 9: The details of the urban regeneration project in Jangwi-dong.....	23
Figure 10: The details of the urban regeneration project in Chang 3-dong.....	24
Figure 11: The details of the urban regeneration project in Jeongneung 3-dong.....	25
Figure 12: Co-occurrence sankey diagram based on ATLAS.ti.....	27
Figure 13: Environmental accessibility of the public parks and topographical map	35
Figure 14: Summary of the answers to the sub-questions	47

List of Graphs

Graph 1: The number of the elderly population in Seongbuk-gu and Dobong-gu.....	40
Graph 2: Change in the number of green spaces per capita in Seongbuk-gu and Dobong-gu.....	40
Graph 3: Changes in positive attitude towards the local social and physical environment of the elderly above 64	41
Graph 4: Changes in the happiness index of the elderly above 64 in Seongbuk-gu and Dobong-gu	41

List of Photographs

Photograph 1: Pedestrian environment improvement projects in Jangwi-dong (left) and Chang 3-dong (right).....	30
Photograph 2: Public parks in Jangwi-dong, Dongbang Children's Park (left) and Odong Park.....	36
Photograph 3: Public parks in Chang 3-dong, Sinchang Children's Park (left) and Water Drop Children's Park (right)	36
Photograph 4: Public parks in Jeongneung 3-dong, Jeongden ssamji park (left) and Samdeok ssamji park (right)....	36

List of Tables

Table 1: Different terms of urban regeneration in the Western countries.....	5
Table 2: Selection of park planning factors	14
Table 3: Operationalization table	17
Table 4: Types of SMG's urban regeneration projects	20
Table 5: Information of the selected cases	21
Table 6: Summary of semi-structured interview method and sampling size	26
Table 7: The secondary data sources	26
Table 8: The main codes and the number of quotations.....	27
Table 9: Co-occurrence table based on ATLAS.ti.....	28
Table 10: General information about the resident interviewees	28
Table 11: General information about the specialist interviewees	29
Table 12: Co-occurrence table of the quality of public parks in the resident interviews based on ATLAS.ti	37
Table 13: Co-occurrence table of health and quality of public parks in the resident interviews based on ATLAS.ti ...	42
Table 14: Co-occurrence table of social relationships and park activities in the resident interviews based on ATLAS.ti	42

Chapter 1: Introduction

1.1 Background

Globally, urbanization and urban growth have progressed at the same time as the elderly population has increased. In 2015, one in eight people worldwide was 65 years of age or older, but by 2050 it will be one in six (World Bank Group, 2021). The increase in the elderly population in cities is a wicked problem, leading to several social, economic, and environmental challenges. The lifestyle of the aging population, which is undergoing social, physical and mental changes, requires more health care and new types of infrastructure. Due to a decline in the labour force and complicated health inequalities, they pose a serious burden in many countries (World Bank Group, 2021; Kano, Rosenberg, & Dalton, 2018). The change in urban demographic structure, growth in an aging population, makes it difficult and complex to achieve the sustainable development that prevents environmental, social, and economic resources from being damaged as a result of increasing urbanization.

Urban planners and policy makers have actively responded to demographic changes and tried to minimize the various urban problems associated with them. Many cities with aging populations are trying to become more age-friendly cities that can accommodate both the older and younger generations. Since WHO announced the “Global Age-friendly City Guide” in 2010 and established the “Global Network of Age-friendly Cities and Communities (GNAFCC),” interest in urban environments that improve the livability of older people has steadily increased, and in 2018, 760 cities joined as members of the GNAFCC (WHO, 2018).

Public parks are especially important in an aging society. The physical environment, such as green spaces, influences life satisfaction in direct and indirect ways (Veenhoven et al., 1993; Mouratidis, 2018; 2020). Parks can directly affect the elderly citizen’s happiness as well as their physical and social health (Esther, Winky, & Edwin, 2017). Furthermore, the elderly do more leisure activities in green spaces compared to other age groups (Youn & Choi, 2014; Sang et al., 2016). Public parks can be used without financial burden, so low-income seniors can easily access them (Park & Lee, 2021).

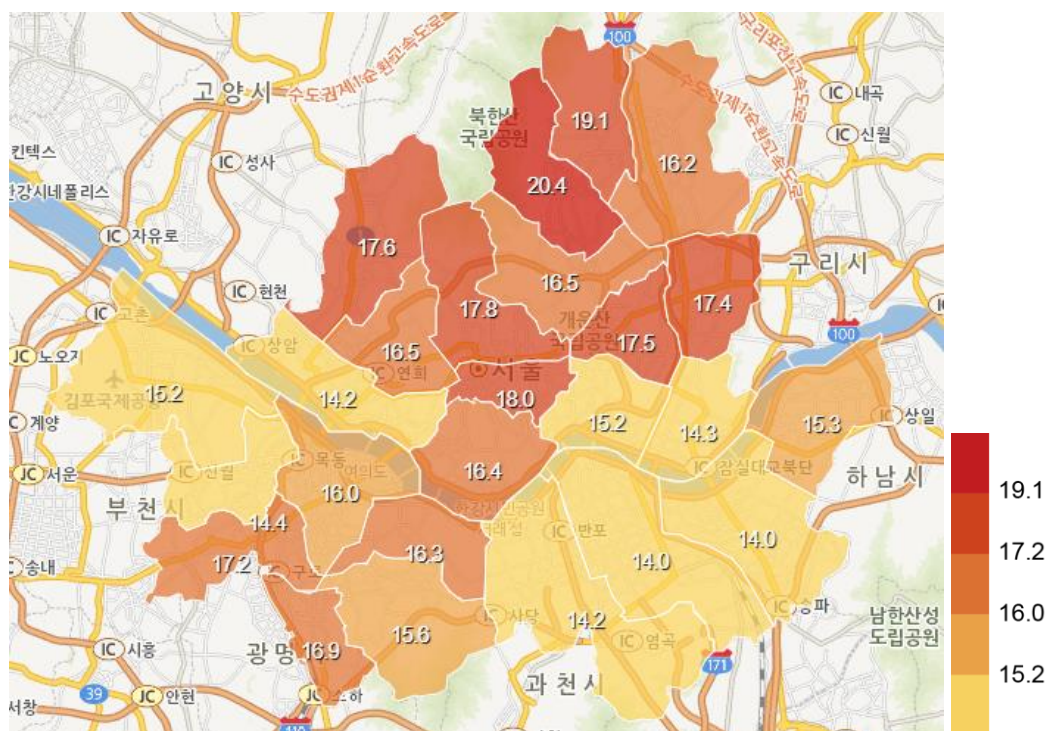
However, it is difficult to consider and reflect the livability of the elderly on urban planning. Livability varies by region, gender, and cultures, and it is complex to measure how their livability is affected by urban environments in a rapidly changing society (Kaal, 2011; Ruth & Franklin, 2014).

1.2 Problem statement

The East Asia and Pacific region is experiencing rapid urbanization and increases in aging populations, and especially in high-income countries, the elderly population is already no longer a minority group (World Bank Group, 2021). Among high-income countries, the aging of the population is most severe in South Korea. The population aged 65 or older was already 16.5% in 2021 and will be 46.4% in South Korea by 2070 (Statistics Korea, 2021a). Furthermore, the change in the working-age population – aged 20 to 64 – in 2060 compared to 2020 is -43.3%, the lowest rate among OECD countries; the average is -9.6% (OECD, 2021).

Seoul, the capital of South Korea, is suitable for studying the livability of the elderly population because Seoul is the home to the largest number of elderly citizens compared to other major cities in Korea, special cities and metropolitan cities. 18.1% of the total elderly population aged 65 and over, which amounts to 1,549,000 people, are living in Seoul in 2021 (Statistics Korea, 2021b). Seoul's aging population is concentrated in the northern areas of the city, where the urban environment is poor (Lee, Lee, & You, 2015; Lee & Lee, 2021). Figure 1 shows that Gangbuk area, the northern area in Seoul, has a high proportion of elderly citizens. Moreover, 23.5% of them are seniors living alone in 2020, and low-income seniors are also concentrated in the Gangbuk area (Lee, Lee, & You, 2015). Therefore, the area where the elderly population is dense, has poor housing infrastructure, and the city has been implementing urban regeneration projects for better accessibility in those areas.

Figure 1: Ratio of the elderly population in 2020 (population over 65/total population * 100)



Source: Statistics Korea, <https://sgis.kostat.go.kr/>

The Seoul Metropolitan Government (SMG) has implemented several policies and plans for the livability of the elderly. Since the 2000s, the government has been interested in age-friendly environments and urban regeneration. SMG presented the 2020 Aged Society Master Plan and aimed to become an age-friendly city in 2010, becoming a member of the GNAFCC in 2013. At the same time, the government steadily implemented urban regeneration projects in the Gangbuk area, where residential areas are aging. In 2015, SMG announced the 2025 Seoul Urban Regeneration Strategic Plan, which comprehensively considers aging, population decline, urban decay, and local economic stagnation (SMG, 2018). The government began to actively deal with the aging society by improving the physical environment. Especially parks and outdoor spaces were considered important by the government and planners to increase the livability of the elderly and the efficiency of urban regeneration.

However, despite Seoul's policies and plans for livability, and its high income, the happiness of the elderly has declined. The suicide rate of the Korean elderly population aged 65 and older

in 2019 is 46.6 per 100,000 people, the highest among the OECD countries (Ministry of Health and Welfare & KFSP, 2021). The average elderly suicide rate in OECD countries – the number of suicides per 100,000 people – is 17.2, which is 2.7 times lower than Korea (Ministry of Health and Welfare & KFSP, 2021). When compared to countries with similar livability rankings, such as the 2021 World Happiness Report, the suicide rate of the elderly is significantly higher in Korea. In addition, there has been criticism that many parks in Seoul are difficult for the elderly to use because they are located on slopes or the park's design does not sufficiently consider the elderly (Park 2018; Lee, 2019). Therefore, it is necessary to study how Seoul's outdoor environment functions for the elderly, and planners need to know exactly what qualities of public parks the elderly need.

There is literature on the relationships between the elderly and parks, but qualitative research on how the quality of the park affects the livability of the elderly is lacking. Most literary work emphasizes the quantitative supply of parks (Lee & Lee, 2019; Sang et al., 2016; Youn & Choi, 2014; Lee, 2019), making it difficult to know what qualities of parks affect the livability of the elderly. Moreover, some studies used park quality as an independent variable, but most of them are studies on user satisfaction (Esther, Winky, & Edwin, 2017; Park & Lee, 2021). Furthermore, the dissertations by Park (2018) and Kim (2019) were limited by their quantitative approach on the relationship between park quality and the health of the elderly, making it challenging to learn in depth about what specific green infrastructure is useful for the elderly. Therefore, it is difficult to know the effect of parks on the overall quality of life of the elderly. In addition, not many studies have been done on the livability of the elderly in the East Asian continent (Esther, Winky, & Edwin, 2017).

1.3 Research objective

The purpose of this study is to understand the relationship between urban regeneration projects and public parks in Seoul, Republic of Korea, from the perspective of the elderly. In detail, this study aims to show how Seoul's urban regeneration projects affect public parks, which are essential for a healthy lifestyle of the elderly. Furthermore, to understand how the parks affect the livability of the elderly, this study analyses how the local elderly view their parks and how they use them for health and social relationships.

1.4 Research question

How have the Seoul Metropolitan Government's urban regeneration projects influenced the quality of public parks to improve the livability of the population above 64?

1.4.1 Research sub-questions

1. What has been the recent development of the urban environment in Seoul, and what changes have the urban regeneration projects initiated?
2. What types of elements determine the quality of public parks from the perspective of the elderly in SMG's urban regeneration project sites?
3. How has the livability of the elderly population been affected by the parks in the areas of SMG's urban regeneration projects?

1.5 Significance of the research

The SMG has sought to improve residents' livability through urban regeneration projects to respond to an ageing society. However, many elderly people are still dissatisfied with their quality of life. It is therefore necessary to analyse the relationship between the projects and the livability of the elderly, as well as the reason for why livability has not improved significantly. The study also addresses the relationship between the qualities of parks and livability in the project sites, which has not yet been studied much. It differs from previous studies in that it involves an in-depth understanding that goes beyond knowing the correlation between parks and the livability of the elderly. Therefore, it is a meaningful contribution to the need for research on East Asian cities where the aging of the population is rapidly increasing.

The study will also be useful for urban planners and policymakers in cities where the population is aging. Especially the high-income countries in East Asia and the Pacific region have a similar context to Seoul, so this research can be useful in establishing urban policies and plans for age-friendly cities. Through this research, they can estimate how changes in the outdoor environment, such as urban regeneration projects or the development of green spaces, affect the lives of senior residents.

Chapter 2: Literature review

2.1 Introduction

In this chapter, the concepts and theories of variables are explained. First, Section 2.2 addresses the concept of urban regeneration and the role of public parks in urban regeneration is also explained. Second, in Section 2.3, the concept of livability and its measurement methods are studied. This part addresses why defining livability is difficult and measuring it is important. Finally, Section 2.4 explains the concept of age-friendly cities. Also, there are several studies that explain why public parks are essential to the elderly for their health and social relationships. Then, in recent studies, how the quality of parks influenced the elderly is explained. In Section 2.5, Conceptual framework addresses how the concepts are used as the variables in this study.

2.2 Urban regeneration

2.2.1 Definitions of urban regeneration

Over time, cities must continue to replace outdated physical environments while addressing each city's health, social welfare, and economic challenges (Robert, 2017). Urban regeneration has emerged to meet that need. Since urban regeneration deals with urban problems not only in physical development but also in social and economic aspects, urban regeneration aims for sustainable urban development (Robert, 2017). Thus, urban regeneration means comprehensive redevelopment considering economic, social, and environmental conditions of urban areas, which has urban issues such as urban shrinkage (Mehan, 2016; Robert, 2017). The concept is also used by various names, such as urban renewal, revitalization, and reconstruction, depending on time and country (MacGregor, 2010; Robert, 2017). Table 1 shows the different terms sharing similar meanings of regeneration.

Table 1: Different terms of urban regeneration in the Western countries

Period policy type	1950s Reconstruction	1960s Revitalisation	1970s Renewal	1980s Redevelopment	1990s Regeneration
Major strategy and orientation	Reconstruction and extension of older areas of towns and cities are often based on a 'master plan'; suburban growth	Continuation of 1950s theme; suburban and peripheral growth; some early attempts at rehabilitation	Focus on in situ renewal and neighborhood schemes; still development at periphery	Many major schemes of development and redevelopment; flagship projects; out of town projects	A more comprehensive form of policy and practice; emphasis on integrated policy and interventions.
Key actors and stakeholders	National and local government; private sector developers and contractors	Move towards a greater balance between public and private sectors	Growing role of private sector and decentralisation in local government	Emphasis on private sector and special agencies; growth of partnerships	Emphasis on private sector and special agencies; growth of partnerships
Spatial level of activity	Emphasis on local and site levels	Regional level of activity emerged	Regional and local levels initially; later more local emphasis	In early 1980s focus on site; later emphasis on local level	Reintroduction of strategic perspective; growth of regional activity and interventions

Source: Robert, 2017, p.19

Urban regeneration deals with current and future concerns and should be a long-term process (Mehan, 2016; Robert, 2017). Thus, many scholars have argued that urban regeneration should be strategic urban planning (Apostolakis, 2004; Carter & Robert, 2017). The strategic approach allows multiple stakeholders to share common visions and missions, and even if they have various measures, they can achieve the shared vision in the long term. Since urban regeneration is tackling the economic, environmental, and social urban challenges altogether, the approach of only a few or a single sector has limitations in solving the challenges (Carter & Robert, 2017). In strategic planning, the different stakeholders can exchange information or resources and develop each other's capacities to maximize their benefit and value (Apostolakis, 2004).

2.2.2 Urban regeneration using a park

Parks are generally involved in urban regeneration, and there are several reasons why parks help to regenerate the areas with urban decline. It has influences on the social, economic, and environmental aspects.

First, from a social point of view, public spaces, including parks, raises a sense of community. In public places, residents can participate in local activities and events so that they do not feel isolated and belong to the same group (Ramlee et al., 2015). In particular, parks allow all different kinds of people to engage in physical and social activities without the stress of urban life (Ramlee et al., 2015). Also, local pocket parks provide social and age-integrated programs and opportunities for socially active groups such as the elderly and children who are vulnerable (Hamdy & Plaku, 2021). In addition to improving the sense of community, Hamdy and Plaku (2021) explain that urban regeneration through pocket parks enhances the safety and security of neighborhoods and promotes the health and well-being of residents through agriculture and other activities in parks.

From an economic aspect, planning public parks increases the nearby land or housing prices as well as the local economy active. Although there is a difference depending on the location of the park, the closer the distance from the park, the higher the real estate price, and the economic effect of parks is greater in declining areas than in active areas (Kim et al., 2020). Also, Li (2003) explains that urban regeneration of public spaces can lead to the improvement of urban image, which can attract other people's urban investment, such as tourism development. Even in pocket parks, there is an economic effect, using pocket parks as a small marketplace, selling some snacks in the parks (Hamdy & Plaku, 2021).

From an environmental perspective, parks prevent a city's air and noise pollution and improve biodiversity. nature-based urban regeneration projects, such as creating both large- and small-scale parks improve the air condition of the cities (Shafraay & Kim, 2017). Shafraay and Kim (2017) also maintain that when the regeneration projects with green infrastructure aim at the city's walkability, local people get not only reduced congestion but also healthy life and social interaction. In addition, pocket parks in neighborhoods contribute to biodiversity and help to protect residents from noise (Hamdy & Plaku, 2021).

2.3 Livability

2.3.1 Definitions of livability

Livability is usually used to demonstrate good conditions for people's habitation. The background of livability is closely related to the progress of urban democracy. The concept was developed as the urban environment was judged from the citizens' perspective, and their urban rights became important (Kaal, 2011). It was first used for poor living conditions in Dutch rural areas experiencing depopulation in 1950s, and the rural areas has a lack of service and facilities compared to Dutch urban areas (Kaal, 2011). The interest in urban livability has increased since the 1960s, recognizing Dutch urban problems including housing and pollution (Kaal, 2011). Scholars argued that modern functionalism degraded urban livability, including a sense of community and belonging (Jacobs, 1961; Kaal, 2011). Also, social movements, such as Provo and Goblin Movement in Amsterdam, used livability as citizenship to protect their environment against pollution from heavy industry (Kaal, 2011). After the 1990s, governments and scholars became interested in the livability of particular communities, such as ethnic minorities and low-income residents (Kaal, 2011; Chivot, 2011; Ruth & Franklin, 2014).

Because livability is defined according to a specific community, livability can be different depending on its characteristics. Livability is described as conditions necessary to enable individuals and societies to develop according to acceptable standards (Kaal, 2011). Thus, the environment interacts with communities with different needs, interests, and values. In other words, the concept should be approached subjectively with context, population, country, time, and culture (Kaal, 2011; Ruth & Franklin, 2014; Miller, Witlox, & Tribby, 2013; Mouratidis, 2018; Mouratidis, 2020). However, livability can be objectively described by focusing on values such as good health care and adequate housing (Kaal, 2011). It is described in detail in Section 2.3.4.

2.3.2 Sustainability and livability

Sustainability and livability are popular concepts in urban planning, and many institutions use together these two concepts (Gough, 2015). Both have in common that they do not look at the urban environment from one point of view but the environment in an integrated way, including social, economic, environmental, or physical points of view. However, there is a difference between sustainability and livability. Livability focuses on the present or near future, which is "now" or "about to be," and also it is about specific areas (Ruth & Franklin, 2014; Gough, 2015). Thus, as mentioned in Section 2.3.1, livability varies by region, county, and city. However, sustainability is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). It is therefore about a long-term vision that takes into account the "intergenerational time horizon" (Gough, 2015). Also, Gough (2015) explains that sustainability is considered on a larger scale, such as at a national or global level, than livability.

2.3.3 Relation between demographic dynamics and livability

Since the communities in a city define urban livability, it is important to understand who consists of a city. One way to do it is by identifying its urban demographic trends. The life course of individuals and households is related to the patterns of changes in interests and needs (Ruth & Franklin, 2014). For example, a city with a high percentage of a young population prioritizes urban services for child health, schooling, and childcare (World Bank Group, 2021). On the other hand, a city with a large population of the elderly requires elderly care systems, public elderly rental residents, and social amenities (World Bank Group, 2021).

Thus, demographic trends are related complicatedly to economic, social, and political trends, creating a dynamic context at the city, town, and regional levels (World Bank Group, 2021). Therefore, Ruth and Franklin (2014) mention that the policymakers should understand urban demographic characteristics not only as life course but also as generations. The demographic and special structures change over time and space because people migrate to another city as they grow older (Ruth & Franklin, 2014). It makes the needs of residents change dramatically, not gradually. By understanding different preferences according to the life course and different generations, the policymakers and planners can understand, predict, and prepare for their changing demand for infrastructure and services.

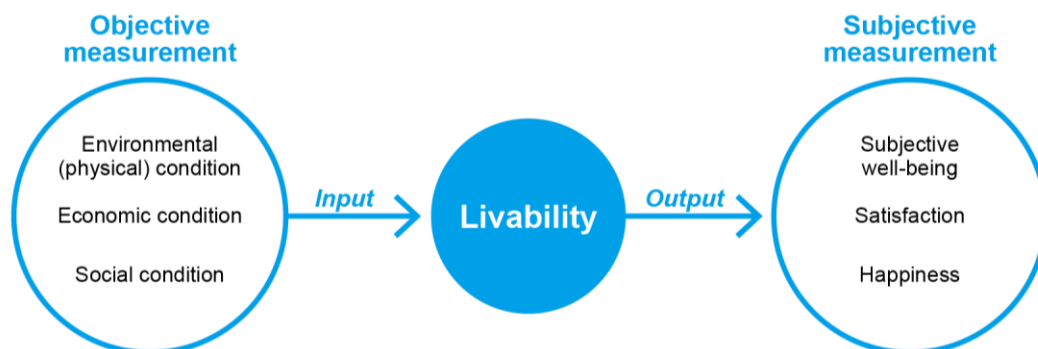
2.3.4 Livability measurement

With increasing interest in livability, many institutions invented measurement tools. Also, many scholars evaluate the livability of a city or country by replacing other concepts such as well-being, quality of life, and happiness (Mouratidis, 2018). Institutions and researchers evaluate their city's livability using objective or subjective indicators.

As mentioned above, many researchers describe livability objectively. They consider the essential conditions for living. For instance, “economic affluence,” “political stability,” “social equality,” and so on are considered as necessary living conditions for good life (Veenhoven et al., 1993). Therefore, objective indicators are from measurable data resources, such as income, education level, housing price, etc. The indicators refer to the quality of living conditions as the inputs of livability (Myers, 1988; Veenhoven et al., 1993; Okulicz-Kozaryn, 2013).

However, to measure the outputs of livability, some researchers use subjective indicators like happiness, satisfaction, and subjective well-being. People living in a livable city are happy and healthy (Veenhoven et al., 1993; Okulicz-Kozaryn, 2013). Also, objective indicators cannot fully explain livability because people who live in a good quality of living environment can be unhappy. Also, since livability means judging an appropriate living environment from the citizens' view, how they satisfy their living conditions is important (Okulicz-Kozaryn, 2013). For example, subjective well-being is one of the subjective indicators of livability. It measures how people consider and assess their life and what is important to them (Mouratidis, 2018). It is content with "hedonic well-being, life satisfaction, and eudaimonia" (Mouratidis, 2018; Mouratidis, 2020). Each of them means "a person's feeling or emotional states," "reflective assessment on a person's life or some specific aspect of it," and "a sense of meaning and purpose in life, or good psychological functioning" (Mouratidis, 2018; Mouratidis, 2020).

Figure 2: Objective and subjective measurement of livability elaborated by the author



Many scholars argue that both subjective and objective indicators are related, but some maintain that their correlation is weak. Subjective well-being, which is a subjective indicator of livability, is influenced by physical, sociodemographic, and perceived neighborhood characteristics (Mouratidis, 2018; Mouratidis, 2020). Mouratidis (2020) shows the literature review that health, social life, and leisure activities are the indirect influences of the urban environment on subjective well-being. There is also a direct influence which is emotional responses (Mouratidis, 2020). In addition, the survey and observation show a strong relationship between the average happiness in countries and the quality of essential living conditions, such as "material comfort, social equality, political freedom, and access to knowledge" (Veenhoven et al., 1993). In contrast, Myers (1987) argues that the individuals' and community's quality of life should be evaluated separately. He compared objective and subjected measurements to identify the difference between community's and citizens' perspectives, and there was a significant difference between the evaluation of residents' quality of life and the evaluation of the community's quality of life (Myers, 1987). Jacobs (1961) also argues that, by introducing the Greenwich Village, residents had high neighborhood satisfaction with rich urban vitality and strong community bonds despite the poor living environment. In addition, Okulicz-Kozaryn (2013) compares the results of city rankings, which were the objective measurement, Mercer index, and the subjective measurement, Urban Audit Perceptions Survey. As a result of the comparison, in some cities, their Mercer ranked low but had high scores in the subjective ranking system (Okulicz-Kozaryn, 2013). The debate on whether objective or subjective indicators should judge livability has still continued, and many research institutes measure livability in an integrated way considering these two indicators.

2.4 Age-friendly cities

2.4.1 Definitions of age-friendly cities

Because of the increasing elderly population worldwide, the interest in the livability of the elderly has also increased. Many scholars and policymakers have put their effort into finding the ideal cities where their elderly citizens live. With the background of these demands, the concept of age-friendly cities emerged. WHO defines an age-friendly city as "an inclusive and accessible community environment that optimizes opportunities for health, participation and security for all people, in order that quality of life and dignity are ensured as people age" (WHO, 2015). Many scholars also commonly define the concept as a city that actively involves, values, and supports senior citizens in urban infrastructure and services that effectively respond to their needs (Fitzgerald & Caro, 2014; Van Hoof et al., 2018). This concept involves two essential concepts: active aging and aging in place.

People who do active aging can continuously involve in economic, social, and leisure activities. The older people were considered as people in the life stage of dependence, decline, and loss, leading to the exclusion of the elderly from the labor market (Boudiny & Mortelmans, 2011). However, because of the demographic shift, aging societies should remain the elderly in the labor market, and the term active aging started to be used. Its narrow definition only includes economic participation, but many scholars and institutions include participation not only in the labor market but also in social and leisure activities since they improve the elderly's health and life satisfaction (Boudiny & Mortelmans, 2011). In addition, WHO (2007) defines active aging as "the process of optimizing opportunities for health, participation, and security in order to enhance the quality of life as people age." WHO (2002) mentions that active aging policies should improve "physical, mental, and social well-being," which is the WHO's health definition.

It also emphasizes providing accessible, pleasant and affordable chances to do physical activities for active aging, such as safe parks (WHO, 2002).

The other important concept is aging in place. It means remaining independent and living in the community with family and friends (Wiles et al., 2011; Iecovich, 2014). It includes the meaning that people can choose the living conditions of their later years, such as where and how they receive the services (Wiles et al., 2011; Iecovich, 2014). Some policies with this concept only focus on home or family care, but the concept has expanded to neighborhoods and community care (Wiles et al., 2011). There are two reasons for its importance. First of all, elderly people usually prefer to age in place (Iecovich, 2014). People feel more attachment to their place and environment with aging, and the elderly who age in place can feel a sense of identity through autonomy (Wiles et al., 2011; Iecovich, 2014). Second, home- and community-based health care services are more economical than institutional care (Iecovich, 2014). Many policymakers and planners argue that providing care services within homes and communities is an alternative to expensive nursing-home care (Iecovich, 2014).

2.4.2 Characteristic of age-friendly cities

Many institutions and scholars have had an interest in what an age-friendly environment looks like. It can be classified as the physical environment and the social environment, which interact complicatedly.

The physical characteristics of age-friendly cities are housing, transportation, and the outdoor environment. First, housing is an important factor in aging in place. Residential designs that are comfortable for older people with disabilities, such as the Universal Design application, allow people to grow old without leaving their homes and reduce the number of injuries that can occur in older people's homes (Fitzgerald & Caro, 2014; Steels, 2015). Furthermore, the application of the health care system at home and providing various housing options in consideration of the various types of households for the elderly enable the independence of the elderly to age in place (Steels, 2015). Second, mobility for the elderly needs various types of transportation. The elderly living in areas with high urban density use the dry season type of transportation rather than driving their own cars (Fitzgerald & Caro, 2014). In addition, the environment close to public transport reduces the feeling of isolation of the elderly and, at the same time, increases the walkability of the city (Steels, 2015). Thus, transportation is closely related to the outdoor environment, such as walkable streets and green spaces. Walkability is very important for an age-friendly city because it has a positive effect on the healthy life of the elderly (Fitzgerald & Caro, 2014). The pedestrian environment should have well-connected sidewalks and crosswalks and enough green space to protect the elderly from noise and pollution in age-friendly cities. Besides, amenities, such as parks, museums, and libraries, increase the elderly's quality of life (Buffel, Phillipson, & Scharf, 2012); these amenities should be close enough for seniors to assess them by walking.

The social characteristics include health services, participation, and social inclusion. First, health is necessary for active aging, but the elderly experience difficulty accessing health services more than others because they usually suffer multiple chronic diseases and lack information and financial resources (Fitzgerald & Caro, 2014). The age-friendly social environment should improve health service information without the financial burden and with physical accessibility (Fitzgerald & Caro, 2014). Second, the elderly should be able to participate in planning and policy-making as well as education and employment. Participating in formal and informal activities is essential for older people to maintain social relationships with others, self-esteem, and a sense of community (Fitzgerald & Caro, 2014). Especially participation in economic activities allows the elderly independence and health (Steels, 2015).

Third, age-friendly cities need cooperative and inclusive attitudes for society as a whole. Social inclusion in old and young generations has been emphasized. All age groups people receive benefits from intergenerational activities and age-friendly public services (Steels, 2015). Also, since livability should be considered from all various fields' aspects, including education and health, the collaboration of public and private sectors or different stakeholders is required (Steels, 2015). It allows to share different resources and gather more knowledge to achieve the same goals (Steels, 2015).

Based on the studies on the characteristics of age-friendly cities, WHO (2007) announced the guideline of age-friendly cities as eight domains: transportation, housing, social participation, respect and social inclusion, civic participation and employment, communication and information, community support and health services, and outdoor spaces and building. However, since the guideline does not include detailed descriptions and elderly communities have different livability, each country and city should develop the guideline in accordance with their contexts. Elderly people have different preferences depending on culture, education, religion, etc. (Steels, 2015).

2.4.3 The impact of public parks on the elderly

Parks are essential in an age-friendly city since parks allow people to age actively (Kim, 2019). Elderly people do more activities in parks than people of other age groups (Youn & Choi, 2014; Sang et al., 2016), and the aesthetic values of nature experienced in parks influence the elderly's well-being more than other age groups (Sang et al., 2016). Also, many studies show that parks positively impact the elderly's physical and mental health and social relationship. Furthermore, some researchers have maintained that the quality of the parks, such as accessibility, proximity, and park activities, influence the elderly's park use.

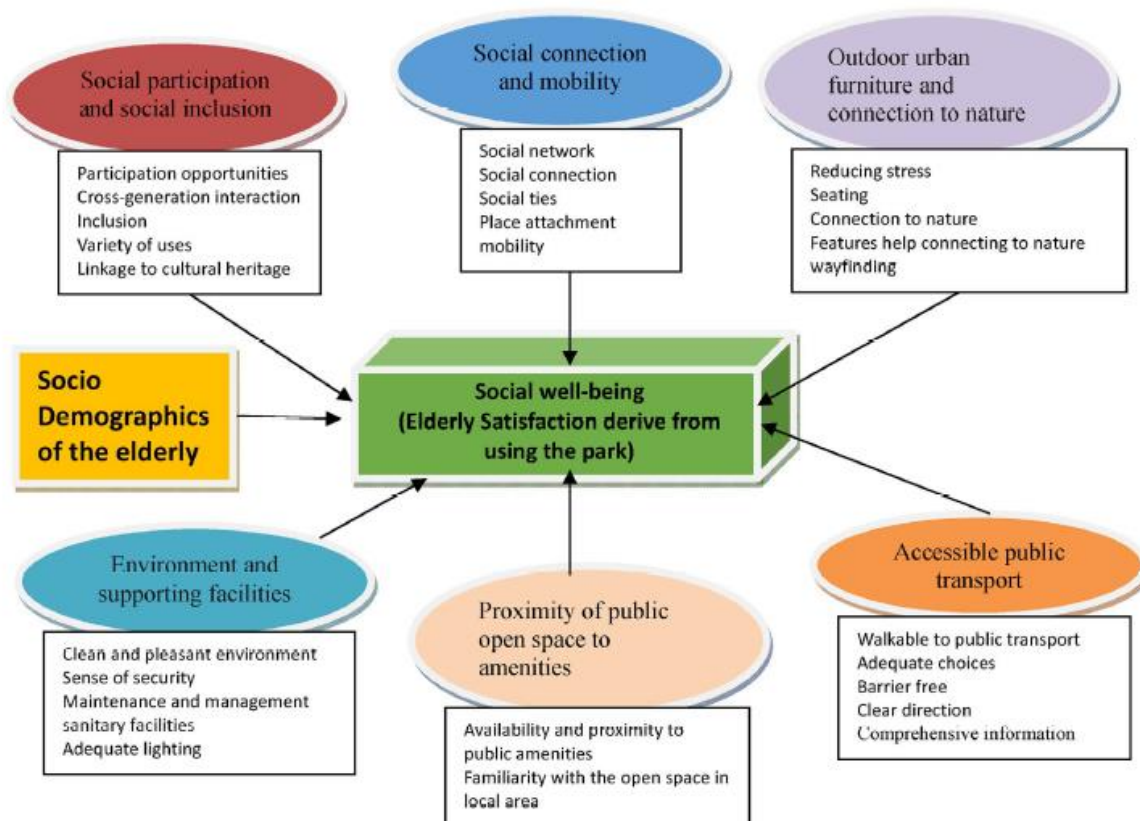
The elderly can improve their physical health by using parks. Sports activities, hobbies, and other leisure activities in the park affect the elderly's physical health (Lee, Lee, & Park, 2014). In a study by Park (2018), the frequency of park use and walking time affect the BMI and the number of chronic diseases in the elderly. As Korean elderly people perceive the park as convenient to walk and use, it affects the frequency of park use and improves their BMI (Park, 2018). In addition, parks are also significant for the mental health of the elderly population. Lee and Lee (2019) classify the seven Korean cities into 4 quartiles by the green area ratios and surveyed how the elderly feel stress and depression in the cities. The result is that the elderly who live in a city with a high rate of greenery have less stress and fewer depression symptoms than those who live in a city with a low rate of greenery; the participants who has stress and depression symptoms increased by 2.2% in the third quartile and by 18.3% in the second quartile compared to the fourth quartile, the highest green area percentage (Lee & Lee, 2019).

Parks also help the elderly keep and develop social relationships. Yung, Conejos, and Chan (2016) did a focus group analysis to identify the open space planning and design guidelines for the elderly in the urban renewal districts in Hong Kong. The elderly citizens consider that "'social and physical activities,' 'community life facilities and services,' and 'social network,' and 'clean and pleasant environment' are most important for the design of the parks in the urban renewal districts" (Yung, Conejos, & Chan, 2016). They prefer to meet their friends in open spaces rather than in their compact houses, and using open spaces allows them to make new friends who moved into the new neighborhood (Yung, Conejos, & Chan, 2016). Furthermore, in the survey on the elderly living in Korean age-friendly cities, 32.1% of the respondents answered that social interaction takes place in outdoor spaces such as parks and playgrounds,

and the younger they were, the more they preferred the outdoor space as a place for social interaction (Kim, 2019).

Since parks are important to the elderly, many scholars have studied how the quality of parks influences the elderly's satisfaction and frequency of park use. Esther, Winky, and Edwin (2017) surveyed the public parks in Hong Kong urban renewal districts to identify the association between different factors of public park planning and the elderly's satisfaction. Figure 3 shows what planning and design factors they consider for their study. They mention that planning public parks needs to consider "social connection, place attachment, mobility, and the short distance of the nearby residents" (Esther, Winky, & Edwin, 2017). Also, in Park (2018)'s study, the elderly in Daegu, South Korea, consider that their parks have good exercise facilities, resting facilities, lighting, safety and security, and proximity, and they use parks more frequently than those who do not. About park satisfaction, the higher the 'facility suitability,' which means that various facilities in the park are in an appropriate location and safe access to the park, the higher the 'convenience of use' (Park, 2018). In addition, Miralles-Guasch et al. (2019) identified that the elderly in Barcelona, Spain, spend more time doing outdoor activities in parks where they are easy to walk, and shorter distances correspond to more physical activities. The types of vegetation influence the elderly's decisions of which parks they use (Miralles-Guasch et al., 2019). The planning elements of parks used in the above and other studies are shown in Section 2.5 Conceptual framework.

Figure 3: Planning and design factors related to the elderly satisfaction of park use



Source: Esther, Winky, & Edwin, 2017, p.41

2.5 Conceptual framework

In previous sections, the literature about urban regeneration and livability, especially about age-friendly cities, is reviewed. Through the literature review, the role of the park is important in these two main concepts, urban regeneration and the livability of the elderly. In this paper, the impact of the urban regeneration projects in Seoul is set as an independent variable and the livability of the elderly as a dependent variable, and the quality of public parks acts as a mediating variable. Figure 4 shows the conceptual framework of this study. There are some explanations of how to select the sub-variables.

First, since parks can improve the community, environment, and economy of cities, they are used for urban regeneration (Ramlee et al., 2015; Hamdy & Plaku, 2021). Thus, parks are developed or renovated according to the urban regeneration values and the needs or interests of stakeholders.

Second, many researchers use subjective indicators to measure livability (Veenhoven et al., 1993; Okulicz-Kozaryn, 2013; Mouratidis, 2020). It is the way to measure the output of livability, and it allows to assess the urban environment from the perspective of communities. Therefore, this study measured livability from the perspective of the elderly at the urban regeneration project sites, so subjective measurement is used.

Third, health and social relationship are used as the sub-variables of the elderly's livability. Age-friendly cities aim for active aging and aging in place (WHO, 2007; Iecovich, 2014; Kim, 2019), so the elderly in the cities should be healthy and connected with their local community. Thus, to evaluate the output of the elderly's livability, the health and social relationships of elderly citizens can be measured. Also, public parks are essential places to enhance the elderly's health and social relationships (Yung, Conejos, & Chan, 2016; Park, 2018; Kim, 2019).

Finally, urban planners and researchers consider several planning factors of public parks important. Depending on proximity, accessibility, activities, safety, and security, the senior users' use satisfaction of parks is different (Esther, Winky, & Edwin, 2017; Park, 2018; Lee, 2019). Also, planting and connection to nature are essential factors that influence park use satisfaction of the elderly (Esther, Winky, & Edwin, 2017; Park, 2018; Miralles-Guasch et al., 2019). Table 2 shows details how the planning factors are selected as the sub-variables in the study.

Figure 4: Conceptual framework

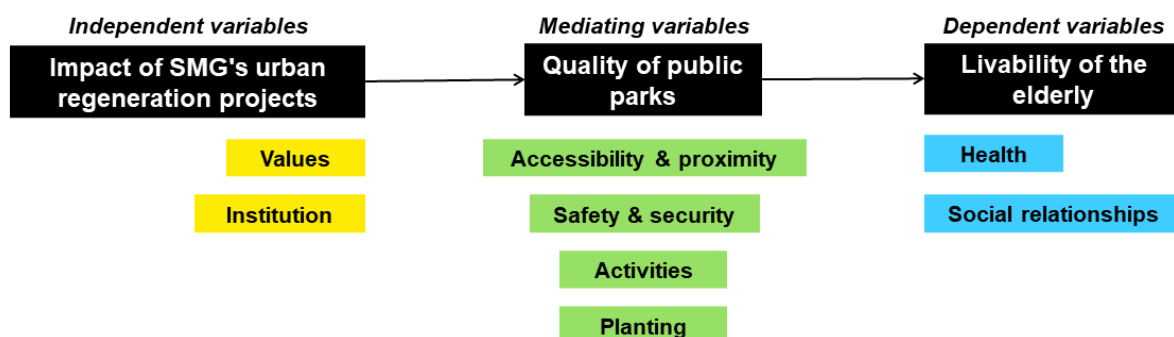


Table 2: Selection of park planning factors

Park planning factors	Details	Esther, Winky, & Edwin, 2017	Park, 2018	Lee, 2019	Miralles-Guasch et al., 2019	Selected in this study
Accessibility & proximity	Distance to the park, safety around the park	○	○	○	○	●
	Public transportation	○		○		●
	Proximity and availability to amenities	○	○			●
Safety & Security	Convenience facilities (benches, chat rooms, etc.), Safety facilities, information signs, lighting facilities, pavement	○	○	○		●
Activities	Offered activities: age-appropriate sports facilities, rest facilities, gardening activities		○	○		●
	Created activities: use of various parks, exchanges between generations, connection with local cultural heritage	○				●
Planning	Diversity of planting, sufficient green area, ample shade areas	○	○	○	○	●
Others	Various attractions (water space, small garden etc.),		○			

Chapter 3: Research design and methodology

3.1 Introduction

This study is about the relationship between the quality of public parks and the livability of the elderly after the SMG's urban regeneration projects. A case study method is used to answer the research questions. Sections 3.2 and 3.3 explain how to select the research design and methods and collect the data and samples. Then, the specific variables and indicators used in this research are shown in Section 3.4. The data analysis methods and the validity and reliability of the study are presented in Sections 3.5 and 3.6.

3.2 Description of the research design and methods

3.2.1. Research type

The main research question in this study is "How have the Seoul Metropolitan Government's urban regeneration projects influenced the quality of public parks to improve the livability of the population above 64?" Thus, the study is descriptive research, describing a phenomenon or characteristics of a specific subject (Van Thiel, 2014). Also, it is deductive research since there is already relevant theories about the relationships between urban regeneration and parks or livability and parks. It is not about building a new theory, but it needs detailed description about the theories.

3.2.2 Research strategy

A case study method is the main research strategy in this paper. Since the case study research is "conducted in a real-life setting" (Van Thiel, 2014), it allows to study the residents' everyday life in the SMG's urban regeneration sites.

There are two reasons to choose the case study method. First, the study is a descriptive research since its objective is understanding the relationship between public parks and the elderly's livability in detail. Second, qualitative research is suitable to measure the livability of the elderly. The qualitative data helps to get deep understanding the perspectives of the elderly in Seoul. Also, since this study measures the subjective livability of the elderly, and the variables such as emotions or social relationships have abstract meanings, it is possible that elderly respondents understand the questionnaire differently or incorrectly if a survey is used.

The case study type is the co-variational case study, showing the improvement of the public parks' qualities in the case study sites leads to a change in the elderly's livability within their urban regeneration context. The co-variational method is a case study research which examine the co-variation between causal factors and effects (Blatter & Blume, 2008). This type is suitable to answer the main research question because it focuses on the effects of specific causes, and in this research, it focuses on the effect of urban regeneration projects on the elderly's livability, setting public parks as a medium.

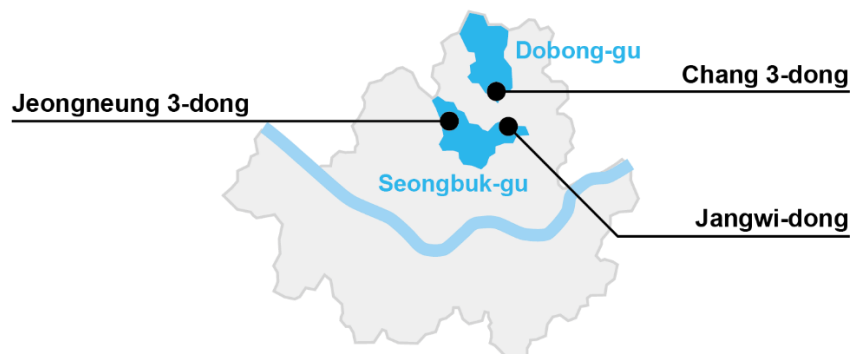
Therefore, this study uses multiple cases. For the co-variational case study, it is important to control the factors which can influence the result of the study (Blatter & Blume, 2008). However, it is difficult to do the same way that statistical research do because the number of units is small in the case study (Blatter & Blume, 2008). For this reason, Blatter and Blume (2008) emphasize selecting comparable cases, which have much the same systems.

The cases were selected from administrative dong, the smallest administrative unit in Seoul, and this study selected them by applying the following selection criteria.

1. Areas located in Gangbuk where the elderly are concentrated
2. Areas where the proportion of seniors is greater than 20%
3. Areas where urban regeneration projects have been completed or are expected to be completed in the near future

This study uses three cases of Seoul's urban regeneration project areas: ① Jangwi-dong, Seongbuk-gu, ② Chang 3-dong, Dobong-gu, ③ Jeongneung 3-dong, Seongbuk-gu. Figure 5 shows the locations of the cases.

Figure 5: Location of the case study sites



3.3 Data collection, sampling selection and size

The study uses primary and secondary data collection methods. In this study, the primary data, which is semi-structured interviews, is mainly used. However, other primary data and secondary data, including observation, government documents, and academic databases, are also used.

For the semi-structured interviews, several questions are prepared on several topics, including the impact of SMG's urban regeneration projects, the quality of public parks, and the livability of the elderly. The interview questions are based on the operationalization table in Section 3.4. The interview guidelines are presented in Appendix 1.

The primary data collection is divided into two parts. First, face-to-face interviews with people over 64 who live in the case study sites are conducted. Through the face-to-face in-depth interviews, the researcher clearly communicates questions with the interviewees and deeply understands their answers and experiences. Second, there are face-to-face or online interviews with specialists related to Seoul's urban regeneration and the elderly's livability. Through the interviews with experts in social welfare and urban planning fields, the researcher analyses in more depth the relationship between parks and the livability of the elderly and between urban regeneration and parks. It also helps to understand what is important when planning elderly-friendly parks and outdoor spaces. Both interviews use non-probability sampling. The interviews with the senior citizens use convenience sampling, and the interviews with the experts use snowball sampling.

For triangulation, in which a researcher uses more than one method to double- or triple-check the data collection and result (Van Thiel, 2014), this study uses several data sources. Using

both primary and secondary data collection and different sources helps to enhance reliability and validity (Van Thiel, 2014). Thus, observation is also used for primary data collection. The observations are conducted in June and early July with the resident interviews. For the secondary data collection, government documents and academic databases were used. It is qualitative and quantitative data. It allows understanding of the recent development of the urban environment as well as the context of the case study sites in detail. Also, it provides additional information on senior livability and the quality of the parks.

Data collection took place in June and July 2022. The timeline of the study also can be found at Appendix 2.

3.4 Operationalization

Table 3 shows the variables and indicators used in the study.

Table 3: Operationalization table

Research Questions	Variables (Concept)	Sub-variables	Indicators	Data Collection	Data Type	Source
What has been the recent development of the urban environment in Seoul, and what changes have the urban regeneration projects initiated?	Impact of SMG's urban regeneration projects	Values	<ul style="list-style-type: none"> • Types of values set in the project • Values changed after the project 	Primary data (Semi-structured interviews & observation)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists • Observation
				Secondary data (The government's documents & academic database)	Qualitative	<ul style="list-style-type: none"> • SMG's documents
		Institution	<ul style="list-style-type: none"> • Institutions paying attention to the project or its outputs 	Primary data (Semi-structured interviews)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists
				Secondary data (The government's documents & academic database)	Qualitative	<ul style="list-style-type: none"> • SMG's documents
What types of elements determine the quality of public parks from the perspective of the elderly in SMG's urban regeneration project sites?	Quality of public parks	Accessibility & proximity	<ul style="list-style-type: none"> • How to reach the park • Obstacles encountered while reaching the park • Public transport accessibility • Time to reach the park • Distance from park to house • Connectivity with other amenities 	Primary data (Semi-structured interviews)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists
				Secondary data (The government's documents & academic database)	Quantitative	<ul style="list-style-type: none"> • GIS database

		Safety & security	<ul style="list-style-type: none"> • Universal design • Management of facilities such as street lights and benches • Road pavement • Toilet 	Primary data (Semi-structured interviews)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists • Observation
		Activities	<ul style="list-style-type: none"> • Facilities for relaxation • Walking space • Facilities for exercise 	Primary data (Semi-structured interviews & observation)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists
				Secondary data (The government's documents & academic database)		<ul style="list-style-type: none"> • SMG's documents
		Planting	<ul style="list-style-type: none"> • Trees • Flowers • Others 	Primary data (Semi-structured interviews & observation)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists • Observation
How has the livability of the elderly population been affected by the parks in the areas of SMG's urban regeneration projects?	Livability of the elderly	Health	<ul style="list-style-type: none"> • Physical health • Mental health 	Primary data (Semi-structured interviews)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists
				Secondary data (The government's documents & academic database)	Qualitative Quantitative	<ul style="list-style-type: none"> • SMG's documents
		Social relationships	<ul style="list-style-type: none"> • Location to meet • Leisure activities • The number of people meeting in the park • The frequency of meeting people in the park 	Primary data (Semi-structured interviews)	Qualitative	<ul style="list-style-type: none"> • Residents above 64 • Specialists
				Secondary data (The government's documents & academic database)	Qualitative Quantitative	<ul style="list-style-type: none"> • SMG's documents

3.5 Data analysis

The interviews and secondary data are collected in Korean, which is the local language of the sites. The interview recordings are transcribed through CLOVA Note software. Then, the researcher translates Korean into English.

The qualitative data from semi-structured interviews and secondary data is analyzed with ATLAS.ti. The coding scheme is made based on Section 3.4. After coding the English transcripts, the relationships between the variables are understood with the co-occurrence table. Also, for analyzing the mediating variable, the quality of parks, QGIS is used. It is utilized to understand the sites' physical environment, such as the proximity of the parks.

3.6 Validity and reliability

The research strategy of the study is case study method. Therefore, there are some challenges to achieve validity and reliability. Case study is difficult to obtain internal validity because there is no experimental control (Bhattacharjee, 2012). Also, since the inferences of case study is deeply related to the research context, it is difficult to generalize to other contexts (Bhattacharjee, 2012). In addition, the research results are criticized for being subjective because the quality of the inferences is determined by the researcher's insight (Bhattacharjee, 2012).

Therefore, the study increases its validity and reliability in several ways. First, this study uses multiple cases. Multiple case studies have higher external and internal validity than single case studies (Bhattacharjee, 2012). Second, triangulation is used to increase validity and reliability (Van Thiel, 2014). This study uses primary and secondary data, and interviews were conducted with experts and residents. The sources used for the triangulation for each variable are in Section 3.4. Finally, this study increases its validity through reviews of other experts on the findings and conclusions of the study (Van Thiel, 2014).

Chapter 4: Results, analysis, and discussion

4.1 Introduction

Chapter 4 presents the results of the study. First, Section 4.2 shows the background of SMG’s urban regeneration projects and what kind of urban regeneration projects have been carried out in the case study sites. Then, in Sections 4.3, the general information about the samples and data analysis is introduced to help understand the results. Sections 4.4 to 4.6 show the findings about the research sub-questions. Each section addressed each sub-question according to the study methods and data sources. Finally, the study results are discussed in Section 4.7.

4.2 SMG’s urban regeneration projects

South Korea achieved rapid urbanization and economic growth after the Korean War, but economic growth and urban development have slowed due to the low fertility rate and aging population (SMG, 2018; SMG, 2015b). Since the existing urban policies focused on developing the outskirts of cities reached the limit, the central government and SMG emphasized the necessity of urban regeneration to develop existing urban areas (Ministry of Land, Infrastructure and Transport [MLIT], 2013; SMG, 2015b).

Therefore, the central government announced the Act on the Improvement of Urban Areas and Residential Environments in 2002 and the Special Act on Promotion and Support for Urban Regeneration, also called the Urban Regeneration Act, in 2013 (MLIT, 2013; SMG, 2015b). SMG announced the 2025 Seoul Urban and Residential Environment Improvement Plan and the 2025 Seoul Urban Regeneration Strategic Plan based on the acts in 2015 (SMG, 2018; SMG, 2015b).

SMG has implemented various projects under methods, forms, and related laws. It can be divided into urban regeneration projects designated by the Special Act and other projects with the concept of urban regeneration. Table 4 shows different types of SMG’s urban regeneration projects. Table 5 and Figures 6 to 8 show the summary and satellite images of the urban regeneration project sites: Jangwi-dong, Chang 3-dong, and Jeongneung 3-dong.

Table 4: Types of SMG’s urban regeneration projects

	Types of SMG’s urban regeneration projects
Projects designated by the Special Act on Promotion and Support for Urban Regeneration	Economic Development Regeneration
	Utilization of Local Asset Regeneration
	Residential Neighborhood Regeneration
Urban regeneration project with the concept of urban regeneration	Saving Our Neighborhood Project
	Residential Environment Improvement Project
	Urban Vitality Promotion Project
	Sae-ttul Village Project
	Project-based Regeneration
	Alleyway Regeneration Project

Data source: SMG (2018)

Table 5: Information of the selected cases

Location	Jangwi-dong, Seongbuk-gu	Chang 3-dong, Dobong-gu	Jeongneung 3-dong, Seongbuk-gu
The ratio of population over 64	Jangwi 1-dong: 16.8% Jangwi 2-dong: 22.5% (2022)	21.5% (2022)	20.3% (2022)
Type of urban regeneration project	Residential Neighborhood Regeneration	Residential Neighborhood Regeneration	Residential Environment Improvement Project
Period	2015~2018	2017~2022	2012~2017 (Jeongden Village) 2013~2017 (Samdeok Village)
Area	318,415 m ²	Area: 346,000 m ²	35,150 m ² (Jeongden Village) 33,443 m ² (Samdeok Village)

Data source: SMG

Figure 6: Jangwi Urban Regeneration Project Site



Figure 7: Chang3-dong Urban Regeneration Project Site



Figure 8: Jeongneung 3-dong Urban Regeneration Project Site



4.2.1 Jangwi-dong, Seongbuk-gu

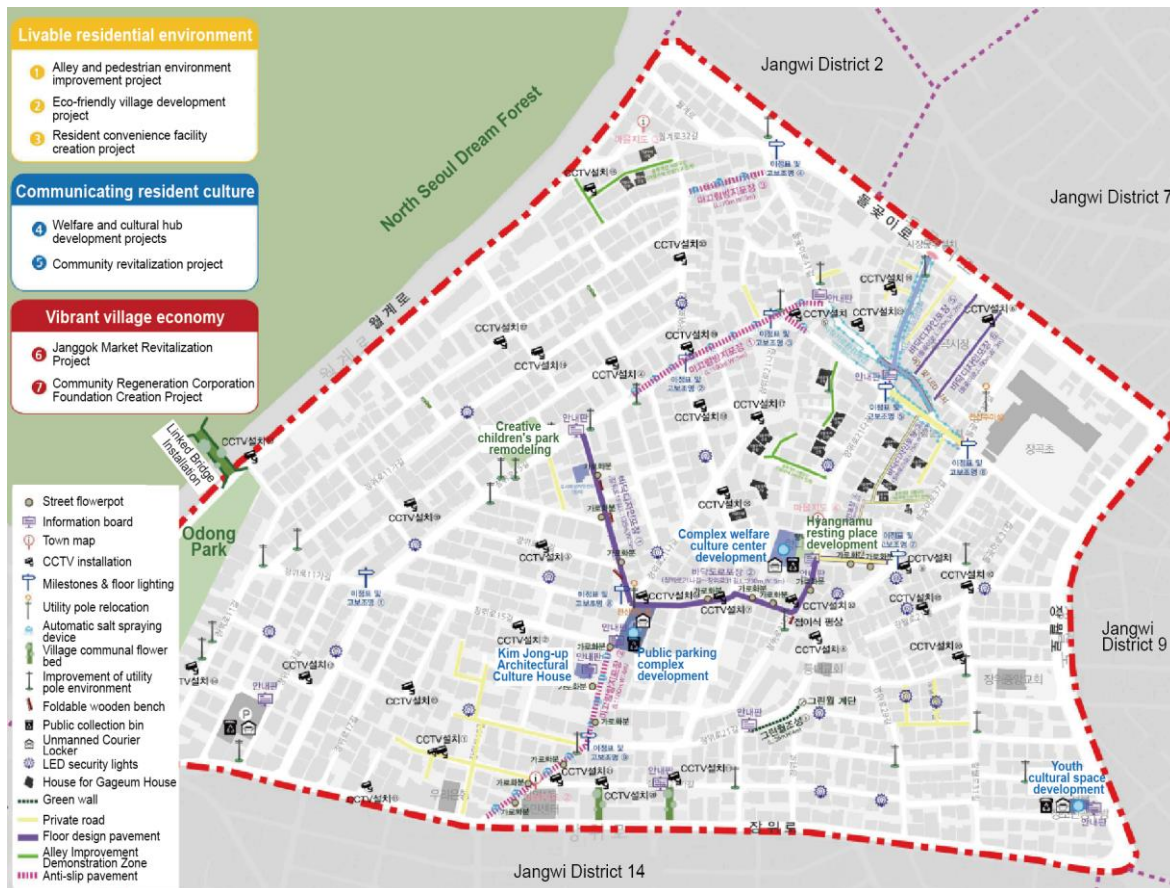
Since Jangwi-dong was designated as a Promotion of Urban Renewal zone in 2005, the prolonged project implementation aggravated physical and social decline (SMG, 2017). Since development was limited, the deterioration of buildings and infrastructure was severe (SMG, 2017). In addition, the residents felt relatively deprived due to the development of the surrounding areas, and there was a continuous population decline (SMG, 2017). Therefore, SMG selected the area as the Seoul Urban Regeneration Pilot Project site in 2015.

The project includes three objectives. The first objective is the ‘livable residential environment,’ and it refers to the quality improvement of the alleyways and residential environment, which are the actual living spaces of residents (SMG, 2017). It includes the alley and pedestrian environment improvement projects, the eco-friendly village creation project, and the resident convenience facilities creation project (SMG, 2017). The second objective is the ‘communicating resident culture,’ which aims to revive a declining local community and resolve the conflicts between the residents (SMG, 2017). Under it, there are the welfare and cultural hub project and the community revitalization project. Finally, the ‘vibrant village economy culture’ aims to revitalize the village economy by discovering and developing local contents and items (SMG, 2017). For example, there are the Janggok Market revitalization project and Community Regeneration Corporation foundation project (SMG, 2017).

These projects improved the safety and security of the outdoor environment and increased green spaces. In detail, there are sewerage and pavement maintenance, CCTV installation, playground restoration, flower beds and green walls installation, bridge installation connected to the North Seoul Dream Forest, etc. (SMG, 2017). In Figure 9, the details of the project can be checked.

The overview of the project is shown in Appendix 5.

Figure 9: The details of the urban regeneration project in Jangwi-dong



Source: SMG, 2017 (Translated into English by the author)

4.2.2 Chang 3-dong, Dobong-gu

Chang 3-dong was designed as the SMG's urban regeneration project site because of the increasing elderly population, decreasing entire population, and the aging residential infrastructure (SMG, 2020). At the planning stage, 24.40% of the elderly population was elderly living alone, which was higher than in Seoul (22.18%) and Dobong-gu (20.99%) (SMG, 2020). In addition, 22.73% of them were recipients of the National Basic Livelihood, and 15.15% were low-income earners (SMG, 2020).

SMG established the urban regeneration plan by utilizing the natural or cultural heritage in the area, such as Uicheon Stream, Choansan Mountain, and Changdong Market. Also, the government emphasized the importance of communication with the elderly and children through community development (SMG, 2020).

The project included several objectives. The first objective is the 'creation of a shared public space for all,' creating urban agriculture, cultural education, and community hub facilities (SMG, 2020). The second objective is the 'maintenance of a pleasant and safe outdoor environment,' which includes remodeling the parks and improving the pedestrian environment of streets and alleys (SMG, 2020). Third, the 'customized improvement of the residential environment at the edge of Choansan Mountain' is to support the repair of aging houses and improve the residential environment, such as road pavement along with house repairs (SMG, 2020). Lastly, the 'sustainable village management through resident participation' strengthens residents' capacity for sustainable urban regeneration and promotes communication among residents (SMG, 2020). It includes establishing and operating various educational programs

and revitalizing the Chang 3-dong traditional markets (SMG, 2020). Figure 10 shows the details of the project.

The overview of the project is shown in Appendix 5.

Figure 10: The details of the urban regeneration project in Chang 3-dong



Source: SMG, 2020 (Translated into English by the author)

4.2.3 Jeongneung 3-dong, Seongbuk-gu

In Jeongneung 3-dong, two residential environment improvement projects, Jeongden Village and Samdeok Village, were implemented. In these project sites, many aging houses need maintenance, and the increase in the elderly population and the continuous influx of people in their 20's due to the nearby universities have taken together (SMG, 2013; SMG, 2015a). Also, there are weaknesses in infrastructure, such as roads and insufficient welfare facilities. Thus, SMG selected Jeongden Village as an urban regeneration project in 2012 and Samdeok Village in 2013.

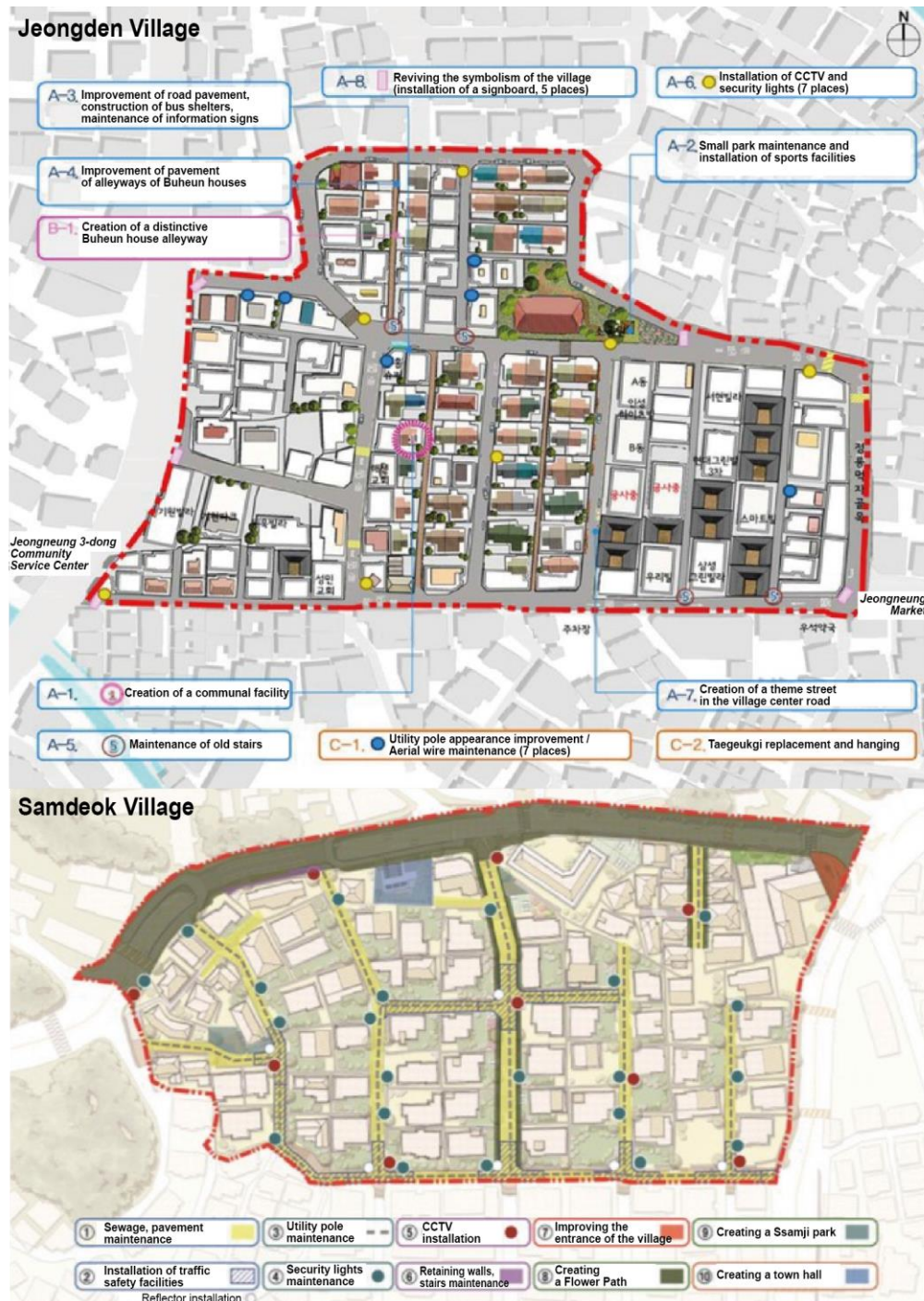
Although the objectives of Jeongden Village are not clearly stated, the plan is divided into improving the residential environment based on local characteristics, forming and revitalizing a resident community, and establishing a resident council and public-private cooperative system. The objectives of Samdeok Village are to create a village where various generations can live together, to create a community to revitalize culture and arts, to create an eco-friendly community village, and to operate the village sustainably by the residents (SMG, 2015a).

They included several sub-projects such as maintenance of sewerage and pavement, CCTV installation, stair maintenance, and construction or maintenance of Ssamzie parks which are small-scale parks (SMG, 2013; SMG, 2015a). Figure 11 explains the details of the projects.

There are several parks in and around the case study site. Bukhansan National Park and Jeongneungcheon Stream are also located around this area. Also, it is close to the commercial space, Jeongneung Market, the traditional market.

The overview of the project is shown in Appendix 5.

Figure 11: The details of the urban regeneration project in Jeongneung 3-dong



Source: SMG, 2013; SMG, 2015a (Translated into English by the author)

4.3 Sampling and data preparation

4.3.1 Data preparation and analysis

As mentioned in Section 3.3, semi-structured interviews are conducted. There are 26 interviews with the residents above 64 in the case study sites and 9 interviews with the specialists. The resident interviewees answer about all the study variables: the impact of SMG's urban regeneration projects, the quality of public parks, and the livability of the elderly. On the other hand, for the specialist interviews, the academic experts of SMG's urban regeneration, the staff in local public welfare centers, and the operators of the urban regeneration projects participate. They answer the question about each specialty. Table 6 shows the detail information.

The study also uses secondary data as mentioned in section 3.3. The data is from several secondary data sources, as shown in Table 7.

Table 6: Summary of semi-structured interview method and sampling size

Sampling method	Respondent type	Sampling size	Contents
Convenience sampling	Residents above 64 in Jangwi Urban Regeneration Project Site	10	<ul style="list-style-type: none"> The impact of SMG's urban regeneration projects The quality of public parks The livability of the elderly
	Residents above 64 in Chang3-dong Urban Regeneration Project Site	9	
	Residents above 64 in Jeongneung 3-dong Urban Regeneration Project Site	7	
Snowball sampling	Academic experts of SMG's urban regeneration	2	<ul style="list-style-type: none"> The impact of SMG's urban regeneration projects
	Staff in local public welfare centers	3	<ul style="list-style-type: none"> The quality of public parks The livability of the elderly
	Operators of the urban regeneration projects	4	<ul style="list-style-type: none"> The quality of public parks The impact of SMG's urban regeneration projects
Total		35	

Table 7: The secondary data sources

	Data sources
Impact of SMG's urban regeneration projects	<ul style="list-style-type: none"> SMG. (2017). Seoul Urban Regeneration Pilot Project Jangwi Urban Regeneration Revitalization Plan (서울형 도시재생 시범사업 장위 도시재생활성화계획). SMG SMG. (2019) Re_Seoul: Urban Regeneration to Read Together Cultivate the Jangwi Alley (Re_서울: 함께읽는 도시재생, 장위 골목을 가꾸다). SMG SMG. (2020). Seoul Urban Regeneration Revitalization Project Chang 3-dong Urban Regeneration Revitalization Plan (서울형 도시재생 시범사업 창 3 동 도시재생활성화계획). SMG Chang 3-dong Urban Regeneration Support Center. (January, 2022). Choansan Village News (초안산 마을소식) SMG. (2013). 372(1) Jeongneung-dong, Seongbuk-gu Jeongdeun Village Residential Environment Management Project Zone and Plan Determination (성북구 정릉동 372(1)번지 정든마을 주거환경관리사업 구역 및 계획결정). SMG SMG. (2015). Jeongneung-dong, Seongbuk-gu Samdeok Village Residential Environment Management Project Zone and Plan Determination (성북구 정릉동 삼덕마을 주거환경관리구역 지정 및 계획 결정). SMG
Quality of public parks	<ul style="list-style-type: none"> Korea National Spatial Data Infrastructure Portal (http://www.nsdi.go.kr/lxportal/)
Livability of the elderly	<ul style="list-style-type: none"> Open Government Data Portal (https://www.data.go.kr/index.do) Seoul Open Data Plaza (https://data.seoul.go.kr/) Community Health Survey (https://chs.kdca.go.kr/chs/recsRoom/healthStatsMain.do)

As mentioned in Section 3.5 Data analysis, ATLAS.ti 9 is used for analyzing the interviews. The coding scheme is created based on the operationalization table in Section 3.4. Also, the additional codes are created during the analysis process, and they help to understand the results and make new discoveries. The total number of the codes is 47 codes, and the details and the hierarchical order of the codes can be seen in Appendix 4. The main codes are based on the variables and sub-variables in the operationalization table. The numbers of quotations of each variable in all the expert and resident interviews are shown in Table 8.

Table 8: The main codes and the number of quotations

Variables	Sub-variables	The number of quotations
Impact of SMG's urban regeneration projects	Values	53
	Institution	53
Quality of public parks	Accessibility & proximity	98
	Safety & security	103
	Activities	46
	Planting	46
Livability of the elderly	Health	98
	Social relationships	55

Through the ATLAS.ti, the co-occurrence table is created based on the codes. Table 9 and Figure 12 show the result of the co-occurrences between the codes. It allows knowing the relative degree of relationship between the main codes, which are the variables.

Overall, the table shows there is a relatively strong relationship between the quality of public parks and the livability of the elderly. The co-occurrences between the health and all the sub-variables of the quality of public parks are more than 7. Especially, the relationship between 'health' and 'activities' are relatively strong, of which co-occurrences are 39. Also, 'activities' have a meaningful relationship with 'social relationships,' of which co-occurrences are 25.

On the other hand, the impact of SMG's urban regeneration projects has weaker relationships with the quality of public parks than the livability of the elderly. The sub-variables of the impact of SMG's urban regeneration projects have a relatively significant relationship with only 'accessibility and proximity', 'activity,' and 'safety and security.' There are 14 co-occurrences between 'institutions' and 'activities.' 15 co-occurrences between 'values' and 'accessibility & proximity.' The 'values' and 'safety & security' have 9 co-occurrences.

Figure 12: Co-occurrence sankey diagram based on ATLAS.ti

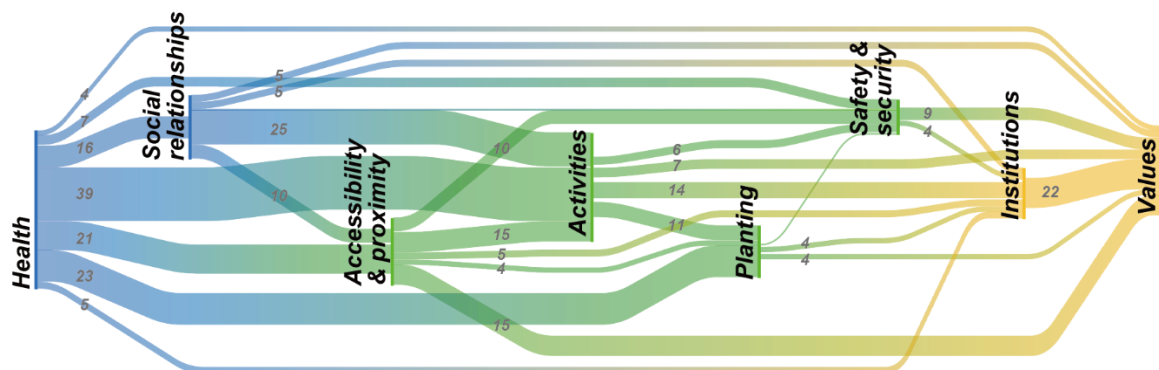


Table 9: Co-occurrence table based on ATLAS.ti

	● Health	● Social relationships	● Accessibility & proximity	● Activities	● Planting	● Safety & security	● Institutions	● Values
● Health	0	16	21	39	23	7	5	4
● Social relationships	16	0	10	25	0	1	5	5
● Accessibility & proximity	21	10	0	15	4	10	5	15
● Activities	39	25	15	0	11	6	14	7
● Planting	23	0	4	11	0	1	4	4
● Safety & security	7	1	10	6	1	0	4	9
● Institutions	5	5	5	14	4	4	0	22
● Values	4	5	15	7	4	9	22	0

● Livability of the elderly ● Quality of public parks ● Impact of SMG's urban regeneration projects

4.3.2 General characteristics of the interviewees

The semi-structured interviews were conducted in June and early July, 2022. Table 10 and Charts 1 and 2 show the general information about the resident interviewees. Also in Table 11, there are the general information about the specialist interviewees.

There is the total of 26 interviewees. Most of them are female, and only six people are male. Among the participants, the elderly in their 80s were the most, and half of the respondents live alone in the case study sites. Most of them also live in case study sites for more than 10 years and use local public parks almost every day. There is more information in Appendix 3.

Table 10: General information about the resident interviewees

		60's	70's	80's	90's	Total
Jangwi-dong	male	0	0	2	0	10
	female	3	4	1	0	
Chang 3-dong	male	0	0	2	0	9
	female	1	0	4	2	
Jeongneung 3-dong	male	0	2	0	0	7
	female	0	2	3	0	
Total		4	8	12	2	26

Chart 1: Number of people by household type

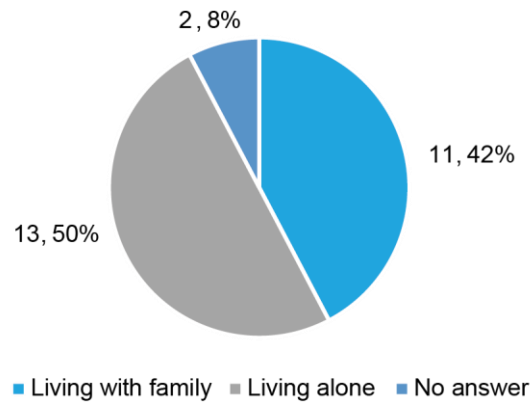


Chart 2: Number of people by the frequency of park use

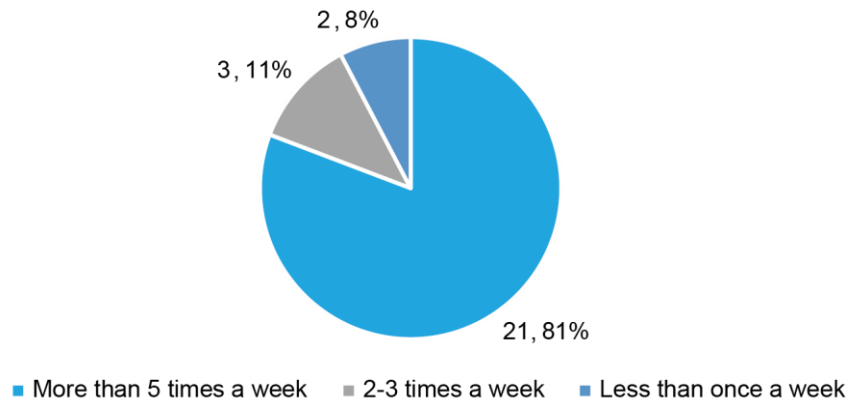


Table 11: General information about the specialist interviewees

Specialists	Specialist info.	Number of people
Academic experts of SMG's urban regeneration	H University – Professor	1
	H University – Ph.D. candidate	1
Staff in local public welfare centers	Senior Welfare Specialist in Seongbuk-gu	2
	Senior Welfare Specialist in Dobong-gu	1
Operators of the urban regeneration projects	Former Director of Urban Regeneration Center in Jangwi-dong	1
	Urban regeneration project coordinator in Chang 3-dong	1
	Deputy Representative of the Chang 3-dong Community Council	1
	Jeongneung 3-dong Urban Regeneration Anchor Facility Operator	1

4.4 Impact of SMG's urban regeneration projects

4.4.1 The government's documents and observation

The urban regeneration project in all the case study sites includes improving the outdoor environment, such as improving pavement of pedestrian paths, remodeling the parks, and installing CCTVs. These projects targeted all residents, including children and the elderly (SMG, 2017; SMG, 2020). Also, the projects increased the green space by turning the abandoned or unused spaces into Ssamji parks or installing flower beds. However, some projects have not been implemented or reduced. Especially since the Jangwi-dong project concentrated on improving the social environment more than its physical environment, many sub-projects were changed. There is more information in Appendix 6.

Photograph 1: Pedestrian environment improvement projects in Jangwi-dong (left) and Chang 3-dong (right)



4.4.2 Specialists

Experts answered that the urban regeneration project did not focus on a specific generation but considered a variety of generations and that the elderly were more interested in the project than other generations and participated in it from the beginning. They determined that the ideal urban environment is an environment in which all generations can live together. Hence, they focused on creating facilities for children and adolescents and outdoor spaces convenient for all socially disadvantaged, including children and the elderly. It is related to the increased interest of various residents, including the elderly, as the project progressed. Since the elderly have lived in the sites for a long time and have already formed a local community, they could participate more in the urban regeneration project than other generations. Particularly, in Chang3-dong, the elderly actively participated in the implementation of the project and were a key actors in the project.

Each site has a slightly different point of view regarding improving the outdoor space. In the case of Jangwi-dong, improvement of the physical outdoor environment was not given priority, but community building and support. In Chang3-dong, various outdoor programs were actively carried out by the residents themselves due to the high interest in the green space. In Jeongneung 3-dong, SMG focused on securing a safer environment and space for rest.

However, there were difficulties in implementing the projects because there was not enough experience in the urban regeneration project, and the residents lacked an understanding of the project. The experts said that it was challenging to gather the opinions of the residents and communicate their opinions to the public officials, so a lot of time and effort were wasted. Also,

some sub-projects were not even implemented. In addition, it is said that some seniors over 80 years old in Chang3-dong have a low understanding of the urban regeneration project, making it difficult to bring their positive participation.

Box 1: Examples of quotations of the urban regeneration specialist interviews

Former Director of Urban Regeneration Center in Jangwi-dong:

We didn't just focus on the elderly. Instead, services for the elderly are relatively more than other generations, so we tried to create an environment where all ages can live, such as daycare centers, housing for newlyweds, youth housing, and youth entrepreneurship-related businesses.

Urban regeneration project coordinator in Chang 3-dong:

Among the urban regeneration projects, the most representative projects are 'Rose Road' and 'Cho Love'. All the people working there are elderly people. Even now, they are constantly taking out the garbage in the neighborhood and caring for the garden.

Former Director of Urban Regeneration Center in Jangwi-dong:

So, when the residents objected to this playground design, the officials said that they had already made the decision until the third round and that it could not be changed.... Because the design was so weird, I got the signatures of local teachers and parents here to convince the officials.

4.4.3 Residents above 64

20 out of 23 respondents answered that the urban regeneration projects have impacted their lives because the parks were created or remodded by the urban regeneration projects. They have experienced the benefits of using the park almost every day. They answered that the parks' 'accessibility and proximity,' 'safety and security,' and 'activities' were improved.

First, the respondents answered that they could access the parks better after improving the pedestrian environment, creating new parks, or renovating the parks. Some respondents answered that the project increased accessibility from houses to parks or from public transportation to parks due to road pavement improvement. Furthermore, they positively responded about the 'accessibility and proximity' because of the increase in exercise equipment and the increase in rest areas such as benches as well as the increase in green spaces and walkable spaces. In other words, the development and improvement of the green spaces through the urban regeneration projects increased the proximity of the parks, which are suitable for the interests of the elderly in the case sites.

Box 2: Examples of quotations about the SMG's urban regeneration projects and parks' accessibility & proximity

Respondent in Jeongneung 3-dong, 79 years old, male:

(After the project,) I got comfortable to visit the parks. Oh well, traffic or road relations became better. In the old days, the roads weren't this good because there are so many hills. It was difficult to go somewhere else.

Respondent in Jangwi-dong, 74 years old, female:

I think people can access parks easily here. Parks are there and there too. Some of them are new. It's nice to be able to use the park so close.

Respondent in Jangwi-dong, 79 years old, female:

Where can elderly people go to use these things? Elderly people feel uncomfortable to do physical activities, so they can't go far and can't approach. If there are several facilities in the local park, the elderly can also use it, which is great. With a little diligence, we can use it all. In addition, it is not financially burdensome and I can use it whenever I want.

Second, the urban regeneration project increases the ‘safety and security’ of the parks. The residents said that installing CCTV in the case study sites made them feel safe when using the park. Also, after the projects, the improved ‘accessibility and proximity’ of the parks enhance the ‘safety and security’ since many people can pass by the parks and watch them.

Box 3: Examples of quotations about the SMG’s urban regeneration projects and parks’ safety & security

Respondent in Jangwi-dong, 66 years old, female:

In the past, there are many thieves in the neighborhood... At night, there were strange people often in the park. But now, there is CCTV. The park is no longer as scary as it used to be.

Respondent in Jeongneung 3-dong, 79 years old, male:

A lot of people visit here when they stop by the market. So, it is safe because always there are many people.

Third, the actors participating in the regeneration project impacted the 'activities' of the park. There are two different points. First, the elderly residents think some projects are more beneficial to the elderly than other age groups. For example, some thought improving walking and green spaces are more critical for the elderly with difficulty walking and financial hardship.

Box 4 Examples of quotations about the SMG’s urban regeneration projects and the elderly’s park activities

Respondent in Jeongneung 3-dong, 79 years old, male:

I use the park more after the street maintenance, and I like the park more... The elderly is difficult to walk, so after the repair I can use it even when I get older.

Respondent in Jangwi-dong, 79 years old, female:

Where can elderly people go to use these things? Elderly people feel uncomfortable to do physical activities, so they can't go far and can't approach. If there are several facilities in the local park, the elderly can also use it, which is great. With a little diligence, we can use it all. In addition, it is not financially burdensome and the elderly people can use it whenever they want.

The other point is that increasing activities for children in parks impact the park use of the elderly. Some elderly people enjoy using space and looking at children in the park due to the increase in children. In contrast, a few respondents who use the park for sports activities said that the parks are noisy and crowded because of the children. They answered that their activities in the park were hindered by using the same park as the children.

Box 5: Examples of quotations about the SMG’s urban regeneration projects and the children’s park use

Respondent in Jangwi-dong, 65 years old, female:

Then this space is really just for children, and old people with nowhere to go only use here... Grandmothers often sit and play, and then... grandmothers can take care of babies too.

Respondent in Chang 3-dong, 90 years old, female:

They say it's a children's park, but the elderly uses here. In the afternoon, children come and play on the swing, but adults come here. There nowhere to go except parks. We can meet people here, and also watching kids are fun. They are lovely.

Respondent in Jangwi-dong, 74 years old, female:

There are many parks in this neighborhood. But here aren't many children and it's not noisy. There are so many children over there, it's crazy. So, it is convenient to use here. I like quiet places because I come to exercise.

However, although most of the resident interviewees said that sub-projects of urban regeneration, such as improving the pedestrian environment and installing CCTV, had a positive effect on park use, they gave negative opinions about urban regeneration itself. They answered that urban regeneration projects were not important to their lives and did not significantly affect their lives. They mentioned that the opinions of the elderly were not sufficiently reflected in the plan. Also, some answered that they did not consider themselves important members of the local community.

Box 6: Examples of quotations about negative opinions on the SMG's urban regeneration projects

Respondent in Chang 3-dong, 67 years old, female:

It is said that what is laid here right now is for people with sore legs, but all the grandmothers bring shopping carts here. Then this is rather inconvenient. So, they're trying, but it's not fit for us. They don't know us well.

Respondent in Jangwi-dong, 65 years old, female:

The government did the renovation here, but they didn't care us much. There's no place to hide from the sun here. We can enter the Senior Citizens' Hall, but we can't feel the natural breeze like this... Grandmothers usually come here and sit for a while, but in hot days, it is difficult to sit outside.

4.4.4 Interpretation of the result

Some sub-projects of the urban regeneration projects, such as separating pedestrian paths from the road, installing CCTV and streetlights, and installing flower beds or pots, make the elderly feel convenient to access the parks. In addition, the increase in green space or the replacement and increase of benches and sports facilities will stimulate park activities for the elderly and increase the satisfaction of using the park.

In addition, the results show that the elderly feel satisfied with using the parks with other generations and think positively about communication with other members of society. However, some elderly people prefer a quiet environment, so it is interpreted that it is crucial to provide a variety of green spaces for seniors.

However, the elderly residents lacked an understanding of urban regeneration projects, and the projects did not sufficiently reflect their opinions through resident participation. Also, some parks lacked detailed designs for the elderly.

4.5 Quality of public parks

4.5.1 The government's documents and observation

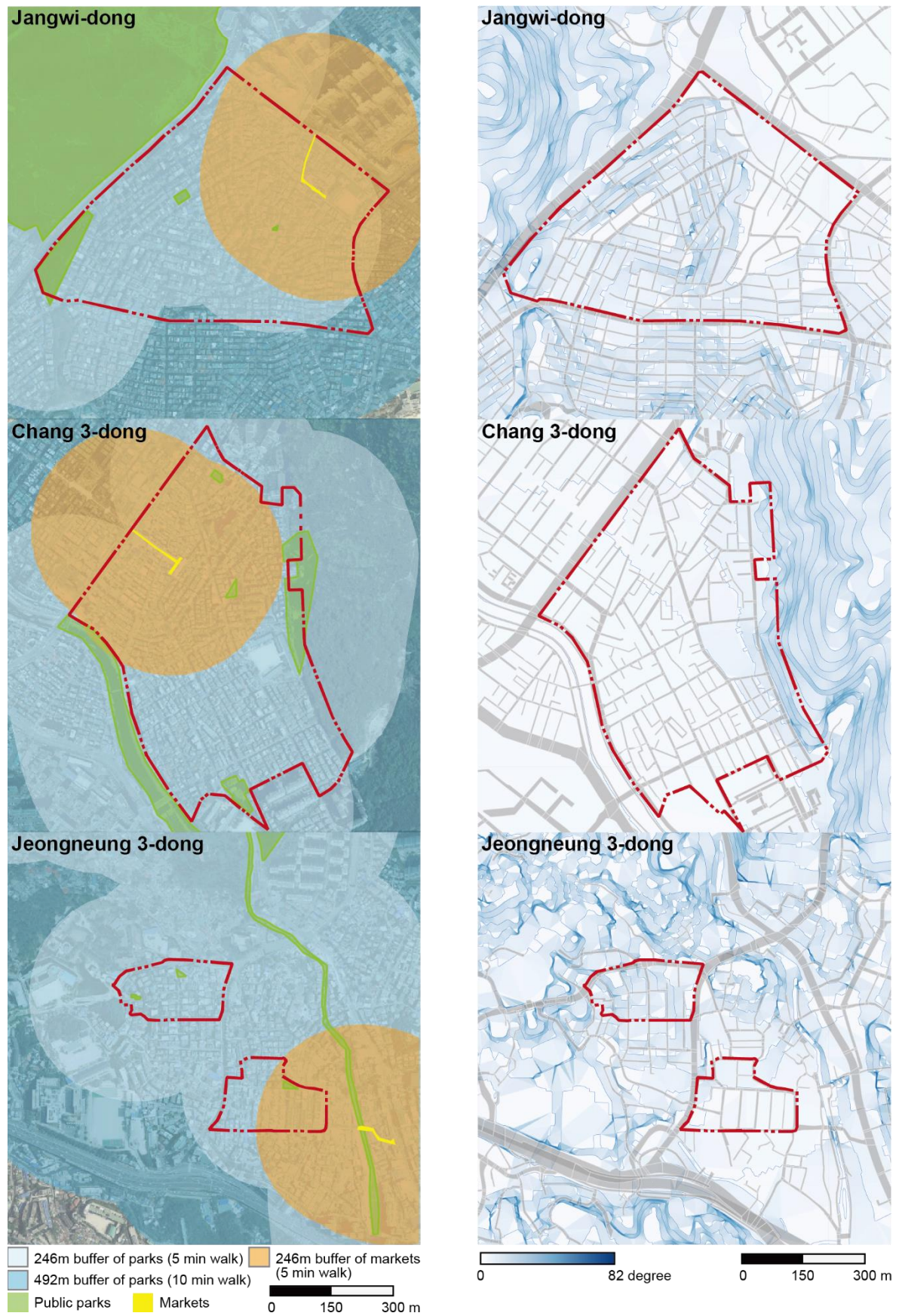
Based on GIS data, most of the sites' areas can access the parks within 5 minutes. In order to calculate the area where elderly people can access the park easily, the study of Busch et al. (2015) was referred to. The average walking speed of the elderly over 60 years old was 0.86 m/s for men and 0.81 to 0.78 m/s for women (Busch et al., 2015). Therefore, this study uses 0.82 m/s as the elderly's walking speed, the average speed of the male and female elderly. However, some parks are not close to the local markets, and Jangwi-dong and Jeongneung 3-dong have steep slopes. Therefore, some parks are difficult to provide the benefits of using parks with other amenities, and it is difficult for the elderly to access the park if they are over 80 or have physical difficulty.

The parks in the sites have a relatively safe design considering elderly users. In particular, for the pavement, the parks maintain a gentle slope that can be used by the elderly. However, toilets were not observed except for Bukhansan Mountain, Jeongneungcheon Stream, and North Dream Forest.

Furthermore, through the observation in the parks, the elderly exercised, took a break, and engaged in various leisure activities such as Yut play and Go, which are traditional Korean games. At the Ssamji park in Jeongdun Village, the elderly also gathered to relax and engage in various static activities, but no elderly users were observed in Ssamji parks in Samdeok Village, where there are few trees. Without sufficient greening, elderly people are vulnerable to summer heat stroke.

The detailed contents of the result of the urban regeneration projects and observation are in Appendix 7.

Figure 13: Environmental accessibility of the public parks and topographical map



Photograph 2: Public parks in Jangwi-dong, Dongbang Children's Park (left) and Odong Park



Photograph 3: Public parks in Chang 3-dong, Sinchang Children's Park (left) and Water Drop Children's Park (right)



Photograph 4: Public parks in Jeongneung 3-dong, Jeongden ssamji park (left) and Samdeok ssamji park (right)



Source: Kakao map (the left photo)

4.5.2 Specialists

The experts said that ‘accessibility and proximity,’ ‘safety and security’ of parks are important for the elderly.

‘Accessibility and proximity’ to parks are essential for elderly people. The easier it is to access the park by walking, the more elderly people use the park. Because the living space area of the elderly in the sites is narrow, they answered that the senior residents of the sites often use the park with good accessibility. Also, as some seniors stop by on their way to other destinations, planning a park adjacent to a variety of amenities is also important.

The park use of the elderly is also related to the ‘safety and security’ of the parks. A large amount of pedestrian traffic along the roadside next to the parks and safe designed facilities for the disabled increase the satisfaction of the parks by providing psychological stability to the elderly.

Box 7: Examples of quotations of the specialist interviews about the quality of public parks

Jeongneung 3-dong Urban Regeneration Anchor Facility Operator:

Many seniors feel that there aren't enough parks in their neighborhood. Because there are many elderly people with disabilities, there are many people who cannot go far. Even if there is a good place, it is difficult for the elderly to find it if the accessibility is not good. It seems that the elderly are much more interested in the park than other people in general and use it a lot, so there is a lot of demand.

...

The elderly think it's safe because it's located in a place where there are a lot of people. The park is near the market and other amenities. Also, the park facilities are designed to be convenient for the elderly with disabilities, so it will not be very inconvenient to use.

4.5.3 Residents above 64

Table 12 is the co-occurrence table, showing the number of quotations on the quality of public parks in resident interviews. Like the table's result, the elderly citizens in the case study sites visit or are satisfied with the parks because of ‘activities’ or ‘accessibility and proximity,’ which have 90 quotations and 87 quotations. When the author interviewed the elderly, 23 out of 26 residents answered that they use the parks for doing light exercise or using relaxation facilities for socializing. They use the parks with purposes Also, 22 out of 26 respondents use the parks near their houses, where they can easily access by walking.

Table 12: Co-occurrence table of the quality of public parks in the resident interviews based on ATLAS.ti

	● Accessibility & proximity	● Activities	● Planting	● Safety & security	The number of quotations
● Accessibility & proximity	0	13	2	9	87
● Activities	13	0	10	5	90
● Planting	2	10	0	1	42
● Safety & security	9	5	1	0	42

Table 12 shows that the 'accessibility and proximity' and 'activities' have a relatively strong relationship than others. They answered that they prefer a nearby park to minimize the time it takes to reach parks to use it whenever they feel bored or have free time in daily life. It is also related to the elderly's health and social relationships. They said that visiting the parks is their daily routine for maintaining good health and social relationships. More explanation is in

Section 4.6.3. Some respondents in Jangwi-dong prefer the nearest park to minimize access time despite the obstacles such as stairs and slopes due to the geographical characteristics.

Box 8: Examples of quotations about parks' activities and parks' accessibility & proximity

Respondent in Jangwi-dong, 80 years old, male:

My house is downstairs from here. It only takes 5 minutes. So, I come here whenever I'm bored. When I come here, I watch people and exercise... There are many things to do, so it's fun.

Respondent in Jangwi-dong, 79 years old, female:

I use it when I have time. I'm out for an hour to workout... I use this park is because it is the closest park to my house. That way I can go often. There is many hills, and they're unavoidable, but the location is like that. So, it's okay.

Also, some elderly people in their 80s and 90s stop by the park to take a break when they visit the local markets. They said that they can use the market by walking without using public transportation by taking a break in the park in the middle although they have physical decline. In addition, some interviewees intentionally visit the park even though it is not the shortest distance to the markets and their houses in order to meet friends and connect with nature. Furthermore, some elderly people buy snacks at the market and eat them while resting in the parks. It will be explained more in detail in Section 4.6.3.

Box 9: Examples of quotations about the proximity to other amenities and parks' activities

Respondent in Jangwi-dong, 66 years old, female:

Today she came and met me. I haven't seen her in a really long time... We met on the way to the market and stopped for a while.

Respondent in Chang 3-dong, 80 years old, female:

There are cars on the road in front of the market. So, it is difficult to walk. But the road towards the park has good air. That is why there are people who do not go to that way and use this side to go to the market.

Also in Table 12, 'accessibility and proximity' is related to 'safety and security.' The interviewee answered that other amenities supplement the park's insufficient facilities when the parks is adjacent to them. Some elderly residents said that they use a toilet in the public offices next to the parks. Also, because many people who use the amenities can pass by the parks, the elderly think their parks close to other amenities are safe.

Box 10: Examples of quotations about the proximity to other amenities and parks' safety & security

Respondent in Chang 3-dong, 80 years old, male:

It's right next to the school, so people come and go... There are often people passing by, so even though it is quiet, it is not depressed but lively and safe... However, there is no toilet. If I'm really in a hurry, I can borrow it by talking to the school building next door here.

Respondent in Chang 3-dong, 80 years old, female:

Here is no bathroom. So, we have to go to the Dong office there.

In addition, Table 12 shows that the 'planting' of parks is also essential for parks' 'activities.' Many elderly residents answered that they used the parks to experience nature since their

residential areas do not have enough greenery. Section 4.6.3 will explain in more detail. The elderly in the case study sites experience a connection with nature during exercising or resting. The good planting condition improves the satisfaction of their park activities.

Box 11: Examples of quotations about parks' activities and parks' planting

Respondent in Jangwi-dong, 80 years old, male:

The air is different. When I wake up in the morning, it smells like grass, which is even better. I like the air, so I feel better when I breathe it while exercising.

Respondent in Jeongneung 3-dong, 79 years old, male:

I usually walk around there. there are fish in Jeongneungcheon now and I like to see nature up close. It's fun to watch. You also can see it where ever you stop during the walk.

In some interviews, 'safety and securits' are also related to the park 'activities.' Well-maintained facilities enable park users to use the park more pleasantly and comfortably. In addition, the installation of security facilities and toilets affects the park usage time. Some answered that they could not stay longer because there was no toilet or lighting.

Box 12: Examples of quotations about parks' activities and parks' safety & security

Respondent in Jeongneung 3-dong, 84 years old, female:

The public restrooms here are also very close and nice. There are two restrooms over there. As the park is being maintained, the facilities become better and easier to use. I'm happy it is clean.

Respondent in Jeongneung 3-dong, 85 years old, female:

No, it's good to come early. But if I do, I have to go to the bathroom several times. That's why I come here afternoon.

Respondent in Jangwi-dong, 80 years old, female: Nobody uses it at night. There are strange people at night... Also, at night, my eyesight gets worse. I hope here are a lot of lamps here. If there are, I can come out at night.

4.5.4 Interpretation of the result

Various parks on the sites were analyzed through the interviews, observation, and secondary data, and it was found that the elderly preferred nearby parks with good access. They prefer both a space for light physical activity and a space to relax. The elderly consider these park activities an essential routine in their daily life.

In addition, the safe environment and sufficient greenery providing shade are essential factors in determining the satisfaction of the elderly in park activities, and it affects the frequency and time of park use.

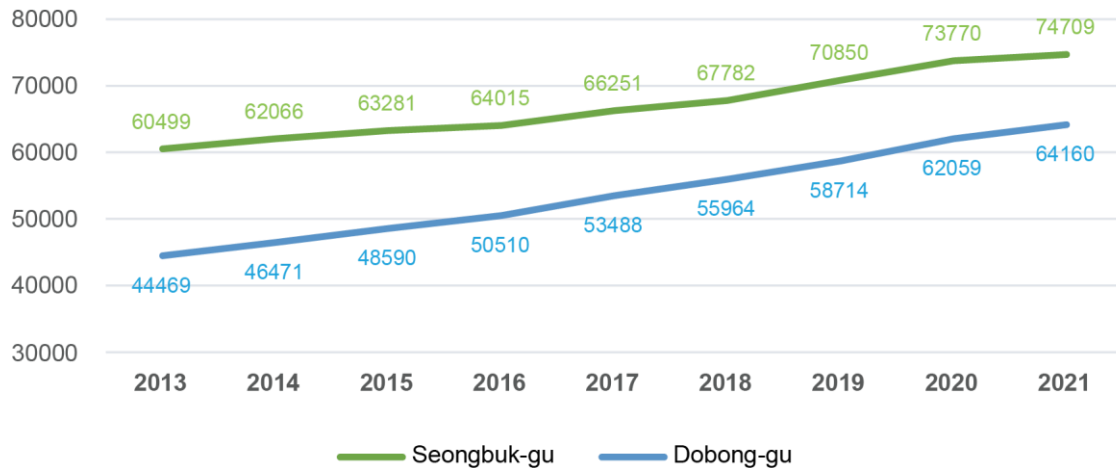
According to the above interpretation, park activities are very important in the daily life of the elderly, and parks should be sufficiently provided in an age-friendly city with easy access and adjacent to other amenity facilities. However, a safe environment and ample trees nature elements, such as trees, are required to promote park use.

4.6 Livability of the elderly

4.6.1 The government's documents and academic database

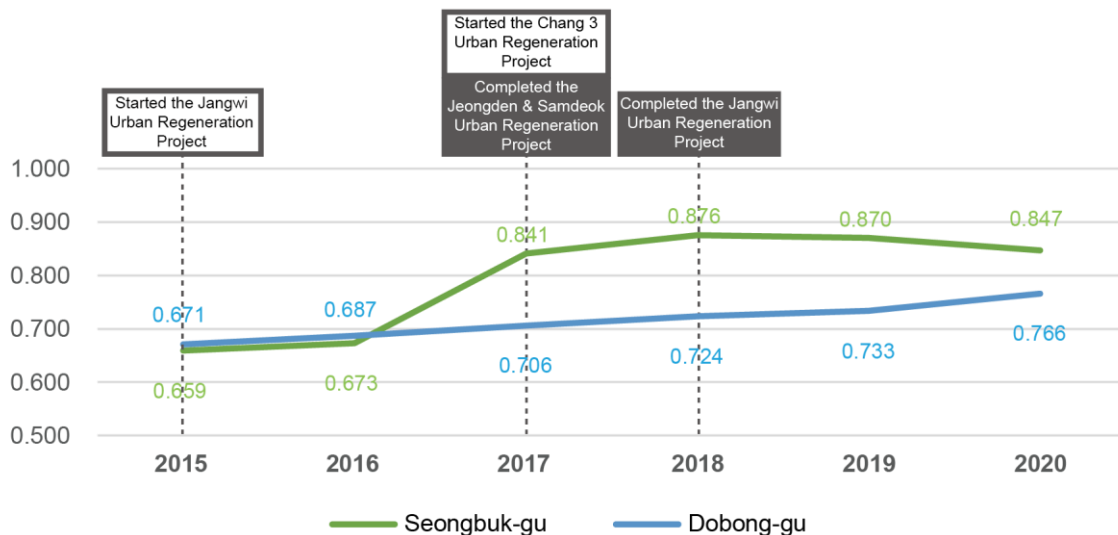
In Graph 1 and Graph 2, while the urban regeneration projects were implemented, the number of elderly people and green spaces per capita increased in Seongbuk-gu and Dobong-gu, where the case study sites were located. Appendix 8 provides more information.

Graph 1: The number of the elderly population in Seongbuk-gu and Dobong-gu



Source: SMG

Graph 2: Change in the number of green spaces per capita in Seongbuk-gu and Dobong-gu

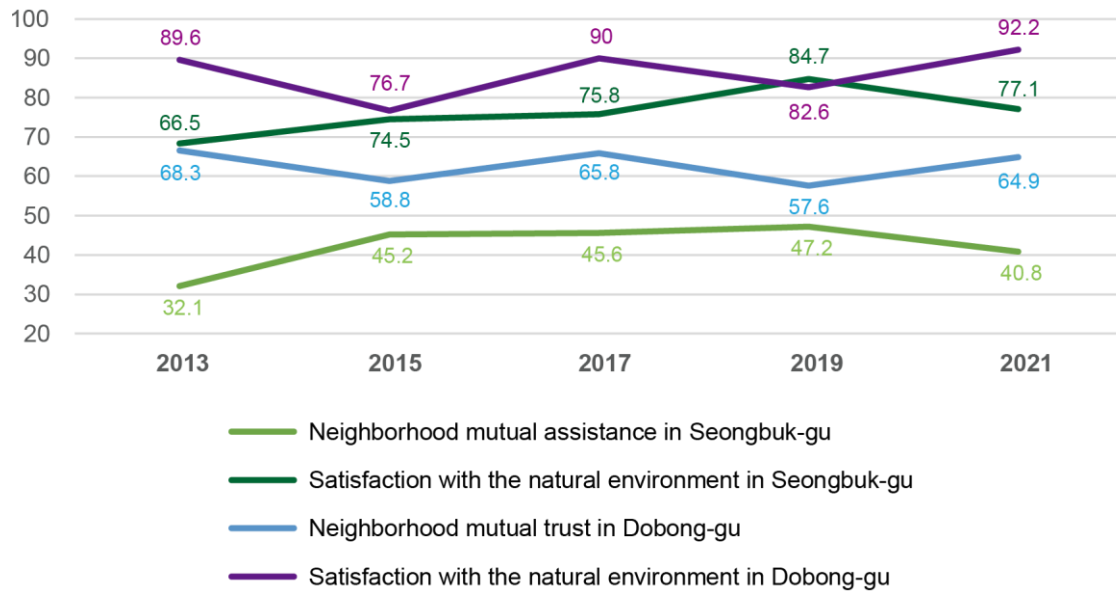


Source: Statistics Korea

The elderly's social relationships with neighbors were improved, while the urban regeneration projects were conducted in Seongbuk-gu but not in Dobong-gu. In Graph 3, Seongbuk-gu's proportion of the elderly above 64, who answered positively about their satisfaction with the local natural environment and relationship with their neighbors, increased steadily, except in 2021, which is a pandemic situation. However, in Dobong-gu, even before the project, the elderly thought positively about the local environment and the relationship between neighbors, and there was no significant change to them. In addition, Graph 4 shows that the happiness

index of the elderly above 64, which is deeply related to the mental health, increased during the projects both in Seongbuk-gu and Dobong-gu. However, other secondary data do not show an improvement in the health of the elderly. For example, the quality of life index, which shows the overall health of the elderly, did not change much. Appendix 8 provides more information.

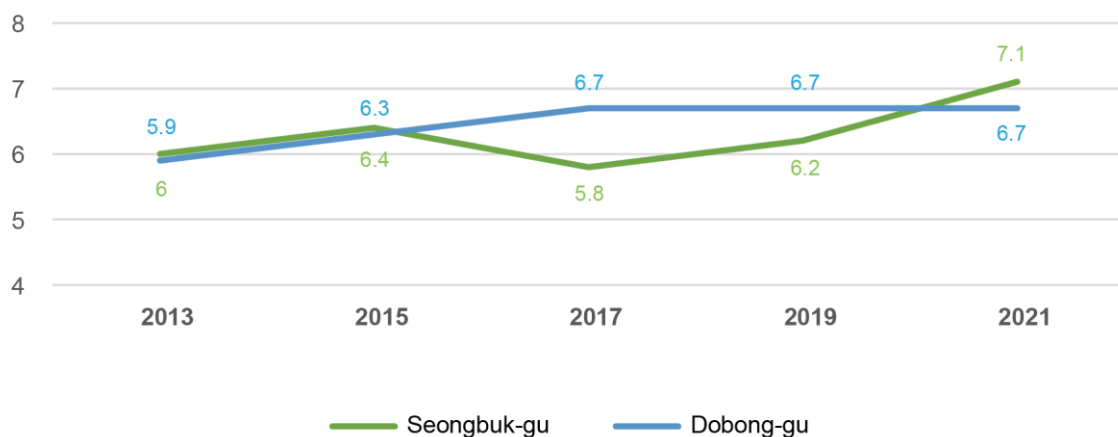
Graph 3: Changes in positive attitude towards the local social and physical environment of the elderly above 64



Positive attitude towards the local social and physical environment:
 $(\text{number of people who responded positively to the local social and physical environment} / \text{number of surveyed respondents}) \times 100$

Source: KDCPA

Graph 4: Changes in the happiness index of the elderly above 64 in Seongbuk-gu and Dobong-gu



Source: KDCPA

4.6.2 Specialists

Activities in the park are critical to the health and social relationships of senior citizens in the case study sites. Both mental and physical health interact with social relationships deeply, and public parks are where the elderly can manage their health and social relationships together.

An open space such as the park located around their houses is a space where the elderly can easily engage in physical activity. The case study sites are populated by many elderly people in their 70s and 80s who do not have sufficient financial capacity. They have very weak physical and mental health than the general population, so continuous physical and social activities are essential to maintaining their health. The experts recommend them to do light physical activities such as walking and light exercise, and parks are suitable places where to do it without any financial burden.

In addition, public parks are spaces where local seniors can gather and communicate. In particular, it is difficult for the elderly to obtain necessary information because they are not familiar with digital technology, and the elderly living alone have insufficient social activities. A space where the elderly can stay, such as a bench in a park, enables social interaction and information exchange that the elderly lack.

Box 13: Examples of quotations of the senior welfare specialist interviews

Senior Welfare Specialist in Seongbuk-gu:
If there is a park or a river nearby, walking is an exercise in itself. We are telling the elderly that they do not have to wander around looking for exercise. That's because walking back and forth like that is an exercise in itself.

Senior Welfare Specialist in Dobong-gu:
In Chang 3 dong, there are many elderly single-person households, so the park is a good place to gather and form social relationships and share various information.

4.6.3 Residents above 64

In Table 9, presented in Section 4.3.1, the relationship between ‘health’ and the factors of the ‘quality of public parks’ is relatively strong, and the relationship between ‘social relationships’ and ‘activities’ is also significant. Thus, Table 13 and Table 14 show those relationships more in detail. In Table 13, parks' ‘activities’ and ‘accessibility and proximity’ are related to both mental and physical health. The ‘planting’ of the parks is only related to the elderly's ‘mental health’ in the table. In Table 14, the ‘relaxation’ in parks such as sitting on the benches is strongly related to the elderly's ‘social relationships.’

Table 13: Co-occurrence table of health and quality of public parks in the resident interviews based on ATLAS.ti

		● Accessibility & proximity	● Activities	● Planting	● Safety & security
● Health	● Mental health	12	18	21	3
	● Physical health	13	20	2	6

Table 14: Co-occurrence table of social relationships and park activities in the resident interviews based on ATLAS.ti

		● Activities		
Indicators	● Walk	● Exercise	● Relaxation	
● Social relationships	0	4	17	

Park activities are related to the elderly’s health. Most elderly citizens have a physical disability, such as back or knee pain and general physical weakness. They engage in physical activity in

the park to restore or improve their body weakness through aging. Therefore, exercise and walking in the park are directly related to the physical health of the elderly.

Box 14: Examples of quotations about parks' activities and physical health

Respondent in Jeongneung 3-dong, 79 years old, male:

I visit there for doing exercise. Yes. I can't climb the mountain anymore because my leg hurts, so I'll just walk around that trail... My leg is bad and sometimes numb. So, I need to do some exercise.

Respondent in Chang 3-dong, 80 years old, female:

Exercise. I'm coming to exercise... People with leg pain like this walking place. After walking in this area, my legs get stronger.

Also, when they do these activities in the park, they experience improving their mental health. They said that exercising and other activities help them to release their stress. Usually, it functions together with the parks' planting conditions because they said that doing activities in the parks is fun and satisfying because they can connect to nature while they do the activities. This applies not only to physical activity but also to static activities such as rest.

Box 15: Examples of quotations about parks' activities and mental health

Respondent in Jangwi-dong, 74 years old, female:

Doing exercise itself helps to relieve stress... If there is no park in my neighborhood, maybe I feel bored. I enjoy going out to the park. Without the park, I think it would be frustrating. Exercising while breathing in the fresh air is the joy of my life.

Respondent in Jangwi-dong, 83 years old, male:

Sitting here after a workout is a great way to relieve stress. When I sit here, I read news through my cell phone and watch people and trees.

The park's 'accessibility and proximity' are related to both the mental and physical health of the elderly. As like mentioned earlier in Section 4.5.3, the elderly use the nearest parks in order to increase the frequency of park use. The parks located close to the elderly increase the chance to do walk, physical exercise, and relaxation in the parks. Thus, the increased opportunities to do the activities influence the elderly's physical and mental health.

In addition, the park's 'planting' is deeply related to the mental health of the elderly. As mentioned in Section 4.5.3, they answered that when they stay in their house, they feel depressed or bored. They feel nature through watching trees, hearing birds' songs, breathing fresh air, etc. They said the connection to nature helps them think positively and maintain mental health. Some answered that they visit the parks just to see the greenery.

Box 16: Examples of quotations about parks' planting and mental health

Respondent in Jeongneung 3-dong, 85 years old, female:

Even in winter, if the day is warm, come here wearing a warm coat. When the sun rises here, sit here and just watch the pigeons. I do it because it's boring to stay in my house.

Respondent in Jangwi-dong, 89 years old, female:

There are no trees where I live. So, I come here to see nature.

Among park activities, ‘relaxation’ in parks affects social relationships much. The local public parks are important places for 80s and 90s interviewees to keep their social relationships. They answered there is no other place to replace the parks to meet people. Also, some seniors socialize in the park, having a light meal or snack with their friends. When they do it, they use the market or restaurant around the park. It is also related to the relationship between park activities and the proximity of other amenities, presented in Section 4.5.3. They extend social relationships when they order and deliver food to nearby stores in the park. Furthermore, if the park is close to houses, the opportunity for the elderly to have social relations increases, with the same principle as the frequency of park activities among the elderly.

Box 17: Examples of quotations about parks’ activities and social relationships

Respondent in Chang 3-dong, 80 years old, female:

I come here to meet people, talk, and have a good time. What else are you going to do when you get older? Old people have nothing to do. So, in the afternoon we sit here on a mat and talk. It's so comfortable because no one is saying anything... No. There is no other place to meet people. Only use the park.

Respondent in Jeongneung 3-dong, 84 years old, female:

Only people who come will come, but there are always about 10 people. Last time there were 10. We get together and eat Chinese food like Jjajangmyeon, sweet and sour pork, and jjamppong at the restaurant right next door.

Respondent in Chang 3-dong, 90 years old, female:

And if there's someone here who rides a bike, if you tell him to run an errand, he'll come right away. If there is something you want to eat as a snack, I ask you to buy it. And if you give me some money, I'll buy it right away. I also buy Bungeoppang (Korean traditional snack). I live like to do that every day. It's very fun.

4.6.4 Interpretation of the result

The result of the interviews shows that parks are closely related to the health of the elderly, although the secondary data does not establish a strong relationship between the quality of parks and the health of the elderly. In particular, for the elderly over 70, the park is a suitable place to maintain health through physical activity. Walking in the park and light exercise using exercise equipment are appropriate activities for maintaining the physical health of the elderly.

In addition, older people maintain their mental health through the experience of connecting with nature and doing the parks’ activities. It is challenging to experience sufficient nature due to the poor residential environment in the case study sites. Many resident interviewees answered that experiencing a connection to nature gives them a positive mind. Also, exercising and relaxing in the parks directly impact mental health since they help the elderly release their stress and feel fun.

Finally, the park is an important place to maintain social relationships with the elderly due to the characteristics of parks as public spaces, that they can be used without an economic burden and are open to all. In the park, the elderly engage in various activities together, such as eating, exercising, and playing games. Through meeting people, the elderly can share various information and live an active life. Meeting people in the park is critical to the elderly living alone who do not have many social relationships.

4.7 Discussion

First, various factors can affect the livability of the elderly (Okulicz-Kozaryn, 2013; Mouratidis, 2018), and it is challenging to determine whether the livability of the elderly is improved only by the park. Not only the parks but also the individual's economic situation, social environment, and other residential environment also affect the livability of the elderly. Therefore, it is difficult to explain the relationship between parks and livability with only the results of the secondary data. However, in interviews with the residents and the experts, they said that parks significantly impact the health and relationships of the elderly. Although more factors need to be considered to measure livability accurately, this study shows that the livability of the elderly and the park are closely related.

Second, it is necessary to study separately because the physical and social situations of the elderly in their 60s and 70s and the elderly order 80 are different. This study also confirmed that the elderly in their 80s had different characteristics. In Section 4.5.2, the urban regeneration expert said that the elderly in their 80s and older had a lack of understanding of the project, and in Section 4.7.2, the physical activity of the elderly in their 80s and older should be light exercise unlike other age groups. More differences can be identified if it is considered from the research method design stage in future studies.

Chapter 5: Conclusions

5.1 Introduction

This study provides an understanding of the relationship between the SMG's urban regeneration projects and public parks from the perspective of the elderly. It takes a qualitative research approach, which has not been done before on this particular topic. It also contributes to the need for research on the rapidly aging society in East Asia. As mentioned in the conceptual framework of section 2.5, the relationship between these two variables, 'SMG's urban regeneration projects' and 'livability of the elderly,' is examined through the mediating variable, 'quality of public park'. The answers to the research questions and the research findings are summarized in Section 5.2. Sections 5.3 and 5.4 present the research limitations and suggestions for future research as well as policy recommendations.

5.2 Conclusions: Answering the research questions

5.2.1 Answering the research sub-questions

In order to answer the sub-questions of the study, a case study was conducted in Jangwi-dong, Chang 3-dong and Jeongneung 3-dong, the locations of the urban regeneration projects in Seoul, where the proportion of the elderly population exceeded 20%. Face-to-face interviews with elderly people over 64 years old, expert interviews, observations and secondary data analysis were conducted. The research sub-questions are as follows:

1. What has been the recent development of the urban environment in Seoul, and what changes have the urban regeneration projects initiated?
2. What types of elements determine the quality of public parks from the perspective of the elderly in SMG's urban regeneration project sites?
3. How has the livability of the elderly population been affected by the parks in the areas of SMG's urban regeneration projects?

Firstly, the finding to the first question is that the accessibility and safety of the park improved after the urban regeneration project. According to expert interviews and secondary data, the urban regeneration project considered the livability of not only the elderly, but also children and adolescents, so it focused on public spaces that all generations could use together. Therefore, in addition to creating public facilities, a safe and convenient street environment for all socially disadvantaged people, including the elderly, and open spaces where different people could get together, were improved or newly created. The aim of improving outdoor space through urban regeneration is to strengthen the sense of community in the local community. This is consistent with the studies by Ramlee et al. (2015), Hamdy and Plaku (2021), and Shafray and Kim (2017). Through interviews, senior residents indicated that the accessibility and safety of the parks had subjectively improved as a result of the urban regeneration projects. Furthermore, some seniors in the interview were satisfied with different generations sharing the same space in the parks, as the projects intended.

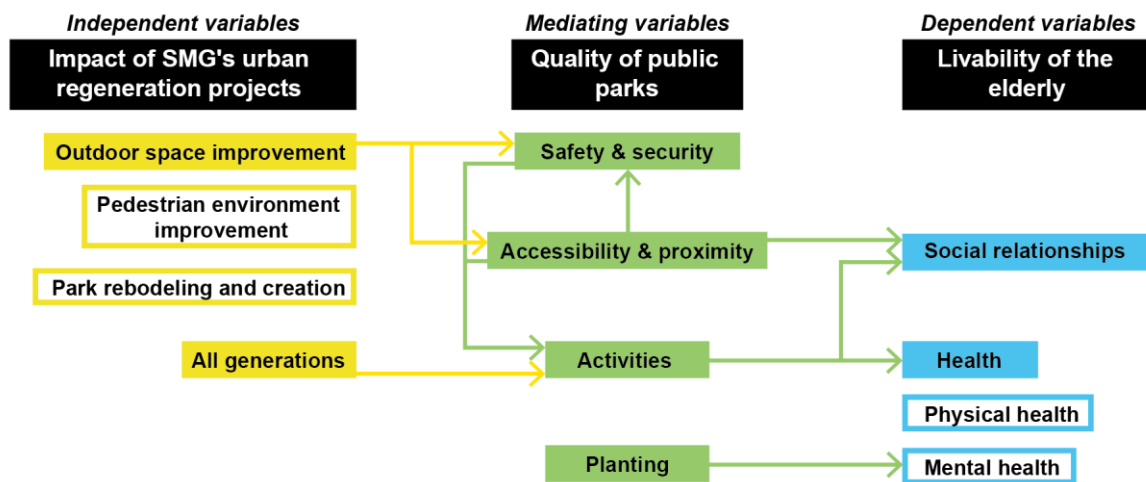
Next, in response to the second question, access, planting, as well as park activities, are essential for the elderly's usage of parks. According to resident interviews, the elderly use parks that are close to their homes. According to secondary data, the parks within the sites are distributed in such a way that residents can easily access them. The experts also emphasized

the accessibility of the parks because the living radius of the elderly is small. This finding is consistent with the claims of Esther, Winky and Edwin (2017) and Park (2018). Moreover, an accessible park not only promotes the usage of parks by the elderly, but also increases the number of pedestrians around the park which increases its security. In addition, the elderly preferred parks with a higher number of trees, as result of the resident interviews and observation. Similar to the study by Miralles-Guasch et al. (2019), the elderly selected and used a park with higher numbers of trees, and their satisfaction with the park was higher for it.

The answer to the last research sub-question is that public parks positively affect the health and social relationships of the elderly. According to interviews with residents and experts, not only physical activity but also static activity improves mental health and social relationships. The findings that park activities benefit the health and social relationships of the elderly are consistent with studies by several other researchers (Lee, Lee, & Park, 2014; Lee & Lee, 2019; Yung, Conejos, & Chan, 2016; Kim, 2019). Resident respondents stated that it is easier to meet people in and around the park when other amenities such as markets are nearby, and that they engage in various activities with their acquaintances. In addition, most respondents said they had positive emotions due to the appreciation of natural elements such as trees in the park. According to the analysis of secondary data, interaction between neighbours and the happiness index of elderly residents also increased after the urban regeneration project.

The answers to the sub-questions are summarized in Figure 14. The urban regeneration projects have a positive effect on elderly’s park use and help improve their livability.

Figure 14: Summary of the answers to the sub-questions



5.2.2 Answering the main research question

The main research question is as follows:

How have the Seoul Metropolitan Government's urban regeneration projects influenced the quality of public parks to improve the livability of the population above 64?

Although the sites' urban regeneration projects mainly consisted of the creation of small-scale green spaces and the improvement of the pedestrian environment, they have a positive effect on the social relationships and health of the elderly over 80 or those who live alone. However, there has been insufficient publicity for the projects and too many institutional limitations, leading to insufficient consideration for the elderly users of parks. These are obstacles to improving the livability of the elderly in the sites.

Since the elderly in the case study sites use the park not only for their health but also for their social relationships, creating small-scale parks or redesigning parks helps improve the livability, especially for single-person households or the elderly over the age of 80. Most of the parks in the sites are relatively small Ssamji parks or Children's parks. It is difficult for residents to engage in various physical activities in these parks. However, since light physical activity is more important than vigorous exercise for the elderly over 80, they use small-scale parks for their physical health. Moreover, since the elderly living alone in the studied sites live with poor housing conditions, the increase in green space complements their environment. The greater connection with nature helps them maintain their mental health. Furthermore, because they have few ties to the local community and have financial difficulties, they use the parks to meet people. Therefore, improving accessibility and proximity through urban regeneration has a positive effect on increasing park use by residents, increasing opportunities to meet people in the park.

However, the lack of understanding of the interests of the elderly in the urban regeneration project negatively affects the use of the park. From the perspective of the elderly, not only easy access, but also safe and convenient facilities and an appropriate amount of trees, are essential. However, some of the parks that were remodelled or created under the urban regeneration project did not satisfy the interest of the elderly. Thus, in some parks, the promotion of park use of the elderly through the project was not achieved. This is related to the lack of consideration to the opinions of the elderly on the projects.

Furthermore, the elderly's lack of understanding of the projects and institutional difficulties negatively affect the quality of public parks. Due to the institutional lack of the urban regeneration project, it is difficult to get a diverse group of residents to participate and establish their opinions and the local government. In Jangwi-dong and Chang 3-dong, delays in project hours, and modifications to projects were caused by conflicts in decision-making between residents and local governments. Also, elderly people over the age of 80 are unfamiliar with resident participation and have difficulty understanding strategic development. Therefore, the elderly negatively view and perceive urban regeneration as time-consuming. As a result, projects were delayed and their outcomes reduced, negatively impacting the improvement of the outdoor environment, including parks.

5.3 Limitations and suggestions for further research

There are two limitations of this study. Firstly, the field research was conducted in June and July, and there may be differences in park usage patterns in winter. Although the author asked additional questions about usage in winter times during the interview, it is necessary to conduct additional field research in winter for a more accurate examination of park usage by the elderly. The second limitation is the spatial extent of the secondary data on the livability of the elderly. They do not fully match the case study sites and include a more extensive spatial coverage. Although secondary data corresponding to the sites were not provided in Seoul and other national institutions, it is necessary to limit the spatial extent for a more accurate study.

Further research requires a study on the impact of public spaces on the social relationships of the elderly. This study finds that public parks affect the livability of the elderly but does not explain how other public spaces may affect the livability of the elderly. Moreover, the urban regeneration projects in Seoul aimed to create urban environments for all age groups and emphasized community revitalization. Thus, there is a need to examine how the urban environment affects the social relationships of the elderly and how the elderly interact with other generations. A specific age-friendly city model should also be analysed by distinguishing between the elderly over 80 who need care and those under 79 who do not.

5.4 Policy recommendation

Public parks enable active aging, and the SMG's urban regeneration projects promote it. However, the findings from this study include some political recommendations. Firstly, for active aging, it is essential to actively improve the outdoor environment through the SMG's urban regeneration projects. Urban regeneration projects have a positive impact on elderly people's use of parks, and parks improve mental and physical health as well as social relationships necessary for active aging. However, since the external environment was not improved as much as planned, the impact was not maximized. Secondly, it is imperative to improve the active participation of the elderly in urban regeneration projects. Since the elderly are familiar with the existing top-down method, the SMG should actively promote the strategic planning method to the elderly residents and use different methods for resident participation, such as surveys, workshops, and games. Finally, the findings recommended prioritizing the perspective of the elderly when designing a park. Because Seoul has a rapidly aging population, parks are essential to support active lifestyles of the elderly. Some of the parks created or redesigned as part of urban regeneration projects are difficult for the elderly to use, and therefore, to actively promote the use of parks by the elderly, the parks should be designed from their perspective.

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Appendix 1: Interview guidelines

Appendix 1.1: Interview guideline for residents above 64

Hello, my name is Dasup Lim. I am a Master's student of Urban Development and Management at the Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, the Netherlands. The interview is a part of the Master's thesis about the livability of elderly and urban regeneration. Therefore, the purpose of the interview is to learn about your experience of public parks and the urban regeneration project. The interview will take about 1 hour, but please don't feel restricted about it. Also, if you want to stop at any time, please feel free to tell me. The interview questions are about the livability of the elderly, the qualities of public parks, and the impact of SMG's urban regeneration projects. If any of the questions feel uncomfortable, let me know. It will not be a problem. It will remain anonymous and will be used only for the academic purpose. Also, I want to ask you the permission of recording this interview. If you have anything you want to ask about this interview, please contact me through the email, 628664dl@eur.nl.

Profile (Residents above 64)	Interview number:
Date and time:	Type of households:
Location:	Level of education:
Gender:	Age:
The period of living in the case study site:	
Park names used by the interviewee:	

Part I: Impact of SMG's urban regeneration projects

(Explain briefly about the urban regeneration sub-projects in the case study sites.)

1. What has been improved through the urban regeneration project? How is it changed?
2. Has the outdoor environment improved as much as you expected? Why?
3. After the urban regeneration project, has there been any change in your use of the park? Why?
 - A. Satisfaction
 - B. Frequency
 - C. Convenience
 - D. Others
4. Is the urban regeneration project important to you? Why?
5. Who do you think would be interested in the project? Why?

Part II: Qualities of public parks

(Show them the satellite images of the case study sites and let them use the images when they answer the questions.)

1. Why do you visit this public park?
 - A. Accessibility
 - B. Proximity
 - C. Safety & security

- D. Activities
 - E. Planting
 - F. Others
2. How do you get to the park? Is there any uncomfortable thing on the way to the park? Please explain with this map.
 3. Is the park close enough to your home? How long does it take to walk to the park?
 4. Are the other amenities, such as hospitals, community centers, and supermarkets, close to the park? How?
 5. Is the park convenient to use its facilities? For example, can you easily use its toilets, benches, lights, and pavement? Why?
 6. If your physical and mental aging is progressed, is the park convenient to use? Why?
 7. Is the park safe also in evening or night? Why?
 8. What kinds of activities do you usually do in the park?
 9. What do you think of the park's resting area?
What do you think of exercise facility?
 10. Do you think the park has enough space to do your activities? Why?
 11. What do you think about the trees and flowers in your park?

Part III: Livability of the elderly

1. How often do you use a park? How long do you stay in the park?
2. Does the park help you to release your stress or do you do exercise in the parks? Why?
3. Do you feel better when you visit the park? Why?
4. Do you visit a park with somebody? If you do, what kinds of activities you do together?
5. How often do you meet at the park? If you there is no parks in your neighbourhood, where do you use to meet people?
6. How do you feel if you don't visit the park or your neighbourhood doesn't have a park?
7. If the park gives a positive (or negative) feeling, when do you feel?

Appendix 1.2: Interview guideline for the coordinators of SMG's urban regeneration

Hello, my name is Dasup Lim. I am a Master's student of Urban Development and Management at the Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, the Netherlands. The interview is a part of the Master's thesis about the livability of elderly and urban regeneration. Therefore, the purpose of the interview is to learn about how the elderly experience the public parks and the urban regeneration projects. The interview will take about 30 minutes, but please don't feel restricted about it. Also, if you want to stop at any time, please feel free to tell me. The interview questions are about the qualities of public parks, and the impact of SMG's urban regeneration projects. If any of the questions feel uncomfortable, just let me know. It will not be a problem. It will remain anonymous and will be used only for the academic purpose. Also, I want to ask you the permission of recording this interview. If you have anything you want to ask about this interview, please contact me through the email, 628664dl@eur.nl.

Profile (Coordinators of SMG's urban regeneration)	Interview number:
Date and time:	Institution:
Location:	Position:
Email address (if possible)	

Part I: Impact of SMG's urban regeneration projects

1. What are the objectives of the project regarding the outdoor spaces? Do you think it achieved them well? Why?
2. How does the project improve the quality of the parks in the neighborhood?
3. How does the urban regeneration projects help the neighborhood become aging-friendly, especially from the environmental perspective? Why?
4. What kinds of institutions do pay attention to the project? Did they have an interest in the project from the first time?
5. Have the elderly residents paid attention to the projects? Why?

Part II: Qualities of public parks

(Show them the satellite images of the case study sites and let them use the images when they answer the questions.)

1. How the elderly can access the parks easily in the case study sites?
2. Does the neighborhood have enough amount and numbers of public parks? Why?
3. How safe are the parks are to use for the elderly?
4. What do you think about the parks' activity? Do you think they are good for the elderly people? Why?
5. What you think the parks' planting condition, such as trees and flowers, from the elderly perspective?

Appendix 1.3: Interview guideline for the experts on the livability of the elderly

Hello, my name is Dasup Lim. I am a Master’s student of Urban Development and Management at the Institute for Housing and Urban Development Studies, Erasmus University Rotterdam, the Netherlands. The interview is a part of the Master’s thesis about the livability of elderly and urban regeneration. Therefore, the purpose of the interview is to learn about how the elderly experience the public parks in their neighborhood. The interview will take about 30 minutes, but please don’t feel restricted about it. Also, if you want to stop at any time, please feel free to tell me. The interview questions are about the livability of the elderly and the qualities of public parks. If any of the questions feel uncomfortable, just let me know. It will not be a problem. It will remain anonymous and will be used only for the academic purpose. Also, I want to ask you the permission of recording this interview. If you have anything you want to ask about this interview, please contact me through the email, 628664dl@eur.nl.

Profile (Experts on the livability of the elderly)	Interview number:
Date and time:	Institution:
Location:	Position:
Email address (if possible)	

Part I: Qualities of public parks

(Show them the satellite images of the case study sites and let them use the images when they answer the questions.)

1. How the elderly can access the parks easily in the case study sites?
2. Does the neighborhood have enough amount and numbers of public parks? Why?
3. How safe are the parks are to use for the elderly?
4. What do you think about the parks’ activity? Do you think they are good for the elderly people? Why?
5. What you think the parks’ planting condition, such as trees and flowers, from the elderly perspective?

Part II: Livability of the elderly

1. How do you think the health of the elderly in the case study sites? Is there any characteristic? If there is, why?
2. How do the public parks help the elderly to maintain their physical health in the neighborhood?
3. How do the public parks help the elderly to maintain their mental health in the neighborhood?
4. How do the elderly people connect with people in the neighborhood? How the parks influence in their social relationship?
5. Do the public parks in the neighborhood helps their social relationships? Why?
6. How can the parks affect the elderly’s day-to-day emotions in the neighborhood?

Appendix 2: Timeline

May, 2022	3 rd & 4 th weeks – Editing the literature review / making detail plans of the research method and data collection / preparing field research
June, 2022	Collecting the data (do interviews)
July, 2022	1 st week – collecting the data (do interviews) Analysing the data
August, 2022	Analysing the data / writing the conclusion
September, 2022	September 19 th – submission of final thesis

Appendix 3: General information of the resident interviewees

Site	NB	Date (Y/M/D)	Gender	Age	Park name	Household type	frequency of park visits	The period of living in the case study site
Jeongneung 3-dong	1	2022/06/09	Male	79	Jeongneungcheon Stream	Living with family	5 times a week	40
	2	2022/06/09	Female	81	Jeongden ssamzie park	Living alone	Almost everyday	50
	3	2022/06/09	Female	84	Jeongden ssamzie park	Living with family	Almost everyday	50
	4	2022/06/09	Female	85	Jeongden ssamzie park	Living alone	Almost everyday	50
	5	2022/06/10	Male	79	Bukhansan National Park	Living with family	Almost everyday	45
	6	2022/07/05	Female	75	Jeongneungcheon Stream	No answer	Almost everyday	58
	7	2022/07/05	Female	74	Jeongneungcheon Stream	No answer	Almost everyday	40
Jangwi-dong	1	2022/06/13	Female	66	Dongbang Children's Park	Living with family	2-3 times a month	33
	2	2022/06/13	Female	65	Dongbang Children's Park	Living with family	2-3 times a month	41
	3	2022/06/14	Female	74	Odong Park	Living with family	5 times a week	40
	4	2022/06/14	Male	83	Odong Park	Living with family	Almost everyday	50
	5	2022/06/14	Female	74	Odong Park	Living alone	2-3 times a week	16
	6	2022/06/14	Female	79	Odong Park	Living alone	Almost everyday	30
	7	2022/06/14	Male	80	Odong Park	Living with family	Almost everyday	45
	8	2022/06/14	Female	79	Odong Park	Living with family	2-3 times a week	20
	9	2022/06/14	Female	89	Odong Park	Living alone	Almost everyday	4
	10	2022/06/14	Female	69	Odong Park	Living alone	Almost everyday	10
Chang 3-dong	1	2022/06/16	Male	80	Chang 3-dong Village Madang	Living with family	3 times a week	18
	2	2022/06/16	Female	90	Water Drop Children's Park	Living alone	Almost everyday	16
	3	2022/06/16	Female	90	Water Drop Children's Park	Living alone	Almost everyday	17
	4	2022/06/16	Female	80	Water Drop Children's Park	Living alone	Almost everyday	20
	5	2022/06/16	Female	86	Sinchang Children's Park	Living alone	Almost everyday	20
	6	2022/06/16	Female	67	Choansan Mountain	Living alone	Almost everyday	20
	7	2022/06/16	Female	80	Choansan Mountain	Living alone	Almost everyday	10
	8	2022/06/16	Female	80	Choansan Mountain	Living alone	Almost everyday	20
	9	2022/07/05	Male	80	Choansan Mountain	Living with family	Almost everyday	25

Appendix 4: Coding Scheme

- ▲ ◇ ● C: Impact of SMG's urban regeneration projects {0-2}
 - ▲ ◇ ● V: SMG's URPs: Institutions {17-2} <is a>
 - ◇ ● I: SMG's URPs: Ins: Institutions paying attention {16-1} <is a>
 - ▲ ◇ ● V: SMG's URPs: Values {22-2} <is a>
 - ◇ ● I: SMG's URPs: Val: Values changed {23-1} ~ <is a>
- ▲ ◇ ● C: Livability of the elderly {0-2}
 - ▲ ◇ ● V: Liv of the Eld: Health {88-3} ~ <is a>
 - ◇ ● I: Liv of the Eld: Health: Mental health {63-1} ~ <is a>
 - ◇ ● I: Liv of the Eld: Health: Physical health {37-1} <is a>
 - ▲ ◇ ● V: Liv of the Eld: Social relationships {41-4} <is a>
 - ◇ ● I: Liv of the Eld: Social: Leisure {4-1} <is a>
 - ◇ ● I: Liv of the Eld: Social: The frequency of meeting people {8-1} <is a>
 - ◇ ● I: Liv of the Eld: Social: The number of people meeting in the park {6-1} <is a>
- ▲ ◇ ● C: Qualities of public parks {0-4}
 - ▲ ◇ ● V: Qual of PPs: Accessibility & proximity {87-7} ~ <is a>
 - ◇ ● I: Qual of PPs: Acc: Obstacles {7-1} <is a>
 - ◇ ● I: Qual of PPs: Acc: Public transport {4-1} <is a>
 - ◇ ● I: Qual of PPs: Acc: Walk {13-1} <is a>
 - ◇ ● I: Qual of PPs: Prox: Connectivity with other amenities {34-1} <is a>
 - ◇ ● I: Qual of PPs: Prox: Distance {27-1} <is a>
 - ◇ ● I: Qual of PPs: Prox: Time {24-1} <is a>
 - ▲ ◇ ● V: Qual of PPs: Activities {89-4} <is a>
 - ◇ ● I: Qual of PPs: Act: Exercise {43-1} <is a>
 - ◇ ● I: Qual of PPs: Act: Relaxation {39-1} ~ <is a>
 - ◇ ● I: Qual of PPs: Act: Walking space {22-1} <is a>
 - ▲ ◇ ● V: Qual of PPs: Planting {42-4} <is a>
 - ◇ ● I: Qual of PPs: Planting: Flowers {0-1} <is a>
 - ◇ ● I: Qual of PPs: Planting: Other {25-1} <is a>
 - ◇ ● I: Qual of PPs: Planting: Trees {23-1} <is a>
 - ▲ ◇ ● V: Qual of PPs: Safety & security {42-4} <is a>
 - ◇ ● I: Qual of PPs: Saf & sec: Management {9-1} <is a>
 - ◇ ● I: Qual of PPs: Saf & sec: Road pavement & universal design {14-1} <is a>
 - ◇ ● I: Qual of PPs: Saf & sec: Toilet {12-1} <is a>
- ◇ ● Meta: Case info {4-0}
- ◇ ● Meta: Respondent info {31-0}
- ◇ ○ OC: Financial benefit {3-0}
- ◇ ○ OC: How long to stay {19-0}
- ◇ ○ OC: How often to visit {24-0}
- ◇ ○ OC: Negative opinion {29-0}
- ◇ ○ OC: Night routine {3-0}
- ◇ ○ OC: Open space & people {15-0}
- ◇ ○ OC: Summer vs. winter {13-0}

Appendix 5: SMG's urban regeneration projects overview

Appendix 5.1: Jangwi-dong Urban Regeneration Project

- Location: Around 232-17 Jangwi-dong, Seongbuk-gu, Seoul
- Area: 318,415 m²
- Period: 2015 ~ 2018
- Project budget: 10 billion won
- Major Public Responsibilities:
 - Residential Regeneration Division, Seoul Metropolitan Government
 - Seoul Urban Regeneration Support Center
 - Urban Regeneration Design Department, Seongbuk-gu Office

Source: SMG 2017

Appendix 5.2: Chang 3-dong Urban Regeneration Project

- Location: Around 543 Chang3-dong, Dobong-gu, Seoul
- Area: 346,000 m²
- Period: 2017-2022
- Business budget: 41.7 billion won (priming water business 10 billion won + linked business 31.7 billion won)
- Major Public Responsibilities:
 - Residential Regeneration Division, Seoul Metropolitan Government
 - Seoul Urban Regeneration Support Center
 - Urban Regeneration Division, Dobong-gu Office

Source: SMG 2020

Appendix 5.3: Jeongneung 3-dong Urban Regeneration Project

① Jeongneung-dong Jeongden Village Residential Environment Management Project

- Location: Around 372 Jeongneung-dong, Seongbuk-gu, Seoul
- Area: 35,150 m²
- Period: 2012. 12 ~ 2017
- Project budget & progress:
 - 2012.12 ~ 2013.12: Planning (248 million won)
 - 2013.12 ~ 2014.05: Detailed design for maintenance infrastructure (51 million won)
 - 2014.07 ~ 2015.01: Maintenance infrastructure construction completed (837 million won)
 - 2016.02: Detailed design for shared facilities (41 million won)
 - 2016.11 ~ 2017.07: Completion of new construction of shared facilities (495 million won)
- Department in charge:
 - Residential Environment Improvement Division, Urban Regeneration Headquarters, Seoul Metropolitan City
 - Urban Regeneration Design Department, Seongbuk-gu Office

Source: SMG website (<https://news.seoul.go.kr/citybuild/archives/70462>), SMG 2013

② Jeongneung-dong Samdeok Village Residential Environment Management Project

- Location: Around 716-8 Jeongneung-dong, Seongbuk-gu, Seoul
- Business area: 33,443.6 m²
- Business Period: 2015 ~ 2017
- Project budget & progress:
 - 2013.12 ~ 2015.02: Planning (112 million won)
 - 2015.09 ~ 2016.02: Detailed design for maintenance infrastructure (65 million won)
 - 2016.09 ~ 2017.05: Maintenance infrastructure construction completed (1043 million won)
 - 2015.11 ~ 2016.05: Detailed design for shared facilities (KRW 18 million)
 - 2016.09 ~ 2017.07: Completion of remodeling construction for shared facilities (587 million won)
- Major Public Responsibilities:
 - Residential Environment Improvement Division, Urban Regeneration Headquarters, Seoul Metropolitan City
 - Urban Regeneration Design Department, Seongbuk-gu Office

Source: SMG website (<https://news.seoul.go.kr/citybuild/archives/70462>), SMG 2015a

Appendix 6: Field observation for SMG’s urban regeneration projects

Appendix 6.1: Jangwi-dong, Seongbuk-gu

Observation period: 130622-140622

	Projects	Project results
Livable residential environment	Alley and pedestrian environment improvement project	<ul style="list-style-type: none"> • CCTV installation and LED security light replacement • Improvement of street environment in some sections and creation of theme alleyways (Playground Road, Saerom Road, Tag Game Road, Market Road) • Anti-slip pavement project for some sections • The street environment improvement project is smaller than planned due to the reduction of the target alleys, the non-installation of green walls, and utility pole relocation
	Eco-friendly village development project	<ul style="list-style-type: none"> • Rainwater piggy bank installation • Box garden support • Village communal flower bed not created
	Resident convenience facility creation project	<ul style="list-style-type: none"> • Development of ‘Youth Culture Nourim Center’ • Changed the plan of the public parking lot complex development project and developed it as a ‘Health Nourim Center’
	Others	<ul style="list-style-type: none"> • North Seoul Dream Forest link bridge installation not implemented • Maintenance of Seoul Gageum House alleyway
Communicating resident culture	Welfare and cultural hub development projects	<ul style="list-style-type: none"> • Established ‘Our Neighborhood Kium Center’ • Established ‘Jangwi Haengbog Nulim Complex Center’ • Creation of ‘Kim Chung-up Architectural Culture House’
	Community revitalization project	<ul style="list-style-type: none"> • Resident open call project
	Others	<ul style="list-style-type: none"> • Construction of Hyangnamu resting place • Dongbang Children's Park remodeling
Vibrant village economy	Janggok Market Revitalization Project	<ul style="list-style-type: none"> • Market alley environmental improvement
	Community Regeneration Corporation (CRC) Foundation Creation Project	<ul style="list-style-type: none"> • ‘Seongbuk Urban Regeneration Cooperative’ launched • Operation of Urban Regeneration Support Center

Source: NAVER map; KAKAO map; SMG 2017; SMG 2019

Source: Kakao Map



Source: Kakao Map



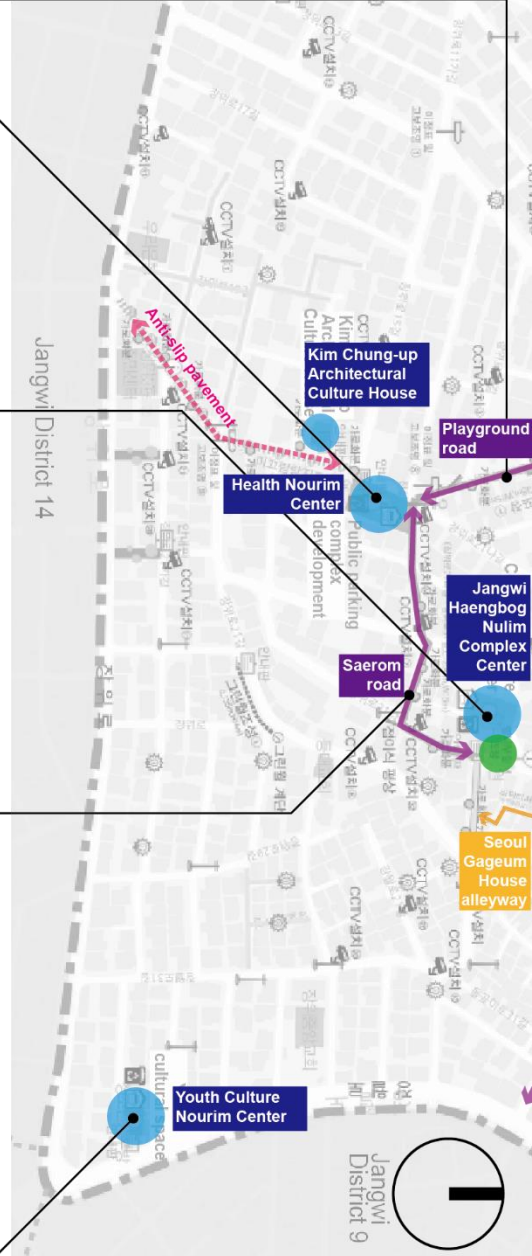
Source: Kakao Map



Source: Kakao Map



Source: Kakao Map





Communicating resident culture

project
Resident convenience facility
creation project



Source: Kakao Map

Source: Kakao Map



Appendix 6.2: Chang 3-dong, Dobong-gu

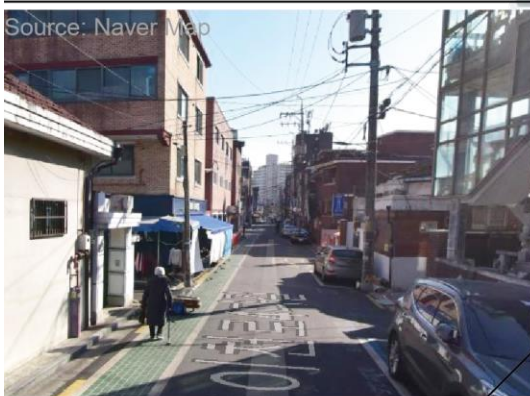
Observation period: 150622-160622

	Projects	Project results
<p>Creation of a shared public space for all</p> <p>(Creating an exchange space where various people gather)</p>	<p>Creating village base spaces</p>	<ul style="list-style-type: none"> • Cultural education base facility (1 anchor facility) scheduled to be completed in October • Community base facility (2 anchor facilities) scheduled to be completed in October • Urban agriculture base facility establishment plan was not implemented, but urban agriculture related programs were operated
<p>Maintenance of a pleasant and safe outdoor environment</p> <p>(Creating a safe walking path for play and rest)</p>	<p>An ecological playground for the elderly and children to enjoy and relax</p>	<ul style="list-style-type: none"> • Remodeling of Sinchang Children's Park, Water Drop Children's Park, and Village Madang Park
	<p>Safe Choansan Saengsaeng companion roads for the elderly and children</p>	<ul style="list-style-type: none"> • Creating theme alleyways (the way to school, the way to Mt. Choan, the way to the market, the way to Uicheon) with three-dimensional sculptures of retaining walls, a road for car division, and installation of night lights • Rose Road Regeneration Project – Road pavement and fence improvement, flower beds and street flowerpot installation • Improvement of building number plates, mailboxes, and gates in some sections
	<p>Alleyway scenario reflecting the housing change process</p>	<ul style="list-style-type: none"> • Scheduled to be implemented in 2023
<p>Customized improvement of the residential environment at the edge of Choansan Mountain</p> <p>(Creating a living space with a healthy home)</p>	<ul style="list-style-type: none"> • Support for Chang 3 customized home improvement • Gageum Housing Complex at the edge of Choansan Mountain 	<ul style="list-style-type: none"> • Old house construction for roof, waterproofing, insulation, windows, boiler equipment, fence, front door
<p>Sustainable village management through resident participation</p> <p>(Creating a place of coexistence with 0 to 100 years old)</p>	<p>Creating and operating of Choansan Forest Garden</p>	<ul style="list-style-type: none"> • Create the 'Chou Love' club and change the garbage dumping site into a garden • Discover village gardeners and create alley gardens through the village gardener training program
	<p>Operating complex cultural programs and Onmaeul Learning Center</p>	<ul style="list-style-type: none"> • Operation of education programs such as village technical school, woodworking education, village gardener education, etc.
	<p>Creating a Vivid Changdong Alley Market</p>	<ul style="list-style-type: none"> • Floor design pavement
	<p>Aged housing improvement project that creates jobs for residents</p>	<ul style="list-style-type: none"> • Autonomous housing maintenance project support – A project to form a resident council and improve and build houses by the residents themselves
	<p>Community enterprise start-up and growth support</p>	<ul style="list-style-type: none"> • Establishment of urban regeneration companies
<p>Others</p>	<ul style="list-style-type: none"> • 72 Hour Urban Saengsaeng Project • Rainwater Village Development Project etc. 	

Source: NAVER map; KAKAO map; SMG 2020; Chang 3-dong Urban Regeneration Support Center, 2022



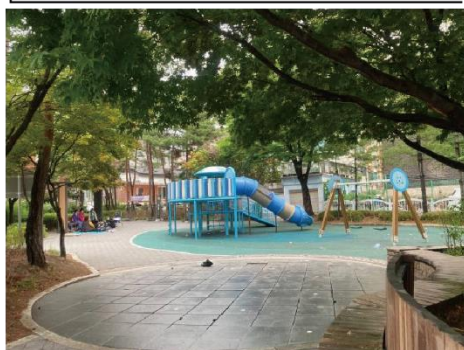
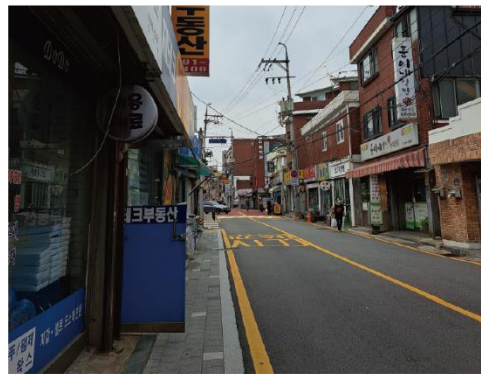
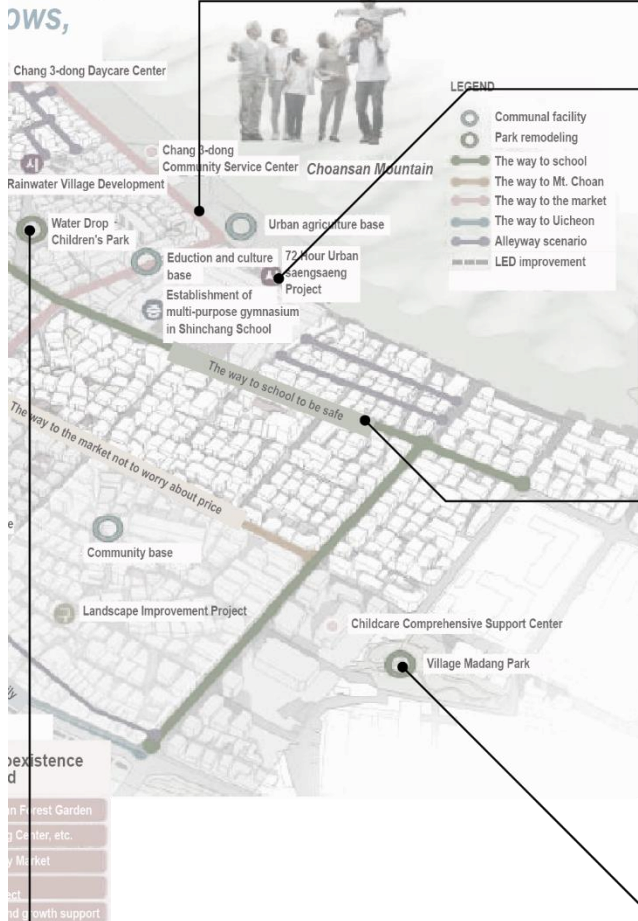
Choansan village where Uicheon flows, a good place to live



Creating an exchange space where various people gather

- A. Creating village base spaces
 - A1. Urban agriculture base
 - A2. Education and culture base
 - A3. Community base
- Creating a safe walking path for play and rest**
 - B1. Ecological playground for the elderly and children
 - B2. Safe Choansan Saengseong companion roads
 - B2-1. The way to school to be safe
 - B2-2. The way to Mt. Choan to be healthy
 - B2-3. The way to the market not to worry about price
 - B2-4. The way to Uicheon to walk easily
 - B3. Alleyway scenario: the housing change process
- Creating a living space with a healthy home**
 - C1. Chang 3 customized home improvement
 - C2. Choansan Gageum Housing Complex
- Creating a place of coexistence with 0 to 100 years old**
 - D. Creating and operating of Choansan Forest Garden
 - F1-2. Operating Onmaeul Learning Center, etc.
 - F1. Creating a Vivid Changdong Alley Market
 - F2. Aged housing improvement project
 - F3. Community enterprise start-up and growth support





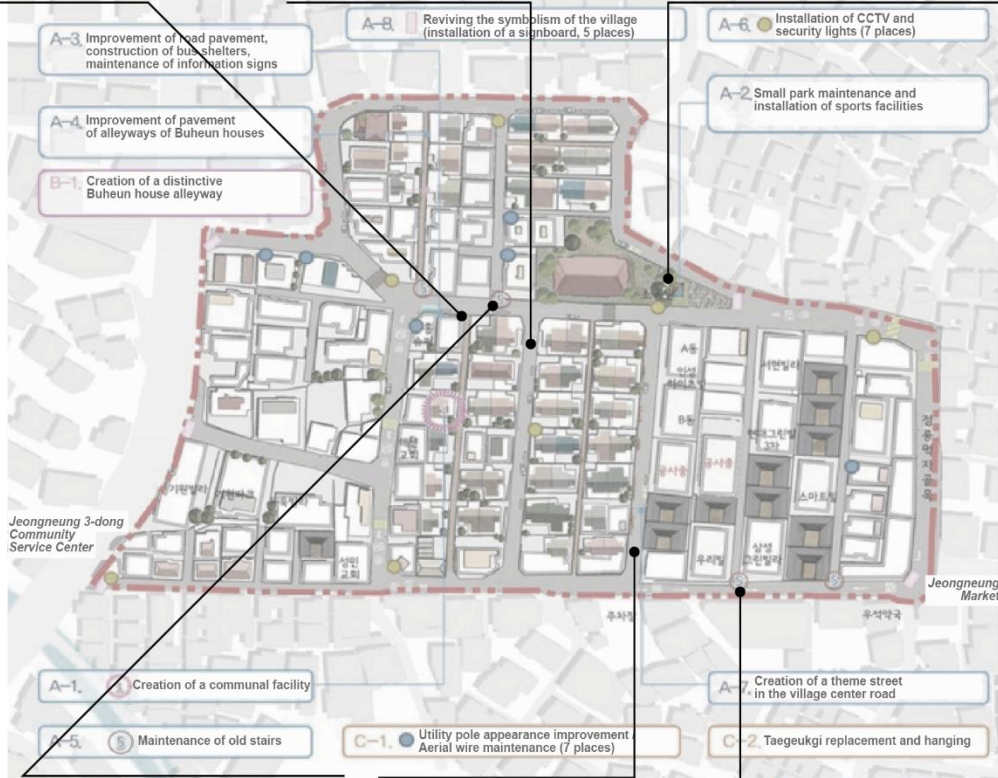
Appendix 6.3: Jeongneung 3-dong, Seongbuk-gu

Observation period: 090622-100622

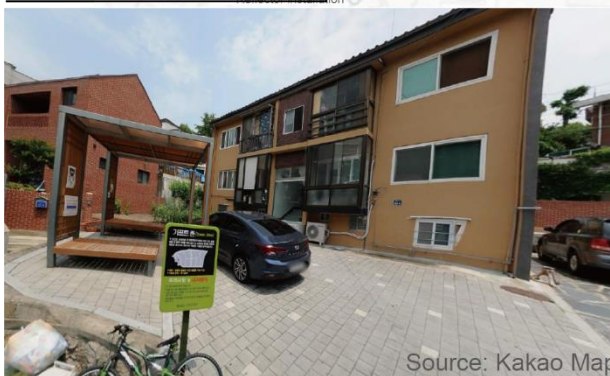
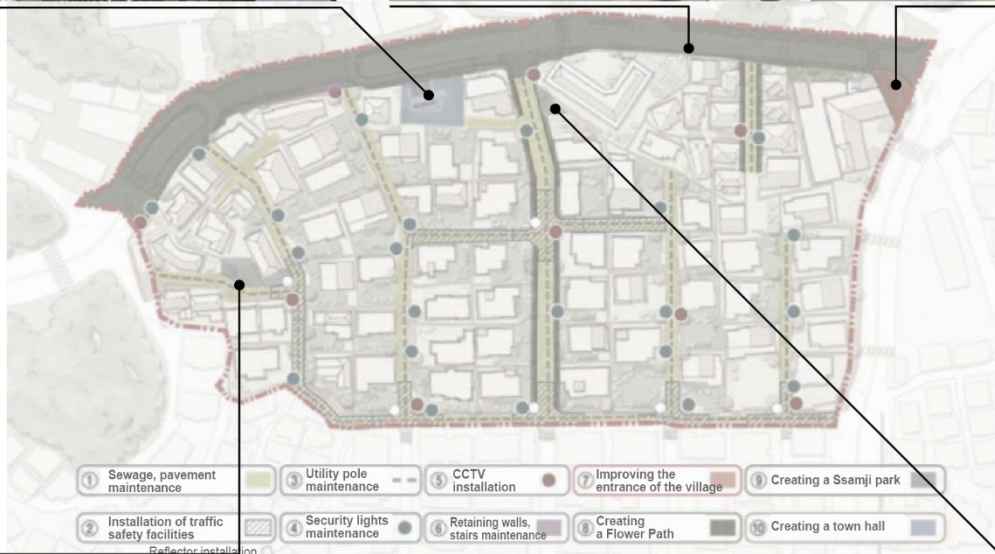
	Projects	Project results
Jeongdeun Village	Public projects	<ul style="list-style-type: none"> • Creation of a communal facility • Small park maintenance and installation of sports facilities • Improvement of road pavement and construction of bus shelters, maintenance of information signs • Improvement of pavement of alleyways of Buheun houses • Maintenance of old stairs • Installation of CCTV and security lights • Creation of a theme street in the village center road • Reviving the symbolism of the village (installation of a signboard)
	Private-sector cooperation projects	<ul style="list-style-type: none"> • Creation of a distinctive Buheun house alleyway (environmental improvement for fences, etc.)
	Others	<ul style="list-style-type: none"> • Utility pole relocation and removal / Utility pole appearance improvement / Aerial wire maintenance • Taegeukgi replacement and hanging
Samdeok Village	Infrastructure maintenance	<ul style="list-style-type: none"> • Sewage and pavement maintenance • Utility pole maintenance • Security lights maintenance • CCTV installation • Maintenance of retaining walls and stairs • Improving the entrance of the village • Creating a Ssamji park • Installation of safety facilities such as reflectors and safety fences • Village flower paths (installing communal flower beds or street pots) are not established • Non-implementation of pedestrian space separation and intersection pavement improvement through pavement classification
	Creation of a communal facility	<ul style="list-style-type: none"> • Creation of a town hall

Source: NAVER map; KAKAO map; SMG 2013; SMG 2015a

I. Jeongdeun Village



II. Samdeok Village



Appendix 7: Observation and secondary data research on the quality of public parks

Janwi-dong, Seongbuk-gu

Observation period: 130622-140622

Jangwi-dong	Park name	Dongbang Children's Park	Odong Park	North Dream Forest	Hyangnamu resting place
Activities	Relaxation	O	O	O	O
	Walking	X	O	O	X
	Exercise	O	O	O	X
Planting	Trees	▲	O	O	▲
	Flowers	X	X	O	X
	Others	X	O	O	X
Safety & security	Universal design	O	▲	▲	O
	Management	O	O	O	O
	Pavement	O	▲	▲	O
	Toilet	X	X	O	X

Chang 3-dong, Dobong-gu

Observation period: 150622-160622

Chang 3-dong	Park name	Sinchang Children's Park	Water Drop Children's Park	Village Madang Park	Choansan Mountain	Uicheon stream
Activities	Relaxation	O	O	O	O	X
	Walking	X	X	O	O	O
	Exercise	O	O	O	O	X
Planting	Trees	O	O	O	O	▲
	Flowers	X	X	X	▲	O
	Others	X	X	X	O	O
Safety & security	Universal design	O	O	O	▲	O
	Management	O	O	O	O	O
	Pavement	O	O	O	O	O
	Toilet	X	X	X	X	X

Jeongneung 3-dong, Seongbuk-gu

Observation period: 090622-100622

Jeongneung 3-dong	Park name	Jeongneungcheon stream	Buckhansan Mountain	Jeongdeun Ssamji Park	Samdeok Ssamji Park 1 (jeongneung-dong 716-87)	Samdeok Ssamji Park 2 (jeongneung-dong 716-113)
Activities	Relaxation	O	O	O	O	O
	Walking	O	O	X	X	X
	Exercise	O	X	O	X	X
Planting	Trees	O	O	O	▲	X
	Flowers	▲	O	X	X	X
	Others	O	O	X	X	X
Safety & security	Universal design	O	▲	▲	O	O
	Management	O	O	O	O	O
	Pavement	O	O	O	O	O
	Toilet	O	O	X	X	X

Appendix 8: Secondary data research on the livability of the elderly

The number of green spaces in Seongbuk-gu

	2015	2016	2017	2018	2019	2020
Total	262	268	313	316	333	354
1) General green space	69	70	70	70	82	93
2) Facility green space	22	22	61	61	60	60
Around the building	47	48	49	49	49	50

Source: Statistics Korea

The number of green spaces in Dobong-du

	2015	2016	2017	2018	2019	2020
Total	302	309	318	323	323	318
1) General green space	166	171	174	175	175	175
2) Facility green space	10	10	10	10	10	10
Around the building	21	22	24	24	24	24

Source: Statistics Korea

- 1) General green space: Square and roadside green area
- 2) Facility green space: Buffer green space, landscape green space, and connected green space

The livability of the elderly above 64 in Seongbuk-gu

		2013	2015	2017	2019	2021
1) Positive attitude towards the local social and physical environment Unit: % (standard error)	2) Neighborhood mutual trust	60.7(4.1)	70.2(4.3)	56.0(3.9)	71.6(2.4)	76.4(3.5)
	3) Neighborhood mutual assistance	32.1(4.0)	45.2(4.1)	45.6(3.7)	47.2(3.3)	40.8(3.6)
	4) Satisfaction with the natural environment	68.3(3.4)	74.5(4.7)	75.8(4.4)	84.7(2.6)	77.1(2.9)
5) Walking practice rate Unit: % (standard error)		46.9(3.2)	55.6(4.1)	60.0(3.1)	56.5(2.9)	51.6(3.6)
6) Quality of life index (EQ-5D Index) Unit: point (standard error)		0.853(0.012)	0.833(0.012)	0.847(0.014)	0.806(0.014)	0.846(0.013)
7) Happiness index Unit: point (standard error)		6.0(0.2)	6.4(0.2)	5.8(0.2)	6.2(0.2)	7.1(0.2)

Source: KDCPA

The livability of the elderly above 64 in Dobong-du

		2013	2015	2017	2019	2021
1) Positive attitude towards the local social and physical environment Unit: % (standard error)	2) Neighborhood mutual trust	66.5(3.6)	58.8(3.6)	65.8(4.1)	57.6(3.2)	64.9(3.3)
	3) Neighborhood mutual assistance	37.2(3.1)	33.1(4.2)	44.2(4.2)	19.4(2.6)	29.7(3.3)
	4) Satisfaction with the natural environment	89.6(2.7)	76.7(3.1)	90.0(3.1)	82.6(2.5)	92.2(1.7)
5) Walking practice rate Unit: % (standard error)		51.5(3.4)	50.6(3.4)	48.4(3.3)	53.4(3.0)	49.1(2.2)
6) Quality of life index (EQ-5D Index) Unit: point (standard error)		0.850(0.013)	0.883(0.009)	0.868(0.011)	0.847(0.011)	0.843(0.011)
7) Happiness index Unit: point (standard error)		5.9(0.1)	6.3(0.2)	6.7(0.1)	6.7(0.1)	6.7(0.1)

Source: KDCPA

- 1) Positive attitude towards the local social and physical environment: (number of people who responded positively to the local social and physical environment / number of surveyed respondents) × 100
- 2) Neighborhood mutual trust: people in our neighborhood can trust and trust each other
- 3) Neighborhood mutual assistance: there is a tradition of giving and receiving help between residents when there is a congratulatory or condolence event in the neighborhood.
- 4) Satisfaction with the natural environment: satisfied with the natural environment (air quality, water quality, etc.) in our neighborhood
- 5) Walking practice rate: (Number of people who practiced walking for at least 30 minutes a day 5 days a week for the past 1 week / Number of survey respondents) × 100
- 6) Quality of Life Index: an index that combines the technical system of five dimensions of health-related quality of life (exercise ability, self-management, daily activities, pain/discomfort, anxiety/depression)
- 7) Happiness index: total happiness index / number of survey respondents

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