

A Study on the Need for Senior Playground Based on Evaluation of Universal Design Index

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(Background and Purpose) In Korea, a large number of elderly people are expected to dwell in apartments in the period ahead amid the nation's rapid transition to the aged society. However, the elderly facilities within the apartment are inefficient space that does not consider the convenience of users thus degrading the residential environment, and show limitations in accommodating the rapidly increasing elderly population due to aging. Therefore, the purpose of this study is to analyze the installation status and user behavior of playgrounds in apartment complexes through evaluation factors of universal design to derive necessary factors for expanding playgrounds for the elderly as well as children in preparation for the upcoming super-aged society. **(Method)** In this study, Nowon-gu, which had been found to have the highest distribution of elderly welfare facilities and children's play facilities within housing complexes among 25 autonomous districts of the Seoul metropolitan area, was targeted as the subject of the research. After the analysis of the universal design, elderly playground, and preceding studies, the necessary factors for the elderly playground were derived by typifying the characteristics of the universal design, elderly playground, and analyzed the identified characteristics from the perspective of universal design. **(Results)** Playground facilities within apartment complexes with a high proportion of the elderly are not safe enough for use due to the absence of countermeasures against physical risks in the selection of materials and are not easily accessible to the elderly. In addition, the lack of exercise equipment installed in such playground facilities and the aging of the equipment made it difficult to induce various actions of users. The difference in the types of information system, such as guidance on the use of facilities and the location, led to the lack of the elements that could provide clear information, thus resulting in the impediment to the communication with users about the facilities. **(Conclusions)** Although the apartments are dwelled mainly by the elderly, it is difficult to expect smooth use of the elderly facilities, such as senior citizen centers and exercise facilities, due to the aging and demolition of these facilities. Furthermore, the lack of the facilities in terms of quantity caused limitation to the accommodation of the elderly population that would increase in the future. In this study, the playgrounds, which had been relegated to the crime-prone area due to the aging of facilities within apartment complexes, smoking, and illegal disposal of wastes and therefore had no clearly specified groups of users, were designated as the elderly playgrounds with introduction of the facilities for the elderly and various programs, which raises the expectation for achievement of physical health of the elderly population that would increase in the period ahead through exercise and for the social promotion through the interchange among the elderly.

Keywords Aging Society, Senior, Apartment, Senior Playground, Universal Design

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유니버설디자인 지표 평가 기반 노인 놀이터 필요성에 관한 연구

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(연구배경 및 목적) 우리나라는 급증하는 고령화 사회와 맞물려 향후 많은 노인 인구가 아파트에 거주하게 될 전망이다. 그러나 대표적 주거형태라 할 수 있는 아파트 단지 내 노인시설은 이용자의 편의가 배려되지 않은 비효율적인 공간으로 주거환경을 저해하며, 고령화로 인해 급격히 증가하는 노인 인구를 수용하는 데 한계가 있다. 이에 본 연구는 아파트 단지 내 놀이터의 설치 현황과 이용자의 행태를 유니버설디자인의 평가요소를 통해 분석하여, 다가올 초고령사회에 대비하여 어린이뿐만 아니라 고령의 이용자 또한 운동 및 문화생활을 즐길 수 있는 노인 놀이터 확대의 필요성 요인을 도출하는 것을 목적으로 한다. **(연구방법)** 본 연구는 서울시 25개 자치구에서 주택단지 내에서 노인복지시설과 어린이놀이시설의 분포가 가장 높게 나타난 노원구를 연구 범위로 선정하였고 유니버설디자인과 노인 놀이터에 대해 이론적 고찰 과 선행연구를 통한 분석 후, 특징을 유형화하고 나타난 특성을 유니버설디자인 관점으로 분석하여 노인 놀이터의 필요성 요인을 도출하였다. **(결과)** 노인의 거주 비율이 높게 나타난 아파트 단지 내 놀이터의 시설물은 재료의 선택에 있어 물리적인 위험에 대한 대비책이 마련되지 않아 안전한 이용이 어렵고 놀이터까지의 이동구간 100m 내에 이용자의 휴식공간이 마련되지 않아 상대적으로 장시간 이동이 어려운 노인의 접근에 어려움이 있었다. 또한 운동기구의 설치 부족과 노후화로 인해 이용자의 다양한 행위 유도를 기대하기 어려웠으며 시설물 이용과 위치 안내와 같은 정보 체계의 종류가 상이하여 명확한 정보를 제공받을 수 있는 요소 부족으로 인해 사용자와 시설물의 소통에 어려움이 있는 것으로 나타났다. **(결론)** 아파트의 거주현황이 고령자 위주로 분포되어 있음에도 노인시설인 경로당, 운동 시설의 환경은 시설의 노후화와 철거 등의 문제로 인해 노인의 원활한 이용을 기대하기 어려우며, 시설의 수량 부족으로 인해 향후 증가할 고령인구의 수용에 있어 한계가 있다. 본 연구는 아파트 단지 내 시설물의 노후화 및 흡연 및 쓰레기 무단투기 등의 이유로 우범 지역으로 구성되어 명확한 이용 주체가 구분되고 있지 않은 놀이터에, 노인을 위한 시설 도입 및 다양한 프로그램이 동반된 노인 놀이터로 지정하여 향후 증가할 노년층에게 운동을 통한 육체적인 건강의 확보와 교류를 통한 사회적 촉진으로 삶의 질적 향상을 기대할 수 있다.

Keywords 고령화, 노인, 아파트, 노인 놀이터, 유니버설디자인

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1. Introduction

1.1 Background and Purpose of the Study

With the advancement of modern medical technology, the average life expectancy has been extended, allowing the elderly to lead super-aged lives. According to the United Nations(UN) standards on aging, Korea entered an aged-society in 2000, made transition to the aged society in 2017, and is expected to enter a super-aged society in 2025. Such rapid increase in the elderly population has led to changes in family structure. A close look at the types of elderly households reveals a significant change with the household consisting of the elderly living alone comprising 23.6%, the household co-habiting with the children comprising 23.7%, household comprised of the elderly married couples comprising 48.4%, and other elderly households comprising 4.4%, which suggests that more than 70% of the elderly households are made up of the elderly alone.(Park, 2020)

Korea has witnessed a fast increase in the elderly population as the baby boom generation joined the elderly group, and as a result, about half of the population is living in Seoul and the capital area, and about half of all households are dwelling in apartments. This means that many elderly will have to live in downtown, even in apartments, in the near future.(Song, 2015)

As the elderly population increases, the environment of living space should also consider the elderly. However, the common facilities within apartment complexes, the most typical type of housing in Korea, form an inefficient environment that does not reflect the needs of residents, and are degrading the residential and living environment. Furthermore, the unattended space within apartment complexes has a negative impact on the living environment of residential complex and is relegated to the crime-prone area, causing problems to the community. In ad-

dition, such unattended space can be misused for illegal disposal of wastes and potential criminal activities by juvenile delinquents, etc., thereby threatening the residential safety and affecting the living environment within the apartment complexes adversely. (Yang, & Moon, 2018)

As many different syndromes occurring in the elderly threaten the aged life and devastate the life, the space serves an important function in inducing the elderly to engage in healthy behaviors in order to ensure a healthy old age. Thus, this study was intended to derive the direction of improvement to turn the existing children-centric playgrounds into elderly playgrounds furnished with integrated facilities that could be used together with the elderly in preparation for the super-aged society amid the expectation for a steep increase in the elderly population by analyzing the current status of playgrounds installed within apartment complexes and the pattern of the behaviors of users from the aspect of universal design.

1.2 Scope and Method of Research

In this study, Nowon-gu, which had the highest distribution of elderly welfare facilities and children's play facilities within housing complexes among 25 autonomous districts of Seoul metropolitan area, was targeted as the subject of research. The methodology for this study was as follows: First, this study considered the definition of universal design, the lives of the elderly, the cases and types of the elderly playground, and related laws and regulations through theoretical examination. Second, this study examined the residence rate in the target area, and particularly, looked into the current status of external environment and the playground for the elderly within apartment complexes in the administrative sub-districts(administrative dong) which showed significant difference in the residence rate between the elderly aged 35 or older

and the children under the age of 13 or less. Third, this study derived the characteristics of the playgrounds within apartment complexes by analyzing the current state of use of the playgrounds within apartment complexes. Fourth, this study categorizes the characteristics of the playground within the apartment complexes, which were identified through the analysis, and analyzed such characteristics from the standpoint of universal design to derive the necessity factors for the elderly playground.

2. Universal Design and Senior Playground

2.1 Universal Design Definition

Universal design means the environment that can be conveniently used by all people without need for special assistance in order to realize both human dignity and equality, and aims to make life comfortable for everyone.

<Table 1> Universal Design and Barrier-Free Park Guideline

Gyeonggi-do Universal Design Guideline : Definition and consideration of the elderly
<ul style="list-style-type: none"> Those who have difficulty walking on their own due to aging or who have impaired visual and auditory functions, such as arthritis, are equally considerate of those who have impaired vision and hearing, and maintain the environment from a comprehensive perspective. Pedestrian walkways are finished with non-sliding materials and rest areas are installed at intervals of 100 meters on pedestrian paths. Considering the use of cane or walking aids, spatial consideration such as width and width is required. When planning a guide sign, consider the size or brightness of the text and lighting plan so that objects can be clearly distinguished. Older people's frequent crosswalks provide sufficient time to cross.
Seoul Metropolitan Government Universal Design Guideline : Consideration for the elderly in the playground
<ul style="list-style-type: none"> Playgrounds belong to rest areas in parks and squares, considering exercise spaces for pregnant women, the elderly, and the disabled.
Seoul Metropolitan Government Barrier-Free Park Guideline : Facilities for the Elderly
<ul style="list-style-type: none"> Composed of complex facilities that induce voluntary participation.

- Considering the use of various ages, not only physical training, but also the rehabilitation of elderly people who are unable to move freely.

Sources: Gyeonggi-do Design Promotion Team, (2011, April). Gyeonggi-do Universal Design Guideline. p21, Seoul Metropolitan Government Design Policy Division of Cultural Headquarters, (2017, August 31). Seoul Metropolitan Government Universal Design Integration Guidelines p.136, Seoul Metropolitan Government Department of Park Greening in the Blue City Bureau, (2015, September 7). Seoul Metropolitan Government Barrier-Free Park Guidelines. p.56, Reconfiguration¹⁾

The considerations for the elderly, explained in the guideline from the universal perspective, are as follows (Table 1 Reference) The Universal Design Guideline of Gyeonggi-do suggests improvement of the welfare for the elderly based on enhancement of environment for pedestrian paths, rest areas, space considerations, guide signs, lighting plans, and crosswalks (pedestrian crossings). The Universal Design Guideline of Seoul City suggests the installation of rest area and exercise space for the elderly within the playground. Meanwhile, the barrier-free friendly park guideline of Seoul City suggests the installation of complex facilities, physical training and rehabilitation assistance facilities that can induce various movements for smooth and uninterrupted use of the park by the elderly.

2.2 Active Senior

The New Senior Generation has 3 keywords, i.e., the ego, nostalgia, and youth, and represents the group of people who were in their 20s during the 1960s and 1970s. They were the first generation that enjoyed new culture from the West, and were the first generation that relished the cultural openness and travel liberalization in the 1980s. New Senior Generation plays a role in driving up the consumption while maintaining health. This generation is called the New Senior or Active Smart Silver Generation. However, such terminology is not an academically established terminology, and this generation is often

called 'Active Seniors' academically. The term, 'the elderly', usually refers to those over the age of 65, and anyone becomes an elderly person as they age. Meanwhile, 'active senior' is a different concept, referring to the generation who shows initiative in choosing the way of their lives. They were born around the 1950s and are currently in their 50s and 60s. They have clear financial ability and values, and are energetic in terms of both physical ability and financial aspect. Recently, they are called TONK(Two Only No Kids) people, a term which refers to the generation of the elderly who steer clear of social and economic activities and enjoy private life of their own.(Ko, 2018)

2.3 A Case Study on the Senior Playground

Among the elderly playgrounds across the nation are included the 'Korea's First Elderly Playground', which was formed as a free-barrier facility with easy accessibility and convenience to ensure convenient use by the elderly. Unlike ordinary sports facilities that concentrate on muscular strength, the 'Korea's First Elderly Playground' is furnished with the equipment that helps improve physical flexibility and sense of balance with a focus on the safety of the elderly.(Kim, Yoon, & Lee, 2021)In overseas countries, elderly playgrounds refer to an outdoor activity space for the elderly, which promotes healthy aging, and are located in easily accessible place, serving the functions for safe use, health promotion, and social exchange.(Table 2 Reference)

Elderly playground means the playground for exclusive use by the elderly. Unlike children, the elderly need the static play equipment, rather than active play equipment requiring agile strength, and the exercise equipment for improvement of physical flexibility and muscular strength due to the musculoskeletal degeneration, and also need the stationary bicycles, cross

trainers, sit-up machines, and treadmills. Moreover, the elderly playground, the gathering place for the group of same age, helps improve the health, naturally forms a community, and expands the living space from the residential space to the outdoors.(Ko, & Choi, 2018)

<Table 2> Examples of playgrounds for senior citizens abroad

Nation (Year)	Type	Only for the Senior	Characteristics
China (1995)	Park type	△	<ul style="list-style-type: none"> Starting with how to encourage physical fitness programs, cultural and physical activities mainly for the elderly. After law enforcement, all parks across the country are integrated for citizens to use.
Germany (2007)	Park type	○	<ul style="list-style-type: none"> Only users over 65 years of age can use the equipment. All equipment is built in consideration of people who are over 1.5 meters tall. The total cost is 20,000, which is about a quarter to a fifth of the cost of children's playgrounds.
United Kingdom (2010)	Utilize existing parks	△	<ul style="list-style-type: none"> Apply Universal Design. Not available for children. Smooth exercise induces patients to recover from surgery and injury.
Australia (2010)	Utilize existing parks	△	<ul style="list-style-type: none"> The main user is the elderly. Adding an elderly playground to an existing children's playground.
New Zealand (2011)	Park type	△	<ul style="list-style-type: none"> Comprehensive playground for older adults and children. Designed by physical therapists to improve balance and muscle strength in older adults. Use wood as the main ingredient to create in harmony with the natural environment.
United States (2011)	Park type	×	<ul style="list-style-type: none"> Apply Universal Design. Not only does it improve physical health, but it also enables older people who are disconnected from society to contact more people.

Sources: Kim, Jiyeon, & Yoon, Heejin, & Lee, Taegyeom, (2021). A Study on Guidelines for the Introduction and Establishment of a Playground for the Elderly in Korea. p.17, Ko, MinJeong, & Choi Heesu, (2018). A Study on the Global Playground for the Elderly Focusing on the current status and history of the establishment of playgrounds for senior citizens overseas. p.3-4, Reconfiguration²⁾

2.4 Regulations on Senior Playgrounds

Various policy debates have been unfolded through the 'Senior Contents Forum' that convened in the National Assembly in 2020, starting

with the discussion on the 'elderly playground', the space for outdoor exercises and cultural life promotion for the elderly, and in May 12, 2021, a bill for partial revision of the Welfare Act for the Aged, which includes the elderly playground in the elderly leisure welfare facilities, was proposed. (Table 3 Reference)

<Table 3> History of change and reorganization of welfare facilities for senior citizens by year

Year	Content
1996	According to the provisions of Article 18 of the Statistics Act, Authorization of statistics by the Director of Statistics.
1996	Preparation of the status of welfare facilities for the elderly, residential welfare facilities for the elderly, leisure welfare facilities for the elderly, welfare facilities for the elderly, etc.
2004	Added status of institutions specializing in protecting the elderly.
2008	The addition of elderly joint living families in residential welfare facilities for senior citizens, The addition of elderly care workers living in elderly medical welfare facilities, Addition of Visiting Bath Service for the Welfare of the Elderly.
2010	Added old age support services for old age welfare facilities with old age support services.
2011	the deletion of hospitals for senior citizens in senior citizens' medical welfare facilities, Deletion of senior citizens' recreation centers in senior citizens' leisure welfare facilities.
2013	Added status of senior job support institutions.
2018	In addition, the status of visiting nursing services at welfare facilities for senior citizens, Added status of long-term care institutions dedicated to dementia, Additional status of those who have completed dementia education.
2019	Added status of shelters dedicated to senior citizens affected by abuse
2019	Added status of welfare tools support service in welfare facilities for the elderly
2021	Added playground for senior citizens to welfare facilities for senior citizens' playgrounds

Sources: Kim, Jiyeon, & Yoon, Heejin, & Lee, Taegyeom, (2021). A Study on Guidelines for the Introduction and Establishment of a Playground for the Elderly in Korea. p.3, Reconfiguration³⁾

As the need for the play-type playground for the elderly has been also raised in Korea, several local governments have also begun to create elderly playgrounds in parks used frequently by the elderly and easily accessible to the elderly. Furthermore, the need for the elderly playground has been brought to the fore as part of the welfare policy for the elderly amid the aging of

the society. (Kim, Yoon, & Lee, 2021)

3. Case Study

3.1 Distribution Status of Playgrounds and Senior Facilities

Nowon-gu was found to have the highest distribution of children's play facilities and elderly leisure welfare facilities among 25 autonomous districts of Seoul metropolitan area. Among them, the children play facilities within apartment complexes numbered a total of 476, which approximately doubled the number of 246 welfare leisure welfare facilities within apartment complexes. (Table 4 Reference)

<Table 4> Status of distribution of children's play facilities and leisure welfare facilities for the elderly in Nowon-gu

Administrative Dong	Playground	Senior facility
Wolgye-dong	84	47
Gongneung-dong	78	43
Hagye-dong	45	18
Junggye-dong	105	50
Sanggye-dong	164	88
Total	476	246

Sources: Ministry of the Interior and Safety, Children's Play Facility Safety Management System Children's Play Facility Status, Nowon-gu Office, (2021, June 22). Guidelines for Senior Citizens' Welfare Facilities, Reconfiguration⁴⁾

Thus, the age of the residents in each sub-district (administrative dong), who were aged 65 or older and aged 13 or younger, was examined to determine whether the age of the residents was reflected in the distribution of the play grounds and elderly facilities installed throughout Nowon-gu. The results showed that the elderly resident population, aged 65 or older, was approximately twice bigger than the population of the children aged 13 or younger, and particularly, that the proportion of the elderly resident population in Junggye 2 and 3-dong was roughly 3 times larger than the resident population of children. (Table 5 Reference)

<Table 5> The current status of population comparison between 65 and 13 years of age by Dong-gu, Nowon-gu

Administrative Dong		Senior	Children
Wolgye -dong	Wolgye -1dong	4,159	1,724
	Wolgye -2dong	5,849	2,418
	Wolgye -3dong	6,041	2,051
Gong neung -dong	Gongneung -1dong	6,428	3,051
	Gongneung -2dong	5,274	4,397
Hagye -dong	Hagye -1dong	4,433	2,013
	Hagye -2dong	3,176	2,552
Junggye -dong	Junggye -bondong	2,522	3,196
	Junggye -1dong	2,334	4,159
	Junggye -4dong	3,989	1,882
	Junggye -2,3dong	7,303	2,982
Sanggye -dong	Sanggye -1dong	6,870	3,454
	Sanggye -2dong	3,317	1,517
	Sanggye -3,4dong	6,079	2,072
	Sanggye -5dong	4,951	1,731
	Sanggye -6,7dong	4,989	3,448
	Sanggye -8dong	2,853	3,111
	Sanggye -9dong	3,420	2,023
	Sanggye -10dong	2,634	1,856
	Sum	86,621	49,637
Total		136,258	

Sources: Nowon-gu Office, (2021, July 2). Population status of resident registration as of the end of June 2021, Reconfiguration⁵⁾

Therefore, current status of the elderly facilities in Junggye 2 and 3-dong were surveyed during the afternoon hours of weekday with high floating population. The results showed that there were a total of 10 elderly facilities within apartment complexes, which was about 3 times lower as compared to the distribution of playgrounds numbering 36. The area of the elderly facilities within apartment complexes was found to stand at 1,722.6m², which was about 7 times

as small as the area of playground measuring a total of 11,905.436m². (Table 6 Reference)




<Table 6> Status of distribution of elderly facilities and playgrounds in apartment complexes in Junggye-dong 2 and 3-dong

Apartment	Senior facility (1,722.6m ²)	Playground (11,905.436m ²)
	Opening Place	Opening Place
A:Jugong Complex 1	2	1
B:Gunyoung	1	1
C:Magnolia Complex 3	1	8
D:Central Aqua Heights	0	0
E:Cotton Complex 4	2	4
F:Rainbow Complex 2	1	7
G:Green	1	9
H:Gyeongnam	1	2
J: Sanga		1
I:Lotte	1	3
Total	10	36

The site survey indicated that there were 3 types of problems in the elderly facilities within the apartment complexes of Junggye 2 and 3-dong. After demolition of senior citizen center, these elderly facilities were left unattended without particular measures, which resulted in the generation of idle tracts of land, and as a result, were relegated to the smoking space of adolescents. Furthermore, the senior citizen center, occupying a narrow area, was split for use within the 2 apartment complexes, and was temporarily closed.(Table 7 Reference) Despite the difficulty in using these facilities, there was external environment for the elderly, which was utilized. Such external environment for the elderly was located at the center of the apartment complex and remained open, and tended to be concentrated in the place furnished with resting facilities. Particularly, the place with smooth influx of the elderly population was equipped with

the exercise facilities for the elderly. Unlike the inactive type of activities on the bench and pavilion, such places were found to induce the elderly to take initiative in using the exercise facilities or to engage in social exchange with other elderly people.

<Table 7> Problems of Elderly Facilities

Idle space, Smoking	Use Split	Temporary closure
		

3.2 Analysis on the Use of Playgrounds in Apartment Complex

The playgrounds, excluding the 18 playgrounds with moderate rate of utilization, showed 3 characteristics based on the results of the analysis of the current status of use of the playgrounds in Junggye 2 and 3-dong, surveyed at the sites during the afternoon hours of weekdays, which coincided with the time for the children to go home from school and raised the expectation for high utilization rate of playgrounds.(Table 8 Reference) In the C1, C2,

<Table 8> An Analysis of the Use of Playgrounds in Apartment Complexes in Junggye-dong 2 and 3-dong

●Elderly Stronghold ●Apartment Complex ●Playground ■Senior facility



●Very High ○High ◐Ordinary ○Low ○Very Low					
Play ground		Floatin g Popu lation	Utili zation rate	User	Characteristics
A	A1	●	◐	children , Senior	a nature trail
B	B1	○	◐		Smoking, aging of facilities
C	C1	●	●	children	Resting and exercising

				Senior children , Senior	for the elderly
	C2	●	●		Children's use, elderly movement.
	C3	●	●	Senior	Natural utilization
	C4	○	○		Removal of rest facilities
	C5	●	○		Smoking
	C6	●	○		located on the outside
	C7	●	●	Senior	
	C8	○	●	children	Adjacent to the promen
E	E1	○	○	Senior	Barrier-Free Playground
	E2	●	●	children	Barrier-Free Playground
	E3	●	●	children , Senior	Location of Senior Park
	E4	○	○		Smoking, aging of facilities
F	F1	○	○		Smoking, aging of facilities
	F2	●	●	children	Removal of rest facilities
	F3	●	●	children	Removal of rest facilities
	F4	●	●		
	F5	●	○		Smoking, aging of facilities
	F6	●	○		Smoking, aging of facilities
	F7	●	○		Removal of rest facilities
G	G1	●	●	children	
	G2	●	●	children	Elementary school ahead
	G3	⊙	●		Removal of rest facilities
	G4	⊙	●	children	Smoking
	G5	⊙	○		Removal of rest facilities
	G6	○	○		Switch to Parking Lot
	G7	⊙	○		Smoking, aging of facilities
	G8	●	●		
	G9	●	●		
H	H1	●	●	children	
	H2	○	○		Located next to a senior center
I	I1	●	●	children , Senior	Located next to a senior center
	I2	●	●		
	I3	●	●	children	Next to kindergarten
J	J1	○	○		Smoking, illegal dumping of garbage.

and E3, which showed the highest rate of utilization on the rating scale corresponding to 'very high', 3 places were overlapped with 7 places indicated as the base for the elderly in

the map of <Table 8>, and main users were the elderly and children. In particular, both facilities for children and facilities for the elderly were provided within the playground, so that all users were using the facilities conveniently. Second, B1, C4, C5, C6, E1, E4, F1 F5, F6, F7, G5, G7, H2, which showed the rate of playground utilization on the rating scale corresponding to 'low', revealed the characteristics that they were located at the periphery of apartment complexes or were used as the smoking space and had the outdated facilities. Finally, the G6, J1, which had the lowest rate of utilization, were relegated to parking lots or were located next to an unattended building that had not been demolished, thus serving as a space for smoking by juvenile delinquents or illegal disposal of wastes, and consequently, showed the tendencies of crime-prone area. The number of elderly residents in Junggye 2 and 3-dong stood at 7,303, which was about 3 times larger than the population of children, and therefore, the C1, C2, E3 playgrounds with high rate of utilization by the elderly, had limitation in accommodating large number of persons based on the high rate of elderly residents within the apartment complexes. Hence, the playgrounds with users not clearly indicated and the playgrounds prone to crimes need to make preparation to accommodate the elderly in consideration of the high proportion of the elderly residents, and for that, the evaluation based on the universal design index would be important.

3.3 Universal Design Evaluation Standards for Playgrounds

The four principles of universal design are the design with high functional support, the acceptable design, the accessible design, and the safe design, as classified in the United States during the 1980s, and were specified by 9 experts, including Cornell and Ronald Mace, in 1988 based

on such underlying principles. The 7 principles of universal design that could be applied to enhance the products and the surrounding environment were re-established. In addition, Kim Ji-Yeon and 2 others derived the keywords of autonomous selection, physical activity, easy understanding, social support, safety, aesthetics and comfort, information, accessibility, and walking convenience for introduction of the elderly playground into Korea, and based on that, proposed the guideline for creation of an elderly playground. Oh Chan-Ok applied 4 universal design keywords of safety, accessibility, supportability, and flexibility to evaluate the application of universal design to the indoor and outdoor complex environments of small apartments and unit houses. The keywords, derived in the 3 preceding studies, are presented in <Table 9>.

<Table 9> Derive universal design evaluation keywords

Author	Title and Year	Keywords
Kim, Jiyeon, Yoon, Heejin, Lee, Taegyom	A Study on Guidelines for the Introduction and Establishment of a Playground for the Elderly in Korea(2021)	Autonomous selection/social support/physical activity/variability/safety/accessibility/aesthetic/comfort/information/walking convenience
Oh, Chan-Ok	A Case Study on the Evaluation of Small-Sized Apartment Houses in aspects of Universal Design(2013)	accessibility/support/safety/flexibility
Ronald Mace and nine others	Seven Principles of Universal Design (1988)	fair use/user flexibility/simple and intuitive use/acceptance of easily recognizable information/error/small physical effort/access and space for use

Therefore, keywords of safety, accessibility, and supportability were derived based on preceding studies. Safety' is based on the selection of safe materials for protection of the elderly vulnerable to physical hazards such as bruises, the arrangement of playgrounds in light of non-physical hazards such as traffic noise, and

the installation of rest facilities that can provide protection from the prolonged exposure to sun–light, and formation or non–formation of open environment enabling the request for expeditious rescue in case of emergency.

<Table 10> Standards for evaluation of playgrounds in apartment complexes in Junggye–dong 2 and 3–dong

Evaluation target		
Utilization rate	Playground	
Low	B1 / C4 / C5 / C6 / E1 / E4 / F1 / F5 / F6 / F7 / G5 / G7 / H2	
Very High	C1 / C2 / E3	
Very Low	G6 / J1	
Evaluation item		
Safety	Safety against physical hazards	Facility closing status Flooring closing status
	Safety against non-physical hazards	Whether to create a rest facility
		Parking lot adjacent status
		Vehicle road adjacent status
	Openness to request rescue in case of an emergency	Distance from the center of the apartment complex
		floating population
Accessi- bility	Adjacent facility status	Senior citizen center entrance to an apartment complex
	Creating a safe walking environment	Whether rest facilities are arranged every 100 meters of travel
		Obstacle placement status every 100 m of travel interval
Support ability	the installation of exercise equipment	Free up exercise space
		At least 4 instruments for exercise
	Establishment of rest facilities	Deterioration of rest facilities
		Public Toilet Adjacent Status
	Information on usage	Facility use guide Location Guidance

'Accessibility' is based on the formation or non–formation of shelter such as the resting facility within the pedestrian environment in view of the elderly who are close to senior citizen

centers or who have difficulty in moving for a long time. 'Supportability' is based on the installation or non–installation of exercise facilities that help improve health of the elderly when they visit the playgrounds for the elderly, the installation of rest facilities and public toilets where the elderly can take sufficient relaxation, and the availability of the information that elderly can easily understand and use when utilizing concerned facilities. Therefore, we intended to substitute the evaluation criteria of <Table 10> in the order of low, very high, and very low for analysis according to the distribution of the 3 types of characteristics revealed through analysis of the current status of utilization as shown in <Table 8>.

4. Case Study of Playground in Apartment Complex

4.1 Characteristics of Playground in Apartment Complex in Junggye 2–dong 3–dong

The 13 playgrounds with the rate of utilization on the scale corresponding to 'low' had the outdated facilities or and showed low rate of the use of shock–absorbing materials in the floor materials, causing the physical hazards such as fall accident, and had low safety against the non–physical hazards such as noise, given that the playgrounds adjoined the parking lots and vehicle roads, as shown in <Table 11>. Moreover, the distance from the center of the complexes was large while there was a small floating population, which would make it difficult to respond quickly in case of emergency that might occur unexpectedly. As for the accessibility, those playgrounds were located close to the entrance of the apartment complexes, but there was no relaxation space between each point spaced 100 m apart in the moving section. Or, the area was small, and the facilities

<Table 11> Evaluation of Playground in Apartment Complex in Junggye 2-dong 3-dong

Evaluation item			Playground Utilization Rate																		
			Low														Very High			Very Low	
			B1	C4	C5	C6	E1	E4	F1	F5	F6	F7	G5	G7	H2	C1	C2	E3	G6	J1	
Safety	Safety against physical hazards	Facility closing status	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	
		Flooring closing status	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	
	Safety against non-physical hazards	Whether to create a rest facility	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	
		Parking lot adjacent status	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	
		Vehicle road adjacent status	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>
	Openness to request rescue in case of an emergency	Distance from the center of the apartment complex	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	
		floating population	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	
Accessibility	Adjacent facility status	Senior citizen center	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>		
		entrance to an apartment complex	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>		
	Creating a safe walking environment	Whether rest facilities are arranged every 100 meters of travel	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>		
		Obstacle placement status every 100 m of travel interval	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>		
Supportability	the installation of exercise equipment	Free up exercise space	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>		
		At least 4 instruments for exercise	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>			
	Establishment of rest facilities	Deterioration of rest facilities	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>			
		Public Toilet Adjacent Status	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>			
	Information on usage	Facility use guide	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>		
		Location Guidance	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>	<div><div></div></div>			

were outdated and even those facilities were used as the smoking place of residents. Furthermore, it was found that the utilization rate of facilities was significantly low due to insufficient space for exercise and inadequate quantity of the equipment within the playground, and the large distance from public toilets hindered the creation of the environment for the elderly to relieve themselves. Additionally, it was found that there was no guide system associated with utilization of playground facilities or that it was difficult to obtain clear guidance on utilization of the facilities due to the aging of the facilities. There was no facility that offered guidance on the location information of playground, making it difficult for unspecific visitors to use the playground.

The 3 playgrounds with the rate of utilization on the scale corresponding to a 'very high' were found to be safe from physical hazards as they used safe materials such as shock-absorbing mats for the surface finish and floor of the facilities. In addition, those playgrounds were spaced apart from parking lot and vehicle road by optimal clearance, ensuring the safety against non-physical hazards such as smoke and vehicle noise. As the area had a large floating population, an open environment was created, enabling the request of expeditious rescue in case of emergency. Moreover, there are few obstacles within 100m of the path into the playground because each playground adjoined the entrance to the complexes. As the rest facilities, such as

benches and pavilions, were arranged, the accessibility to the playground remained high. The separate space for exercise was arranged in the playground, and the exercise facilities of more than 4 units or types were provided, along with detailed information, thus allowing the elderly to use the facilities without disruption.

Finally, the 2 playgrounds with the rate of utilization on the scale corresponding to 'very low' were built without any consideration of the materials for surface finish and floor of the facilities, and adjoined the parking lot, making those playgrounds vulnerable to both physical and non-physical hazards. Moreover, no separate space or facility was available for exercise, and it was found that the playgrounds were the outdated space not used by the elderly and the children, the main users, who showed high residence ratio. Those playgrounds tended to be avoided even by residents of apartment complexes because the playgrounds were used as a space for smoking by juvenile delinquents and illegal disposal of wastes.

4.2 Sub-Conclusion

It was found that the safety of facilities against physical hazards, such as fall accidents, abrasion, and non-physical hazards, such as traffic noise and prolonged exposure to sunlight, was an important factor in the course of the utilization of facilities for the elderly. Most playgrounds lacked the universal design elements, such as overall safety, accessibility, and supportability, due to insufficient facilities, which is expected to cause comprehensive difficulty with the utilization of playground by the elderly. Furthermore, resting facilities, such as benches and pavilions, should be installed between each point within 100m along the section of movement towards the playground in order to ensure pedestrian safety for the elderly who have difficulty in moving for a long time. However, rest

areas near the playgrounds were found to be used as the space for smoking and parking of bicycles and two-wheeled vehicles, which hindered the visit by the elderly to the playgrounds. Meanwhile, the playgrounds with high rate of utilization by the elderly can be positively evaluated as they were furnished with the exercise equipment and rest facilities for exclusive of the elderly within the playgrounds. However, the usability of those parking lots remains low due to the aging of the facilities, lack of quantity, and installation of different facilities. Furthermore, the different way of providing the information caused limitation to the supportability of the guidance on the use of the facilities by the elderly. Thus, it would be necessary to strengthen the safety and functionality and provide uniform accessibility for each type of playgrounds in order to ensure resolution of aforesaid issues and promote effective use of the playgrounds by the elderly, and it would be necessary to designate the elderly playgrounds premised on universal design.

5. Discussion

In Korea, approximately half of the nation's population resides in Seoul and capital area, and about half of all households are dwelling in apartments. Amid the steep increase in the aging population, many elderly people are expected to live in apartments in downtown in the near future. However, despite the fact that the apartments are inhabited mainly by the elderly, the environment of senior citizen centers and sports facilities, which are the facilities for the elderly, is difficult to lead to smooth use by the elderly for reason of the problems such as aging and demolition of the facilities, and furthermore, there is limitation in accommodating the elderly population, which will increase in the period

ahead, due to the lack of quantity of facilities. As a result of such problems, the elderly who became migrants within the residential area were found to be using the resting facilities such as benches and pavilions. However, the environment, which could induce the actions that might enhance the physical ability, was not formed due to aging and situation where comfortable environment was difficult to be provided as a result of the deterioration caused by mismanagement and limitation of available area. Even such space was relegated to the area for smoking and illegal disposal of wastes, which made it difficult to guarantee the right to leisure activities and the right to take a rest. In this study, therefore, the elderly playgrounds were designated for introduction of the facilities and various programs for the elderly, raising the expectations for the elderly to achieve physical health through exercise and to engage in social life more actively through interchange, leading to qualitative improvement of life, regarding the playgrounds that were relegated to crime-prone area and did not have clear category of users due to aging of facilities, smoking, and illegal disposal of wastes within apartment complexes.

Although exercise and appropriate diet are the main components of preventive medicine, it is difficult to find a place where the elderly can exercise appropriately, except for a walk in a park. The elderly playground in the downtown will be significantly helpful for the elderly to improve their physical health, and based on that, even achieve emotional health, and counter-measures will need to be prepared for the elderly population that will increase in the period ahead.

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