

Protection Convergence

2020 5(2)

<Index>

1. A Study on the CHANGE in Plants of the Wind Power Complex in Mt. Hyeonjong.
/ **Changjun Kim, Hyangju Lee, Wonhyeon Lim**
2. Government Roles in Policy Networks against COVID-19: Comparing Two Cases in S. Korea.
/ **Dongwon Kim**
3. SELF-PROTECTION Sport: An Analysis of the Connection between the Experience of Winning a Competition and the Experience of Being Selected as a Representative Player of Middle and High School and College Judo Players.
/ **Sunggu Jo, Jusik Park, Byeongchan Kim**
4. A Comparative Study on the Operation Status and Users' Perceptions of URBAN GARDEN FIELDS.
/ **Eyesoo Youn, Wookwang Cheon, Wonhyeon Lim**
5. Differences in PROTECTION for Sports Im-agery Ability of High School Taekwondo Breaking Athletes.
/ **Jongsoo Kim, Sunjang Lee, Jusik Park**
6. The PROTECTIVE Effect of White Beech Mushroom(Hypsizygus Marmoreus) Extract against Atopic Dermatitis Skin Lesion Model using NC/Nga Mice.
/ **Jongwon Woo, Boksil Hong, Sanghyun Ahn**
7. Learning Attitude to an CONVERGENCE Evaluation Method for Fundamental Nursing Practice Education, Self-Leadership and Academic Self-Efficacy in Nursing Students.
/ **Yeonghee Kim**
8. Exploring the Experience of Job CONVERGENCE Change in the Beauty and Health Industry Using Grounded Theory.
/ **Heejung We, Jaebum Lee, Eunjoo Kim**
9. Analysis of Perception of Naturopathy CONVERGENCE and Utilization Satisfaction Perceived by Skin Beauty Industry Workers.
/ **Taesung Kim, Jaebum Lee**
10. Effects of the Integrativ Play THERAPEUTIC COUNSELING Program on the Depression of the Elderly.
/ **Younghee Cha**

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Publisher: J-INSTITUTE
ISSN: 2426-1151

Website: www.j-institute.jp/protection/

Editor: protection@j-institute.jp

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dx.doi.org/10.22471/protective.2020.5.2.01

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A Study on the CHANGE in Plants of the Wind Power Complex in Mt. Hyeonjong

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Abstract

Purpose: To identify the changes in plants before, during, and after the wind farm construction in Mt. Hyeonjong, we investigated the number of plant species. And we studied the main characteristics of the distribution status in plants' family composition, plant life form analysis, Korean endemic plant, rare plant, specific plants by phytogeography, naturalized plant, and invasive alien plants. We compared this data to confirm the change before or after the wind farm construction.

Method: We conducted the plants' form research 16times in five years. Before the wind farm construction(2014 and 2015), during the wind farm construction(2017 and 2018), and after the wind farm construction(2019). Plants' changes were analyzed based on the results obtained through field trips. According to the national standard plant list, we listed plant names and scientific names(the Korea national arboretum & the plant taxonomic society of Korea 2015). We arranged the classification groups according to the Engler system. Based on the created plants' list, the Korean endemic plant, rare plant, specific plants by phytogeography, naturalized plant, and invasive alien plants were extracted and analyzed.

Results: The vascular plants decreased compared to before wind farm construction. Compositae was the most common category in plants' family composition. Korean endemic plants decreased from 3 species before the construction to 2 species after the construction. Rare plants were investigated 4 species of Vulnerable species(VU) and 2 species of Least Concerned species(LC). Specific plants by phytogeography were surveyed the same as a total of 13 species. Naturalized plants decreased from 33 species to 20 species and 26 species. Then, they increased again.

Conclusion: As a result of this study, the total plant species, Korean endemic plant, and rare plant growing were reduced in the wind farm section in Mt. Hyeonjong. However, many Naturalized plants and 1 and 2 years old herbage appeared in the area. So we found out that ecological stability was not yet stable, and the disturbance was continuing. In this study, the investigation period after wind farm construction is one year, which is a short time to observe and analyze plants' succession state, and a follow-up study to examine the growth characteristics of plants more closely is needed.

[Keywords] Mt. Hyeonjong, Vascular Plants, Endemic Plants, Rare Plants, Naturalized Plants

1. Introduction

The natural ecosystem comprises biological elements such as animals and plants and abiotic factors such as topography, soil, and climate. It maintains harmony and balance through interaction[1][2].

However, increases in population and industrial facilities due to urbanization and industrialization have accelerated environmental pollution and climate change [3][4], reducing biodiversity

by degrading and destroying the natural ecosystem[5][6]. We use plants for various purposes such as edible, medicinal, and lumber, enabling humans' survival. Plants' importance is increasing day by day as they have numerous genetic information[7][8][9][10]. However, it is not easy to obtain useful genetic information because plants are affected by the climate and soil environment where they grow. Therefore, if you know plants' growth and reproduction characteristics, you can confirm the ecosystem's phenotype[11][12][13][14]. If the research and investigation are carried out continuously, you will know the plant system's changes. This research site is located in the wind farm section in Mt. Hyeonjong and its vicinity. Mt. Hyeonjong(416.7m) is situated in Mangyang-Ri, Kiseong-Myeon, Uljin-Gun, Gyeongsangbuk-Do by administrative district, and Deoksin-Ri, Maehwa-Myeon, Uljin-Gun. Mt. Hyeonjong was a region where disturbances occurred due to a forest fire in 2007.

The research on the plants of Mt. Hyeonjong was instituted by Jung KY and Park MS(2007), examining 67 families, 176 genera, 204 species, 2 subspecies, 26 varieties, 2 forma, a total of 234 species. Lee SH, Shin SH, and Kim DB(2014) reported that there were 81 families, 188 genera, 238 species, 2 subspecies, 22 varieties, 2 forma, a total of 264 species, and argued that monitoring is needed to check the plant distribution and changes in plants due to forest fires[15][16]. Therefore, this study aims to provide necessary data for vegetation management by identifying plants' changes before, during, and after the wind farm construction in Mt. Hyeonjong.

2. Methods

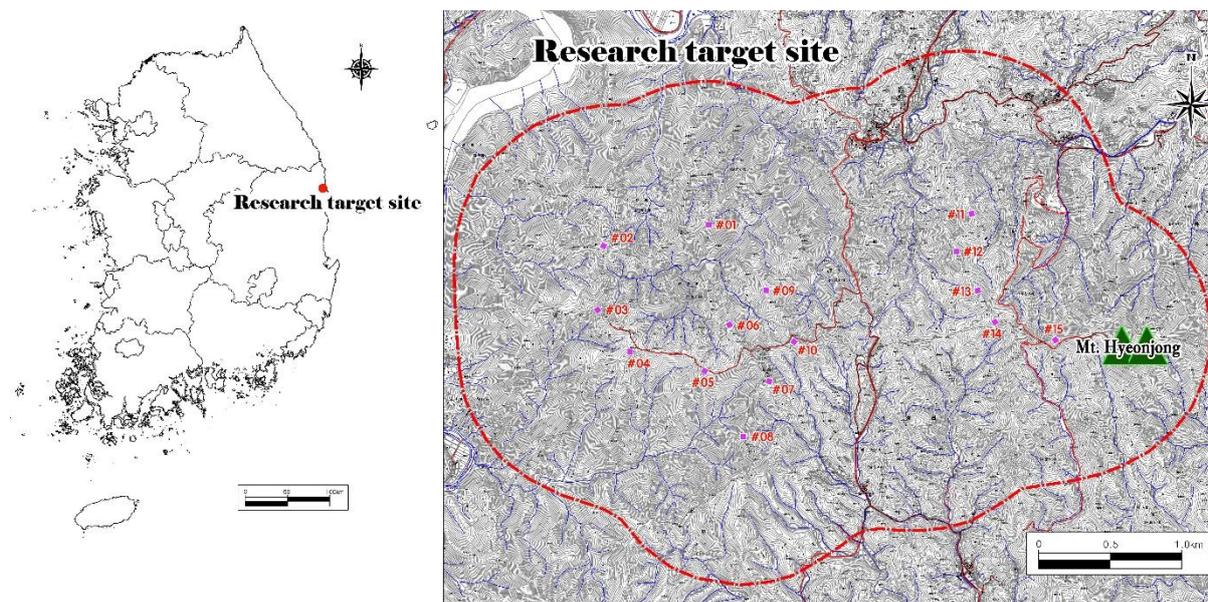
2.1. Gathering data

Mt. Hyeonjong is a 416.7-meter-high mountain and belongs to the Mangyang-Ri area and the Deoksin-Ri area in the administrative district. In 2007, a forest fire burned down 30ha of the forest. Most of the trees were felled, and shrubs were planted in there. This study's subject is the construction site of a wind farm in Mt. Hyeonjong, and the study's range is 1km on both sides of the site. We conducted this research for five years - Before the wind farm construction(2014 and 2015), during the wind farm construction(2017 and 2018), and after the wind farm construction(2019) <Table 1> or <Figure 1>.

Table 1. Date of investigation.

Years	Investigate	Month/day
Before	2014	11/19, 11/20
	2015	5/28, 5/29, 8/31, 9/1, 11/19
Middle	2017	6/21, 9/20, 12/7
	2018	3/14, 6/20, 9/6, 9/27, 11/19
After	2019	2/7, 5/28, 10/16, 10/17

Figure 1. The map showing investigated area.



2.2. Data analysis

This research is a fundamental study to understand the plants' form changes before, during, and after the wind farm construction in Mt. Hyeonjong. We analyzed the plants' survey data based on the results obtained through field trips. According to the national standard plant list, we listed plant names and scientific names (the Korea national arboretum & the plant taxonomic society of Korea 2015) [17]. We arranged the classification groups according to the Engler system.

Based on the created plants' list, the Korean endemic plant (Korea Forest Service 2012), rare plant (Korea Forest Service 2012), specific plants by phytogeography (Ministry of Environment 2012), naturalized plant [18], and invasive alien plants (Ministry of Environment 2020) [19], were extracted and analyzed.

3. Results & Discussion

3.1. Vascular plants

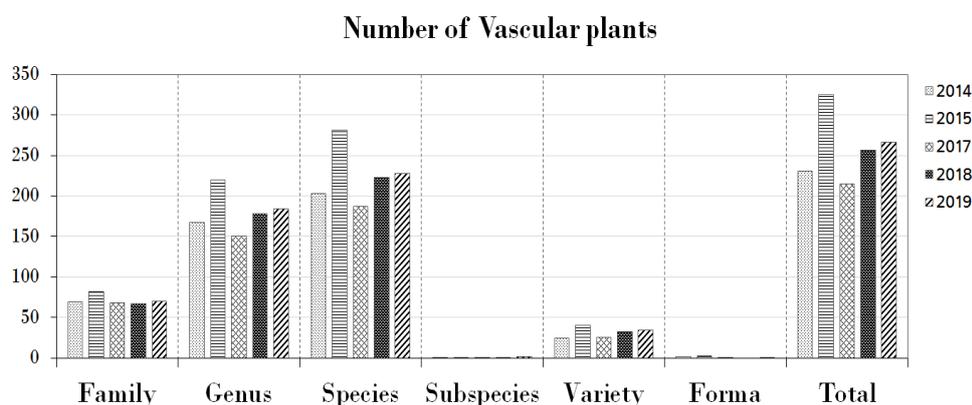
After the wind farm construction, the investigated plants were 70 families, 184 genera, 228 species, 2 subspecies, 35 varieties, 1 forma, a total of 266 species in 2019 <Table 2> or <Figure 2>. As a result, 59 species decreased compared to 325 species before the wind farm construction (2015). However, 51 species increased compared to 215 species in the first year of construction (2017), and 9 species increased compared to 257 species in the second year of construction (2018). So it is judged that the plants are gradually recovering after the wind farm construction is completed.

Table 2. Number of vascular plants in the survey area.

Taxon	Pteridophyta					Gymnospermae					Angiospermae									
											Monocotyledons					Dicotyledons				
	2014	2015	2017	2018	2019	2014	2015	2017	2018	2019	2014	2015	2017	2018	2019	2014	2015	2017	2018	2019
	14	15	17	18	19	14	15	17	18	19	14	15	17	18	19	14	15	17	18	19

Family	4	4	3	4	3	3	3	3	4	2	7	8	6	5	6	55	67	56	54	59
Genus	6	7	4	6	4	5	5	5	6	4	34	45	29	34	34	122	163	112	132	142
Species	7	9	4	7	4	9	9	8	9	7	34	53	27	38	39	153	210	148	169	179
Subspecies	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	1	1	2
Variety	1	1	1	1	1	-	-	-	-	-	8	10	6	7	8	16	29	19	25	26
Forma	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	3	1	-	1
Total	8	10	5	8	4	9	9	8	9	7	42	63	33	45	47	172	243	169	195	208

Figure 2. Comparison of vascular plants phase.



As a result of analyzing the plants in the survey site, a total of 325 species, including 82 families, 220 genera, 281 species, 1 subspecies, 40 varieties, and 3 forma, were investigated in the 2015 survey before the wind farm construction. With this data, the Compositae was 49 species, accounting for 15.08%, and the Gramineae, 35 species, accounting for 10.77%. Next, it appeared in the order of Leguminosae(18 species), Rosaceae(14 species), Polygonaceae, and Liliaceae(11 species). Also, Cyperaceae, Labiatae, Ranunculaceae, Fagaceae, Aspidiaceae, and Salicaceae showed many species in the order, and other species accounted for 44.31%. In the 2017 survey, the first year of construction, a total of 215 species, including 68 families, 150 genera, 187 species, 1 subspecies, 26 varieties, and 1 forma, were investigated during the wind farm construction. The Compositae was 34 species with this data, accounting for 15.81%, and the Gramineae, 21 species, accounting for 9.77%. Next, it appeared in the order of Rosaceae(16 species), Leguminosae(14 species), and Fagaceae(7 species). Also, Polygonaceae, Liliaceae, Labiatae, Aspidiaceae, Salicaceae, Cyperaceae, and Ranunculaceae showed many species in the order, and other species accounted for 43.72%. In the 2018 survey, the second year of construction, a total of 257 species, including 67 families, 178 genera, 223 species, 1 subspecies, and 33 varieties, were

investigated during the wind farm construction. The Compositae was 39 species with this data, accounting for 15.18%, and the Gramineae, 30 species, accounting for 11.67%. Next, it appeared in the order of Rosaceae(18 species), Leguminosae(17 species), Labiatae(12 species), and Polygonaceae(9 species). Also, Liliaceae, Salicaceae, Fagaceae, Cyperaceae, Aspidiaceae, and Ranunculaceae showed many species in the order, and other species accounted for 38.52%. In the 2019 survey, a total of 266 species, including 70 families, 184 genera, 228 species, 2 subspecies, 35 varieties, and 1 forma, were investigated after the wind farm construction. The Compositae was 46 species with this data, accounting for 17.29%, and the Gramineae, 29 species, accounting for 10.90%. Next, it appeared in the order of Rosaceae(17 species), Leguminosae(16 species), and Labiatae(8 species). Also, Liliaceae, Fagaceae, Polygonaceae, Cyperaceae, Ranunculaceae, Salicaceae, and Aspidiaceae showed many species in the order, and other species accounted for 42.48% <Table 3> or <Figure 3> <Figure 4>.

The Compositae accounts for the highest percentage by year, which is believed to be due to the 1 and 2 years old herbage transferred to the forest fire area or wind farm construction area.

Table 3. Family composition of plants by year.

Family \ Year	2014		2015		2017		2018		2019	
	Species	Percentage								
Aspidiaceae	5	2.16	7	2.15	3	1.40	4	1.56	2	0.75
Salicaceae	5	2.16	5	1.54	3	1.40	7	2.72	3	1.13
Fagaceae	7	3.03	7	2.15	7	3.26	7	2.72	7	2.63
Polygonaceae	9	3.90	11	3.38	6	2.79	9	3.50	7	2.63
Ranunculaceae	3	1.30	7	2.15	2	0.93	3	1.17	5	1.88
Rosaceae	14	6.06	14	4.31	16	7.44	18	7.00	17	6.39
Leguminosae	12	5.19	18	5.54	14	6.51	17	6.61	16	6.02
Labiatae	4	1.73	8	2.46	6	2.79	12	4.67	8	3.01
Compositae	35	15.15	49	15.08	34	15.81	39	15.18	46	17.29
Gramineae	29	12.55	35	10.77	21	9.77	30	11.67	29	10.90
Cyperaceae	5	2.16	9	2.77	3	1.40	5	1.95	6	2.26
Liliaceae	4	1.73	11	3.38	6	2.79	7	2.72	7	2.63
Other	99	42.86	144	44.31	94	43.72	99	38.52	113	42.48

Figure 3. Number of family composition of plants by year.

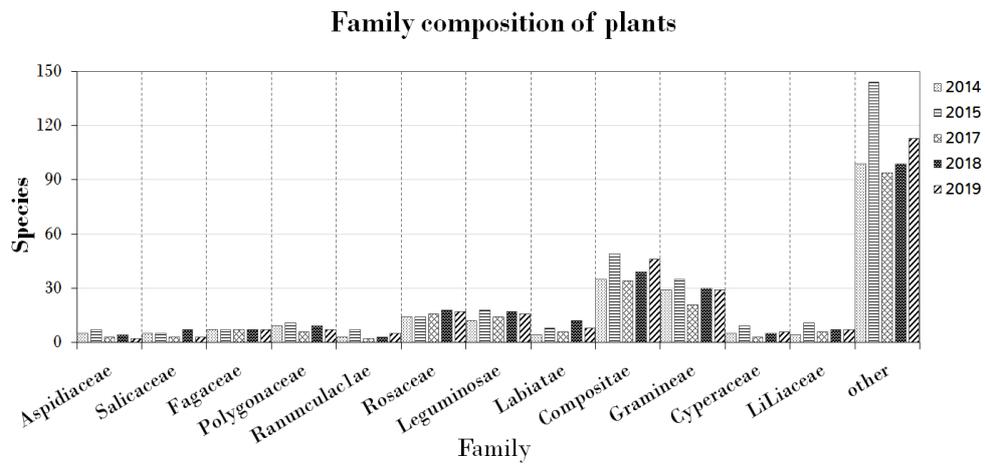
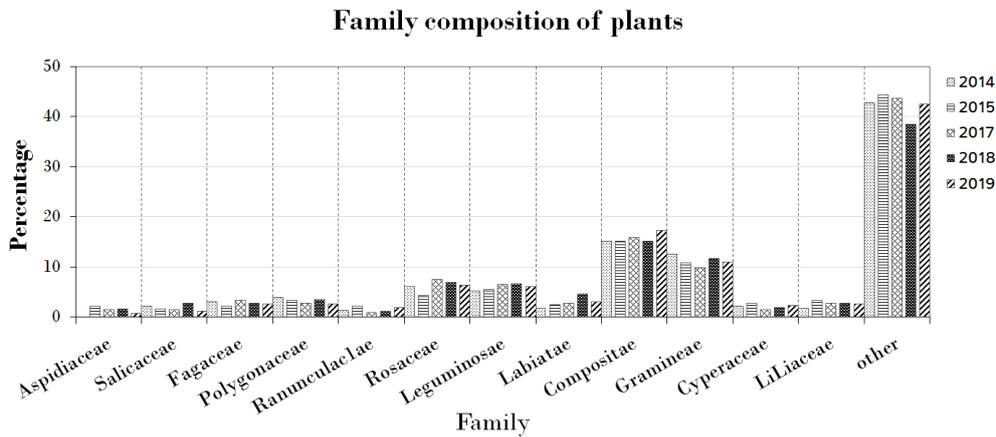


Figure 4. Ratio of family composition of plants by year.



3.2. Plant life form

The plant life form is an adaptive type in which plants and various natural environmental conditions surrounding them interrelated for an extended period [20]. As a result of the analysis, Hemicryptophytes showed the highest distribution rate by year, with 28.57%(2014), 32.92%(2015), 29.30%(2017), 29.96%(2018), and 31.20%(2019). After that, Therophytes and Megaphanerophytes followed in order <Table 4> or <Figure 5> and <Figure 6>. The result of comparing the plant life form of the survey area with the plant life form of South Korea shows that each distribution rate of Hemicryptophytes, Therophytes, and Megaphanerophytes was higher than the average value of South Korea(H: 23.0%, Th: 19.0%, M: 20.1%). We analyzed that this data is because the survey site belongs to the forest area, but the grassland area's distribution rate was high due to the disturbance caused by forest fire and construction.

Table 4. Life form distribution of plants in the survey area.

Sortation Life form	2014		2015		2017		2018		2019	
	Species	Percentage								
Megaphanerophytes	53	22.94	60	18.46	47	21.86	59	22.96	45	16.92

Nanophanerophytes	30	12.99	34	10.46	31	14.42	37	14.40	37	13.91
Epiphytes	0	0.00	0	0.00	0	0.00	0	0.00	0	0.00
Chamaephytes	6	2.60	7	2.15	5	2.33	5	1.95	8	3.01
Hemicryptophytes	66	28.57	107	32.92	63	29.30	77	29.96	83	31.20
Geophytes	19	8.23	37	11.38	22	10.23	22	8.56	30	11.28
Hydrophytes	1	0.43	1	0.31	1	0.47	0	0.00	0	0.00
Therophytes	56	24.24	79	24.31	46	21.40	57	22.18	63	23.68

Figure 5. Number of life form distribution of plants in the survey area.

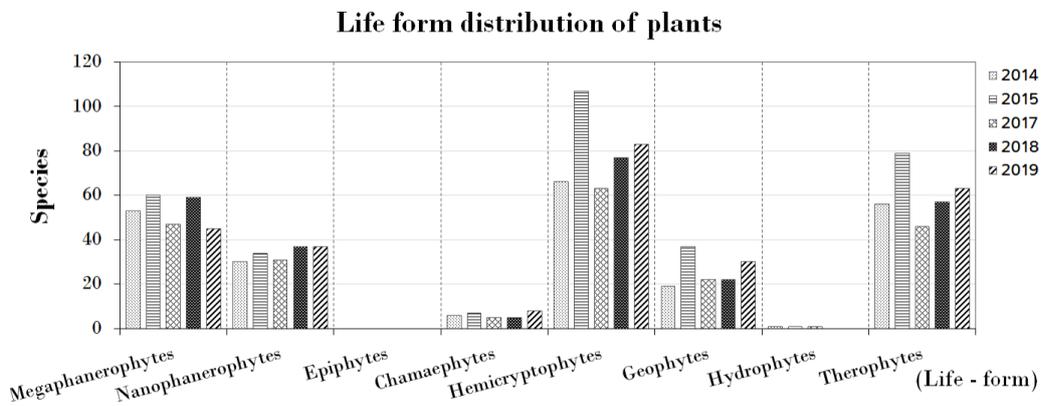
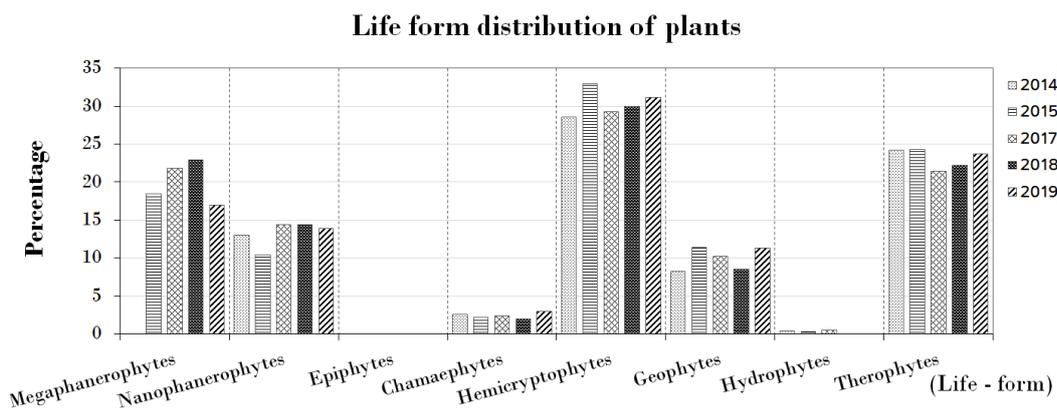


Figure 6. Ratio of life form distribution of plants in the survey area.



3.3. Korean endemic plants

In the wind farm construction area and nearby, the Korean Endemic plant was surveyed into 7 species, accounting for 1.9% of the 360 species designated by the Korea Forest Service. After the wind farm construction, there are 2 species of the Korean Endemic plant investigated in

2019. Compared to the 3 species before the construction(2015) and the first year during construction(2017), 1 species decreased. Also, compared to the 4 species in the second year during construction(2018), 2 species decreased. These results seem that there were changes or influencing factors in the growing environment <Table 5>.

Table 5. The list of the Korean endemic plants in the survey area.

Species	Year				
	2014	2015	2017	2018	2019
<i>Populus tomentiglandulosa</i>	○	○	-	○	-
Forsythia koreana(Rehder)	-	-	○	○	-
Salix koriyanagi	-	-	-	○	-
Paulownia coreana	○	○	○	○	○
Hemerocallis hakuunensis	-	○	-	-	-
Saussurea seoulensis	-	-	○	-	-
Aster koraiensis	-	-	-	-	○

3.4. Rare plants

We investigated 4 species of Vulnerable species(VU) and 2 species of Least Concerned species(LC) as Rare plants designated by the Korea Forest Service in and around the wind farm construction site. Vulnerable species(VU) such as *Bupleurum falcatum*, *Dipsacus japonicus*, *Taxus cuspidata*, *Lilium callosum*, and Least Concerned species(LC) such as *Thuja orientalis*, *Potentilla discolor* were growing in there <Table 6>. We could not find *Bupleurum falcatum* and *Dipsacus japonicus* after the start of construction, so this result seems that there were changes or influencing factors in the growing environment.

Table 6. The list of the rare plants in the survey area.

Sortation		Year				
		2014	2015	2017	2018	2019
EW	-	-	-	-	-	-
CR	-	-	-	-	-	-
EN	-	-	-	-	-	-
VU	<i>Bupleurum falcatum</i>	-	○	-	-	-
	<i>Dipsacus japonicus</i>	-	○	-	-	-
	<i>Taxus cuspidata</i>	-	-	-	○	-
	<i>Lilium callosum</i>	-	-	-	○	-
LC	<i>Thuja orientalis</i>	○	○	○	○	○
	<i>Potentilla discolor</i>	-	-	○	○	-
DD	-	-	-	-	-	-

Note: EW : Extinct in the wild, CR : Critical Endangered, EN : Endangered, VU : Vulnerable, LC : Least Concerned, DD : Data Deficient.

3.5. Specific plants by phytogeography

In 2019 after wind farm construction, we surveyed a total of 13 species, 1 species of IV grade, 3 species of III grade, 2 species of II grade, and 7 species of I grade for specific plants by phytogeography <Table 7>. We compared this data with a total of 12 species, 1 species of V grade, 2 species of IV grade, 3 species of III grade, 1 species of II grade, and 6 species of I grade before wind farm construction(2015). 1 species increased. We compared the data of 2019 with a total of 6 species, 1 species of V grade, 1 species of III grade, 2 species of II grade, and 2 species of I grade in the first year during construction(2017). 7 species increased. Then, we compared the data of 2019 with a total of 11 species, 1 species of V grade, 5 species of III grade, 1 species of II grade, and 4 species of I grade in the second year during construction(2018). 2 species increased. So it seems that they decreased during construction, and then growth continues again after construction.

Table 7. The list of the Specific plants by phytogeography in the survey area.

Grade/Species		Year				
		2014	2015	2017	2018	2019
V	<i>Woodsia macrochlaena</i>	-	o	-	-	-
IV	<i>Thuja orientalis</i>	o	o	o	o	o
	<i>Dipsacus japonicus</i>	-	o	-	-	-
III	<i>Dryopteris varia(L.) Kuntze</i>	o	o	-	-	-
	<i>Taxus cuspidata</i>	-	-	-	o	-
	<i>Juniperus chinensis</i>	o	o	-	o	o
	<i>Indigofera pseudotinctoria</i>	-	-	o	o	o
	<i>Linum stelleroides</i>	-	o	-	-	-
	<i>Elaeagnus glabra</i>	-	-	-	o	-
	<i>Lilium callosum</i>	-	-	-	o	-
	<i>Phaenosperma globosa</i>	-	-	-	-	o
	II	<i>Celtis aurantiaca</i>	-	o	-	-
<i>Saussurea ussuriensis</i>		-	-	o	-	-
<i>Achillea alpina</i>		-	-	o	-	-
<i>Rhaponticum uniflorum</i>		-	-	-	-	o
<i>Heloniopsis koreana</i>		-	-	-	-	o
<i>Equisetum hyemale</i>		-	-	-	o	-
I	<i>Pinus koraiensis</i>	o	o	o	o	o
	<i>Salix chaenomeloides</i>	o	o	-	o	o
	<i>Betula davurica</i>	o	o	-	-	o
	<i>Euonymus japonicus</i>	o	o	-	o	o
	<i>Cirsium pendulum</i>	-	o	o	-	o
	<i>Aster spathulifolius</i>	o	o	-	-	-
	<i>Dictamnus dasycarpus</i>	-	-	-	o	o
	<i>Pyrus ussuriensis</i>	-	-	-	-	o

3.6. Naturalized plants and Invasive alien plants

In 2019 after the wind farm construction, there were a total of 12 families and 35 species of Naturalized plants that we investigated.

These figures are 10.9% of 321 species of Naturalized plants distributed in Korea and 13.2% of 266 species of vascular plants. Among the investigated Naturalized plants, *Rumex acetosella*, *Aster pilosus*, and *Ambrosia artemisiifolia* were studied as Invasive alien plants designated by the Ministry of Environment <Table 8>. This result shows that 2 species increased compared to 12 families and 33 species before construction(2015), and 15 species increased compared to the 8 families and 20 species in the first year during construction(2017). Also, 9 species increased compared to 9 families and 26 species in the second year of construction(2018), indicating that the number of Naturalized plants which decreased due to construction is gradually increasing[21][22]. Three invasive alien plants appeared among the naturalized plants, such as *Rumex acetosella*, *Aster pilosus*, and *Ambrosia artemisiifolia*. And a total of 4 species of *Humulus japonicus* Siebold & Zucc appeared as Ecosystem Disturbance Creatures designated by the Ministry of Environment(2020), not naturalized plants <Table 9>.

Table 8. The list of the naturalized plants in the survey area.

Family		Year	2014	2015	2017	2018	2019
Polygonaceae	<i>Rumex acetosella</i>		-	-	-	o	o
	<i>Rumex crispus</i>		o	o	o	o	o
	<i>Fallopia dumetorum</i>		-	-	-	o	o
Chenopodiaceae	<i>Chenopodium ficifolium</i> Smith		-	-	-	-	o
Amaranthaceae	<i>Amaranthus lividus</i>		-	-	-	-	o
	<i>Amaranthus retroflexus</i>		o	o	o	-	-
Phytolaccaceae	<i>Phytolacca americana</i>		o	o	o	o	o
Caryophyllaceae	<i>Silene armeria</i>		-	o	-	o	o
Cruciferae	<i>Lepidium apetalum</i>		o	o	o	o	o
	<i>Thlaspi arvense</i>		-	o	-	-	-
Leguminosae	<i>Robinia pseudoacacia</i>		o	o	o	o	o
	<i>Lotus corniculatus</i>		-	o	-	-	-
	<i>Amorpha fruticosa</i>		o	o	o	o	-
	<i>Trifolium pratense</i>		-	-	-	-	o
	<i>Trifolium repens</i>		o	o	o	o	o
	<i>Medicago sativa</i>		-	o	o	o	o
Simaroubaceae	<i>Ailanthus altissima</i>		o	o	-	-	-
Euphorbiaceae	<i>Euphorbia supina</i>		-	-	-	-	o
Onagraceae	<i>Oenothera biennis</i>		o	o	o	o	o
Convolvulaceae	<i>Ipomoea purpurea</i>		o	o	-	-	-
	<i>Ipomoea hederacea</i> Jacq		-	o	-	-	-
Scrophulariaceae	<i>Veronica arvensis</i>		-	-	-	o	-
	<i>Veronica persica</i> Poir		o	o	-	o	o
Compositae	<i>Carduus crispus</i>		-	-	-	-	o
	<i>Centaurea cyanus</i>		-	o	-	-	-
	<i>Aster pilosus</i>		o	o	o	o	o
	<i>Erigeron annuus</i>		o	o	o	o	o
	<i>Conyza canadensis</i>		o	o	o	o	o
	<i>Helianthus tuberosus</i>		-	-	-	-	o

	Rudbeckia bicolor	○	○	○	-	-
	Coreopsis tinctoria	-	○	-	-	-
	Coreopsis lanceolata	○	○	○	○	○
	Cosmos bipinnatus	○	○	-	○	-
	Cosmos sulphureus	-	○	-	-	-
	Bidens frondosa	○	○	○	○	○
	Galinsoga parviflora	○	○	○	○	○
	Galinsoga ciliata	○	○	○	○	○
	Ambrosia artemisiifolia	○	○	-	○	○
	Taraxacum officinale	○	○	○	○	○
	Sonchus oleraceus	-	-	-	○	○
	Sonchus asper	○	○	-	-	○
	Conyza parva(Nutt.) Cronquist	-	-	-	-	○
Gramineae	Dactylis glomerata	○	○	○	○	○
	Lolium perenne	-	-	-	-	○
	Lolium multiflorum Lam	-	-	-	○	○
	Poa pratensis	-	-	-	-	○
	Bromus tectorum	○	○	-	-	○
	Bromus unioloides Kunth	-	-	-	-	○
	Avena fatua	-	-	○	-	-

Table 9. Invasive alien plants.

Family		Year				
		2014	2015	2017	2018	2019
Cannabinaceae	<i>Humulus japonicus Siebold & Zucc.</i>	○	○	○	○	○
Polygonaceae	Rumex acetosella	-	-	-	○	○
Compositae	Aster pilosus	○	○	○	○	○
	Ambrosia artemisiifolia	○	○	-	○	○

4. Conclusion

This study investigated the vascular plants for five years in the wind farm section in Mt. Hyeonjong, including 2014, 2015, 2017, 2018, and 2019. To identify the changes in plants before, during, after the wind farm construction, we analyzed the changes, and the obtained results are as follows.

The vascular plants were 82 families, 220 genera, 281 species, 1 subspecies, 40 varieties, 3 forma, and 325 species before the wind farm construction. Compared with 70 families, 184 genera, 228 species, 2 subspecies, 35 varieties, 1 forma, and 266 species after the wind farm construction, 59 species decreased. However, they increased compared to 215 and 257 species during the wind farm construction. As a result of analyzing the plants in the survey site, Compositae was the most common, followed by Gramineae, Rosaceae, and Leguminosae. Compositae showed the highest percentage by year, and we believe this to be because many of the 1 and 2

years old herbage were transferred to the forest fire area or wind farm construction area. As for the plant life form, Hemicryptophytes showed the highest distribution rate, followed by Therophytes and Megaphanerophytes in order. This result is because the survey site belongs to the forest area, but the grassland area's distribution rate was high due to the disturbance caused by forest fire and construction. As a result of this study, the total plant species, Korean endemic plant, and rare plant growth were reduced in the wind farm section in Mt. Hyeonjong. However, many Naturalized plants and 1 and 2 years old herbage appeared in the area. So we found out that ecological stability was not yet stable, and the disturbance was continuing.

The factor of the reduction of plant species in Mt. Hyeonjong is also affected by changes in the natural environment, but the main factor is believed to be due to artificial interference. Therefore, a systematic vegetation management plan should be established to preserve plant species' diversity in Mt. Hyeonjong, and continuous ecological monitoring is required.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	CGK	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/>
Corresponding Author*	HJL	-Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
Co-Author	WHL	-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2426-1151

Website: www.j-institute.jp/protection/

Editor: protection@j-institute.jp

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E-mail: kdw@inu.ac.kr

dx.doi.org/10.22471/protective.2020.5.2.14

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Government Roles in Policy Networks against COVID-19: Comparing Two Cases in S. Korea

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Abstract

Purpose: *The purpose of this study is to discuss what structural type of policy network, that is, inter-organizational relations, is effective for overcoming health crisis such as coronavirus outbreak and a pandemic. Assuming that Korea has been relatively successful in protecting the spread of infection, we attempt to select two main Korean cases and compare the structural characteristics, such as centrality of policy networks for those cases.*

Method: *It defines the scope of the network to major decision-making agencies, resource mobilization agencies, and other supporting agencies that officially participate in achieving the policy goals, and analyzes the urgency and importance of the policy goals, the public-good nature of policy, leading forces and authority, participants and their activities, etc. with qualitative data released by various experts and organizations including the government.*

Results: *In the corona response system, the policy goal is very urgent and important, so the government is in charge of it, and the network has been highly concentrated around disease control and prevention institutions that have specialized expertise while destroying the ranks. In the treatment and vaccine development support system, reduced concentration characterizes public-private partnerships, where the private sector wants to actively participate due to the enormous opportunity to generate profits, while the private sector wants active leadership from the government due to the high risk of market failure.*

Conclusion: *Korea's successful prevention of corona damage came from the role of the government, which effectively utilizes IT technology and medical resources and promotes public trust, leading to citizen participation. However, the symbolism of "the big government is back" is implied behind it. Now, at the time when the "big government" is about to return, it will not only expand the size and budget of the government as in the past, but will expand its character as a surveillance state and a health crisis state.*

[Keywords] COVID-19, Policy Network, Korean Government, Pandemic, Coronavirus

1. Introduction

Public policy processes grow more complex with the increased involvement of business, not-for-profits, interest groups, and multiple levels and units of government. Furthermore, this complexity becomes more intense as policy actors create ties with each other and as they pursue their goals. In this context, much attention is given to the concept of network. In particular, a reason for the popularity is that network is understood by some scholars as an alternative inter-organizational model with an emphasis on interdependence, or an alternative analytical model that directs attention to a higher level of analysis.

If so, is it effective for the government to use networks with organizations other than the government even for the purpose of disaster response or national crisis management? According to organizational theory, it is understood that a centralized system such as the government, concentrating authority and roles to specific organizations, is more effective in emergency situations in crisis.

Here, in terms of organizational theory, the two demands collide. On the one hand, the general demands of the times require a decentralized network organization, while the situational demands of crisis on the other hand require a centralized government-led promotion system. What is the most effective network organization to respond to COVID-19 (Coronavirus disease-2019), acute respiratory disease, which is currently sweeping the world? Which of the decentralized networks and centralized initiatives is preferred, or what compromise model is being proposed?

COVID-19 is mainly spread by tiny droplets that occur when contacting, coughing, sneezing, and talking, and infected people can have mild to severe symptoms such as fever, cough, shortness of breath, and diarrhea. In particular, people with complications or illness, and the elderly are more likely to die. WHO declared a pandemic against COVID-19 on March 11, 2020. As of October 3, 2020, a total of more than 34 million confirmed cases and more than 1 million deaths were reported worldwide, so the contagion of the disease is frightening.

Korea is praised as a world-class model country in responding to the coronavirus. Many countries want to learn about Korea's effective corona response system. Therefore, this study attempts to approach the network perspective on what the Korean government has in the policy networks of 3 main cases including response system to COVID-19, COVID-19 treatment and vaccine development, and international standardization of K-Quarantine model. By this way, this essay attempts to draw some valuable concepts of network, especially about centrality and concentration, for public policy and administration as well as organization theory. Then, the essay discusses the potential and limitations of network research, emphasizing on its conflict with the concepts of organizations and institutions.

2. Literature Review

2.1. Network as an alternative governance and “hollow state”

Policy networks are the relationship between policy actors and the large structure, but each scholars define it slightly differently. Kenis & Schneider argues that the policy-making process is the informal and decentralized arrangement of policy decisions in which relations between actors are made horizontally[1]. Marin & Mayntz understands policy networks as a network between policy actors and their attribute is recognized as a resource-dependent relationship[2]. Policy networks are the type of interdependence between actors that are formed around a policy problem or limited resources, and this type of relationship is formed, maintained and changed by a series of games.

Furthermore, many scholars in public administration view the network as an alternative governance, with an emphasis on interdependence, stability, and trust, at the inter-organizational level. The network perspective of public administrators is likely to supplement their conventional, hierarchy-oriented and market-oriented perspectives. O'Toole argues that networks involve “a very wide range of structures in between formal hierarchies and perfect markets.”[3]. Powell views the network as a distinctive form of organization that is “neither market nor hierarchy.”[4]. Kickert, et al. sees the network as an alternative to governance that is built on both top-down and bottom-up criticism[5].

The concept as alternative governance are also parallel to the newly emerging context of public policy and administration—the context of the “hollow state,” a form of government in which the function of the government is significantly reduced by entrusting administrative ser-

vice work to a third party such as the private sector. In the network setting, state and bureaucracy have come to lose their authority considerably, and thus we see the emergence of what Milward terms the “hollow state” [6]. When raising its level of analysis, such a network perspective tends to underscore the influence of interdependence with others rather than the effect of structures, values, and institutionalization within a public agency, or its subunits.

2.2. “Hollow state” versus effectiveness of centrality

In addition to alternative governance, a group views network as a unit of analysis in research to public administration. It directs analytical attention to a higher level of analysis, diversity in constituency perspectives, or even epistemological assumption. Hence, it seems that network research in public administration can draw rich, theoretical implications from organization study, policy study, and political science, since the theoretical roots of policy networks encompass those three disciplines, as Kickert et al. assert in their book, *Managing Complex Networks* [5].

However, network analysis indeed encompasses the lack of coherent theory of their origins, their causes, and the precise range of their occurrence. McCool points out that many scholars like to use the concept of policy subsystem (or policy network) but “there is little empirical evidence to support it” [7].

On the other hand, the limitation is contrast to academic accomplishment in organization study. Existing studies related to network analysis between organizations can be largely divided into studies from the perspective of egocentric networks and studies from the perspective of whole-network [8]. The former, after forming a network centered on “ego,” surveys “ego” about its relational factors with each of multiple “alters” [9][10]. The latter, whole-network studies shed light on how the structure, such as density and centrality, of the overall network evolves, what the power structure is, and what collaborations are drawn [11][12][13].

Centrality and density have been the most important and popular themes in the network analysis of organization study. A useful exemplar of empirical studies regarding networks is Provan & Milward’s article, “A Preliminary Theory of Inter-organizational Network Effectiveness,” which compared the effectiveness of the mental health services of four urban areas. Their study is noteworthy in that it takes advantage of a strength of network analysis in terms of effectiveness measurement. The authors point out that a real measure of effectiveness for inter-organizational networks should not be limited to any individual organization; instead, it must include various constituencies in the entire network. Hence, their network analysis is based on responses from clients, their families, and case-managers concerning the clients’ quality of life, their satisfaction with the services of the network, and their level of functioning. The authors found that the most effective of the four mental health service networks was centralized and concentrated around a primary organization [12].

While Provan & Milward recognize effectiveness of centrality and density in the network context as a result of their empirical study, they make seemingly inconsistent claims that state’s power and function have been declining as they term the “hollow state” as above. The emergence of the “hollow state” as a description is contrast to the positive causal relationship between centrality, or concentration, and effectiveness as empirical results. Does it possible for the “hollow state” to coexist with more centrality or density for inter-organizational effectiveness?

Answering the above questions can be summarized as follows. First, in modern society, the government cannot go alone as in the past to solve policy problems, and has a tendency to move in a structure of cooperation with other organizations in the private sector and third sector, so it is necessary to try to analyze it from a network perspective. Second, the more the authority and resource mobilization are concentrated in a specific organization within the network structure, the more effective the policy is.

2.3. Purpose and methodology of the study

Until recently, the “hollow state,” the newly emerging context of public policy and administration, has swept a number of countries over the new liberal world especially. Will this trend persist even after the coronavirus outbreak that has caused one of the most serious crisis of mankind as well as states? Does government intervention, if any, take decentralized forms or centralized ones in representative two cases, respectively? This study aims at examining the degree of centrality as well as the role of the Korean government in a network context since the coronavirus outbreak.

A challenge to network research may be the difficulty of defining boundaries between a network and its environment, but a clue may be found from sociologists’ two approaches to boundary definition: the one is the realist approach, in which an analyst adopts the presumed vantage point of the actors themselves in defining the boundaries of social entities; and the other is the nominalist approach, in which an analyst self-consciously defines boundaries to serve his or her own analytic purposes.

This study defined the scope of the network based on the data on the policy implementation system officially distributed by the government. The corona crisis, as it is called a pandemic, is so wide that it is difficult to analyze groups or regions as in sociology. Instead, it was limited to major decision-making agencies, resource mobilization agencies, and other supporting agencies that officially participate in achieving the policy goals. Based on the qualitative data released by the government, we attempt to evaluate the structure and concentration of the network by analyzing various factors: the urgency and importance of policy goals, the public-good nature of policy, leading forces such as authority and position, the participating organizations, etc[14][15].

3. Korean Network Cases Related to COVID-19

3.1. Network for response to COVID-19

A. Policy Context and Mission

South Korea has experienced two national public health crises over the past decade. The failure of the 2015 Middle East Respiratory Syndrome-Coronavirus(MERS-CoV) response to address coordination issues or rights conflicts provides a legitimacy to renovate the national disease control system prior to the 2020 Coronavirus Disease 2019(COVID-19) crisis. It has been argued that centralized coordination efforts at the national level are desirable rather than fragmented local, urban or regional efforts in a national epidemic or pandemic [16][17][18].

In more detail, the main causes of the MERS failure were late diagnosis, 'super spreader' quarantine failure, family care and visits, patient privacy, poor communication by the Korean government, and so on. This outbreak occurred entirely in hospitals and was primarily due to infection control and policy failures rather than biomedical factors [19].

Korean government refined the related legal basis, on which it shall respond to COVID-19 by applying 'Class 1 Infectious Disease New Infectious Disease Syndrome' until information about the clinical characteristics and epidemiological characteristics is revealed. Corresponding directions include early recognition and identification of outbreak patterns, rapid epidemiological investigation, patient and contact management, environmental management, and strengthen education and publicity for prevention of corona 19 about personal hygiene, social distance, etc.

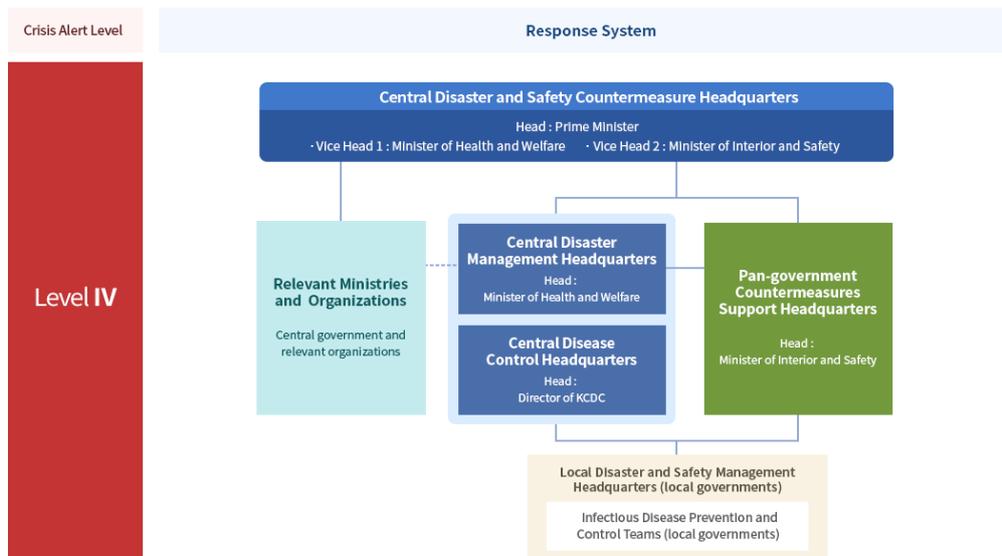
Grounded in the above legal basis and directions, management policy aims to prevent the transmission of infectious diseases through monitoring-epidemiological investigation-management as well as infection through personal hygiene education and publicity such as hand washing and cough etiquette. From the network perspective, the policy also aims to strengthen community capacity by establishing a cooperative system of local governments, private medical institutions, and related organizations.

B. Shape of Policy Network

As the Korean government raised Crisis Alert Level to the highest(Level 4) in February 23, 2020, the government operated the Central Disaster and Safety Countermeasure Headquarters headed by the Prime Minister as the organization for responding to Corona 19 to support government-wide responses to COVID-19. As shown in <Figure 1>, the quarantine control tower, the Central Disease Control Headquarters(KCDC, Korea Centers for Disease Control & Prevention) serves as the command center of the prevention and control efforts because of its specificity and expertise of infectious disease response, assisted by The Vice Head 1 of the Central Disaster and Safety Countermeasure Headquarters, who also serves as the Head of the Central Disaster Management Headquarters and Minister of Health and Welfare [20].

The Minister of Interior and Safety, head of the Pan-government Countermeasures Support Headquarters, which also serve as Vice Head 2 of the Central Disaster and Safety Countermeasure Headquarters, provides necessary assistance such as coordination between the central and local governments. At each local government, heads of the local governments establish Local Disaster and Safety Management Headquarters to secure an enough number of Infectious Disease Hospitals and beds. If the countermeasure required is beyond the capacity of local governments, the central government may support necessary resources including beds, personnel, and supplies[20].

Figure 1. Korean government’s response system at the crisis alert level IV[20].



The Working Group is established for the coordination between Central government and local governments at cities and provinces under the Deputy Head of the Central Disaster Management Headquarters, that is Vice Minister of Health and Welfare.

C. Network Participants and Changes at the Central Level

Ministry of Health and Welfare, as Central Disaster Management Headquarters, supports Central Disease Control Headquarters activities and pan-government counter-measures. It consults between ministries related to disaster response and control of infectious disease in hospitalization, treatment, life support, damage compensation, psychological support, etc. The Ministry, a communication hub, is also responsible for the issue of crisis alerts and dissemination of the situation as well as support for crisis communication to the public by unifying communication channels to the disease management headquarters [21].

Ministry of Health and Welfare is used to play the role of the control tower with the above tasks, but its role as the central tower has been transferred to Korea Disease Control and Prevention Agency(KDCA), which has been promoted from the former KCDC in September 12, 2020. KCDA, as Central Disease Control Headquarters, conducts epidemiological investigations and supports on-site measures such as quarantine as well as dealing with transition to high-risk and critical patients. To attain the goals, the Agency conducts crisis monitoring and evaluation enhancement, strengthens the operation of the emergency room for 24 hours, and prevents additional inflows through strengthening quarantine. Furthermore, it supports base hospitals to change their function from outpatient care to hospitalization and intensive care as well as controls surveillance system for critical patients such as the dead[21].

In fact, the Agency covers almost all kinds of on-site works related to the response, such as driving cooperation and coordination of related organizations and offering briefing, press releases, coverage support for media communication as well as civil complaint response and communication to the public.

As crisis levels rise with some serious outbreaks, a major transformation took place in the centralization and power structure within the network. It was the health care community that called for organizational reforms aggressively. According to the community, in order to effectively respond to infectious diseases, the health and welfare functions of the Ministry of Health and Welfare should be separated. The community also pointed out that it was unable to secure the expertise and independence of the quarantine system against the outbreak of MERS in 2015. The Centers for Disease Control and Prevention did not have personnel rights and budget rights, and that there was no executive organization for each region, and that it did not have the authority to command and lead other ministries in crisis situations. Therefore, it was necessary to follow the decision of an administrative bureaucrat who is an unprofessional. At the same time, they continuously insisted that the Centers for Disease Control and Prevention be promoted to the Korea Centers for Disease Control and Prevention[22].

The National Assembly smoothly passed a bill to promote the Korea Centers for Disease Control and Prevention to the Korea Centers for Disease Control and Prevention. Despite the intensifying conflict between the ruling party and the opposition party in the 21st National Assembly, consensus was formed regardless of the opposition party regarding the serious national and global crisis. In particular, it was the opposition party that proposed the same bill in the 20th National Assembly before the corona crisis. It was also an election pledge of the current president and opposition candidate.

As promoted from the Center to the Agency, as an independent central administrative agency, KCDA can operate the organization, personnel, and budget independently. The size of the organization is composed of 1 director, 1 deputy director, 8 bureaus, 16 government departments, and a total of 1476 people. 350 people are being supplemented compared to the previous one. Unlike the administration of affairs commissioned by the Ministry of Health and Welfare, it has jurisdiction over six laws including the Infectious Disease Prevention Act and has the authority to execute. With the promotion, the regional response system also will change. While there was no central dedicated organization previously, five disease response centers and Jeju branch offices will be established in the metropolitan area and dedicated organizations will be established in all cities and provinces. As its affiliated institution, the National Institute of Infectious Diseases, will also promote the commercialization of vaccines and treatments.

D. Network Participants at the Local Level

City/Province and City/County/District are responsible for the operation of Regional Disaster and Safety Management Headquarters and Regional Disease Prevention and Control Teams. They do not only strengthen local patient monitoring system and operate regional quarantine infrastructure, but also offer regional epidemiological investigation, on-site quarantine measures, patient transfer, contact identification support, patient and contact management, quarantine release, etc[21].

The local governments plan management of quarantine beds and quarantine facilities in the region and additional securing, Their severity classification teams and hospital bed allocation teams operate patient management classes in all cities and provinces nationwide. If necessary, they reorganize health centers focused on quarantine services and reinforcement of inspection personnel. At the local level, they play central roles in the response network. To do works fluently, they strengthen the cooperation system with relevant local organizations and cooperate for the operation of the working group between central and local governments. They also strengthen communication such as education and promotion for local residents[25].

Under each City/Province government, several subsidiary organizations work for response under local governments. First, Institute of Health and Environment conducts Corona 19 pathogen laboratory test. Second, Infectious Disease Management Support Unit is responsible for technical support such as city/province corona19 monitoring, epidemiological investigation, data analysis, etc. as well as technical support for customized Corona 19 management by city or province. Third, Local Medical Institutions offer diagnosis and treatment for Corona-19 patients, and report Corona 19 on occurrence, death, discharge, etc. They also play the role of a corona-19 patient screening clinic, offering economic investigation and infectious disease management cooperation in case of corona-19 patients[21].

3.2. Network for COVID-19 treatment and vaccine development

A. Policy Context and Mission

COVID-19 vaccine is a private goods as well as a public goods. It is analyzed that 20% of the population vaccination is insufficient to achieve collective immunity. For this reason, some countries have direct vaccine supply contracts with vaccine developers. For example, the United States has professed not to join COVAX, an international Project for vaccine joint purchase and distribution. The UK also signed a separate purchase contract with researchers and pharmaceutical companies, apart from the contract with COVAX. If production volumes are insufficient at the initial stage of vaccine development, bilateral transactions between high-income countries and vaccine manufacturers are expected to increase[23].

Albert Bourla, Pfizer's CEO, said it was unethical to set prices according to "open market principles" and not "doing business as usual" for companies in a pandemic. There are still "great commercial opportunities," he said. The company has never been involved in research to pursue a return on investment, he said, rather it was seeking "a return on effort." [24].

Under the global competition for the vaccine, in April 9, 2020, the Korean government formed a joint public-private government support group to intensively support the development of COVID-19 treatments and vaccines on the occasion of the joint meeting of industry, academia, research, and hospital, presided over by the President, to quickly create results. The support team comprehensively checks the development status of COVID-19 treatments and vaccines, and establishes a rapid decision-making system to quickly discover and resolve difficulties in the field such as regulations[25].

In particular, the support group develops the "Corona 19 Therapeutic and Vaccine Development Pan-Government Roadmap", which includes expansion of government R&D investment for promising corona 19 treatment and vaccine items in Korea, to support full-cycle research and development from basic research to commercialization, and measures to improve regulations related to licensing and commercialization[25].

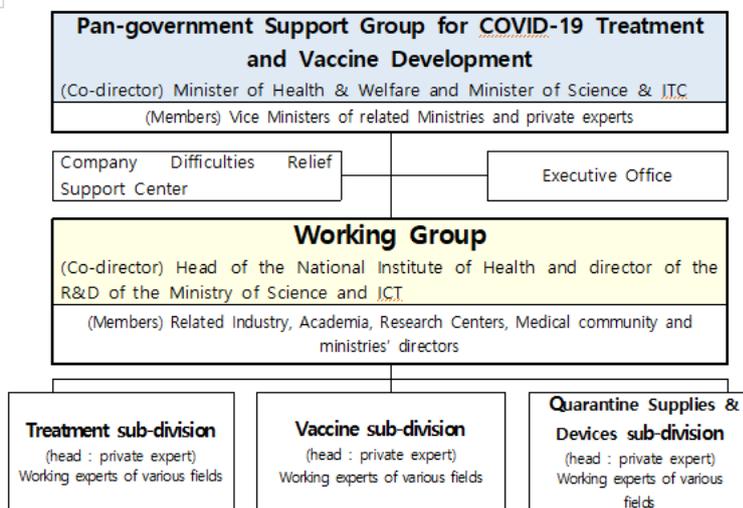
B. Shape of Policy Network

The public-private partnership is actually the network form that needs the active role of the government because Korea Pharmaceutical and Bio-Pharma Manufacturers Association has asked for it. According to the Chairman of the National Bio-Health Industry Innovation Strategy Promotion Committee, for global competitiveness, the industry must come up with a solution

to unmet need, and the government should create an ecosystem of medical, industrial, academia, and research networks, while uniting the industrial command system. Emphasizing the necessary of a control tower, he said that the decentralization of the command system is limited to affect universities and research institutes, so that only artificial and temporary convergence can be induced to secure research funding, and a fundamental convergence ecosystem to produce creative ideas cannot be established. Most members of the Korea Pharmaceutical Bio Association asked for creating a government-led fund and expanding the role of a large government for the globalization of the domestic pharmaceutical bio industry.” [26].

The governmental responded to the business request by standing at the hear of the network, as shown in <Figure 2>. Participants, co-directed by Minister of Health and Welfare and Minister of Science and ITC, include Vice Ministers of related ministries in Economy and Finance, Industry, Small and Medium Industry, and Government Policy Coordination Office, Commissioner of Korea Disease Control and Prevention Agency, and Minister of Food and Drug Safety as well as private experts.

Figure 2. Support group for COVID-19 treatment and vaccine development[27].



To this end, the working group under the support group discovers and discusses detailed agendas through regular and intensive discussions every week in three sub-divisions including treatments, vaccines, and quarantine supplies & devices. Private experts in those sub-divisions participate in the group. On the government side, the head of the National Institute of Health and the director of the Research and Development of the Ministry of Science and ICT are co-directors, and the director-level officials of the Ministries of Economy and Finance, of Industry, of Food and Drug Safety, and the relevant departments additionally attend [27].

In addition, in connection with the “Company Difficulties Relief Support Center(Korea Health Industry Development Agency)”, which will be installed under the Pan-Governmental Support Group, the support group provides professional consulting to quickly resolve the difficulties of domestic treatment and vaccine development companies. The support group cooperates with other organizations on finding solutions to scientific and technological difficulties through the “R&D Support Council” consisting of research institutes and universities [27].

C. Network Participants and Activities

The government collected on-site difficulties, such as support for licenses and permits, and promptly resolved or presented important matters to the pan-government support group meeting. The support group analyzed the R&D status of treatments and vaccines as well as research support plans. The group also analyzed the supply and demand status of quarantine products

and devices, and prepared for the support plans of their localization. Furthermore, the group expanded infrastructure for developing treatments and vaccines such as international joint research support plans, open research data, and animal models[27].

The 4th meeting(July 14) invited the Bio Association, Biopharmaceutical Association, Medical Device Industry Association, and Global Pharmaceutical Industry Association to hold a pan-governmental support plan briefing session for COVID-19 treatment and vaccine development, and support measures and promotions there. The current status and the execution plan of the related budget were also explained and communicated. The 5th meeting(August 21) discussed strategies for promptly introducing overseas vaccines through participation in the COVAX Facility and negotiations with individual companies, as well as vaccine vaccination strategies such as vaccination timing and those who are recommended for priority vaccination. The 6th meeting(September 25) provided opportunities for conglomerates to communicate the progress and difficulties in the development of treatments and vaccines, reports on the status of additional executions and the government budget for the next year, and clinical trials to speed up the development of treatments and vaccines. Finally, the 7th meeting(October 30) discussed the plan to support clinical trials for COVID-19 treatments and vaccines, the current status and plan for the introduction of the COVID-19 vaccine abroad, and the promotion to apply the research results of various National Research Institutes to the quarantine field[28].

4. Comparative Analysis of Policy Networks

Above, we reviewed the structure of two corona-related policy networks formed by the Korean government during the corona outbreak: response system to COVID-19 and support system for treatment and vaccine development. By reviewing them, we became aware of the purpose and performance of each network, participants and their roles, and inter-relations and interactions between participants in respective network. In <Table 1>, we will analyze their structural characteristics by comparing them in five aspects.

Table 1. Comparison of 3 policy networks.

Criteria \ Policy networks	Response system to COVID-19	COVID-19 treatment and vaccine development
Urgency and importance of policy goals	Higher	Lower
Public-good nature of policy	Stronger	Weaker
Leading forces and authority	Disease prevention and control	Bio R&D and industry
Main participants	Governmental agencies	Public-private partnership
Centrality	Higher	Lower

The characteristic of the corona response system is that the policy objectives are very urgent and important, so the network is showing a centralized appearance, and the fact that Korea Disease Control & Prevention Agency(KDCA, the former KCDC) has been highly recognized for its speciality and expertise to respond to the pandemic. The Agency served as the control tower and practical command center of prevention and control efforts as Central Disease Control Headquarters. A considerable level of decision-making authority was delegated to the Agency from high-ranking institutions or political circles, and the Agency prepared guidelines for actions to be followed by various governments, public institutions, private institutions, and citizens in

Korean society, communicated with the public, and provided professional advice. With the prime minister as the peak, related ministries were superior institutions in order to the Agency, but in reality, physically or legally, they showed a breakdown in order to support the Agency's leadership.

In view of this, it can be said that the KDCA constitutes a concentric circle-shaped network supported by other ministries. In addition, at each local level, the head of health-related departments with the highest expertise for each local government was in charge, and Local Disaster and Safety Management Headquarters played a central executive role. In addition, they could receive professionalism or legal and material support from the central government. These institutions also played a central role in the concentric circle-shaped network, especially in a structure that received strong central support[29].

The other case, Support System for Treatment & Vaccine Development, shows the shape of network in which the concentration in the corona response system has been significantly reduced. The public sector and the private sector form partnerships and work together to achieve common goals, and it cannot be found here that the urgency and importance of the policy goals, as seen in the corona response system, show a correlation with the concentration of the network. The policy goal of treatment & vaccine development is relatively less urgent and important than responding to COVID-19, so the development support system is limited to justify the network concentration led by the government. Furthermore, companies are highly encouraged to join the partnership because the private sector is the subject of R&D and production, and the profits are directly returned to the private sector.

What is interesting is that coronavirus-related companies, afraid of investment failure, also wants the government to support, even to lead, the partnership more actively in various aspects such as funding, planning and globalization as well as supporting such as hearing and solving on-site difficulties. In other words, businesses in treatments, vaccines, and quarantine supplies & devices want "a bigger government" in the direction of easing government regulation and strengthening government support. We can see an aspect of industrial nationalism in which the government and companies of a country create an industrial ecosystem together in response to global competition.

5. Conclusion

Recently, as of early November 2020, Korea has achieved remarkably reducing the number of new cases to around 100 per day. Korea's response to the coronavirus would have been impossible without a sound citizenship of citizens to voluntarily participate and cooperate with government guidelines to overcome the national crisis. Another success factor was the oriental sense of community that prioritized the well-being of the community over individual freedom. Behind this, the role of the government was large. The government tried to gain public trust through communication and information disclosure, and took quick and flexible measures to meet the changing circumstances[30]. In addition, the infection tracking and surveillance system worked effectively through Korea's excellent IT technology, and the dedication and teamwork of the medical staff were added[29][31][32].

However, the government's role is creating a new administrative environment. In other words, "the big government is back". Global crises such as World Wars and the Great Depression led to the formation of a "big government" and continued to expand until the 1970s, but new liberalism regarded "big government" as sin. Now, at the time when the "big government" is about to return, it will not only expand the size and budget of the government as in the past, but will expand its character as a surveillance state and a health crisis state.

The structure of coronavirus response system examined in this study shows a concentric circle shape showing a high level of concentration, centered on the government, especially the KDCA, so that the so-called "hollow state" is overshadowed. On the other hand, the treatment

& vaccine development support system encompasses the forms of public-private partnership with their concentration being considerably relaxed. While the private sector wants to participate actively for the high opportunity to make profits and strong nature of private goods, it wants government's leadership due to the high risk of market failure and the weak nature of public goods. The role and intervention of the government is expected to increase in cases where the urgency and importance of policy goals is high, and in cases where investment is widely open to market failure under the era of COVID-19.

Network research, including this study, is methodologically limited in catching the internal characteristics of organizations as independent variables. That is, it tends to overlook the effects of those characteristics on constituency satisfaction or network effectiveness as well as their internal response to an increase in environmental complexity and uncertainty. From institutional perspectives, it is expected that further studies explore the question of how public organizations, or their members, arrange structures, values, and institutionalization processes in order to interact with their networked environment under the era of COVID-19[33][34].

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Author	DWK	<ul style="list-style-type: none">-Set of concepts <input checked="" type="checkbox"/>-Design <input checked="" type="checkbox"/>-Getting results <input checked="" type="checkbox"/>-Analysis <input checked="" type="checkbox"/>-Make a significant contribution to collection <input checked="" type="checkbox"/>-Final approval of the paper <input checked="" type="checkbox"/>-Corresponding <input checked="" type="checkbox"/>-Play a decisive role in modification <input checked="" type="checkbox"/>-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

6.2. Funding agency

This work was supported by Incheon National University Research Grant in 2016.

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2426-1151

Website: www.j-institute.jp/protection/

Editor: protection@j-institute.jp

Corresponding author
E-mail: parkjs@kmu.ac.kr

dx.doi.org/10.22471/protection.2020.5.2.27

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SELF-PROTECTION Sport: An Analysis of the Connection between the Experience of Winning a Competition and the Experience of Being Selected as a Representative Player of Middle and High School and College Judo Players

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Abstract

Purpose: This study analyzed 198 middle and high school and college judo players in Daegu and Gyeongbuk Province as of 2020 for the connection between their experience of winning a competition and being selected as a representative player.

Method: Using the SPSS 23.0 program, this study conducted a frequency analysis to identify the general characteristics of the study subjects and calculated Cronbach's α coefficient to verify the reliability of the questionnaire. Chi-Square was conducted to find out the connection between the experience of winning a competition and being selected as a representative player.

Results: The study found that men had more experience of being selected as a representative player than women and that they had more experience of winning a competition as the school year advanced. In addition, as the school year advances, the experience of being selected as a representative player increases, and the longer the player's career, the more the experience of winning a competition. The longer the player's career, the more the experience of being selected as a representative player, and the more the experience of being selected as a representative player if one has the experience of winning a competition.

Conclusion: The results confirmed through this study believed to be fully utilized as basic data for training plans and management for judo players to improve their performance, but due to the limited number of study subjects, differences in the level of participating players, region, gender, and career, it is considered to be somewhat difficult to generalize the results of this study.

[Keywords] Self-Protection Sport, Middle School, High School, College, Judo Players

1. Introduction

Among the various sporting events[1], judo is reported to be trained among men and women of all ages[2] and have a positive effect on emotional development as well as physical strength and character development[3][4][5][6][7][8]. On the international stage[9], Korean judo players' career of winning competitions began at the 1964 Tokyo Olympics, but many people began to show interest in judo when Ahn Byeong-geun and Hah Hyeong-ju won gold medals by a stunning ippon in the 1984 Los Angeles Summer Olympics. Judo training has a positive effect on self-discipline, patience, consideration for others, and positive value formation[10], and the experience of winning various competitions is reported to enhance one's self-control and confidence[11] and to have a positive effect on task performance and self-management[12]. It is also reported that as judo players career increases, there are negative effects on stress response and sports deviation[13] and positive effects on character development including activeness,

dominance, sociality, and consideration[14]. Recently, a study[15] of 249 elite judo players in high school and college analyzed the effects of self-management and sportsmanship on the perceived performance of judo players and reported that self-management of judo players has a positive connection with mental strength, competitive spirit, interpersonal management, and performance. Another study[6][16][16] that analyzed the impact of achievement goal propensity on athletic passion and athletic motivation on elementary, middle, and high school judo players also reported that achievement goal propensity and athletic passion based on winning city, province, and national level competitions were statistically significant in the group with winning experience. Recently, global sports stars have been born in Korea, becoming role models for elite athletes. They include Ryu Hyeon-jin in baseball, Son Heung-min in soccer, Jeong Hyeon in tennis, and Kim Yeon-gyeong in women's volleyball. It is believed that by examining the connection between winning various competitions and the experience of being selected as a representative player for city and provincial level competitions, it can be useful in providing information for athletes' immersion in training, athletic passion, mental strength, competitive spirit, and interpersonal management skills, as reported in the results of various prior studies [11][17][18][19]. Therefore, this study seeks to find out the relevance between the winning experience of middle and high school and college judo players and the experience of being selected as a representative player and to provide the results confirmed through this study as basic data for training plans for the improvement of judo players' performance and for coaches' player management.

2. Research Method

2.1. Research subjects and sampling methods

In this study, 200 judo players in Daegu and Gyeongbuk Province as of 2020 were surveyed as a population by convenience sampling and self-administration method, and 198 questionnaires were selected valid samples, except for those whose answers were insincere or missing.

Table 1. General characteristics of the research subjects.

	Description	N(%)	Total
Gender	Male	119(60.1)	198
	Female	79(39.9)	
School year	Middle school first school year	18(9.1)	198
	Middle school second school year	20(10.1)	
	Middle school third school year	22(11.1)	
	High school first school year	17(8.6)	
	High school second school year	24(12.1)	
	High school third school year	22(11.1)	
	College first school year	19(9.6)	
	College second school year	13(6.6)	
	College third school year	27(13.6)	

	College fourth school year	16(8.1)	
Athletic career	2 years or less	52(26.3)	198
	3-5 years	48(24.2)	
	6 years or longer	98(49.5)	
Experience of winning a competition	Yes	148(74.7)	198
	No	50(25.3)	
Experience of being selected as a representative player	Yes	118(59.6)	198
	No	80(40.4)	

2.2. Contents of the questionnaire

A questionnaire was used as a research tool to achieve the purpose of this research, and the questionnaire was drafted based on gender, school year, career, the experience of winning a competition, and the experience of being selected as a representative player, and revised and supplemented after consulting with judo coaches and players.

2.3. Validity and reliability of the questionnaire

In this study, the appropriate method for each verification method was chosen to increase the content validity and to verify the construct validity of the questionnaire. In order to adopt survey questions suitable for the purpose of this study, the content validity was secured through consultation with experts in the relevant research field. In this study, reliability was verified based on the results of the survey questions and was analyzed using Cronbach's α coefficient.

2.4. Data processing and statistical method

The data processing of this study, after retrieving the distributed questionnaire, excluded data deemed to be poor or unreliable, and individually entered the analyzable data into the computer and performed statistical verification for the purpose of the research hypothesis and data analysis with the SPSS 23.0, a statistical package program. Frequency analysis was performed to identify the general characteristics of the study subjects, and Cronbach's α coefficient was calculated to verify the reliability of the questionnaire. Chi-Square was conducted to find out the connection between the experience of winning a competition and the experience of being selected as a representative player.

3. Research Results

3.1. Results of cross-analysis between gender and school year

The results of the cross-analysis to find out the connection between gender and school year showed no statistical significance as shown in <Table 2>.

Table 2. The connection between gender and school year.

Description	Male	Female	Total
Middle school first school year	11 (61.1)	7 (38.9)	18 (100.0)

Middle school second school year	13 (65.0)	7 (35.0)	20 (100.0)
Middle school third school year	13 (59.1)	9 (40.9)	22 (100.0)
High school first school year	9 (52.9)	8 (47.1)	17 (100.0)
High school second school year	14 (58.3)	10 (41.7)	24 (100.0)
High school third school year	13 (59.1)	9 (40.9)	22 (100.0)
College first school year	10 (52.6)	9 (47.4)	19 (100.0)
College second school year	10 (76.9)	3 (23.1)	13 (100.0)
College third school year	14 (51.9)	13 (48.1)	27 (100.0)
College fourth school year	12 (75.0)	4 (25.0)	16 (100.0)
χ^2 (p)	4.845(0.848)		

3.2. Results of cross-analysis between gender and athletic career

The results of the cross-analysis to find out the connection between gender and athletic career did not show any statistical significance as shown in <Table 3>.

Table 3. The connection between gender and athletic career.

Description	Male	Female	Total
2 years or less	33 (63.5)	19 (36.5)	52 (100.0)
3-5 years	29 (60.4)	19 (39.6)	48 (100.0)
6-10 years	57 (58.2)	41 (41.8)	98 (100.0)
10 years or longer	0	0	0
χ^2 (p)	.400(0.819)		

3.3. Results of cross-analysis between gender and experience of winning a competition

The results of cross-analysis to determine the connection between gender and experience of winning a competition showed no statistical significance as shown in <Table 4>.

Table 4. The connection between gender and experience of winning a competition.

Description	Male	Female	Total
Yes	88 (59.5)	60 (40.5)	148 (100.0)
No	31 (62.0)	19 (38.0)	50 (100.0)
χ^2 (p)	.101(0.751)		

3.4. Results of cross-analysis between gender and experience of being selected as a representative player

The results of the cross-analysis to find out the connection between gender and experience of being selected as a representative player showed that they were relevant as shown in <Table 5> with the statistically significant difference of $\chi^2=.745$, $p=0.388$.

Table 5. The connection between gender and experience of being selected as a representative player.

Description	Male	Female	Total
Yes	68 (57.6)	50 (42.4)	118 (100.0)
No	51 (63.8)	29 (36.3)	80 (100.0)
χ^2 (p)	.745(0.388)		

Note: $p^*<0.05$.

3.5. Results of cross-analysis between school year and athletic career

The results of the cross-analysis to find out the connection between school year and athletic career showed that they were relevant as shown in <Table 6> with the statistically significant difference of $\chi^2=185.544$, $p=0.000$.

Table 6. The connection between school year and athletic career.

Description	2 years or less	3-5 years	6-10 years	Total
Middle school first school year	15 (83.3)	3 (16.7)	0 (0.0)	18 (100.0)
Middle school second school year	17 (85.0)	3 (15.0)	0 (0.0)	20 (100.0)
Middle school third school year	10 (45.5)	12 (54.5)	0 (0.0)	22 (100.0)
High school first school year	6 (35.3)	7 (41.2)	4 (23.5)	17 (100.0)
High school second school year	3 (12.5)	12 (50.0)	9 (37.5)	24 (100.0)
High school third school year	1 (4.5)	10 (45.5)	11 (50.0)	22 (100.0)
College first school year	0 (0.0)	1 (5.3)	18 (94.7)	19 (100.0)
College second school year	0 (0.0)	0 (0.0)	13 (100.0)	13 (100.0)
College third school year	0 (0.0)	0 (0.0)	27 (100.0)	27 (100.0)
College fourth school year	0 (0.0)	0 (0.0)	16 (100.0)	16 (100.0)
χ^2 (p)	185.544(0.000)***			

Note: *** $p<0.001$.

3.6. Results of cross-analysis between school year and experience of winning a competition

The results of the cross-analysis to find out the connection between school year and experience of winning a competition showed that they were relevant as shown in <Table 7> with the statistically significant difference of $\chi^2=103.567$, $p=0.000$.

Table 7. The connection between school year and experience of winning a competition.

Description	Yes	No	Total
Middle school first school year	3 (16.7)	15 (83.3)	18 (100.0)
Middle school second school year	4 (20.0)	16 (80.0)	20 (100.0)
Middle school third school year	12 (54.5)	10 (45.5)	22 (100.0)
High school first school year	11 (64.7)	6 (35.3)	17 (100.0)
High school second school year	22 (91.7)	2 (8.3)	24 (100.0)
High school third school year	21 (95.5)	1 (4.5)	22 (100.0)
College first school year	19 (100.0)	0 (0.0)	19 (100.0)
College second school year	13 (100.0)	0 (0.0)	13 (100.0)
College third school year	27 (100.0)	0 (0.0)	27 (100.0)
College fourth school year	16 (100.0)	0 (0.0)	16 (100.0)
$\chi^2(p)$	103.567(0.000)***		

Note: *** $p<0.001$.

3.7. Results of cross-analysis between school year and experience of being selected as a representative player

The results of the cross-analysis to find out the connection between school year and experience of being selected as a representative player showed that they were relevant as shown in <Table 8> with the statistically significant difference of $\chi^2=97.300$, $p=0.000$.

Table 8. The connection between school year and experience of being selected as a representative player.

Description	Yes	No	Total
Middle school first school year	1 (5.6)	17 (94.4)	18 (100.0)
Middle school second school year	2 (10.0)	18 (90.0)	20 (100.0)
Middle school third school year	6 (27.3)	16 (72.7)	22 (100.0)

High school first school year	5 (29.4)	12 (70.6)	24 (100.0)
High school second school year	17 (70.8)	7 (29.2)	24 (100.0)
High school third school year	18 (81.8)	4 (18.2)	22 (100.0)
College first school year	17 (89.5)	2 (7.7)	19 (100.0)
College second school year	12 (92.3)	1 (7.7)	13 (100.0)
College third school year	24 (88.9)	3 (11.1)	27 (100.0)
College fourth school year	16 (100.0)	0 (0.0)	16 (100.0)
χ^2 (p)	97.300(0.000)***		

Note: ***p<0.001.

3.8. Results of cross-analysis between athletic career and experience of winning a competition

The results of the cross-analysis to find out the connection between athletic career and experience of winning a competition showed that they were relevant as shown in <Table 9> with the statistically significant difference of $\chi^2=187.812$, $p=0.000$.

Table 9. The connection between athletic and experience of winning a competition.

Description	2 years or less	3-5 years	6-10 years	Total
Yes	2 (1.4)	48 (32.4)	98 (66.2)	148 (100.0)
No	50 (100.0)	0 (0.0)	0 (0.0)	50 (100.0)
χ^2 (p)	187.812(0.000)***			

Note: p*<0.05, p**<0.01, p***<0.001.

3.9. Results of cross-analysis between athletic career and experience of being selected as a representative player

The results of the cross-analysis to find out the connection between athletic career and experience of being selected as a representative player showed that they were relevant as shown in <Table 10> with the statistically significant difference of $\chi^2=108.346$, $p=0.000$.

Table 10. The connection between athletic career and experience of being selected as a representative player.

Description	2 years or less	3-5 years	6-10 years	Total
Yes	0 (0.0)	33 (28.0)	85 (72.0)	118 (100.0)
No	52 (65.0)	15 (18.8)	13 (16.3)	50 (100.0)

χ^2 (p)	108.346(0.000)***
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Note: ***p<0.001.

3.10. Results of cross-analysis between the experience of winning a competition and experience of being selected as a representative player

The results of the cross-analysis to find out the connection between the experience of winning a competition and experience of being selected as a representative player showed that they were relevant as shown in <Table 11> with the statistically significant difference of $\chi^2=98.666$, $p=0.000$.

Table 11. The connection between the experience of winning a competition and experience of being selected as a representative player.

Description		Experience of winning a competition		Total
		Yes	No	
Experience of being selected as a representative player	Yes	118 (100.0)	0 (0.0)	118 (100.0)
	No	30 (37.5)	50 (62.5)	80 (100.0)
χ^2 (p)		98.666(0.000)***		

Note: ***p<0.001.

4. Discussion

Based on the analysis of the connection between the experience of winning a competition and the experience of being selected as a representative player for 198 judo players from middle and high school and college, this study aims to compare and discuss the results vis-a-vis prior studies. The results of this study showed no statistical significance in the cross-analysis conducted to find out the connection between gender and school year, gender and athletic career, and gender and the experience of winning a competition. However, gender and the experience of being selected as a representative player were shown to be connected ($p<.05$), with men being more experience of being selected as a representative player than women. Gender differences in sports lasted for a very long time since the ancient Olympic Games, and women's sports began in earnest in the 20th century [20][21]. In addition, various prior studies have reported that there are differences by gender based on the results of tests of psychological functions, mood, and sports replacement technologies [19][22][23]. However, there is no prior study that analyzed the connection between gender and experience of being selected as a representative player, so it is difficult to discuss it compared to the results of this study.

The results of the cross-analysis to find out the connection between school year, the experience of winning a competition, and the experience of being selected as a representative player showed that there was a statistical significance between them ($p<.0001$). For middle and high school judo players, as school year increases, the experience of winning a competition increases, and college players had evenly distributed winning experience across the school year.

In a prior study[6] that analyzed the impact of judo players' achievement goals on athletic passion and athletic motivation, high school students were higher in achievement goals, athletic passion and motivation than elementary and middle school players. Nam In-su(2010)[24] who analyzed the impact of kendo players' performance goals on their passion and Kim Jun-hyeon(2014)[25] who analyzed the impact of sports high school athletes' achievement goals on athletic passion and perceived performance also support in part the results of this study that showed that the higher the school year the more the experience of winning a competition, reporting that those in higher school year had higher achievement goal orientation than those in lower school year.

The results of the cross-analysis to find out the connection between the experience of winning a competition, athletic career, and the experience of being selected as a representative player showed that there was connection between them($p < .0001$). In this study, frequency analysis of athletic career showed that both men and women were the highest in 6 - 10 years, and men were higher than women. The results of the cross-analysis to find out the connection between the experience of winning a competition and the experience of being selected as a representative player showed that there was connection between them with a statistically significant difference($p < .0001$). Although direct comparison will be difficult due to differences in research subjects, the results of the preceding studies[6][26][27][28][29] show that the longer the athletic career, the higher the athletic passion, and the higher the achievement goals orientation, self-orientation, and athletic passion who have won city, province, and national level competitions, which partly supports the positive connection found in this study.

5. Conclusion

In this study, 198 middle and high school and college judo players in Daegu and Gyeongbuk Province as of 2020 were analyzed to find out the connection between the experience of winning a competition and the experience of being selected as a representative player, and the following conclusion was obtained. First, an analysis on the connection between gender and the experience of being selected as a representative player showed that men had higher experience of being selected as a representative player than women. Second, there was a connection between school year and athletic career, and as the school year increased, the more the experience of winning a competition. Third, there was a connection between school year and the experience of being selected as a representative player, and as the school year increased, the more the experience of being selected as a representative player. Fourth, the longer the athletic career, the more the experience of winning a competition. Fifth, the longer the athletic career, the more the experience of being selected as a representative player. Sixth, there was a positive connection between the experience of winning a competition and the experience of being selected as a representative player. Although there may be some difficulties in generalizing the results of this study due to the number of people studied and the differences in the level of players' performance, region, gender, and career, the results confirmed through this study are believed to be fully utilized as basic data for training plans and player management to improve their performance.

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	SGJ	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/>
Corresponding Author*	JSP	-Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
Co-Author	BCK	-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2426-1151

Website: www.j-institute.jp/protection/

Editor: protection@j-institute.jp

Corresponding author
E-mail: lwh7152@hanmail.net

dx.doi.org/10.22471/protective.2020.5.2.38

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A Comparative Study on the Operation Status and Users' Perceptions of URBAN GARDEN FIELDS

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Abstract

Purpose: This study was conducted to present differences, problems, and improvement measures by investigating and comparing the operation status of public and private vegetable gardens operated communal gardens by the initiating entity.

Method: This study collected data from prior studies, literature, media, interview with public officials, garden managers, and users, and on-site survey and conducted variance analysis, frequency analysis, and cross analysis.

Results: The study found that urban vegetable garden users are mostly men, married couples, and families, and people aged between 40s and 70s. People with higher educational background tended to use them more, and the occupation of the users included employees of commercial businesses, the self-employed, and housewives. In the public-private comparison of the management and operation, allowing and using vinyl mulching was found to be a problem. In the public-private comparison of environment and facilities, it was found that the environment was similar, but the facilities were different from each other in the private sector. In comparing users' perception, the public sector preferred the operation by local governments, while the private sector preferred the joint operation of the public and private sectors. The preferred area for sale was 17 to 33 square meters, and the inconvenient facilities were the toilets of the private sector. The activity satisfaction comparison showed that the effect of the use of urban gardens fields included being helpful for the production and sharing of safe agricultural products, health, and exercise, and helpful for mental health and providing exercise effects in terms of the health satisfaction.

Conclusion: To sum up, urban agriculture is believed to spread the pluralistic value of agriculture, improve the urban environment, and help urban residents to utilize their leisure time and improve the quality of life.

[Keywords] Vegetable Gardens, Communal, Private, Operation, Ordinance

1. Introduction

According to the Ministry of Land, Infrastructure, and Transport[1]'s 2017 urban planning statistics, 91.82% of the entire population in Korea live in urban areas. There are problems such as food insecurity(e.g. the recent incident of the distribution of eggs contaminated with pesticides), lack of green space, air pollution, lack of water, an increase of retirees and the elderly, widening the gap between the rich and the poor, increasing the number of alienated and vulnerable people, and heat island phenomenon. In response, urban agriculture, an alternative to solving these problems at all, continues to spread. Urban agriculture is reported to have various effects, including the production of safe food, hobbies and leisure, the educational opportunity for children, environmental improvement, job creation, and the formation of a community with

local residents. According to the data from the Ministry of Agriculture, Food, and Rural Affairs [2], the number of participants in urban agriculture increased from 150,000 in 2010 to 1.9 million in 2017, and the area of vegetable gardens increased from 104ha in 2010 to 1,100ha in 2017. The number of participants and areas has increased remarkably due to the central and local governments' policies to foster urban agriculture, and urban agriculture continues to expand due to the revitalization policies of the Ministry of Agriculture, Food, and Rural Affairs and local governments, the development and distribution of technologies by the Rural Development Administration, and the activities of private organizations. Urban vegetable gardens provide children with opportunities to experience rural areas and nature and learn the importance of food, and for the elderly, garden activities are opportunities to produce and share eco-friendly agricultural products, communicate with neighbors, relieve the frustration of urban life, and form a community. It is reported that various functions of urban agriculture should be continuously fostered as they have many positive functions such as easing urban problems and improving the quality of life of urban residents and that the role of urban agriculture is important to solve rural problems such as rural population reduction, aging population, and lack of young farmers [3][4]. Urban agriculture should be developed into a complementary and win-win relationship with rural agriculture, not a competitive one. In addition, for urban agriculture, research on advanced agricultural technologies continues including vegetable factories in preparation for future food crises, such as falling food self-sufficiency, reducing farmland, and climate change caused by global warming [5][6]. The results of Noh Hee-young's study of the factors influencing community revitalization in urban vegetable gardens [7] indicate the possibility that urban vegetable gardens can function as spaces that form leisure opportunities and urban community culture for the residents and that if urban vegetable gardens are used for community purposes, it can be used as a plan for revitalizing a community. This requires a plan that takes into account the opinions of community members and a systematic plan centered on the understanding of the characteristics of the community. In addition, research on the actual conditions of urban ecological agriculture and ways to revitalize the urban eco-farm has limited cultivation crops, including the concentration on cultivating leafy vegetables, causing inconvenience to neighboring garden participants due to the cultivation of vines, lack of communication opportunities between civic farm managers and participants, low interest in vegetable gardens, and vertical relations between the public and private sectors, including issues related to soil management due to difficulties in sustainable cultivation of vegetable gardens [8]. In a study by Yoo Si-beom [9] on the status and characteristics of urban vegetable gardens from the perspective of urban publicness, limitations are found along with various problems. However, if the environmental conditions of urban vegetable gardens were considered and strategies to overcome problems within the boundaries were executed continuously, a basis for public use will be provided. Several prior studies [10][11][12] have analyzed the current status of urban vegetable gardens, users' perception and satisfaction level [13], and community formation, selecting sample cases of urban vegetable gardens, and presented measures to the revitalization and improvement of urban vegetable gardens. This study defined urban agriculture as daily agriculture for alleviating urban problems and producing safe food, hobbies, and healing [14] as non-commercial agricultural activities within urban areas. Accordingly, the purpose of this research is to investigate and compare the actual conditions of operation of public and private urban gardens fields and user perception by the initiating entity to derive differences, problems, and improvement measures and to provide basic data for the development of urban agriculture.

2. Research Method

2.1. Research target sites

As shown in <Table 1>, a total of four vegetable gardens were selected. They are communal vegetable gardens run by local governments and private organizations in Dong-gu and Suseong-

gu, Daegu, where urban agriculture is activated, and where public and private vegetable gardens are located, with two gardens each from both sectors that sell more than 100 accounts. The target gardens are relatively easy to access because they are located in residential and neighborhood living areas and are well-known through the media.

Table 1. Research target sites.

Description	Target site	Location	Accounts
Public	Dong-gu office happiness sharing garden	823-12,13, Bulo-dong, Dong-gu	160
	Suseong-gu office joilgol eco-friendly garden	16-1, 2, 18, 19, Jisan-dong, Suseong-gu	200
Private	LH yulha nanum garden	1413 Yulha-dong, Dong-gu	350
	Daegu city farmers school garden	97 Nobyeon-dong, Suseong-gu	100

2.2. Survey items

To analyze the target sites, the prior research papers by Lee Cha-hee[6], Kim Min-sun[15], Kim Yi-seon[16], Hwang Jeong-im, Jang Bo-kyung, and Choi Yun-ji[17] were reviewed. The survey items were divided into management, operation, environment, and facilities. Management and operation were divided into management methods and sales methods, and the environment and facilities were divided into location environment, accessibility, safety, and amenities.

Table 2. Survey items.

Description	Details	Survey method
Management operation	Operation method, ordinance, regulation, cost sharing, education, manager, site use, cultivation principle, free supply	Literature interview
	Area, parcel, interval, period, amount, target, selection method, garden type, garden making	Literature interview
Environment facilities	Duration of sunshine, water, slope, drainage, risk of crop damage, direction, earthiness	Site
	Transport, surroundings, garden conditions, fences	Site
	Toilets, parking lots, shelters, training space, garbage collection, communal farming materials, greenhouse facilities, irrigation, water tanks for irrigation	Site

2.3. User survey

For the user survey, "Study on the Mid to Long-term Development of Urban Agriculture" by the Korea Rural Economic Institute[18] and "Status and Development of Small and Medium-Sized Agricultural Tools for Urban Agriculture" by Jeong Jun-rae[19] were referenced, modified, and supplemented. A survey consisting of a total of 31 items, including 7 items for user activity, 13 items for user perception, 5 items of user satisfaction, and 6 items for the demographics, was administered by visiting the target garden sites on weekends from late April to late May 2018. A total of 121 questionnaires were collected, including 29 from Happiness Sharing Garden,

34 from Joilgol Eco-friendly Garden, 33 from LH Yulha Nanum Garden, and 25 from Daegu City Farmers School.

2.4. Data processing

The data collected through prior research review, literature survey, media interview, public official interview, garden manager interview, garden field survey, user interview, and questionnaire survey were processed using the SPSS statistical program for variance, frequency, and cross analysis.

3. Results

3.1. Demographic characteristics

The demographic characteristics by the initiating entity are as shown in <Table 3>.

Table 3. Comparison of demographic and general characteristics by the initiating entity.

Item	Description	Public		Private		Total	
		Fre- quency	Percent- age (%)	Fre- quency	Percent- age (%)	Fre- quency	Percent- age (%)
Gender	Male	42	66.7	43	74.1	85	70.2
	Female	21	33.3	15	25.9	36	29.8
	Total	63	100	58	100	121	100
Age	30s	7	11.1	4	6.9	11	9.1
	40s	13	20.6	21	36.2	34	28.1
	50s	21	33.4	17	29.3	38	31.4
	60s	13	20.6	11	19.0	24	19.8
	70s	9	14.3	5	8.6	14	11.6
	Total	63	100	58	100	121	100
Educa- tion	Graduated from middle school	7	11.1	3	5.1	10	8.2
	Graduated from high school	18	28.6	11	19.0	29	24.0
	Graduated from college or higher	38	60.3	44	75.9	82	67.8
	Total	63	100	58	100	121	100
Monthly income	2 mill. won or less	17	27	10	17.2	27	22.4
	3 mill. won or less	11	17.5	15	25.9	26	21.5
	4 mill. won or less	13	20.6	11	19.0	24	19.8

	5 mill. won or less	7	11.1	13	22.4	20	16.5
	More than 5 mil. won	15	23.8	9	15.5	24	19.8
	Total	63	100	58	100	121	100
Occupation	Employee	18	28.6	15	25.9	33	27.3
	Public official	3	4.8	5	8.6	8	6.6
	Self-employed	17	27.0	15	25.9	32	26.4
	Housewife	13	20.6	9	15.5	22	18.2
	Other	12	19.0	14	24.1	26	21.5
	Total	63	100	58	100	121	100
Residence	Detached house	9	14.3	8	13.8	17	14.0
	Apartment	54	85.7	50	86.2	104	86.0
	Total	63	100	58	100	121	100

3.2. Comparison of years of activity

The comparison of the number of years of activity by the initiating entity is shown in <Table 4>.

Table 4. The comparison of the number of years of activity.

Description	Public		Private		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
First year	26	41.3	19	32.8	45	37.3
Second year	15	23.7	16	27.6	31	25.6
Third year	11	17.5	8	13.8	19	15.7
Fourth year	8	12.7	9	15.5	17	14.0
Fifth year	3	4.8	6	10.3	9	7.4
Total	63	100	58	100	121	100
Description	Public	Private	Total	F	p	
Mean	2.16	2.43	2.29	1.328	0.251	
SD	1.234	1.366	1.300			

Note: p* < 0.05.

3.3. Comparison of use time

The comparison of use time by the initiating entity is shown in <Table 5>.

Table 5. The comparison of use time by the initiating entity.

Description	Public		Private		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
30 min. or less	12	19.0	4	6.8	16	13.2
30 min. to 1 hour	30	47.6	27	46.6	57	47.1
1 to 2 hours	18	28.6	22	38.0	40	33.1
2 to 3 hours	3	4.8	5	8.6	8	6.6
Total	63	100	58	100	121	100

Description	Public	Private	Total	F	p
Mean	60.00	70.87	64.83	2.994	0.086
SD	30.599	33.528	32.300		

Note: p* < 0.05.

3.4. Comparison of travel time

The comparison of travel time by the initiating entity is shown in <Table 6>.

Table 6. The comparison of travel time by the initiating entity.

Description	Public		Private		Total	
	Frequency	Percentage (%)	Frequency	Percentage (%)	Frequency	Percentage (%)
30 min. or less	31	49.2	36	62.1	67	55.4
30 min. to 1 hour	25	39.7	18	31.0	43	35.5
1 to 2 hours	7	11.1	3	5.2	10	8.3
2 to 3 hours	0	0	1	1.7	1	0.8
Total	63	100	58	100	121	100

Description	Public	Private	Total	F	p

Mean	17.86	16.29	15.33		
SD	10.766	12.963	11.650	0.524	0.470

Note: p* < 0.05.

3.5. Comparison of means of transport

The comparison of means of transport by the initiating entity is shown in <Table 7>.

Table 7. The comparison of means of transport by the initiating entity.

Description	Public		Private		Total		x ²	p
	Fre- quency	Percent- age (%)	Fre- quency	Percent- age (%)	Fre- quency	Percentage (%)		
On foot	13	20.6	31	53.5	44	36.4	17.863	0.000
Car	43	68.3	18	31.0	61	50.4		
Bike	7	11.1	9	15.5	16	13.2		
Total	63	100	58	100	121	100		

Note: p* < 0.05.

3.6. Comparison of management method

The comparison of management method by the initiating entity is shown in <Table 8>.

Table 8. The comparison of management method by the initiating entity.

Description	Public		Private	
	A garden	B garden	C garden	D garden
Operating entity	Dong-gu office	Suseong-gu office	LH land and housing corporation	Maeil newspaper, Daegu metropolitan office of education
Operation method	Direct management	Direct management	Consigned	Direct management
Ordinance	×	○		
Regulation	○	○	○	×
Operation cost	Budget, sales revenue	Budget, sales revenue	Subsidies, sales revenue	Sales revenue

Education	Consigned	Consigned	When necessary	No
Manager	Full-time	Full-time	Volunteer	No
Site use	Rented	Rented	Free	Rented
Contract period	5 years	5 years	1 years	1 years
Cultivation principle	3 No (Chemical fertilizer, synthetic pesticide, vinyl)	2 No (Chemical fertilizer, synthetic pesticide)	3 No (Chemical fertilizer, synthetic pesticide, vinyl)	3 No (Chemical fertilizer, synthetic pesticide, vinyl)
Free supply	Green pesticide, compost	Green pesticide, compost	Green pesticide	Natural pesticide, learning material

Note: ○:Yes, X:No.

3.7. The comparison of the environment and facilities by the initiating entity

The comparison of the environment and facilities by the initiating entity is shown in <Table 9>.

Table 9. The comparison of the environment and facilities by the initiating entity.

Description	Public		Private	
	A garden	B garden	C garden	D garden
Duration of sunshine(h)	6	6	6	6
Water	Ground water	Ground water	Ground water	Ground water
Slope, drainage	Flatland, good	Flatland, good	Flatland, good	Flatland, good
Transport	On foot, bike, car	car	On foot, bike, car	On foot, bike, car

Surroundings	Houses, airport, apartments, neighborhood facilities	reservoir, mountain, farmland	Apartments, parks, schools, neighborhood facilities	Schools, apartments, neighborhood facilities
Fencing	Barbed-wire fence	Barbed-wire fence	Barbed-wire fence	Barbed-wire fence, thuja
Entrance	1	2	2	2

3.8. The comparison of the user perception by the initiating entity

The comparison of the user perception by the initiating entity is shown in <Table 10>.

Table 10. The comparison of the user perception by the initiating entity.

Item	Public		Private		Total		x ²	p
	Frequency	Percent-age (%)	Frequency	Percent-age (%)	Frequency	Percent-age (%)		
Local government	54	85.7	26	44.8	80	66.1	23.795	0.000
Individual, private organization	1	1.6	11	19.0	12	9.9		
Private/public joint	8	12.7	21	36.2	29	24.0		
Total	63	100	58	100	121	100		
Yes	14	22.2	32	55.2	46	38.0		
No	49	77.8	26	44.8	75	62.0	13.914	0.000
Total	63	100	58	100	121	100		
Chemical fertilizer	0	0	1	1.7	1	0.8	4.882	0.181
Organic fertilizer	29	46.0	33	56.9	62	51.2		
Chemical fertilizer-organic fertilizer	8	12.7	10	17.3	18	14.9		
Not use	26	41.3	14	24.1	40	33.1		
Total	63	100	58	100	121	100		

Note: p* < 0.05.

3.9. The comparison of the use effects by the initiating entity

The comparison of the use effects by the initiating entity is shown in <Table 11>.

Table 11. The comparison of the use effects by the initiating entity.

Description	Public		Private		Total		x ²	p
	Fre-quency	Percent-age (%)	Fre-quency	Percent-age (%)	Fre-quency	Percent-age (%)		

Production and sharing of safe agricultural products	32	50.8	16	27.6	48	39.7		
Interaction with neighbors	4	6.4	8	13.8	12	9.9		
Help for health and exercise	18	28.5	25	43.1	43	35.5		
Increasing conversation with family members	1	1.5	7	12.1	8	6.6	16.795	0.005
Help for education of children	4	6.4	2	3.4	6	5.0		
Reducing food expenditure	4	6.4	0	0	4	3.3		
Total	63	100	58	100	121	100		

Note: p* < 0.05.

4. Discussion

Since the operation of vegetable gardens is expensive, it is difficult for individuals and private organizations to secure land and raise operating costs. As the population ages and leisure time increases, the number of urban residents seeking daily pastime increases, and the number of participants in vegetable garden activities continues to increase [11]. In the case of local governments, securing sites and budgeting are thought to be relatively easier than the private sector, and it is also in line with the promotion of national health and the implementation of improving the quality of life for citizens in the aging era. Therefore, the number of local governments participating in the enactment of the ordinance (39.3%) and the operation of vegetable gardens continues to increase [15]. This study found that users mainly preferred local government operation (66.1%) and public-private joint operation (24%), which was supported by the study results of Lee Cha-hee [5]. Local governments need to participate so that urban agriculture can be settled in a stable manner. Vegetable gardens are mostly a leased property owned by others, and the contract is closed on a medium or short term basis, usually one or five years, so the site can no longer be used if it were developed or converted to other uses. To solve these temporary use problems, it is necessary to secure continuously available vegetable gardens. These findings are supported by the results of prior studies done by Kim Tae-gon, Park Mun-ho, and Heo Ju-nyeong [3]. It is not easy to secure idle space in urban areas, so it is necessary to secure various spaces including long-term unexecuted park sites, river sites, and vacant lots. Most users responded that they rarely used chemical fertilizers and synthetic pesticides, and that the permission or use of vinyl mulching does not match the purpose of urban agriculture, and that unsightly things such as vinyl and fertilizer bags are left unattended in the garden, which may hinder the creation of pleasant and environmentally friendly gardens. Therefore, it is believed that public relations and education will be needed to promote environmental awareness on the use of vegetable gardens. These results were also reported in a prior study by [18] Jeong Jun-rae (Status and Development of Small and Medium-Sized Agricultural Tools for Urban Agriculture).

Due to the lack of activities to form a community, which is the purpose of operating urban vegetable gardens, most users often focus only on growing crops, requiring the operation of various programs such as cultural events for harmony and communication among neighbors [20], community garden creation and crop donation events, and farm parties. It is believed that local

governments will need to support the development of private organizations to create vegetable gardens that can be operated autonomously by private organizations such as women's associations and senior citizens' associations by utilizing small urban vegetable gardens and apartment gardens. Urban agricultural managers continue to be produced due to the implementation of national certificates in 2017, but they are not fully utilized. It is believed that utilizing certified urban agricultural managers from public vegetable gardens plays an important role in establishing urban agriculture as a daily agriculture, including creating jobs, distributing cultivation techniques and guiding users, and holding various hands-on events. To sum up, urban agriculture is believed to contribute to spreading the pluralistic value of agriculture, improving the urban environment, utilizing leisure time for and improving the quality of life of urban residents[21].

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	ESY	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/>
Corresponding Author*	WHL	-Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/>
Co-Author	WKC	-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2426-1151

Website: www.j-institute.jp/protection/

Editor: protection@j-institute.jp

Corresponding author
E-mail: parkjs@kmu.ac.kr

dx.doi.org/10.22471/protection.2020.5.2.50

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Differences in PROTECTION for Sports Imagery Ability of High School Taekwondo Breaking Athletes

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Abstract

Purpose: The study was conducted to verify the differences in sports imagery ability among high school students/taekwondo breaking athletes participating in taekwondo breaking competitions across the country. In order to achieve the purpose of this research, 230 high school students/taekwondo breaking athletes who had participated in national-level taekwondo breaking competitions were surveyed and the collected data were analyzed. The conclusions of the analysis are as follows.

Method: The study surveyed 230 high school taekwondo breaking athletes who participated in nationwide taekwondo breaking competitions. The survey was conducted online due to COVID-19. The collected data were analyzed using SPSS 26.0. Frequency analysis was conducted to identify the general characteristics of the study participants. T-test and one-way ANOVA were conducted to find out what the differences were in sports imagery ability among high school taekwondo breaking athletes. The significance level of all the statistics is set to .05.

Result: First, as a result of verifying the differences in sports imagery ability according to the gender of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the goal imagery factor. Second, as a result of verifying the differences in sports imagery ability according to the school year of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor. Third, as a result of analyzing the differences in sports imagery ability according to the experience of demonstration training of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor. Fourth, as a result of analyzing the differences in sports imagery ability according to the number of participation in breaking competitions of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor and goal imagery factor. Fifth, as a result of analyzing the differences in sports imagery ability according to the experience of winning in competitions of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor and goal imagery factor.

Conclusion: As a result of analyzing the differences in sports psychological abilities of high school athletes who participated in the taekwondo competition, there was a statistically significant difference.

[Keywords] Taekwondo, Technical Breaking, Sports Imagery Ability, High School Student, Breaking Competition

1. Introduction

Taekwondo breaking competitions began in 1992 at the Taekwondo Hanmadang event held to promote the diversity and quality as a martial arts of taekwondo and to vitalize taekwondo for adult trainees[1]. Since then, Taekwondo Hanmadang has been held annually, leading to the quantitative and qualitative growth of taekwondo competitions and the development of breaking techniques, and has attracted the attention of many taekwondo trainees for its splendor of skills not seen in previous competitions of sparring and forms(poomsae). In addition, the special college entrance benefits, which were only applied to winners in existing sparring and forms competitions, were expanded to winners in breaking competitions, which led to the creation of new demonstration teams specializing in technical breaking and the increase in the number of taekwondo breaking athletes.

As breaking competitions are held every year, the number of participants in the competitions increases and new technologies emerge, and the techniques are developing[2], but problems are also arising accordingly. In the midst of fierce competition, high-level skills began to emerge in order to perform well in the competitions[3]. Recently, there have been high-difficulty taekwondo breaking techniques that incorporate acrobatic movements and gymnastics techniques into taekwondo[4]. Due to these high-level skills, taekwondo athletes are complaining of unstable emotions for various factors in the competitions, including anxiety over success or failure and physical injury, and are attempting various training methods including self-control through technical training and imagery training as a means to overcome the anxiety of the competitions.

Self-control based on the imagery ability is the ability to lead to desirable behavior in the midst of difficulties widely lurking in sports competitions[5], and the ability to pursue positive performance, patience, control of thinking, and changes in an emotional state are important to self-control in sports. In addition, given that there is a high correlation between total score of performance strategy, imagery and goal setting, conditioning, talking to oneself, and relaxation, and that factors such as conditioning, talking to oneself, image training, and setting goals are related to the athletic performance strategy in the event of competitions, sports psychological skills are essential to improving performance[6][7][8].

With the scientific development of sports, it is becoming an opportunity to specialize in improving performance and demand more diverse physical and mental abilities at the same time. Competition instability in sports events results in increased mental and physical stress, and depending on the number of sports events, athletes who participate in sports events are having difficulty improving their performance due to anxiety, unstable emotional control, muscle strain, unstable heart rate, lack of concentration, and lack of attention. Taekwondo breaking competitions require mental factors such as concentration, continuous self-management, mental training, and image training because there is a wide gap in rankings even by a single mistake.

Therefore, the purpose of this study is to identify differences in sports imagery ability of high school students/athletes participating in taekwondo breaking competitions and to provide the results as basic data for the coaches and athletes to improve their performance.

2. Research Method

2.1. Research participants

The study surveyed 230 high school taekwondo breaking athletes who competed in nationwide taekwondo breaking competitions. The demographic characteristics of the study participants are as shown in <Table 1>. In particular, the survey was conducted online in 2020 according to the situation where breaking competitions were canceled or postponed due to COVID-19. As questions remain about the reliability and validity of the online survey, we produced the Google online questionnaire by referring to the preceding studies[3][9][10] that conducted the study with online surveys. The purpose of the study and the online questionnaire

method were fully explained, and with the help of coaches of each team, the consent forms were collected and the survey was conducted online.

Table 1. The general characteristics of the study participants.

Item	Description	Frequency	Percentage(%)
Gender	Male	174	75.7
	Female	56	24.3
School year	First year	62	27.0
	Second year	84	36.5
	Third year	84	36.5
Experience of demonstration training	Less than 1 year	24	10.4
	1 year to less than 2 years	45	19.6
	2 years to less than 3 years	45	19.6
	3 years to less than 4 years	34	14.8
	4 years to less than 5 years	24	10.4
The number of participation in the competitions	Longer than 5 years	58	25.2
	One to three times	75	32.6
	Four to six times	60	26.1
	Seven to nine times	39	17.0
	More than 10 times	56	24.3
Experience of winning in the competitions	First place	40	17.4
	Second place	34	14.8
	Third place	31	13.5
	None	125	54.3
Total		230	100.0

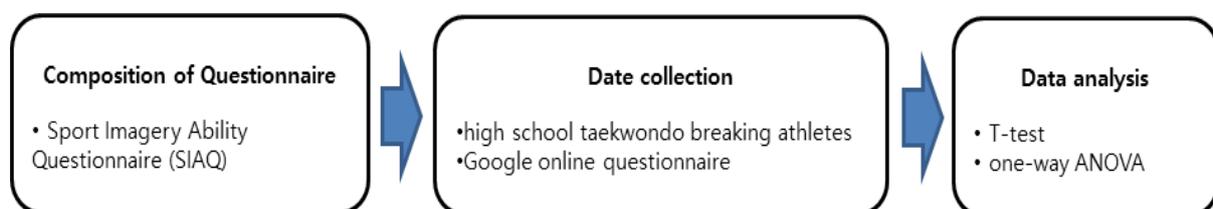
2.2. Date collection

Sport Imagery Ability Questionnaire(SIAQ) developed by Williams & Cumming [11] was used to measure the sports imagery ability of high school students/athletes of taekwondo breaking. The imagery ability scale is to measure the following five factors: technical imagery ability, strategic imagery ability, goal imagery ability, emotional imagery ability, and mastery imagery ability, and consists of a total of 15 questions, with a seven-point Likert scale. It consists of three questions for technical imagery ability, three questions for strategic imagery ability, three questions for goal imagery ability, three questions for emotional imagery ability, and three questions for mastery imagery ability.

2.3. Research process

The procedure for this study is to compose a questionnaire, collect date, and analyze it. The contents are as shown in <Figure 1>.

Figure 1. Research process.



2.4. Data analysis

The collected data through the survey were analyzed using SPSS 26.0. Frequency analysis was conducted to identify the general characteristics of the study participants. T-test and one-way ANOVA were conducted to find out what the differences were in sports imagery ability among high school taekwondo breaking athletes. The significance level of all the statistics is set to .05.

3. Result and Discussion

3.1. The differences in sports imagery ability according to the gender of high school taekwondo breaking athletes

The results of t-test to analyze the differences in sports imagery ability according to the gender of high school taekwondo breaking athletes are as shown in <Table 2>. Statistically significant differences were shown in the goal imagery factor with $t=1.505$, $p=.031$. On the other hand, there were no statistically significant differences in technical imagery factor ($t=2.248$, $p=.136$), strategic imagery factor ($t=2.085$, $p=.094$), emotional imagery factor ($t=4.258$, $p=.059$), and mastery imagery factor ($t=4.009$, $p=.572$). These results differ from the results of a prior study [12] where there were differences in emotional imagery ability according to the gender of taekwondo poomsae athletes, which shows the differences between the characteristics of breaking and poomsae events.

Table 2. The differences in sports imagery ability according to the gender.

Area	Gender	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>
Technical imagery	Male	174	5.1686	1.07565	2.248	.136
	Female	56	4.8095	.91642		
Strategic imagery	Male	174	4.5766	1.15645	2.085	.094
	Female	56	4.2202	.96038		
Goal imagery	Male	174	4.7874	1.61444	1.505*	.031
	Female	56	4.4286	1.33442		
Emotional imagery	Male	174	5.4253	1.03029	4.258	.059
	Female	56	4.7738	.87872		
Mastery imagery	Male	174	4.9272	1.19292	4.009	.099
	Female	56	4.2083	1.08164		

Note: * $p<.05$, ** $p<.01$, *** $p<.001$.

3.2. The differences in sports imagery ability according to the school year of high school taekwondo breaking athletes

The results of t-test to analyze the differences in sports imagery ability according to the school year of high school taekwondo breaking athletes are as shown in <Table 3>. Statistically significant differences were shown in the strategic imagery factor with $t=3.667$, $p=.027$. On

the other hand, there were no statistically significant differences in technical imagery($t=1.409$, $p=.247$), goal imagery($t=2.722$, $p=.068$), emotional imagery($t=3.045$, $p=.050$), and mastery imagery($t=1.594$, $p=.205$). The results are the same as those of a prior study[13] that showed differences in poomsae athletes' strategic imagery ability depending on the age. This suggests that the strategic imagery ability of both poomsae and breaking athletes increases as their age or school year increases.

Table 3. The differences in sports imagery ability according to the school year.

Area	School year	<i>n</i>	<i>M</i>	<i>SD</i>	<i>t</i>	<i>p</i>	<i>post-hoc</i>
Technical imagery	First year	62	5.1613	1.08935	1.409	.247	
	Second year	84	4.9286	1.03367			
	Third year	84	5.1746	1.02770			
Strategic imagery	First year	62	4.4355	1.14135	3.667*	.027	b<c
	Second year	84	4.2817	1.09703			
	Third year	84	4.7381	1.09284			
Goal imagery	First year	62	4.7151	1.50633	2.722	.068	
	Second year	84	4.4167	1.61143			
	Third year	84	4.9722	1.50253			
Emotional imagery	First year	62	5.3763	.99632	3.045	.050	
	Second year	84	5.0476	1.03116			
	Third year	84	5.4048	1.03496			
Mastery imagery	First year	62	4.8871	1.16560	1.594	.205	
	Second year	84	4.5675	1.23836			
	Third year	84	4.8373	1.19065			

Note: * $p<.05$, ** $p<.01$, *** $p<.001$.

3.3. The differences in sports imagery ability according to the experience of demonstration training of high school taekwondo breaking athletes

The results of t-test to analyze the differences in sports imagery ability according to the experience of demonstration training of high school taekwondo breaking athletes are as shown in <Table 4>. Statistically significant differences were shown in the strategic imagery factor with $t=4.895$, $p=.000$. On the other hand, there were no statistically significant differences in technical imagery($t=1.659$, $p=.146$), goal imagery($t=1.483$, $p=.196$), emotional imagery ($t=.654$, $p=.659$), and mastery imagery($t=.622$, $p=.683$). The results are the same as those of a prior study[12] that showed differences in poomsae athletes' strategic imagery ability depending on the athletic career.

Table 4. The differences in sports imagery ability according to the experience of demonstration training.

Area	Experience	<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	<i>post-hoc</i>
Technical imagery	Less than 1 year	24	4.9028	1.08338	1.659	.146	
	1 year to less than 2 years	45	5.0815	1.02778			
	2 years to less than 3 years	45	4.7778	.93744			
	3 years to less than 4 years	34	5.3039	1.02615			
	4 years to less than 5 years	24	5.0278	1.15435			
	Longer than 5 years	58	5.2816	1.07025			
	Less than 1 year	24	3.6250	1.24067	4.895***	.000	a<b,c,e,d

Strategic imagery	1 year to less than 2 years	45	4.4963	1.17556	1.483	.196	c<d a,c<f
	2 years to less than 3 years	45	4.2667	.87502			
	3 years to less than 4 years	34	4.7843	1.16307			
	4 years to less than 5 years	24	4.7778	.95131			
	Longer than 5 years	58	4.7241	1.05804			
Goal imagery	Less than 1 year	24	4.2083	1.77425	.654	.659	
	1 year to less than 2 years	45	4.7556	1.44495			
	2 years to less than 3 years	45	4.4000	1.38462			
	3 years to less than 4 years	34	4.9510	1.39777			
	4 years to less than 5 years	24	4.5694	1.88940			
Emotional imagery	Longer than 5 years	58	5.0000	1.57465	.622	.683	
	Less than 1 year	24	5.3194	1.12709			
	1 year to less than 2 years	45	5.2000	1.05505			
	2 years to less than 3 years	45	5.1111	.90732			
	3 years to less than 4 years	34	5.4902	1.00583			
Mastery imagery	4 years to less than 5 years	24	5.1667	1.06322			
	Longer than 5 years	58	5.3276	1.08236			
	Less than 1 year	24	4.7500	1.17646			
	1 year to less than 2 years	45	4.8148	1.13386			
	2 years to less than 3 years	45	4.6593	1.07658			
3 years to less than 4 years	34	4.8431	1.31614				
4 years to less than 5 years	24	4.4028	1.37254				
Longer than 5 years	58	4.8678	1.24243				

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

3.4. The differences in sports imagery ability according to the number of participation in breaking competitions of high school taekwondo breaking athletes

The results of t-test to analyze the differences in sports imagery ability according to the number of participation in breaking competitions of high school taekwondo breaking athletes are as shown in <Table 5>. Statistically significant differences were shown in the strategic imagery factor with $t=8.050$, $p=.000$ and goal imagery $t=6.022$, $p=.001$. On the other hand, there were no statistically significant differences in technical imagery ($t=1.331$, $p=.265$), emotional imagery ($t=.162$, $p=.922$), and mastery imagery ($t=.819$, $p=.485$). Looking at the changes in imagery ability through training, it was shown that the imagery ability improved as the experience of participation in competitions increased. This is consistent with Orlick & Partington [14] study that reported clarity could be developed step by step through training and Jeong Chung-hee and Kim Byung-joon's study [15], that showed that only when an image can be controlled, one could draw the right image that one wanted, not the image of making mistakes, and that the control could gradually improve through practice, just as with clarity. This suggests that the more experience one has in competitions, the better one's strategy and goal imagery ability.

Table 5. The differences in sports imagery ability according to the number of participation in competitions of demonstration training.

Area	Number	<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	<i>post-hoc</i>
	One to three times	75	4.9333	1.00897	1.331	.265	

Technical imagery	Four to six times	60	5.0222	.97592	8.050***	.000	a,b,c<d				
	Seven to nine times	39	5.1709	1.14164							
	More than 10 times	56	5.2798	1.09872							
Strategic imagery	One to three times	75	4.0267	1.15569							
	Four to six times	60	4.5333	.91277							
	Seven to nine times	39	4.7265	1.16195							
Goal imagery	More than 10 times	56	4.8988	1.04817							
	One to three times	75	4.2089	1.58235							
	Four to six times	60	4.7278	1.50641							
Emotional imagery	Seven to nine times	39	4.6838	1.57641				6.022***	.001	a<b a,b,c<d	
	More than 10 times	56	5.3393	1.34614							
	One to three times	75	5.2000	1.05409							
Mastery imagery	Four to six times	60	5.2944	.91254							
	Seven to nine times	39	5.2821	1.18108	.162	.922					
	More than 10 times	56	5.3155	1.03752							
Technical imagery	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
	Seven to nine times	39	4.7692	1.31379			.819				.485
Strategic imagery	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
Goal imagery	Seven to nine times	39	4.7692	1.31379							
	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							
Emotional imagery	Four to six times	60	4.6889	1.14301							
	Seven to nine times	39	4.7692	1.31379							
	More than 10 times	56	4.9583	1.20447							
Mastery imagery	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
	Seven to nine times	39	4.7692	1.31379							
Technical imagery	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
Strategic imagery	Seven to nine times	39	4.7692	1.31379							
	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							
Goal imagery	Four to six times	60	4.6889	1.14301							
	Seven to nine times	39	4.7692	1.31379							
	More than 10 times	56	4.9583	1.20447							
Emotional imagery	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
	Seven to nine times	39	4.7692	1.31379							
Mastery imagery	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
Technical imagery	Seven to nine times	39	4.7692	1.31379							
	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							
Strategic imagery	Four to six times	60	4.6889	1.14301							
	Seven to nine times	39	4.7692	1.31379							
	More than 10 times	56	4.9583	1.20447							
Goal imagery	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
	Seven to nine times	39	4.7692	1.31379							
Emotional imagery	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							
	Four to six times	60	4.6889	1.14301							
Mastery imagery	Seven to nine times	39	4.7692	1.31379							
	More than 10 times	56	4.9583	1.20447							
	One to three times	75	4.6400	1.19905							

Note: *p<.05, **p<.01, ***p<.001.

3.5. The differences in sports imagery ability according to the experience of winning in competitions of high school taekwondo breaking athletes

The results of t-test to analyze the differences in sports imagery ability according to the experience of winning in competitions of high school taekwondo breaking athletes are as shown in <Table 6>. Statistically significant differences were shown in the strategic imagery factor with $t=3.988$, $p=.010$ and goal imagery $t=5.926$, $p=.001$. On the other hand, there were no statistically significant differences in technical imagery ($t=1.486$, $p=.219$), emotional imagery ($t=.179$, $p=.911$), and mastery imagery ($t=1.425$, $p=.236$). These results are in the same context as a study of U.S. Olympic athletes by Murph & Jowdy [16], in which 90% of U.S. Olympic athletes used imagery, 40% of whom to relax, 44% to acquire new skills, and 48% to correct technical errors, and 97% of them improved their performance [17]. This can be interpreted as players with experience of winning in competitions have higher strategy and goal imagery ability [18].

Table 6. The differences in sports imagery ability according to the experience of winning in breaking competitions.

Area	Place	<i>n</i>	<i>M</i>	<i>SD</i>	<i>F</i>	<i>p</i>	<i>post-hoc</i>
Technical imagery	First place	40	5.3333	1.08078	1.486	.219	
	Second place	34	5.1961	1.21472			
	Third place	31	5.1183	1.11072			
	None	125	4.9600	.96591			
Strategic imagery	First place	40	4.8167	1.04582	3.899**	.010	a>d, c>d
	Second place	34	4.5980	1.19420			
	Third place	31	4.8280	1.12504			
	None	125	4.2720	1.08375			
Goal imagery	First place	40	5.2083	1.39940	5.926***	.001	a>d, b>d
	Second place	34	5.3627	1.19586			

	Third place	31	4.7204	1.75562		
	None	125	4.3520	1.54983		
Emotional imagery	First place	40	5.3333	.86726	.179	.911
	Second place	34	5.3039	1.19022		
	Third place	31	5.3226	1.00916		
	None	125	5.2213	1.05064		
Mastery imagery	First place	40	5.0667	1.16990	1.425	.236
	Second place	34	4.5588	1.24376		
	Third place	31	4.8495	1.19517		
	None	125	4.6800	1.20140		

Note: * $p < .05$, ** $p < .01$, *** $p < .001$.

4. Conclusion and Suggestions

The study was conducted to verify the differences in sports imagery ability among high school students/taekwondo breaking athletes participating in taekwondo breaking competitions across the country. In order to achieve the purpose of this research, 230 high school students/taekwondo breaking athletes who had participated in national-level taekwondo breaking competitions were surveyed and the collected data were analyzed. The conclusions of the analysis are as follows.

First, as a result of verifying the differences in sports imagery ability according to the gender of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the goal imagery factor.

Second, as a result of verifying the differences in sports imagery ability according to the school year of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor.

Third, as a result of analyzing the differences in sports imagery ability according to the experience of demonstration training of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor.

Fourth, as a result of analyzing the differences in sports imagery ability according to the number of participation in breaking competitions of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor and the goal imagery factor.

Fifth, as a result of analyzing the differences in sports imagery ability according to the experience of winning in competitions of high school breaking athletes who participated in taekwondo breaking competitions, statistically significant differences were found in the strategic imagery factor and the goal imagery factor.

Based on the results of this study, here are some suggestions for follow-up research.

First, the study was conducted only on high school students. It would be meaningful if a study was conducted on middle school and college students as well.

Second, the study only focused on the differences in sports imagery ability of high school breaking athletes. Subsequent research will be meaningful if there were studies that identify not only sports imagery ability but also relationships with various variables such as sports competition anxiety and sports performance strategies, and qualitative studies that can find in-depth causes.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	JSK	<ul style="list-style-type: none"> -Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/>
Corresponding Author*	JSP	<ul style="list-style-type: none"> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/>
Co-Author	SJL	<ul style="list-style-type: none"> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

Publisher: J-INSTITUTE
ISSN: 2436-1151

Website: www.j-institute.jp/protection/
Editor: protection@j-institute.jp

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dx.doi.org/10.22471/protective.2020.5.2.60

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The PROTECTIVE Effect of White Beech Mushroom(*Hypsizygus Marmoreus*) Extract against Atopic Dermatitis Skin Lesion Model using NC/Nga Mice

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Abstract

Purpose: This study was carried out to evaluate the protective effects of *Hypsizygus marmoreus* extract against sodium dodecyl sulfate-induced atopic dermatitis-like skin lesions in vivo.

Methods: Six-week-old NC/Nga mice were divided into a control group(Ctrl), atopic dermatitis induction group(ADIG), and *H. marmoreus* extract feeding group after atopic dermatitis induction(HTFG). After 3 weeks, cannabinoid receptors type 1(CB1) and type 2(CB2), and the orphan G protein-coupled receptor 55(GPR55) levels were observed to verify the modulation of the endocannabinoid system activity, whereas filaggrin and kallikrein-related peptidase(KLK) 7 expression in the stratum corneum and protease activated receptor(PAR)-2 expression in the interstitial space of epithelial tissue were observed to verify the inhibition of inflammation. Furthermore, phosphorylated extracellular signal-related kinase(p-ERK), phosphorylated mammalian target of rapamycin(p-mTOR), and E-cadherin levels were studied to verify microenvironmental regulation.

Results: Expression of CB1, CB2, and GPR55 was significantly increased in HTFG as compared to that in ADIG. The positive reaction of filaggrin in the stratum corneum was significantly higher in HTFG than in ADIG. KLK7 and PAR-2 positivity in HTFG were significantly reduced as compared to those in ADIG. The p-ERK-positive and p-mTOR-positive reactions in HTFG were significantly reduced as compared to those in ADIG.

Conclusion: *H. marmoreus* extract has a beneficial effect on the epithelium barrier function and can inhibit the progression of atopic dermatitis.

[Keywords] *Hypsizygus Marmoreus*, Atopic Dermatitis, Endocrine System, Filaggrin, Lipid Barrier

1. Introduction

Atopic dermatitis(AtD), also known as atopic eczema, is a chronic skin inflammatory disease that can occur at any age, and it affects infants as well as adults. It is known to be an intractable disease, and it is accompanied by characteristic severe itching, skin dryness, and eczema[1][2][3]. The number of AtD patients continue to increase; however, the causes and pathogenesis of AtD have not yet been clearly elucidated, and it is estimated that its onset is caused by a combination of genetics, living environment, immunity, skin barrier problems, and psychological problems[4][5]. Currently, antihistamines, topical steroids, and oral steroids are used in the treatment of AtD[6]. However, these treatments are only effective in temporarily alleviating AtD symptoms, but do not fundamentally cure AtD; therefore, there is need for better and effective treatment modalities[7][8].

β -glucan, a polysaccharide, is a physiologically active constituent present in yeast cell walls, grains, mushrooms, and others, and it can promote various physiological activities, including immunity enhancement, and skin regeneration; it exhibits antioxidant, anti-cancer, and anti-cholesterol effects, as well[9][10]. Furthermore, it is widely used as an ingredient or additive

in cosmetics[11][12][13]. β -glucan particularly regulates immune responses by influencing immune cells, like monocytes, macrophages, dendritic cells, natural killer cells, and neutrophils, through cell receptors such as Dectin-1, Toll-like receptor(TLR)-2, and TLR-6, inducing cytokine secretion, and it also stimulates B cells to regulate immune responses[14]. Although many studies have been conducted to validate the antioxidant, anti-inflammatory, and skin regeneration effects of β -glucan, most of these studies have shown its efficacy when administered orally[15][16][17].

The endocannabinoid system(ECS) is a biological system composed of cannabinoids that regulate appetite, pain, sensation, mood, and memory[18]. It has been recently demonstrated that an increase or decrease in the ECS is associated with a variety of pathological conditions[19]. Temporarily altered ECS activation reduced symptoms of the compensatory response in the body and slowed disease progression[20]. ECS is also closely related to the regulation of cell growth, proliferation, and immune and inflammatory responses involved in the skin homeostasis[21].

The purpose of this study was to demonstrate the effects of *Hypsizygus marmoreus* extract in regulating epithelial inflammation caused by AtD through ECS activity. CB1, CB2, and GPR55 were observed to verify the regulation of ECS activity, and filaggrin and kallikrein-related peptidase(KLK) 7, in the stratum corneum, and protease activated receptor(PAR)-2, in the interstitial space of epithelial tissue, were observed to verify the inhibition of inflammation. Furthermore, to demonstrate the microenvironmental regulation, phosphorylated extracellular signal-related kinase(p-ERK), phosphorylated mammalian target of rapamycin(p-mTOR), and E-cadherin levels were studied. In this study, we confirm that *H. marmoreus* extract inhibits epithelial inflammation caused by AtD by regulating ECS activity.

2. Materials and Methods

2.1. In vivo study subjects and procedures

Six-week-old Nc/Nga male mice(Orient Bio, Republic of Korea) were acclimated for 2 weeks in a sterile breeding device, and then mice(weight 20 ± 2 g) were selected for experimental use. The mice were divided into three groups: control group(Ctrl), AtD induction group(ADIG), and *H. marmoreus* extract fed group after AtD induction(HTFG), with seven mice assigned to each group. For the HTFG group, 80 mg/kg of *H. marmoreus* extract was diluted in 0.2 mL of saline, and it was orally administered daily for 3 weeks after induction of AtD. In order to induce AtD, the skin on the back of the mouse was shaved, followed by rubbing of 1 ml sodium dodecyl sulfate(SDS, Sigma-Aldrich, USA) 20 times with a cotton swab, to disrupt the lipid barrier of the stratum corneum. The animal experiments were performed after approval from the Semyung University Animal Experimental Ethics Committee(IACUC: smecae-20-11-02), and the management and use of laboratory animals were conducted in accordance with the NIH guidelines.

2.2. Immunohistochemical analysis

Immuno-histochemistry analysis was performed as described in a previous study[22][23][24]. The skin was subjected to cardiac perfusion fixation with a vascular rinse and 10% neutral buffered formalin(NBF). The dorsal skin was fixed in 10% NBF at room temperature for 24 h, and then embedded in paraffin in a conventional manner, and continuous 5- μ m-thick sections were made. For immunohistochemical staining, the skin sections were first subjected to proteolysis in proteinase K(20 μ g/ml) for 5 min, followed by a blocking reaction in 20% normal goat serum for 2 h. The sections were immunostained using incubation with different primary antibodies, including mouse anti-CB1(1:100), mouse anti-CB2(1:100), mouse anti-GPR55(1:100), mouse anti-E-cadherin(1:100), and mouse anti-p-mTOR(1:100) purchased from

Abcam, USA and mouse anti-filaggrin(1:200), mouse anti-KLK7(1:50), mouse anti-PAR-2(1:50), and mouse anti-p-ERK(1:50) purchased from Santa Cruz Biotech, USA, in a humidified chamber at 4 °C for 48 h. The secondary antibody, biotinylated goat anti-mouse IgG(1:100, Abcam), was linked for 12 h at room temperature, and then reacted with an avidin biotin complex kit (Vector Lab, USA) for 1 h at room temperature. Color was developed in 0.05 M Tris-HCl buffer solution(pH 7.4) containing 0.05% 3,3'-diaminobenzidine and 0.01% HCl, followed by counter staining with hematoxylin. The immunohistochemistry results were quantified as means \pm standard error[25][26]. The image analysis was performed using Image Pro Plus(Media Cybernetics, USA). Skin tissues sections randomly selected from each group were observed at x 400 magnification, and then imaged with positive pixels /20,000,000 pixels. Statistical analyses were performed using the SPSS software(SPSS 25, SPSS Inc., USA), and the significance(p < 0.05) was verified using one-way ANOVA, and the Tukey HSD was performed for the post-hoc test.

3. Results and Discussion

A positive reaction for CB1 was strongly observed in the skin epithelial tissues of ADIG(53,269 \pm 2,509 /20,000,000 pixels) with a 341% increase as compared to that in Ctrl group(12,090 \pm 478/20,000,000 pixels). Furthermore, it was significantly increased in HTFG(107,874 \pm 4,037/20,000,000 pixels) by 103% as compared to that in ADIG <Figure 1>. A strong CB2 positive reaction was observed in the epithelial tissue in ADIG(34,386 \pm 1,176 /20,000,000 pixels) with an increase by 114% as compared to that in the Ctrl group(16,062 \pm 1,176/20,000,000 pixels). CB2 positivity in HTFG(130,456 \pm 4,525/20,000,000 pixels) was significantly higher(201%) that in ADIG <Figure 1>. GPR55 positive reaction was observed as strong positive in epithelial tissue of ADIG(58,337 \pm 1,992/20,000,000 pixels) with a 113% increase as compared to that in the Ctrl group(27,380 \pm 913/20,000,000 pixels), and this increase was significantly higher(68%) in tHTFG(97,866 \pm 1,610/20,000,000 pixels) than that in the ADIG <Figure 1>. Filaggrin-positive reaction was observed in the stratum corneum, with a 54% decrease in ADIG(21,327 \pm 1,906 /20,000,000 pixels) as compared to that in Ctrl(46,833 \pm 1,817/20,000,000 pixels). On the other hand, filaggrin positivity was significantly higher(287%) in HTFG(82,563 \pm 1,837/20,000,000 pixels) than that in ADIG <Figure 2>. The KLK7 positive reaction was observed as a strongly positive in the interstitial space of the epithelial tissue. It was increased in ADIG(101,351 \pm 2,697/20,000,000 pixels) by 367% as compared to that in the Ctrl(21,724 \pm 1,332/20,000,000 pixels), and it was significantly decreased by 34% as compared to ADIG in the HTFG(66,526 \pm 1,318/20,000,000 pixels) <Figure 2>. A PAR-2 positive reaction was observed as strongly positive in the interstitial space of epithelial tissue, and it was increased in ADIG(94,848 \pm 2,481/20,000,000 pixels) by 527% as compared to that in Ctrl(15,134 \pm 1,373/20,000,000 pixels). In contrast, it was significantly decreased in HTFG(40,040 \pm 1,428/20,000,000 pixels) by 58% as compared to that in ADIG <Figure 2>. Strongly positive p-ERK reaction was observed in the interstitial space of the epithelial tissue. It was increased by 11,056% in ADIG(100,652 \pm 2,486/20,000,000 pixels) as compared to that in Ctrl(8,705 \pm 322/20,000,000 pixels), and it was significantly decreased by 51% in HTFG (49,484 \pm 2,036/20,000,000 pixels) as compared to that in ADIG <Figure 3>. A strong positive p-mTOR signal was observed in the interstitial space of the epithelial tissue, with a 765% increase in ADIG(85,448 \pm 2,730/20,000,000 pixels) as compared to that in Ctrl group(9,876 \pm 295/20,000,000 pixels). Furthermore, it was significantly decreased by 66% in HTFG(29,291 \pm 1,106 /20,000,000 pixels) as compared to that in ADIG <Figure 3>. A strong E-cadherin positive reaction was observed in the intercellular space of epithelial tissue, and it was decreased in ADIG(16,763 \pm 1,264/20,000,000 pixels) by 60% as compared to that in Ctrl group(42,111 \pm 2,280/20,000,000 pixels). In contrast, it was significantly increased by 327% in HTFG(71,588 \pm 2,069/20,000,000 pixels) as compared to that in ADIG <Figure 3>.

AtD is an inflammatory skin disease characterized by proliferative eczema, erythema, and dryness, with a very high recurrence rate[27]. It is also an early hallmark of the atopic streak leading to asthma and allergic rhinitis[28]. The pathogenesis of AtD is still unknown, and it is thought to be caused by a combination of genetic, immunological, and environmental factors and skin barrier dysfunction[29]. Various keratinocyte differentiation markers, including filaggrin, involucrin, and loricrin, are low in AtD[30], and ceramide levels in the stratum corneum are also reduced[31]. The characteristic feature of AtD skin is spongiosis due to tissue remodeling and epidermal proliferation because of increased epidermal proliferation and decreased differentiation[32][33]. This structural change in the skin barrier interferes with skin homeostasis and prevents the skin from performing the normal barrier function. Therefore, it can be assumed that AtD is caused by an abnormality in the physiological balance required to maintain skin homeostasis.

ECS intervenes in the regulation of skin homeostasis by regulating cell growth, differentiation, and immune and inflammatory responses[34]. Recent studies indicated that inadequate operation of the ECS can affect skin pathologies caused by dysfunction of the skin barrier in AtD, thereby making ECS a new treatment target for a variety of skin diseases[35]. ECS comprises cannabinoid receptors(CBRs), endogenous ligands, and enzymes involving the synthesis and degradation of cannabinoids[36]. The main CBRs are CB1 and CB2, and recently, another G protein-coupled cannabinoid receptor, GPR55 was identified as a type 3 CBR[37][38]. Several studies have demonstrated the alleviation of inflammatory symptoms by CB1 agonists through the downregulation of mast cell activation[39] and the reduction of pro-inflammatory mediators derived from keratinocytes[40]. In addition, CB2 agonists inhibit skin inflammation by inhibiting the migration of inflammatory cells[41], and GPR55 found in mast cells demonstrates anti-inflammatory effects by inhibiting the release of nerve growth factors mediated by mast cells and by reducing angiogenesis[42]. In this study, CB1, CB2, and GPR55, were all significantly increased in the groups administered with the *H. marmoreus* extract. In ADIG, CB1 was decreased as compared to that in Ctrl, whereas it was increased in HTFG compared to that in ADIG. CB2 and GPR55 positive reactions were also decreased in ADIG compared to those in Ctrl, whereas they were increased in HTFG compared to that in ADIG. These results indicated that administration of *H. marmoreus* extract had an anti-inflammatory effect on the skin epithelial tissue.

In addition, a positive reaction to filaggrin was observed in this study confirming the improvement of the lipid barrier of the skin. Filaggrin is a protein that forms the granular layer of the epithelium, and it is one of the genetic markers of AtD[43]. Decrease in filaggrin due to genetic changes or acquired factors weakens the formation of cell membranes in the keratinocytes and reduces the junction between keratinocytes, thereby disrupting the skin barrier function. This facilitates the penetration of allergens from outside, causing sensitization and allergic reactions[44]. In this study, a strong filaggrin-positive reaction was observed in the stratum corneum in HTFG by 413% as compared to that in ADIG, and filaggrin levels were decreased by 72% in ADIG as compared to that in Ctrl group. This increase in the filaggrin-positive reaction indicated that the *H. marmoreus* extract could improve the skin barrier function by promoting keratinocyte differentiation.

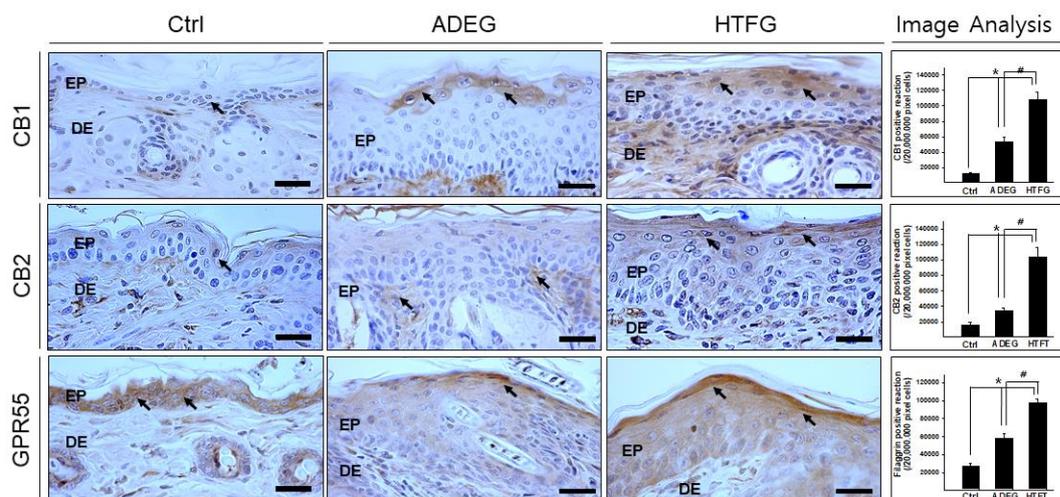
The increase in pH in the stratum corneum due to various causes, increases the activity of serine proteases such as KLK7, which induces the exfoliation of keratinocytes[45]. KLK plays an important role in the skin barrier function, and its abnormal expression causes skin diseases such as AtD, and psoriasis. KLK7 is a physiological activator of caspase 14 and acts as the first step in the filaggrin degradation process[46]. It mediates the inflammatory response through PAR-2, thereby causing pruritis. PAR-2 is a G protein-coupled receptor present in mast cells, keratinocytes, and vascular endothelial cells, and it is involved in inflammatory reactions, pigment production, and skin barrier functions[47]. In this study, the KLK7 positive reaction was increased in ADIG as compared to that in Ctrl, whereas it was significantly decreased by 40% in HTFG compared to that in ADIG. The PAR-2 positive reaction also increased

in ADIG compared to Ctrl, but was significantly decreased by 63% in HTFG compared to ADIG. These results indicated that HTFG could reduce inhibition of the expression of filaggrin-like substances by regulating the process that leads to KLK7 and PAR-2 expression due to damage to the lipid barrier. Therefore, it may contribute to the recovery of the skin barrier by inhibiting the pathological process caused by damage to the lipid barrier.

According to a recent study, inflammatory cytokines, such as TNF- α , IL-1 β , and IL-17A, which are tumor necrosis factors, induce mTOR activation, promote epidermal proliferation, and reduce the expression of epidermal differentiation markers[48]. In AtD skin lesions, the mTOR inhibitor, rapamycin decreases inflammatory cell infiltration and serum IgE levels, suggesting that inhibition of mTOR signaling can inhibit AtD[49]. E-cadherin expression decreased on the surface of keratinocytes of AtD lesion skin[50], followed by dissolving of the tight junctions that are crucial in maintaining the epidermis barrier function. In addition, oxidative stress directly affects epidermal keratinocytes and induces intracellular changes, leading to edema, spongiosis, and destruction of the stratum corneum. Mitogen-activated protein kinases(MAPKs), such as ERK and JNK, are essential signals for the production of cytokines, such as IL-4 and TNF- α , through the activity of nuclear factor kappa-light-chain-enhancer of activated B cells(NF- κ B), which regulates the inflammatory response. IL-17, a pro-inflammatory cytokine, decreases filaggrin expression in AtD through the MAPK signaling pathway. In the present study, p-ERK-positive and p-mTOR-positive reactions were increased in ADIG as compared to those in Ctrl, whereas, they were significantly decreased in HTFG as compared to those in ADIG. E-cadherin positive reaction was decreased in ADIG compared to that in Ctrl group, and it was increased significantly in HTFG as compared to that in ADIG by 22%. Collectively, these results demonstrated that *H. marmoreus* extract regulated the expression of E-cadherin to maintain the epidermal structure and to inhibit phosphorylation of ERK, thereby blocking the MAPK signaling pathway.

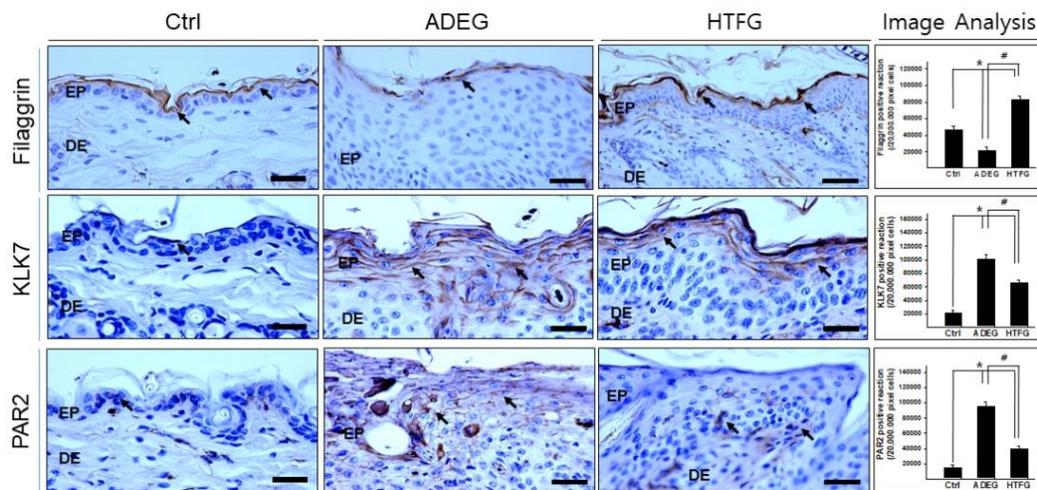
In conclusion, *H. marmoreus* extract promotes the functions of the skin barrier by modulating ECS regulation, keratinocytes differentiation, and filaggrin expression in AtD, thereby restoring the skin barrier function of the stratum corneum. Therefore, on the basis of these results, β -glucan, which is abundant in grains and mushrooms, may be used in the management of AtD in the future.

Figure 1. Endocannabinoid system(ECS) activation effects of *Hypsizygos marmoreus*(HM) extract.



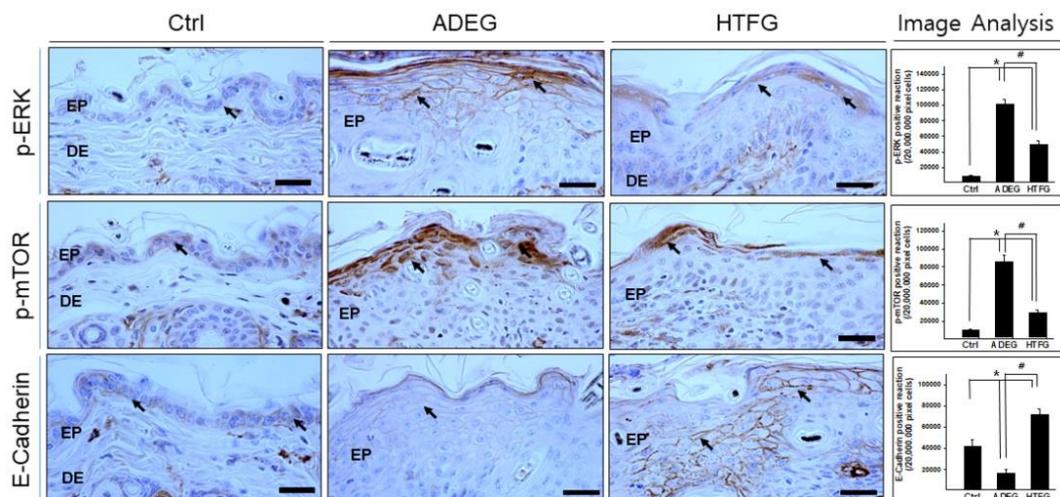
Note: HM extract promotes the ECS in HTFG. CB1, CB2, and GPR55 expression (dark brown indicated by arrows) were significantly increased in HTFG as compared to that in ADIG ($p < 0.01$) (bar size, 50 μ m). Data of CB1, CB2, and GPR55 image analyses indicates similar results ($p < 0.01$). * $p < 0.01$, compared with the Ctrl; # $p < 0.01$, compared with ADIG. Ctrl, normal; ADIG, Atopic dermatitis (AtD) induced with no treatment; HTFG, HM treated with AtD; EP, epidermis; DE, dermis.

Figure 2. Regulation of lipid barrier and inflammation by HM extract.



Note: HM promotes lipid barrier (filaggrin) function and regulates inflammation signal proteins (KLK7 and PAR-2) in HTFG. Filaggrin expression (dark brown indicated by arrows) was significantly increased in HTFG as compared to that in ADIG ($p < 0.01$). KLK7 and PAR-2 expression (dark brown indicated by arrows) was significantly decreased in HTFG as compared to that in ADIG ($p < 0.01$) (bar size, 50 μm). Data of Filaggrin, KLK7, and PAR-2 image analyses indicates similar results ($p < 0.01$). * $p < 0.01$, compared with the Ctrl; # $p < 0.01$, compared with the ADIG. Ctrl, normal; ADIG, Atopic dermatitis (AtD) induced with no treatment; HTFG, HM treated with AtD; EP, epidermis; DE, dermis.

Figure 3. Regulation of inflammation induced by microenvironmental factors modulated by HM extract.



Note: p-ERK and p-mTOR expression (dark brown indicated by arrows) were remarkably decreased in HTFG as compared to that in ADIG ($p < 0.01$). E-cadherin expression (dark brown indicated by arrows) was significantly increased in HTFG as compared to that in ADIG ($p < 0.01$). Data of p-ERK, p-mTOR, and E-cadherin image analyses indicates similar results ($p < 0.01$) (bar size, 50 μm). * $p < 0.01$, compared with the Ctrl; # $p < 0.01$, compared with the ADIG. Ctrl, normal; ADIG, Atopic dermatitis (AtD) induced with no treatment; HTFG, HM treated with AtD; EP, epidermis; DE, dermis.

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5. Appendix

5.1. Authors contribution

	Initial name	Contribution
Lead Author	JWW	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/>
Corresponding Author*	SHA	-Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
Co-Author	BSH	-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

5.2. Funding agency

This work was supported by Semyung University's University Innovation Support Project, in 2020.

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2436-1151

Website: www.j-institute.jp/protection/

Editor: protection@j-institute.jp

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E-mail: gyumdung20@naver.com

dx.doi.org/10.22471/protective.2020.5.2.70

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Learning Attitude to an CONVERGENCE Evaluation Method for Fundamental Nursing Practice Education, Self-Leadership and Academic Self-Efficacy in Nursing Students

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Abstract

Purpose: This study is a descriptive research study to investigate the effect of convergence evaluation method of fundamental nursing practice education using peer and faculty evaluation on learning attitude, self-leadership and academic self-efficacy of nursing students.

Method: The Data was collected from 100 nursing students from April 18, 2019 to June 14, 2019. A total of 94 questionnaires were analyzed using descriptive statistics, t-test, a one way ANOVA, Pearson correlation coefficient, multiple linear regression with stepwise method.

Results: The result of the learning attitude was average point 3.73, self-leadership was 3.82, and academic self-efficacy was 3.35. Learning attitude was positively correlated with self leadership and academic self-efficacy, self leadership was positively correlated with academic self-efficacy. The factors affecting learning attitude was self leadership, academic self-efficacy. The evaluation method of fundamental nursing practice education affected the learning attitude, self-leadership and academic self-efficacy of nursing students, explanatory was 45%.

Conclusion: The fundamental nursing practice convergence evaluation method using faculty and peer evaluation was found to correlate with and affect learning attitude, self-leadership, and academic self-efficacy. Therefore, Various teaching and learning strategies will be needed to improve skills by identifying nursing students.

[Keywords] Attitude, Education, Leadership, Nursing, Efficacy

1. Introduction

Practical nursing education is to foster professional nurses by integrating theoretical education and practice education, and nursing education in the practice lab is mandatory for mastering nursing skills[1]. For students who start to learn nursing science, basic nursing practice education that is to improve executive ability for nursing science[2] is the only course to educate nursing skills. The object of basic nursing practice education is to develop the ability of students and promote their nursing skills[3], and well-structured teaching and learning methods are necessary to enhance nursing skills.

In basic nursing practice, peers are used as a teaching and learning medium of this sort. This is the kind of environment that enables learners to acquire nursing skills by interacting with peers, and peers are a compulsory source of feedback[4], As educational environments for basic nursing practice affect the cognitive process for the acquisition of nursing skills, it's needed to diversify evaluation methods that are one of practice education methods[5].

Since evaluation is closely linked with educational goals, goal-oriented evaluation should be used to determine whether instructional objectives and learning objectives are achieved or not.

To acquire nursing skills, goal-oriented evaluation should be done [6]. A study assessed the clinical competence of medical students in the 1950s by applying peer evaluation among different evaluation methods geared toward improving skills, and since then studies have constantly found that it was beneficial to boosting performance [7]. And that was found to be positively correlated with professor evaluation in medical and pharmacy education [4]. Nursing science is a discipline that focuses on practice and needs performance assessment as well, and there is a tendency that peer evaluation is introduced to change existing curriculums into student-centered ones [8]. The object of peer evaluation is to offer meaningful and workable feedback to facilitate professional growth [9]. A professor should assess learning outcome, and peer evaluation is a means to complement professor evaluation as that is conducive to acquiring competence and is professional [4][7].

A process that one evaluates his or her own learning is effective at improving learning attitude, and learning by observing others is a strategy that is helpful in acquiring professional knowledge as well. Therefore being with peers is a factor to affect self-leadership [10][11]. Furtner et al argued that self-leadership is a skill which could be learned by proving that it could be optimized through training. As that is a factor to urge the goal-oriented behaviors of students, they should engage in cognitive and action-oriented activities to acquire nursing skills [12].

Another crucial factor of learning is academic self-efficacy. According to Bandura, academic self-efficacy affects learning and performance. That is, academic self-efficacy becomes better when nursing skills are improved, and that is a vital element of professional nursing services as a good indicator that predicts the results of practice [13]. To promote the academic self-efficacy of students, the course of practice should be given weight to facilitate their learning to develop their ability instead of merely checking whether they perform properly or not [14].

To elevate the efficiency of practice education, there have been studies on prior video-assisted learning [2], self-directed practice based on peer tutoring [15], learning by peer evaluation via an educational program of core fundamental nursing skills [16] and peer tutoring [17] and on peer tutoring and peer evaluation for nursing students, but these studies mostly focused on unsupervised learning sessions or prior to clinical practice which are not part of a normal curriculum, and no studies have ever tried to apply peer evaluation and professor evaluation together during normal classroom hours [15][16][17].

In peer evaluation, there is a possibility that students might collude to give high marks to each other, and whether that is suitable for their personality and learning styles is raised as another problem [11]. When nursing skills are assessed, collaborative evaluation is more useful for improving performance than individual tests [18]. Therefore peer evaluation and professor evaluation were both applied in this study. Such a multiphasic educational method that performs peer evaluation and professor evaluation together is a way to ensure the impartiality and quality of practical evaluation [9].

In team-based learning environments for basic nursing practice, peers are viewed as cooperators, which is of use for improving learning capability and nursing skills by expediting their interaction [9], and an educational method for basic nursing practice that makes use of peer evaluation and professor evaluation will stimulate active learning participation and thereby promote nursing skills.

This study attempted to examine the learning attitude, self-leadership and academic self-efficacy of nursing students, the correlations of these variables and influential factors for learning attitude in an effort to maximize educational effects and devise effective teaching and learning strategies.

2. Methods

2.1. Research design

This is a descriptive research study to examine learning attitude to the evaluation method by

peers and professor for basic nursing practice education, self-leadership, academic self-efficacy, the relationships of these variables and influential factors for learning attitude in students taking a basic nursing practice course, which was a second-year core course in a university.

2.2. Subjects

The subjects in this study were 100 students who were in the second year in the department of nursing. The sample size was 85 when it was calculated by G*power 3.1.9 program at the .05 level of significance(α), .80 power($1-\beta$) and medium effect size with four predictor variables to make a multiple regression analysis. 100 students were surveyed in consideration of a possible 15% dropout rate. Out of them, 94 students(94%) were finally examined except for six who didn't fill out the questionnaires and who didn't fill them out fully. The sample size in this study was appropriate.

2.3. The evaluation method for basic nursing practice education

Basic nursing practice is a core practice course in the first semester of the second year. The number of students that could use a practice lab was 25 or fewer. The evaluation period of the practical test was four days, which were two in midterms of the 8th week and two in the finals of the 15th week.

The number of the selected evaluation items for core fundamental nursing skills were four, which were three with a low level of difficulty(vital signs measurement, wearing protection equipment, waste management and oxygen therapy using nasal cannula) and one with a middle level of difficulty(pre-operational nursing). These items were selected in consideration of the themes of basic nursing practice classes in the first semester of the second year and the level of difficulty appropriate for the second year. Eight items of core fundamental nursing skills were taught, among which four items were covered in the practical evaluation in accordance with the practice curriculum of the university.

The order of receiving practical evaluation was decided a day before, and peer evaluators were randomly selected on the day when the practical evaluation was carried out. According to each class's timetable, two items each were evaluated in the 8th and 15th weeks. One item each was evaluated a day, and the four items were evaluated for four days during the semester. An evaluator evaluated two nursing students at the same time for each item.

Before peer evaluation was conducted, every student was explained about why it was applied and how to do that, and the results of the peer evaluation weren't reflected in practical evaluation scores. As for the method of peer evaluation, the peer evaluators followed their fellow students to judge and check whether they performed each item or not according to the given itemized checklist, after the fellow students introduced themselves to their professors and told they were going to perform the items of core fundamental nursing skills. Korea Accreditation Board of Nursing Education's itemized checklist for core fundamental nursing skills was used. To ensure the accuracy of the peer evaluation, the students practiced it during normal classroom hours and unsupervised practice hours using video clips for each item and a detailed manual for core fundamental nursing skills produced by the university, and then they were asked to evaluate according to the detailed manual. The specific evaluation guidelines of the detailed manual were prepared in the university's basic nursing classroom on the basis of the checklist presented by Korea Accreditation Board of Nursing Education. That was presented as a guidebook in regular classes so that the students could practice in the practice lab or evaluate their peers according to that.

In practical evaluation, the knowledge, skills and attitude of the students were evaluated according to practical evaluation rubrics after checking whether they performed properly or not. In the rubrics, scoring was done on the basis of 100 points, and their knowledge, skills and attitudes were rated as good, fair or poor.

After the peer evaluation was finished, the checklists were submitted to the evaluators without informing the students evaluated of the results. To confirm the agreement between the

evaluators and the peer evaluators about the results, the peer evaluators were asked to take a brief note on the itemized checklist about why it's decided that the fellow students didn't perform properly, and the checklists of the evaluators were compared with their checklists to make a comparison. When their evaluation results were not the same, they talked in detail about the situation at that time and made a decision after they discussed together. All the results were pieced together, and then immediate feedback was provided for the students evaluated after the practical evaluation.

2.4. Instrumentation

2.4.1. Learning attitude

Learning attitude refers to the cognitive, emotional and physiological characteristics of interaction with every environment necessary for learning[19]. In this study, Hwang's revised version[20] of Korea Accreditation Board of Nursing Education's Nursing Attitude Inventory was put to use. This consists of 16 items, and a five-Point Likert scale is used. A higher score indicates better learning attitude. As for reliability, the Cronbach alpha of the original inventory was .83, and Hwang's inventory was .84. In this study, it was .86.

2.4.2. Self-leadership

Self-leadership is a process to affect oneself and is an action-oriented strategy to improve performance[12]. In this study, Kim's revised version[21] of Manz(1986)'s Questionnaire was put to use. This consists of 18 items and six subareas: self-expectation(three items), rehearsal(three), target setting(three), self-compensation(three), self-criticism(three) and constructive thinking(three). A five-point Likert scale is used, and a higher score indicates better self-leadership. As for reliability, the Cronbach alpha of it was .87 in Kim's study and .91 in this study.

2.4.3. Academic self-efficacy

Academic self-efficacy refers to an ability to perform the given learning task successfully, namely to individual confidence[14]. In this study, Kim & Park's inventory[22] was put to use. It consists of 24 items and three subfactors: confidence(eight items), task difficulty preference(five) and self-regulating efficacy(12). A five-point Likert scale is used, and a higher score indicates better academic self-efficacy. As for reliability, the Cronbach alpha of it was .88 in Kim & Park's study and .89 in this study.

2.5. Data collection

Data were gathered during a semester of 2019 from April 18 through June 14, which were respectively in the periods of midterms and finals. The students were asked to fill out the questionnaires after the final practical evaluation was finished. They were fully explained verbally about the purpose of the study and guarantee of anonymity and confidentiality, and their written consents were obtained. To protect the subjects who were in a vulnerable position, they were told that they could voluntarily decide whether to participate in this study or not, and that there would be no disadvantage if they wouldn't participate. There is a possible problem that they might suffer anxiety and stress if they were going to undergo the practical evaluation right after peer evaluation. In that case, they were allowed to change their turns not to suffer any loss. The self-administered questionnaires that covered general characteristics, learning attitude, self-leadership and academic self-efficacy were handed out only to the students who submitted their written consents, and then they were asked to fill them out and to put them in a collection box in a classroom on a floor that was different from the floor where the practice labs were located.

2.6. Data analysis

The collected data were analyzed by SAS 9.3. Statistical data on mean and standard deviation were obtained about learning attitude, self-leadership and academic self-efficacy, and real number and percentage were calculated regarding general characteristics. Concerning differences in learning attitude, self-leadership and academic self-efficacy according to characteristics, independent t-test and one-way ANOVA were carried out, and Scheffe test was used to conduct post-hoc tests. In regard to the relationships among learning attitude, self-leadership and academic self-efficacy, Pearson correlation coefficients were calculated. As to influential factors for learning attitude, a multiple linear regression analysis with stepwise method was carried out.

3. Results

3.1. Learning attitude, self-leadership and academic self-efficacy

The students got a mean of 3.73(± 0.42) in learning attitude to the evaluation method for basic nursing practice education, a mean of 3.82(± 0.51) in self-leadership and a mean of 3.35(± 0.49) in academic self-efficacy out of five <Table 1>.

Table 1. Mean score for learning attitude, self-leadership and academic self-efficacy.

Variables	Categories	Mean \pm SD	Range
Learning attitude		3.73 \pm 0.42	1~5
Self-leadership	Self-expectation	3.92 \pm 0.71	1~5
	Rehearsal	3.91 \pm 0.68	
	Goal setting	3.71 \pm 0.73	
	Self-reward	4.18 \pm 0.68	
	Self-criticism	3.61 \pm 0.77	
	Constructive thinking	3.56 \pm 0.70	
	All	3.82 \pm 0.51	
Academic self-efficacy	Confidence	3.39 \pm 0.85	1~5
	Task hardness preference	2.62 \pm 0.81	
	Self-control efficacy	3.63 \pm 0.50	
	All	3.35 \pm 0.49	

3.2. General characteristics and learning attitude, self-leadership and academic self-efficacy by the characteristics

Concerning the gender of the subjects, the female students(84.0%) were larger in number, and the most common motivation that they chose the department of nursing was a favorable impression(29.8%). As to career after graduation, hospitals were most preferred(83.0%). Satisfaction with majoring in nursing was on an average level(43.6%). Regarding satisfaction with basic nursing practice classes, the largest group was satisfied(54.3%). As for the level of participation in basic nursing practice classes, the biggest group was active(46.8%). Whether their peers would make an accurate and fair evaluation or not was asked, and the most dominant answer was that they would do so(52.1%) <Table 2>.

In regard to learning attitude by general characteristics, there were statistically significant differences according to satisfaction with majoring in nursing($F=9.86$, $p=.002$) and satisfaction with basic nursing practice classes($F=11.82$, $p=.000$). As a result of conducting a post-hoc test, the groups that were highly satisfied with majoring in nursing and with basic nursing practice classes excelled the average group and the satisfied group in learning attitude. There were

statistically significant differences in self-leadership according to the level of participation in basic nursing practice classes ($F=4.85, p=.030$). As a result of conducting a post-hoc test, the highly active participant group surpassed the average group and the active group in self-leadership. There were statistically significant differences in academic self-efficacy according to satisfaction with majoring in nursing ($F=7.21, p=.009$), satisfaction with basic nursing practice classes ($F=4.12, p=.045$), the level of participation in basic nursing practice classes ($F=7.13, p=.009$) and the impartiality of the practical evaluation ($F=9.64, p=.003$). As a result of conducting a post-hoc test, the group that was highly satisfied with majoring in nursing excelled the unsatisfied group and the satisfied group in academic self-efficacy, and the groups who was highly satisfied with basic nursing practice classes, who took basic nursing practice classes very actively and who were highly satisfied with the impartiality of the practical evaluation were ahead of the average group in terms of academic self-efficacy <Table 2>.

Table 2. Learning attitude, self-leadership and academic self-efficacy according to general characteristics.

Variables		Categories	n(%)	Learning attitude		Self-leadership		Academic self-efficacy	
				Mean±SD	t/F(p) Scheffe	Mean±SD	t/F(p) Scheffe	Mean±SD	t/F(p) Scheffe
Gender	Female	79(84.0)	3.73±0.40	-0.08 (.940)	3.84±0.50	0.98 (.330)	3.34±0.47	-0.57 (.572)	
	Male	15(16.0)	3.71±0.55		3.70±0.57		3.42±0.62		
Entering motivation	Aptitude	16(17.0)	3.83±0.43	0.01 (.925)	3.89±0.44	0.21 (.642)	3.52±0.58	0.00 (.960)	
	Employment	27(28.7)	3.55±0.38		3.70±0.49		3.21±0.41		
	Recommendation	12(12.8)	3.72±0.48		3.90±0.61		3.39±0.61		
	Longing	28(29.8)	3.85±0.43		3.79±0.55		3.39±0.42		
	School grade	3(3.2)	3.73±0.28		4.07±0.59		3.29±0.68		
	Volunteer	5(5.3)	3.61±0.37		4.06±0.04		3.28±0.37		
	etc.	3(3.2)	3.83±0.43		3.69±0.61		3.54±0.91		
Desired work	Hospital nurse	78(83.0)	3.75±0.43	0.78 (.379)	3.80±0.52	0.63 (.429)	3.33±0.49	0.64 (.427)	
	Healthcare teacher	2(2.1)	3.81±0.18		4.03±0.12		3.81±0.03		
	Public official	10(10.6)	3.53±0.34		3.80±0.57		3.31±0.42		
	Entered graduate	2(2.1)	4.19±0.18		4.58±0.08		4.23±0.50		
	etc.	2(2.1)	3.50±0.35		4.36±0.08		3.10±0.21		
Nursing major satisfaction	Very dissatisfaction	-	-	9.86 (.002) a,b<c	-	2.49 (.118)	-	7.21 (.009) a,c<d	
	Dissatisfaction ^a	3(3.2)	3.90±0.47		4.13±0.93		3.25±0.77		
	Moderate ^b	41(43.6)	3.60±0.38		3.71±0.42		3.23±0.41		
	Satisfaction ^c	37(39.4)	3.84±0.44		3.82±0.57		3.43±0.53		
	Very satisfaction ^d	13(13.8)	3.95±0.46	4.08±0.41	3.63±0.44				
Practice satisfaction	Very dissatisfaction	1(1.1)	3.13±0.00	11.82 (.000) a,b<c	4.67±0.00	1.01 (.319)	3.21±0.00	4.12 (.045) a<c	
	Dissatisfaction	-	-		-		-		
	Moderate ^a	23(24.5)	3.54±0.42		3.78±0.47		3.32±0.40		

	Satisfaction ^b	51(54.3)	3.69±0.35		3.71±0.46		3.25±0.49	
	Very satisfaction ^c	19(20.2)	4.09±0.39		4.09±0.58		3.66±0.50	
Participation Practical classes	Not at all	-	-	3.72 (.056)	-	4.85 (.030) a,b<c	-	7.13 (.009) a<c
	No	-	-		-		-	
	Average ^a	15(16.0)	3.48±0.36		3.59±0.48		3.15±0.42	
	Conducted ^b	44(46.8)	3.66±0.41		3.80±0.44		3.29±0.41	
	Very conducted ^c	35(37.2)	3.92±0.38		3.93±0.58		3.51±0.57	
Practical evaluation fairness	Very dissatisfaction	-	-	1.51 (.223)	-	2.86(.094)	-	9.64 (.003) a<c
	Dissatisfaction	-	-		-		-	
	Moderate ^a	4(4.3)	3.83±0.49		4.15±0.73		3.50±0.98	
	Satisfaction ^b	49(52.1)	3.56±0.33		3.66±0.43		3.17±0.34	
	Very satisfaction ^c	41(43.6)	3.92±0.43		3.96±0.53		3.56±0.51	

Note: $p < .001$. a,b,c,d scheffe test: means with the letter are significantly different.

3.3. The correlations of learning attitude, self-leadership and academic self-efficacy

Learning attitude had a significant positive correlation with self-leadership ($r = .567, p < .001$) and academic self-efficacy ($r = .567, p < .001$), and self-leadership had a significant positive correlation with academic self-efficacy ($r = .589, p < .001$) <Table 3>.

Table 3. Correlation for learning attitude, self-leadership and academic self-efficacy.

Variables \ Categories	Learning attitude	Self-leadership	Academic self-efficacy
	$r (p)$	$r (p)$	$r (p)$
Learning attitude	1		
Self-leadership	.567	1	
Academic self-efficacy	.567	.589	1

3.4. The influence of self-leadership and academic self-efficacy on learning attitude

To determine which factor affected the learning attitude of the subjects, satisfaction with majoring in nursing science and satisfaction with practice classes that were found to be significantly linked to learning attitude among self-leadership, academic self-efficacy and general characteristics were selected as independent variables, and then a multiple regression analysis was made.

To test the hypothesis for the multiple regression analysis, the independency, normality and homoskedasticity of the residuals were tested. The autocorrelation of the errors that was tested by Durbin-Watson test was 1.95, which showed they were independent. The tolerance limit value was .644, and VIR value was 1.55. Thus, there was no possibility of multicollinearity. As a result of making an analysis, the regression model was statistically significant ($F = 40.10, p < .001$), and the explainability of it was 45.7 percent.

The factor that exercised the largest influence on learning attitude was self-leadership ($\beta = .476, p < .001$), followed by academic self-efficacy ($\beta = .283, p = .004$) <Table 4>.

Table 4. Influencing factors of learning attitude.

Variables	B	SE	β	t	p
Constant	1.014	.305		3.32	<.001
Self-leadership	.476	.095	.476	5.00	<.001
Academic self-efficacy	.274	.092	.283	2.97	.004

Adjusted R²=.457, F=40.10, p<.001

4. Discussion

In this study, practical evaluation that made use of peer evaluation and professor evaluation was implemented among different evaluation methods for basic nursing practice education to stir up the direct participation of the students in learning process. It attempted to find out the levels of learning attitude, self-leadership and academic self-efficacy depending on this evaluation method, the relationships of the variables and influential factors for learning attitude. There are some discussions on the findings of the study:

The subjects got 3.73 in learning attitude. Their scores were relatively high when the finding was compared with the findings of studies that the subjects got 3.17 in learning attitude when peer evaluation was done over eight items of core fundamental nursing skills as an evaluation method for practice education[16] and that the third-year nursing students who received simulation-based emergency care education got 3.25 in learning attitude[23]. And the groups that were highly satisfied with majoring in nursing and with basic nursing practice classes after the practical education evaluation were different from the others in learning attitude. As basic nursing practice is executed by organizing teams, teamwork and positive contact between the team members create the kind of learning environments that promote mutual cooperation, and a positive attitude toward peers seemed to be helpful to peer evaluation. Furthermore, it seemed that the students indirectly shared the feedback that the professor provided to their fellow students about the method of individual practice guidance[14] and that thereby they participated in the learning process. This practice education method that made use of peer evaluation and professor evaluation seemed to be of use for developing a positive learning attitude. If the results of peer evaluation are reflected in grades, students usually take active part in learning process with a sense of responsibility[4], but in this study, the students scored relatively high in learning attitude even through the results of peer evaluation weren't reflected in their grades. Learning and review that they did by watching their peers seemed to be the good opportunity for them to learn in a natural way. It's said that among different learning methods in medical education, creating the sort of learning environments that stimulate peers to take more active part in evaluation than professors is more beneficial to learners when a series of skills are educated in a practice lab in regular sequence[10]. So the introduction of peer evaluation seems necessary to improve nursing skills in nursing education. In order to reflect marks given by peers, however, thorough preparations should be made in advance to decide evaluation criteria and how to make a peer evaluation, and the results of it should be reflected in consideration of ethical factors.

The subjects in this study got 3.82 in self-leadership. This score is high when the finding is compared with the findings of studies that seniors got 3.60 when peer evaluation was conducted over competence in core fundamental nursing skills during a semester[16], that four-year nursing students got 3.63[24] and that third-year nursing students got 3.36[25]. Leadership is prerequisite for becoming a nurse, and that is necessary to improve the quality of nursing and to provide effective nursing services[12]. Leadership becomes better in comfortable learning environments that students are able to be with their peers and to give support to each other in basic nursing practice education[11], and it seemed that the students demonstrated leadership

in the course of cross-checking what they learned and what peers learned. and that they fostered leadership by comparing the results of peer evaluation with those of professor evaluation. Among the subfactors of self-leadership, they got 4.18 in self-compensation, which was the highest score. This corresponds with the findings of studies that applied peer evaluation to fourth-year students about eight items of core fundamental nursing skills[16] and that examined how self-leadership affected clinical competence in fourth-year students[24]. The finding that they scored the highest in self-compensation might be the result of compensation mentality, which meant that they were able to correct their own behaviors, to build confidence about nursing skills and eventually to become motivated in the course of evaluating their peers and learning from it. This may be comparable to the findings of studies that the self-leadership of a group who actively participated in basic nursing practice classes was significantly different and that students who were passionate about learning and took the lead in their teams were given higher marks by their peers in leadership classes that were conducted by project learning in a college of medicine[26]. However, their scores in constructive thinking that was one of the subfactors was 3.56, which was the lowest. Peer evaluation has a merit of making it possible for learners to grow by cross-checking their levels. In this study, the psychological factor that was having to evaluate peers seems to be a barrier. So the kind of positive strategy that instills a willingness to correct one's own behaviors in the course of checking his or her own strengths and weaknesses through peers[14] should be reinforced. In addition, a study that examined peer evaluation in internal medicine residents[7] found that 84.3 percent replied they received feedback from peers about what was out of their professors' sight and that the peer feedback was beneficial to professional development. Thus, it seems necessary to offer direct feedback to peers when peer evaluation is carried out.

The subjects in this study got 3.35 in academic self-efficacy. This is higher than 3.22 that second-year students got when they underwent a practical evaluation after prior learning by video clips[2] and than 3.27 that the second-year nursing students of the experimental group who took basic nursing practice classes got[27]. Students whose self-efficacy is good come to put a new learning strategy to use[25], and playing the role of an evaluator seemed to be a positive experience for the subjects in this study. As positive and useful experiences that students gain through their professors are bound up with the improvement of self-efficacy, they should receive precise and well-trained feedback from their professors, and professors should be capable of offering effective feedback[28]. Indeed, continuing evaluation experiences should be provided for them to achieve the objects of education to boost their spirit of independence and confidence by consistently being trained by their professors. Among the subareas, the students got 3.39 in confidence area, which was the highest score. This seems to be in the same vein with the finding that academic self-efficacy was significantly different in the groups who was satisfied with majoring in nursing, who was satisfied with basic nursing practice classes, who actively participated in practice classes and who considered it fair to make a practical evaluation by peer evaluation. Hyeon & Bae's study[29] also found that higher satisfaction with major and with practice led to better self-efficacy, and a study that investigated medical students found that undergoing practice itself was useful for learning, and that class participation was linked to self-efficacy[30]. As self-efficacy gets better when knowledge and skills are improved[28], students should be induced to actively take classes. Among the subareas, however, they got 2.61 in task difficulty preference, which was markedly low, and this coincides with the finding of Kim's study[2]. Task difficulty preference refers to which level of difficulty individuals prefer when they set a goal to perform a particular task[15]. For the subjects in this study, practical evaluation is a mandatory part of basic nursing practice education. Their performance in preset items was evaluated, and they couldn't choose whether to undergo it or not. Owing to the characteristics of the practical evaluation, they seemed to be afraid of the challenging situation that they had to assess their peers. To relieve such a pressure, peer evaluation scores weren't reflected, but that should be taken into account more carefully in the future. On the other hand, the academic self-efficacy score of the subjects in this study was lower than 3.56

that an experimental group to which peer tutoring was applied during unsupervised practice got [15] and than 3.66 that nursing students got after receiving convergence-based core fundamental nursing skills education [29]. The former was the finding of Koo's study [15] that applied peer tutoring, and the latter was the finding of Hyeon & Bae's study [29] that practice and unsupervised practice were conducted in a convergence-oriented manner after prior learning. That is, self-efficacy is a complex phenomenon that individual people's accumulated experiences and diverse internal and external factors interact with one another, and it's not easy to verify the effects in a short-term study. In the future, a wide variety of evaluation methods should be introduced to ensure the efficiency of basic nursing practice education. Nursing is a practical discipline that requires performance assessment [8], and practice in a practice lab itself is beneficial to students. Therefore learning environments should be well structured to diversity practice education and evaluation methods on nursing skills.

The learning attitudes of the subjects in this study were linked with self-leadership and academic self-efficacy, and self-leadership was related to academic self-efficacy. Their explainability about learning attitude was 45 percent. Because no studies have ever applied peer evaluation and professor evaluation together, direct comparison is impossible to make, but in Kim's study [2], one of a few studies of peer evaluation, learning attitudes were correlated with self-leadership in seniors when only peer evaluation was carried out as practical evaluation in a course that adopted absolute grading. In addition, Chae & Lim's study [26] established that peer evaluation was of use because the results of peer evaluation were highly correlated with readiness for self-directed learning among medical students in leadership classes. An openness to learning factor was identified as a variable that could affect peer evaluation scores, and its explainability was 22.9 percent. Choi & Jung's study [25] found that self-leadership had a positive correlation with self-efficacy, that self-leadership exerted a direct influence on self-efficacy, and that its explainability was 53 percent. In a multiphasic evaluation method, self-leadership and self-efficacy are mutually related and influential, and they are reliable elements that are useful for skills evaluation [30]. Accordingly, uniform teaching, learning and evaluation methods should be avoided, and it seems necessary to apply a convergence-based teaching and learning method that enables learners to learn through dynamic interactions with peers and professors [31].

In conclusion, the evaluation method for basic nursing practice education that made use of peer evaluation and professor evaluation was interrelated with learning attitude, self-leadership and academic self-efficacy, and the factors that affected learning attitude were self-leadership and academic self-efficacy [31][32]. In other words, the evaluation method for practice education that adopted both peer evaluation and professor evaluation was found to be an effective evaluation method for practice education.

This study is of significance in that in terms of nursing education, it found the evaluation method for basic nursing practice education which utilizes peer evaluation and professor evaluation could be considered as one of down-to-earth evaluation methods for practice education because it enables learners to introspect and naturally participate in learning process. In terms of nursing services, the ultimate effect of nursing education is to improve clinical competence [20]. Competence is one of major factors for the nursing profession, and it's said that peer evaluation is critical for professional development because relationship building with peers is the foundation of good nursing performance [16]. The experience of actively participating in basic nursing practice education in this study serves to enhance self-leadership necessary for nursing performance, and the evaluation process that created the learning environment of being with peers contributed to furthering interpersonal skills and nursing competence [33][34]. Therefore they will be helpful in improving executive nursing skills. As no studies have ever applied peer evaluation and professor evaluation as a way of evaluation for practical education, direct comparison is difficult to make, but a study found that proficiency and learning satisfaction were higher when peer tutoring was applied during unsupervised practice. In peer learning, however, it's needed to understand learning styles. A learning style is a complex of cognitive, emotional and physiological characteristics, and what learning styles students prefer should be

taken into account[19]. This study that adopted the evaluation method to which peer evaluation and professor evaluation were both introduced could be said to be of significance in terms of nursing education and nursing service, because it applied the objective and rational evaluation method in a multiphase way. The peer evaluation would become a source of valuable information to facilitate professional and personal growth as it enabled the students to introspect in the course of critically assessing and judging the behaviors of their peers and the quality of their nursing skills[34]. The professor evaluation was a first-hand evaluation that was beneficial to furthering nursing competence in situations that are similar to real nursing settings [9].

Therefore the evaluation method for practice education that made use of peer evaluation and professor evaluation in this study is expected to be used as a reliable instrument to enhance the effects and quality of learning.

5. Conclusion and Suggestion

This was a research study to examine the learning attitude, self-leadership and academic self-efficacy of 94 second-year students taking a basic nursing practice course, the correlations of the variables and influential factors by applying an evaluation method for practice education that utilized peer and professor evaluation.

The findings of the study show that learning attitude, self-leadership and academic self-efficacy were interrelated with one another, that the factors affecting learning attitude were self-leadership and academic self-efficacy, and that their explainability was 45 percent. Accordingly, this study is expected to provide some information on an evaluation method for basic nursing practice education and its efficiency. But only the students from a university were investigated, and no comparative study has been implemented. So the findings of the study might not be generalizable. Given the findings, qualitative research efforts should be directed into peer evaluation to determine the merits of it, what improvements should be made and how to boost professionalism. Besides, it's suggested that an experimental research should be conducted to check the effects of team-based learning into which peer tutoring and peer evaluation converge.

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7. Appendix

7.1. Authors contribution

Initial name	Contribution
Author	YHK -Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

7.2. Funding agency

This work was supported by Jinju Health College Research Grant in 2020.

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2436-1151

Website: www.j-institute.jp/protection/
Editor: protection@j-institute.jp

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E-mail: jaebumlee@mju.ac.kr

dx.doi.org/10.22471/protection.2020.5.2.84

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Exploring the Experience of Job CONVERGENCE Change in the Beauty and Health Industry Using Grounded Theory

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Abstract

Purpose: Currently, the beauty/health industry is playing a public role in implementing changes in various consumer markets. In this central role, there are workers who work in the beauty/health industry, and they play the role of mediators seeking health and beauty. Therefore, this study attempts to verify the experience of workers according to the change in the occupational field of the beauty/health industry with a grounded theory, and investigate a strategy for responding to future occupations.

Method: In the selection of research participants in this study, a sample was extracted by adopting purposeful sampling, snowball sampling, which is one of the non-probability of artificially sampling the subjects who can contribute to the development of the theory of the research. The research procedure went through five steps: selection of research questions, selection of research participants and data collection, analysis of data, interpretation of data, and report of research results. A theoretical sample was extracted through the procedures of open coding, axial coding, and selective coding to find key categories and classify them by type.

Results: In the process of naming concepts and confirming the attributes and dimensions of categories through continuous questioning and comparative analysis based on data obtained from participants, 95 concepts, 37 subcategories, and 21 categories were identified. Accordingly, with regard to the attitude of acceptance and the search for change, there are four types in classification such as 'innovators' who are active in change, the 'early majority' who pursues economic benefits first, and the 'late majority' who do not ignore the innovation itself but join late, and 'laggards', which ignore change or innovation itself.

Conclusion: In terms of job acceptance attitude, there are diverse variables such as job satisfaction, career attitude, and acceptance intention. In this study, it was confirmed that participants' attitudes toward change in occupational field of beauty/health industry can be expressed in various ways. Through the results of this study, it is meaningful that this study may present basic information on strategies and methods to cope with changes of the beauty/health industry in the future.

[Keywords] Experience, Job Convergence, Beauty, Health Industry, Grounded Theory

1. Introduction

This The modern society is achieving the so-called 4th industrial revolution era in which the paradigm of industrial structure is fundamentally changed by increasing productivity through intelligent information technology. The core technology of the 4th industrial revolution refers to the technology that implements ICBM called artificial intelligence and data utilization technology. That is, it refers to a high-dimensional information processing capability technology by combining Internet of Things(IoT), Cloud, Big Data, and Mobile [1][2][3]. In the case of Korea, new technologies and convergence industries are also emerging due to rapid growth and development. Representatively, new areas of energy, artificial intelligence(AI), and health indus-

try are being implemented at the national level owing to the policy of the Green New Deal[4][5].

As Korea keeps pace with the times, changes have begun to take place in the beauty/health area as well. This change is presumed to be attributable to an increase in Korean national revenue, an increase in single-person households, and a change in consumption patterns. Looking at the specific contents, the consumer life indicators in Korea in 2015 were divided into 10 areas: clothing, housing, food, communication, transportation, medical care, congratulations and condolence services, leisure/culture, and beauty/health. It is reported that the beauty/health area also plays a large role in the perceived importance of the consumption area[6][7][8]. Unlike the past in Korean society, along with an increase in income due to active economic activities of women, the demands and desires of beauty and health have increased due to the pursuit of individuality of young men, and as a result, it is speculated that it is a great driving force in the growth of the beauty/health industry.

The position of the beauty/health industry in Korea is recognized as a promising industry as a high value-added industry that is increasing interest due to the influence of the Hallyu(Korean Wave) industry and the media[9]. With the spread of Hallyu, global interest in Korean culture and the appearance of Korean celebrities is increasing, and domestic cosmetics and beauty service companies are expanding overseas, and the Hallyu trend has evolved from K-movies and dramas to K-pop, K-beauty, and K-Culture, and national recognition is spreading[10][11]. Korean companies are actively developing the healthcare convergence business, and they are in earnest in the convergence business of beauty and health, such as medical equipment, biopharmaceuticals, M-healthcare platform construction using smartphones, and healthcare business centered on household appliances[5][12].

In this study, the beauty/health industry is defined as a new industry that expects a positive psychological effect and quality of life in daily lives, including materials, goods, devices, and services necessary to maintain healthy beauty[13]. These fields include hair and hair-care, skin-related care, semi-permanent make-up, eyelash extension and nail care, and other fields of pursuit of beauty, as well as body shape management and nutritional status management for physical health, which is defined as a comprehensive industry.

Currently, the beauty/health industry is playing a public role in implementing changes in various consumer markets. In this central role, there are workers who work in the beauty/health industry, and they play the role of mediators seeking health and beauty. Therefore, it is the time when the importance of the beauty/health industry workers as the subjects of job creation and smart beauty/health care industry is emerging. In the end, the development of the beauty/health industry results in job competency based on the professional perception of workers, and this background is based on changes in the field of work, such as changes in workers' job perception and consumers' paradigm[14][15].

Therefore, this study attempts to verify the experience of workers according to the change in the occupational field of the beauty/health industry with a grounded theory, and investigate a strategy for responding to future occupations. The grounded theory approach is a research method that can be usefully used when the conceptual framework for a specific phenomenon is not clear and there are no related theories, when there is a need to help understanding between variables or when you want to explore practical fields through theoretical model development[16][17]. Through this research, we intend to provide basic data on the creation of convergence jobs in the beauty/health industry in future by providing conceptual framework and basic data on job change and segmentation of beauty/health industry workers.

2. Methods

2.1. Participants

In the selection of research participants in this study, a sample was extracted by adopting purposeful sampling, which is one of the non-probability of artificially sampling the subjects who can contribute to the development of the theory of the research[18]. In addition, snowball sampling was used in this study, and it is a popular method among the methods of selecting participants, which is a method of receiving recommendations for the person most appropriate to the situation in the field[19]. Therefore, eight people were initially selected as research participants, but a total of 12 study participants were selected by recommending four participants who are very interested in beauty/health-related occupational change and are actually undergoing experience through the snowball sampling method in the course of the study. When looking at the gender and age distribution of the participants, there were two males and 10 females, and the final study participants were confirmed with two in their 30s, five in their 40s, four in their 50s, and one in their 60s.

2.2. Research design

This study applied the grounded theory approach by Strauss and Corbin to grasp the opinions and concrete details of the change in the occupational field of beauty/health industry workers[20]. Qualitative research is a research method that allows a small number of participants to be explored in an in-depth and practical context. The research procedure went through five steps: selection of research questions, selection of research participants and data collection, analysis of data, interpretation of data, and report of research results. A theoretical sample was extracted through the procedures of open coding, axial coding, and selective coding to find key categories and classify them by type. In the report of the final study results, the core categories were identified, the development of the story outline was set according to the hypothetical relationship statement, and classification by type was attempted according to the attributes of the participants.

2.3. Data collection and analysis process

Qualitative data analysis is an activity related to three things such as data condensation, data arrangement, conclusion derivation and verification. This activity proceeds in the process of designing and planning a study, in the process of collecting data and conducting initial data analysis, and until the final result is reached after data collection and the study is completed. The data analysis in this study was performed by describing the data collected in three in-depth interviews in words and after transcribing them, the research participants went through a step to confirm the concurrence between the transcribed data and the interview contents. We attempted to classify the subjects by categorizing the original data. The categorized factors were structured to classify common factors for each sub-area, and the transcribed data classified the meaning of the content, and the abbreviation step for each topic was performed appropriately.

2.4. Researcher preparation and evaluation of research methodology

The validity and reliability of qualitative research are guaranteed when the subjective viewpoint and prejudice of the researcher are excluded and the theoretical orientation is enhanced[21]. Also, the researcher itself becomes an important tool in qualitative research. Researchers in qualitative research should be aware of their personal prejudices, values, and beliefs, which are necessary before collecting data and during the research process. The research team in this study has more than 20 years of field experience in the beauty/health-related field, and has experience in running beauty/health-related programs. In this study, truth value, applicability, consistency, and neutrality were applied as evaluation criteria for research methodology[18]. Therefore, through the research procedure and analysis process of the grounded theory, we tried to express the phenomenon as it is about the experience of change in the occupational field experienced by the beauty/health industry workers.

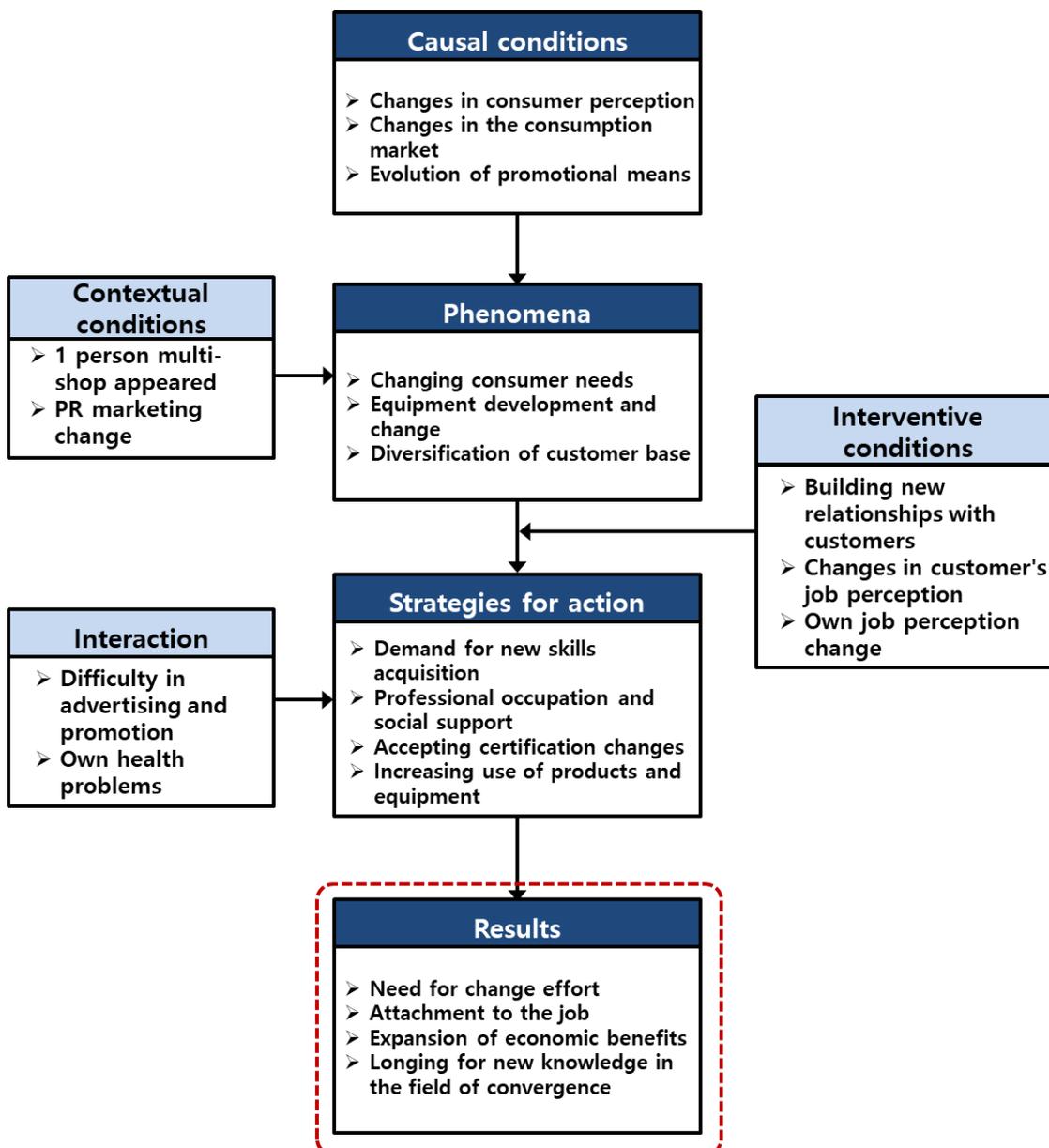
3. Results

3.1. Open coding: data categorization process

In the process of naming concepts and confirming the attributes and dimensions of categories through continuous questioning and comparative analysis based on data obtained from participants, 95 concepts, 37 subcategories, and 21 categories were identified. In the first interview research for categorization of data in open coding, three structured interviews were conducted, and a semi-structured interview was used in addition to allowing participants to freely explore the subject to secure the reliability of the research results.

3.2. Axial coding: category analysis by paradigm

Figure 1. Paradigm model according to experience of change in occupation area.

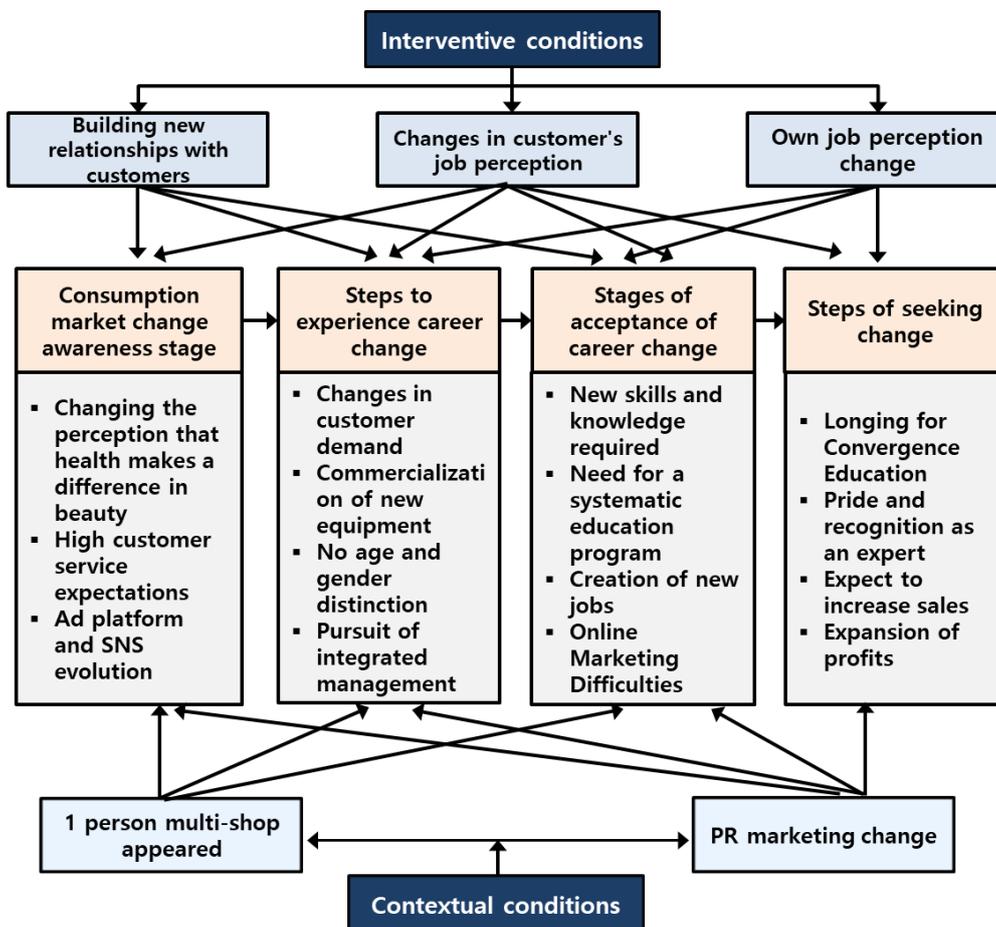


By analyzing the paradigm category, a model for the change experience in the beauty/health industry was established as shown in <Figure 1>. Axial coding is the process of re-combining data that was decomposed during open coding. In other words, it shows how the categories intersect and connect with each other by continuing to develop the properties and dimensions of the categories and linking the categories into subcategories according to the properties and dimensions. Based on the paradigm model, the correlations between causal conditions, contextual conditions, intervening conditions, interaction strategies and interaction strategies, and outcomes are as follows.

3.3. Selective coding: identification and type analysis of core categories

As the last step, selective coding is the process of clarifying the core category and integrating and elaborating other categories around this core category. This is divided into the development of the story outline and the construction of a context model that systematically associates the core categories with other categories to create a story line. As a result of analyzing the participant's experience according to the change in occupational field in the process analysis before constructing the situation model, it was shown as a four-step sub-process: 'the stage of recognizing changes in the beauty/health consumption market', 'the stage of experiencing changes in the beauty/health occupational environment', 'the stage of accepting changes in the beauty/health job role', and 'the stage of seeking change'. The contents of each stage are shown in <Figure 2>.

Figure 2. Analysis of process steps according to experience of change in occupational field.



At the stage of selective coding, the types were classified according to the attitudes of participants to accept the changing process, as shown in <Table 1>. In grounded theory, type analysis is to formalize the relationship that repeatedly appeared between each category by continuously comparing the hypothetical formalization of data and relational statements with the grounded data to build a theory. In this study, types were classified into attitudes to accept the changing process related to beauty/health job roles.

It was named as four types such as 'innovators' who are active in change, 'early majority' who seek economic benefits first, 'late majority' who do not ignore innovation itself but join belatedly, and 'laggards' who ignore change or innovation itself. <Table 1> below analyzes the types of acceptance according to the experiences of workers in the beauty/health industry. According to paradigm causal conditions, central phenomena, contextual conditions, intervening conditions, action and interaction strategies, and outcomes, participants' perceptions of high and low, active and passive acceptance states, and strong and weak attitudes toward seeking change can be identified.

Table 1. Analysis of acceptance type according to experience of change in occupational field.

Paradigm	Paradigm	Innovators	Early majority	Late majority	Laggards
Causal conditions	Changes in consumer perception	High	High	High	Middle
	Changes in the consumption market	High	High	High	Middle
	Evolution of promotional means	High	High	High	Middle
Phenomena	Changing consumer needs	Active	Active	Active	Passive
	Equipment development and change	Active	Negative	Passive	Passive
	Diversification of customer base	Active	Active	Passive	Passive
Contextual conditions	1 person multi-shop appeared	Positive	Positive	Positive	Negative
	PR marketing change	Positive	Positive	Negative	Negative
Interventive conditions	Building new relationships with customers	Strong	Strong	Middle	Weak
	Changes in customer's job perception	Strong	Middle	Middle	Weak
	Own job perception change	Strong	Middle	Middle	Weak
Strategies for interaction/ action	Demand for new skills acquisition	Active	Active	Passive	Passive
	Professional occupation and social support	High	Middle	Middle	Low
	Accepting certification changes	Active	Active	Passive	Passive
	Difficulty in advertising and promotion	Low	Middle	Middle	High
	Own health problems	Low	Middle	Middle	High
	Increasing use of products and equipment	Active	Passive	Passive	Passive
Results	Need for change effort	Strong	Strong	Low	Low
	Attachment to the job	Strong	Middle	Middle	Low

	Expansion of economic benefits	Middle	High	High	Middle
	Longing for new knowledge in the field of convergence	Strong	Middle	Weak	Weak
	Participant type	Participant 3, 4, 6, 9	Participant 5, 8, 10, 12	Participant 2, 11	Participant 1, 7

4. Conclusion and Recommendations

This study was conducted using a grounded theory approach to confirm in vivid language what kind of occupational field changes are experienced in the modern society where beauty and health are converged to an industry of beauty and health. The beauty/health industry is a field of industry that is newly started by convergence of the existing beauty industry and health industry, and it is an industry that can satisfy human needs. In addition, as an industry that constantly creates new values in response to a changing society, it is defined as an industry in which trends are constantly changing to meet the needs of sensitive consumers [22]. Therefore, it is an industry that has an indestructible market for all human beings as a distinctive feature from other industries, and it is a trend-sensitive business as deterioration of technology is rapidly in progress, and it is claimed as an emotional industry that satisfies human emotional needs [5][13].

The grounded theory used as the methodology of research in this study is a qualitative research method that develops a theory that inductively leads to a phenomenon through a series of systematic processes, and an appropriate research method based on the language of the field is provided for unstructured research questions that are not suitable for quantitative research methods [23][24]. By applying this grounded theory methodology, with the content of the results derived through causal conditions, central phenomena and interactions, interaction strategies, contextual conditions, and intervening conditions related to the experience of change in the occupational field of the beauty/health industry, this study tracked what changes of job roles we experienced.

In the results of this study, first, the category analysis of the paradigm by open coding was confirmed. It was possible to grasp what participants perceived that consumers' perceptions were changing under causal conditions. Changes in consumer perception can be seen as changes in communication. In the central phenomenon, it was found that the needs of consumers and the development of equipment and the increase in demand were taking place, and through in-depth interviews, the diversification of the customer class was confirmed. In the beauty/health industry, a revolutionary device shift is coming due to the development of the Internet of Things (IoT) [25][26]. Therefore, it can be seen that the use of equipment according to customer needs is emerging as a new core.

Among the paradigm category analysis, it was confirmed through interviews with participants that a characteristic part of the contextual condition is the emergence of single-person multi-shops. The emergence of single-person multi-shop means that one person can do the work by digesting all the tasks that several people had done in the past. When it is confirmed that the acceptance factor of smart health is that user transformation and service adequacy appear as a mediating effect, the emergence of single-person multi-shop is inferred as an inevitable result.

Participants should run operations in accordance with the lifestyle and trend of customers in the contents of changes in promotion marketing, and to reassure competitiveness, it was recognized that internet-based promotion should be carried out based on equipment, programs, and advanced facilities. Among the paradigm category analysis, it was confirmed that the beauty industry is expanding into the healthcare field, including health management, under the intervening conditions for changes in beauty/health job roles.

It is inferred that this is due to the change in the perception of customers who pursue healthy beauty in the healthcare industry as well. In the paradigm category analysis, positive and negative parts of participants' interaction strategies and interaction strategies were derived together. Currently, various problems have appeared in Korea regarding changes in technology, equipment and programs related to the beauty/health industry, and patents. To solve these issues, the Korean government has also investigated beauty/health patent applications as well as proposed measures to improve regulations in line with the paradigm shift of the healthcare industry[27][28]. Looking at the trend of these changes, it can be inferred that programs and certifications can change with the emergence of new professional occupations in the beauty/health industry.

In the result of category analysis of paradigm by open coding, the characteristic part is the craving for new knowledge in the area of convergence. When analyzing the future of the healthcare industry in consideration of the technological change and environment of the modern society, the U-healthcare, personalized treatment technology, daily health care, smart consumer, and universal healthcare are predicted to become megatrends[29]. Therefore, the physical environment and service orientation in the beauty/health industry should be armed with new knowledge in the convergence field, and it is the part that can deduce that the participants themselves need to change.

The second part to be checked in the research results is the analysis of the core category according to selective coding and the type of acceptance according to the experience in the beauty/health industry. The change in the field of work in the beauty/health field is a natural consequence according to the changing times. Accordingly, with regard to the attitude of acceptance and the search for change, there are four types in classification such as 'innovators' who are active in change, the 'early majority' who pursues economic benefits first, and the 'late majority' who do not ignore the innovation itself but join late', and 'laggards', which ignore change or innovation itself.

In terms of job acceptance attitude, there are diverse variables such as job satisfaction, career attitude, and acceptance intention[30]. As the beauty/health industry is an area where the existing beauty industry and health industry are converging to establish a new position, we must constantly change ourselves and be sensitive to consumer trends to create new values. Therefore, it is necessary to provide educational support for future competency development, to prepare a continuous learning environment and specialized career development support programs, and to continuously develop careers according to the changing employment environment.

In this study, it was confirmed that participants' attitudes toward change in occupational field of beauty/health industry can be expressed in various ways. The content of this study served as an opportunity to confirm what participants think about the change in the beauty/health occupational field, what preparations were made for him/her and his/her surroundings, and how the direction of change was flowing. Through the results of this study, it is meaningful that this study may present basic information on strategies and methods to cope with changes of the beauty/health industry in the future.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	HJW	-Set of concepts <input checked="" type="checkbox"/>
		-Design <input checked="" type="checkbox"/>
		-Getting results <input checked="" type="checkbox"/>
		-Analysis <input checked="" type="checkbox"/>
Corresponding Author*	JBL	-Make a significant contribution to collection <input checked="" type="checkbox"/>
		-Final approval of the paper <input checked="" type="checkbox"/>
		-Corresponding <input checked="" type="checkbox"/>
		-Play a decisive role in modification <input checked="" type="checkbox"/>
Co-Author	EJK	-Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/>
		-Participants in Drafting and Revising Papers <input checked="" type="checkbox"/>
		-Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2436-1151

Website: www.j-institute.jp/protection/
Editor: protection@j-institute.jp

Corresponding author
E-mail: jaebumlee@mju.ac.kr

dx.doi.org/10.22471/protective.2020.5.2.94

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Analysis of Perception of Naturopathy CONVERGENCE and Utilization Satisfaction Perceived by Skin Beauty Industry Workers

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Abstract

Purpose: As consumers' interest in skin beauty has increased recently, the market size of the skin beauty care business also shows a rapid growth. According to these social demands, the base of the population using skin beauty salons is expanding, and the beauty industry is also rapidly actively using Naturopathy. Therefore, this study conducted an analysis of the perception and utilization satisfaction of naturopathy perceived by skin beauty industry workers.

Method: In this study, 246 subjects were sampled by the convenience and judgmental sampling among the non-probability sampling methods. The analysis of the data was carried out by multiple regression analysis to understand the relationship between the perception of naturopathy and the satisfaction of use of the skin beauty industry workers. The statistical level was verified at the $p < .05$ level.

Results: In multiple regression analysis conducted to investigate the relationship between perception and satisfaction on naturopathy, regression models were all statistically significant in social satisfaction, educational satisfaction, physical satisfaction, psychological satisfaction, and rest satisfaction. educational perception had a great influence on social satisfaction, and it was found that in educational satisfaction, the higher the educational perception, the higher the influence, in physical satisfaction, the higher the educational perception, the higher the influence, and in the result of psychological satisfaction analysis, the higher the educational perception, the higher the influence.

Conclusion: Naturopathy is a way to achieve health intervention through the enhancement of the body's natural healing force without the use of surgery or chemotherapy to restore the human body's insufficient function. Therefore, In the skin beauty industry as well, along with beauty management, naturopathy is used to improve customer satisfaction and services, and it is a point in time that its utilization as a new field of the skin beauty industry is attracting attention. The results of this study inform us that the perception of natural healing perceived by the skin beauty industry workers and their utilization are positively changing according to the changing circumstances of the times.

[Keywords] Skin Beauty Industry Workers, Naturopathy, Convergence, Perception, Satisfaction, Health Intervention

1. Introduction

As consumers' interest in skin beauty has increased recently, the market size of the skin beauty care business also shows a rapid growth. Looking at the 2019 beauty & personal care market analysis presented by Euromonitor, a global market research organization, Korea ranked ninth after the US, China, Japan, Brazil, Germany, UK, India, and France. The United States maintained the first place with \$92.9 billion, followed by China with \$69.2 billion. Japan ranked third with \$38.9 billion, Brazil ranked fourth with \$29.6 billion, and Germany fifth with

\$19.3 billion, followed by the UK(\$16.9 billion), India(\$14.8 billion), and France(\$14.6 billion). Korea's beauty & personal care market was found to have maintained its 9th position in the world, recording a scale of 13,253 billion dollars last year[1].

Worldwide, the skin beauty industry was initially limited to hair, makeup, and skin including massage creams, and was mainly developed with a method for activating the physiological function of the skin and maintaining healthy skin. However, in the modern society, the skin beauty industry has developed into a variety of industries as the standards for the development and beauty of society have changed[2]. The skin beauty industry is a high value-added, advanced country-type industry, and is becoming a universal culture while meeting the well-being trend in accordance with perception changes, and is a process that is transforming into a high value-added business coping with the essence and form of beauty[3].

Many consumer goods markets are being hit by Covid-19, which recently hit the world, but it is analyzed that the beauty market, where online commerce is already well formed, will have less impact than other consumer goods markets[4][5][6]. Rather, it can be predicted that after Covid-19, beauty products with functions such as health, immunity, and hygiene or products with healthy natural ingredients will be activated worldwide.

Moreover, in modern society, the connection through convergence is an essential keyword of the 4th industrial revolution, and the intelligent information technology of IoT, Cloud, Big Data, and Mobile is rapidly changing through the connection of intelligent information technology and artificial intelligence technology[7][8][9]. Thus, as a convergence of beauty and health, it can be predicted that the trend of the global market will gradually expand to the business area that encompasses the overall lifestyle.

Due to this trend of global diversification, in 2008, a national technical qualification certificate, which was divided into skin beauty care therapists according to the enforcement regulations of the National Technical Qualification Act of the Human Resources Development Service of Korea, was newly established in Korea, and as a result, professional activities of occupational groups working in the skin beauty industry became possible[10][11]. In Korea, the qualification certificate for beauty was originally maintained in one form, but it was separated into general beauty and skin beauty in consideration of the specialization and subdivision of the beauty industry. Therefore, more specialized spa management rooms, meridian massage rooms, Ayurvedic, medical skin care, and Thai massage rooms are in prosperity, and franchise skin beauty shops have also appeared[12][13].

These social changes have begun to drive changes in the profession of the new skin beauty industry. It started to change from simple skin care to health management such as body shape management, obesity management, stress management, and pain management[14]. Therefore, the occupational group engaged in the skin beauty industry is expanding into the health industry based on the beauty industry through re-socialization education, and in terms of health care, consumer satisfaction and service improvement are achieved by combining natural remedies.

In this study, the term, naturopathy used by the skin beauty industry practitioners is a complementary therapy that achieves health intervention through the enhancement of the body's autoimmunity and healing power without using surgery or chemotherapy to recover the human body's insufficient function[15]. Naturopathy is an act of resolving the imbalance between body and mind rather than curing a disease, and resolving the etiology without side effects based on the natural resilience of humans.

It refers to a complementary therapy that improves the natural healing force to restore the human body to a normal state by maintaining the homeostasis possessed by humans. Therefore, natural healing therapy is not viewed as a medical practice, but can be applied as a complementary means as a non-drug bloodless therapy for health promotion or health intervention[16]. Therefore, this study conducted an analysis of the perception and utilization satisfaction of natural healing perceived by skin beauty industry workers.

2. Methods

2.1. Participant

This study sampled the subjects of study by convenience sampling and judgmental sampling among non-probability sampling methods. All participants of the study were selected from those with more than 10 years of experience, and those who are currently using natural healing were sampled. The questionnaire survey was conducted for a total of 270 people, and the data of 246 people were analyzed excluding the data of 24 people who had poor or omitted survey responses.

2.2. Instruments

In this study, a total of 11 items including three items of psychological perception, two items of physical perception, three items of social perception, and three items of educational perception were surveyed on a 5-point Likert scale in order to find out perception of naturopathy among the skin beauty industry workers. All three factors were extracted as a result of the factor analysis of the items on perception of naturopathy among the skin beauty industry workers, and the composition of the variable items except for the psychological factor item 3, which showed a factor load of .100, was found to be good. The explanatory power of the extracted factors was found to be 74.521%, and the items for each factor were finally composed of 10 items including four psychological and physical perception items, three social perception items, and three educational perception items, and Cronbach's α values for these factors were found to be .834, .859, .864, and .762, indicating a reliable level.

Five factors were extracted in all of the scales set as dependent variables to find out the naturopathy utilization satisfaction of participants in this study, and the composition between the variable items except for the item 2 in the social domain, which showed a factor load of .026, was found to be good. The explanatory power of the extracted factors was 70.204%, and the items for each factor are composed of a total of 19 items including four items in the social area, four items in the educational area, four items in the physical area, three items in the psychological area, and three items in the resting area. Cronbach's α values for these factors were found to be .795, .653, .811, .658, and .754, indicating reliable levels.

2.3. Data analysis

In this study, multiple regression analysis was performed to determine the influence relationship between the perception variable for naturopathy and utilization satisfaction variable. For this, in order to find out the explanatory power of the factors of utilization satisfaction of naturopathy users, four sub-factors of the perception variable were used as independent variables, and a multiple regression analysis was conducted with five factors of utilization satisfaction as dependent variables. The statistical level was verified at the $p < .05$ level.

3. Results

3.1. Correlation analysis of measurement variables

A correlation analysis was conducted to find out the relationship between the variables of skin beauty industry workers' perception on naturopathy and their utilization satisfaction. Overall, the correlation has a positive direction, so it can be seen that the correlation between perception and utilization satisfaction is consistent with the direction of the research question, and it can be judged that there is a conceptual relationship. As shown in the following <Table 1>.

Table 1. Correlation analysis of measurement variables.

Division	1	2	3	4	5	6	7	8	9
Perception	Psychological perception	1							
	Physical perception	.651*	1						
	Social perception	.563*	.493*	1					
	Educational perception	.543**	.515*	.559*	1				
Utilization satisfaction	Social area	.580*	.517**	.639*	.657*	1			
	Educational area	.572*	.519**	.490*	.594**	.716*	1		
	Physical area	.610*	.583**	.572*	.608*	.730*	.728*	1	
	Psychological area	.617*	.541*	.597*	.638*	.761*	.689*	.795*	1
	Resting area.	.604*	.539*	.517*	.553*	.738*	.695*	.806*	.731*

Note: *p<.05**p<.01.

3.2. The influence relationship between participants' perception of naturopathy and social satisfaction

Looking at the analysis results, it was found that the regression model was statistically significant in all of the perception factors except for physical perception. When examining the explanatory power of the perception factor for social satisfaction in detail, the F value was 78.487, which was statistically significant (p<0.5), and R², which explains the social satisfaction of each independent variable, was found to be .559. In addition, statistically significant results were found in all of psychological perception (p<0.00), social perception, and educational perception (p<.00). In the results of analyzing the relative influence of perception factors that influence social satisfaction, it was found that educational perception (β=.357) showed the greatest influence. Next, it was found that the influence was shown in the order of social perception (β=.311) and psychological perception (β=.163). Therefore, it can be seen that the higher the educational perception, the more influence on social satisfaction.

Table 2. Results of multiple regression analysis of perceptions on social satisfaction.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance	F	R ²
Social satisfaction	Constant	.239						
	Psychological perception	.161	.061	.163	2.653	.009*		
	Physical perception	.072	.056	.074	1.273	.204	78.487	.559
	Social perception	.293	.052	.311	5.593	.000**		
	Educational perception	.365	.057	.357	6.445	.000**		

Note: *p<.05**p<.01.

3.3. The influence relationship between participants' perception of naturopathy and educational satisfaction

Looking at the analysis results, it was found that the regression model was statistically significant in all of the perception factors except for Social perception. When examining the explanatory power of the perception factor for social satisfaction in detail, the F value was 51.112, which was statistically significant ($p < 0.5$), and R², which explains the educational satisfaction of each independent variable, was found to be .450. In addition, statistically significant results were found in all of psychological perception ($p < 0.00$), Physical perception ($p < .03$). In the results of analyzing the relative influence of perception factors that influence educational satisfaction, it was found that educational perception ($\beta = .334$) showed the greatest influence. Next, it was found that the influence was shown in the order of psychological perception ($\beta = .246$) and physical perception ($\beta = .140$). Therefore, it can be seen that the higher the educational perception, the more influence on educational satisfaction.

Table 3. Results of multiple regression analysis of perceptions on educational satisfaction.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance e	F	R ²
Educational satisfaction	constant	.634						
	Psychological perception	.234	.065	.246	3.595	.000**		
	Physical perception	.130	.060	.140	2.155	.032*	51.112	.450
	Social perception	.086	.056	.096	1.540	.125		
	Educational perception	.328	.061	.334	5.411	.000**		

Note: * $p < .05$ ** $p < .01$.

3.4. The influence relationship between participants' perception of naturopathy and physical satisfaction

Looking at the analysis results, it was found that the regression model was statistically significant in all of the perception factors. When examining the explanatory power of the perception factors for physical satisfaction, the F value was 68.129, which was statistically significant ($p < 0.5$), and R², which explains the physical satisfaction of each independent variable, was found to be .523. In addition, statistically significant results were found in all of psychological perception, physical perception, social perception, and educational perception ($p < .00$). In the results of analyzing the relative influence of perception factors that influence physical satisfaction, it was found that educational perception ($\beta = .277$) showed the greatest influence. Next, it was found that the influence was shown in the order of psychological perception ($\beta = .220$), physical perception ($\beta = .202$) and social perception ($\beta = .193$). Therefore, it can be seen that the higher the educational perception, the more influence on physical satisfaction.

Table 4. Results of multiple regression analysis of perceptions on physical satisfaction.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance e	F	R ²
Physical satisfaction	Constant	.842					68.129	.523
	Psychological perception	.196	.057	.220	3.449	.001**		

Physical perception	.175	.053	.202	3.332	.001*
Social perception	.164	.049	.193	3.348	.001*
Educational perception	.255	.053	.277	4.811	.000**

Note: * $p < .05$ ** $p < .01$.

3.5. The influence relationship between participants' perception of naturopathy and psychological satisfaction

Looking at the analysis results, it was found that the regression model was statistically significant in all of the perception factors. When examining the explanatory power of the perception factors for physical satisfaction, the F value was 68.129, which was statistically significant ($p < 0.5$), and R², which explains the physical satisfaction of each independent variable, was found to be .523. In addition, statistically significant results were found in all of psychological perception, physical perception, social perception, and educational perception ($p < .00$). In the results of analyzing the relative influence of perception factors that influence physical satisfaction, it was found that educational perception ($\beta = .277$) showed the greatest influence. Next, it was found that the influence was shown in the order of psychological perception ($\beta = .220$), physical perception ($\beta = .202$) and social perception ($\beta = .193$). Therefore, it can be seen that the higher the educational perception, the more influence on physical satisfaction.

Table 5. Results of multiple regression analysis of perceptions on Psychological satisfaction.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance e	F	R ²
	Constant	.528						
	Psychological perception	.237	.060	.247	3.952	.000**		
Psychological satisfaction	Physical perception	.096	.055	.102	1.721	.086	73.552	.542
	Social perception	.207	.052	.227	4.004	.000**		
	Educational perception	.322	.056	.324	5.754	.000**		

Note: * $p < .05$ ** $p < .01$.

3.6. The influence relationship between participants' perception of naturopathy and resting satisfaction

Looking at the analysis results, it was found that the regression model was statistically significant in all of the perception factors. When examining the explanatory power of the perception factor for resting satisfaction in detail, the F value was 52.386, which was statistically significant ($p < 0.5$), and R², which explains the resting satisfaction of each independent variable, was found to be .456. In addition, statistically significant results were found in all of psychological perception ($p < .00$), educational perception ($p < .00$), physical perception ($p < .01$) and social perception ($p < .02$). In the results of analyzing the relative influence of perception factors that influence resting satisfaction, it was found that psychological perception ($\beta = .296$) showed the greatest influence. Next, it was found that the influence was shown in the order of educational perception ($\beta = .232$), physical perception ($\beta = .156$), and social perception ($\beta = .144$). Therefore, it can be seen that the higher the psychological perception, the more influence on resting satisfaction.

Table 6. Results of multiple regression analysis of perceptions on resting satisfaction.

Dependent variable	Independent variable	B	SE	β	t	Probability of significance e	F	R ²
	Constant	.915						
Resting satisfaction	Psychological perception	.276	.064	.296	4.342	.000**	52.386	.456
	Physical perception	.142	.059	.156	2.412	.017*		
	Social perception	.128	.055	.144	2.338	.020*		
	Educational perception	.223	.059	.232	3.770	.000**		

Note: * $p < .05$ ** $p < .01$.

4. Conclusion and Recommendations

In the skin beauty industry, a new occupation was formed in 2008 with the establishment of a national technical certificate divided into skin beauty care therapists, and the skin beauty industry has undergone major changes with the segmentation of the occupational group. Looking at the previous studies, it is argued that the business and scope of the beauty industry gained a new legal status, thereby opening a way to perform more types of services than the existing ones[17][18]. In addition, it can be seen that the direction of the skin beauty industry is changing to a form of an industry that combines skin care and healthcare due to changes in awareness of health and consumer demand[19][20].

The results of Multiple Regression Analysis, educational perception had a great influence on social satisfaction, and it was found that in educational satisfaction, the higher the educational perception, the higher the influence, in physical satisfaction, the higher the educational perception, the higher the influence, and in the result of psychological satisfaction analysis, the higher the educational perception, the higher the influence. Putting together the results of the study, overall, it can be seen that educational perception has the greatest relationship among perception variables that influence participants' utilization satisfaction of naturopathy. In other words, it can be evaluated that the higher the educational perception that naturopathy is closely related to the traditional lifestyle and that it is of educational value, the higher utilization satisfaction of naturopathy. These results are similar to other research results that the educational part of skin beauty affects job satisfaction, and are consistent with other research results showing that professionalism and regular education affect management performance[10][18].

The beauty service industry is a labor-intensive industry with a high dependence on human resources, and among service organizations, it needs efficient human management to cope with diversification of customer needs and competitiveness[21][22]. Therefore, according to the rapid social change in the modern age, it can be confirmed that the skin beauty industry workers are highly aware of new naturopathy education to improve the quality of services and create profits.

Naturopathy is a way to achieve health intervention through the enhancement of the body's natural healing force without the use of surgery or chemotherapy to restore the human body's insufficient function[15][23]. Therefore, naturopathy can be viewed as a complementary therapy that can be differentiated from existing medical practices. This study managed to confirm positive results for participants' perception and utilization for skin beauty massage, thermal therapy, manual therapy, psychotherapy, meridian massage, water therapy, diet therapy, taping therapy, and aroma therapy, which are naturopathy used in the skin beauty industry.

In the skin beauty industry as well, along with beauty management, naturopathy is used to improve customer satisfaction and services, and it is a point in time that its utilization as a new field of the skin beauty industry is attracting attention. The results of this study inform us that the perception of natural healing perceived by the skin beauty industry workers and their utilization are positively changing according to the changing circumstances of the times. These research results served as an opportunity to scientifically verify the perception and utilization satisfaction of the service structure of the changing skin beauty industry, and this study will be meaningful in that it can provide basic data to improve the service of the skin beauty industry in the future.

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6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	TSK	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/>
Corresponding Author*	JBL	-Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>

Protection Convergence

Publisher: J-INSTITUTE
ISSN: 2436-1151

Website: www.j-institute.jp/protection/

Editor: protection@j-institute.jp

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E-mail: chayh@kwu.ac.kr

dx.doi.org/10.22471/protective.2020.5.2.103

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Effects of the Integrativ Play THERAPEUTIC COUNSELING Program on the Depression of the Elderly

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Abstract

Purpose: The present research attempted to find whether there was any relevance between integrative play therapeutic counseling programs and the lessening of depression among the elderly who had experienced a sexually inequal society, and whether the experiment group which took part had different results from that which did not take part.

Method: The research targeted the 24 elderly people over 63 years of age and divided them into an experiment group of 11 and a control group of 13. The program happened 12 times in 90 minute intervals. The data was handled with the SPSS 18.0 program and was analysed using the covariance method with the prior score for depression serving as the covariate. After the program was done, 2 of the experiment group members were used for personal case studies.

Results: First, the experiment group which took part in the therapeutic program displayed a meaningful decrease in the depression level while the control group which did not take part had no meaningful changes. Second, in the personal case study it was found that the present program is effective in lessening depression.

Conclusion: First, the cognitive distortion and self management skills were expounded upon, which led to the decrease in depression level. Second, it was found that they were mostly professional retirees and the well educated who had teaching occupations. Third, the figure play with family symbols was shown to be a desirable activity in determining the understanding of self and the dynamics between family members. Fifth, at the end of each interval the elders shared empathy and support for each other and repeatedly cried "Let's put our best foot forward now and today". Sixth, in the activity in which a distorted cognitive structure was reformed, the messages of comfort and reinforcement also affected the outcome. Seventh, the present program has the effect of decreasing the depression level of the elderly, and may provide preliminary data in developing a program on depression of the elderly in the future.

[Keywords] Elderly, Depression, Integrative Play Therapeutic Program, Counseling, Program

1. Introduction

The modern society is called an aging era or a silver era. In 2018, the senior citizens aged 65 and up accounted for 14.3 percent of the entire population, turning Korea into an aging society, and it is expected that it will in turn become super-aging society in 2025 where senior citizens will represent 20.0 percent[1]. Such a rapid increase in the elderly population has emerged as one of social issues, and geriatric diseases that are caused by aging and concurrence with emotional disorders like loneliness, solitude and a sense of alienation may result in health impairment and dropping their quality of life[2].

In modern society the elderly are being excluded voluntarily or forcefully from the labor

market, and the nuclearization of family, the loss of position within the household and the lowering of status serves factors in which the depression of the elderly is heightened. After retirement and the loss of financial ability, social relationships of various kinds are weakened, resulting in an existential crisis. Also, as the lifestyle is mainly family oriented, a new surviving tactic is needed due to the change in the family structure. Especially in the case of the female elderly, they face a change in the stage of life, becoming mothers in law or grandmothers.

Reuben Hill and Evelyn Duvall, family social scientists, divided the family living stages into 8, mentioning the 8th stage, the elderly couple stage, as one in which the phenomenon of financial, physical, mental aging causes psychological social depression due to retirement. Also, they said that health problems due to aging, financial problems due to retirement, and every day occurrences related to solitude and loneliness due to loss in a social role, adds to depression [3].

Martin Seligman(1975) offered the Learned Helplessness Theory in which he said that the most consequential factor which causes depression was learned helplessness. When it's impossible to adjust various events, the people at hand give up the will or effort to control the environment. Realizing that unhappiness and pain occurs no matter the effort to avoid it, people self-depreciate and show signs of anxiety and depression[4]. In particular the elderly suffer from differing opinions with their children, and suffer emotional pressure due to an obstinate wife or husband, They also suffer lethargy from bodily aging, changing of position due to retirement, change of status within the family, and considerable alterations in the swiftly changing society [5].

Julian Rotter(1968) said that the development of lethargy has to do with the level of inner and outer control, in which inner control means the extent in which an individual thinks the control over environments depends on willpower, and outer control one in which he thinks such a control depends on outer factors and other people. At the elderly stage of life, outer environmental factors such as the death of a spouse, losses such as the death of a friend, the withdrawal of social statuses and privileges, financial hardships, social losses such as disdain for the elderly, lessens the meaning of life, where depression is experienced[6]. Among inner factors, illnesses such as chronic diseases, changes in appearance due to aging, and the decline of body function appears as depression traits. The older the individual, the more easily angered they are, losing interest or excitement in everyday activities, seeing a decline in sexual functions, and easily showing signs of depression. They are less inclined to make decisions easily, live in solitude and loneliness, and believe they won't be heeded even if they asked for help [7]. In addition, factors which affect depression in elders are the decline of the ability to hear, teeth loss, eyesight, digestive power, and resistance for illnesses. They are slow in recovering from illnesses should they have one. Thus, everyday life is limited and depression is exacerbated. The elders, seeing their marriage life discontinued and limits in relationship with family, feel lonely, finding their lives meaningless, and also lose confidence. Lazarus & Folkman(1984) said that although the death of a spouse and serious illnesses do not occur often, it has grave consequences for the person at hand[8].

Also, the distorted cognitive structure of the elders results in depression, and some elders find it hard to continue relationships due to illogical convictions or experience depression in everyday lives. They often criticize themselves and the environment, incapable of escaping a negative personal conviction, and become depressed[9]. Cognitive Behavior Therapy(CBT) is a process of finding negative notions or dysfunctional thoughts and correcting negative emotions and behaviors[10].

Jangho Lee(2006) said that there are few approaches to actively understand the problems of the elders and helps its solving, and mentioned the benefits of group counseling in order to take care of the problem of the elderly[11]. He also said that the majority of the elderly population feel social helplessness through retirement and are anxious due to the loss of friends and family, and group therapy can appease these individuals to a considerable degree[12]. In particular, in order to reduce the depression due to a distorted cognitive structure we need to develop a professional psychologic therapy program which helps reform the cognition. Therefore, instances of social participation and contact for the reduction of depressions in the elderly must

be made[13], maintaining the physical and mental health of the old and strengthen their social function.

The present research therefore examines the need for program development on the mental and social health of the elderly and improve their life quality, and see whether the integrative play therapeutic counseling program has a toll on their depression reduction. The research question is as follows.

Will the experiment group who took part in the therapeutic program find elderly depression reduced more readily than the control group which did not take part?

2. The Integrative Play Therapeutic Counseling Program

The integrative Play Therapeutic Counseling Program utilizes various mediums of play, focusing on the three areas of emotions, thoughts and deeds, examining the body, mind and emotions of the elderly[14].

The program aims to revive the remaining ability for memory in a state where cognitive, emotional and social aging has taken place, and in order to promote effective studying uses mediums and regards emotions, thoughts, and deeds. Taking use of integrative play mediums, the program consists of 12 intervals.

In the preliminary stage the prior examination is done, the purpose of the program is relayed, and aims for bonding with other members are pursued. The leader focuses on making the program interesting and motivating the participants. The members share a story each on the happiest or the proudest memory, and strive to encourage their own selves.

In the middle stage there are light warm up exercises first, and members are encouraged to continue to think of a memory of joy. By inquiring and answering with a figure in hand, a moment of self discovery is had. Later, explanation on the activities is given, and there is practice time in understanding thoughts, emotions and feelings. When illogical convictions are found and altered, there are repeated exchanges of sympathy, encouragements, support and compliments. Mediums, such as famous paintings and animal figures representing family members, are used for bonding, and the participants are asked to express and let out all the negative emotions inside they had suppressed or disconnected from. With a chance to express negative emotions, the subjects attempt to take another stance in viewing the incident which brought forth depression, and realize their own illogical thinking. Through various mediums, they are encouraged to let out all the depressive emotion. The source of negative emotion and its solution are found and understood by the group. The source and solution for depression is mutually understood. As a group, they cry together: "I chose to be depressed. From now on, I will choose not to be depressed!"

At the very end, a post examination was conducted, and the total story was exchanged on the group experience. In addition, a moment of exchanging support and encouragements is had, and thanking each other for their company, the program is concluded.

3. Methods

3.1. Research subject

The subjects of this study were 24 elders using OO elderly welfare classes in J Province, D city. Group therapy program was applied to the 11 of the experiment group, while none was done to the 13 of the control group. Even after the program's effectiveness was validated, 2(N=2) among the participants(N=11) consented to a private interview in order to see whether the program had lasting consequences.

3.2. Research tools

In the present research, the Elderly depression scale developed by Yesavage(1983) and modified by Jinyeong Jang(2010) was taken into use[15]. Among 15 questions scores were attributed, 1 for “Very.” 2 for “Yes, a little bit” 3 for “So-so”, 4 for “No, Not quite” 5 for “Not at all”, and no. 2, 7, 8, 11 and 12 were calculated inversely. The ones with the higher score were said to be more depressed.

3.3. Data analysis

In order to find the effect that the integrative Play Therapeutic Counseling Program had on the depressive state of the elderly, the pre-research and post-research scores of depression from the experiment group and control group were taken and estimated, and the statistic program SPSS 18.0 was used to conduct an analysis of covariance with the pre-research score as the covariate. In order to shed light on the harvest experience of the subjects, personal case studies were chosen. In the personal case studies the meaning of real experiences throughout the passage of time were pursued. After the examining of the effect of the program the harvest experiences of program participants were evaluated according to the timeline of program contents. Through personal case studies, the harvest experiences of the participating elderly were discussed interpretively and the program’s efficiency explored.

The present program was executed by an expert counselor and continued midst integrative play counseling.

4. Results & Discussion

4.1. Reaearch results and analysis

A meaningful difference between the experiment group and control group($t = 2.331, p < .05$) is as shown in <Table 1>. Since the experiment group and control group are unequal, the pre-experiment depression rate was controlled as the covariate and the adjusted post-experiment score was pursued. The average depressive rate of the experiment group was 42.54, the standard difference .31. The average depressive rate of their control group had an everage of 44.14, and the standard difference .32 <Table 2>.

Table 1. The Examination of difference in pre-experiment depressive score.

Division	Experiment group		Control group		t
	Average	Standard difference	Average	Standard difference	
Pre-experiment depressive score	46.27	3.88	43.38	2.06	2.331

Note: *p<.05.

Table 2. The average and standard difference of pre/post experiment depression and the adjusted average and standard difference.

Division	Pre-experiment depression		Post-experiment depression		Adjusted depressive state	
	Average	Standard difference	Average	Standard difference	Average	Standard difference
Experiment group	46.27	3.88	43.99	3.56	42.54	.31
Control group	43.38	2.06	43.00	1.91	44.14	.32

In order to find a meaningful difference between groups on the average decline pre-experiment and post-experiment, we controlled the pre examination as the covariate and conducted a covariance analysis on the post examination depressive score, resulting in <Table 3>. The F of covariate amounted to 175.478 and the significance probability at $p < .001$ level, statistically relevant. The effect that the group therapy program had on depression with the integrative play as the main effect with the pre-experiment test as the control factor, was F of 14.170, and the relevant possibility remained at $p < .01$, statistically meaningful. Thus, the group therapy program based on integrative play had a positive effect on depressed elderly.

Table 3. Covariance.

Variety	Variance	Sum of squares	Degree of freedom	Average square	F
Depression rate	Covariate (Pre-examination)	152,642	1	152,642	175.478***
	Main effect(group)	12,326	1	12,326	14.170**
	Difference	18,267	21	.870	
	Whole	175,833	23		

Note: ** $p < .01$, *** $p < .001$.

4.2. The personal attributes of research participants

6 months before the present research commenced, the character traits of elders who experienced our program two times a week (2 to 2 hours and thirty minutes) and took part in the present case study are as follows <Table 4>.

Table 4. Attributes of interviewee.

Order of interview	Name	Age	Schooling	Main career
1 E	Bang 00	63	College graduate	Retired from profession, a cat mom
2 F	Shin 00	65	College graduate	Retired from profession, teaching related occupation

Such a result seems mainly due to the ardent participation of the elderly and their mindset eager to assume an active role. In terms of the program content and constitution, the elderly seem to have found more meaningful the symbolic play course where a medium actively chosen by the subjects was used to express the emotions, thoughts and deeds, rather than entertainment based activity. Such an in-depth structural activity seems to have taken place because an expert took over and continued a cognitive and action related professional approach. It seems that whenever a participant couldn't quite understand a part of a program and pose a question, the repeated acts of patience and encouragement in which the leader and participants tackled the problem together inspired active participation from members.

Within the present study, the elderly in the program, learning about and exposing, through the medium that was a tambourine, their source of depression which had been suppressed and not expressed, and expressing their anger and sadness overcame them and came to realize the unresolved emotions within them. In addition, the elderly came to recall the domestic problems and issues with their children, and seem to have been motivated to strive and overcome these during the time they had left, attributing meaning to the program at hand. Having experienced sympathy, support and recognition, not seeing depression as depression but having gone

through positive interaction, seem to have paid its toll to behavioral changes and reduction of depression.

The present study conducted an in-depth interview to examine the harvest experience and its meaning after the therapeutic program was done. From 2 participants of the program, in-depth interviews were recorded twice per individual (a total of 40 minutes). A core category in the harvest experience was created, and the final results (① the change of stance on elders themselves at an old age and irrational thinking about depression : The accepting of differing positions in the course of making depression related choices, the discovery of emotional control.) and ② The gaining of insight in finding themselves in a family environment (The number of expression about feeling wronged due to isolated depression management was reduced) was deducted.

4.3. Case study results

4.3.1. Case study 1

E realized that the fact that people have differing characters must be something to be embraced and accepted: realizing character, her depression state was altered.

E was depressed because she could not understand her husband's actions in every day life. Although occupying the same space, they do not exchange conversations eye to eye, conversing only through text messages and SNS utilities. She is a cat mom. Her husband speaks in person with the cats, but would not say a single word to her his wife. Even on the meal table they have individual meals, without a word between them. The husband does the dishes but she steps into the room because she cannot stand his sight. He never once helped her out or acknowledged her labor in his youth. He thought it was something to be taken for granted, an anachronist man who could be from the Choseon dynasty. Looking at him doing the dishes, she realizes how the world has changed. He never once helped her midst child rearing, and when his side of the family was present all he'd do was read newspapers. Even then, she did not say anything and took care of the three children. They were dangerous moments.

Now with the absence of the in laws, she spoke up. The husband held the financial rights without providing for the living expenses. Not to be devastated she chose to be practical. She did receive money from her children to pay for the living. Because she had an occupation and did not force from him the living expenses, it has become a habit for him to not provide for her. Now she has no income. She has only her children's allowance and the pension. As for the pension, she has been saving it to prepare for her youngest son's marriage. To add to her dismay, her husband only eats the food she prepared herself, never once dining out. Of course, he does not drink nor smoke. No need to worry about health. He's never been ill once. The reason she came to recall these incidents was due to the activity where she saw an elephant figure which symbolized her husband. She was asked to find good attributes of his. Once she found that her husband had good characteristics too, she came to peace with herself. She did not once deem him a proper husband. She always thought she'd drive him out and live in solitude. She doesn't know how long she should endure and because she compared her life with others she seldom went out. A friend of hers recommended the program and she participated by chance, then learned that her husband has positive traits as well.

Finding positive traits in him, she feels less angry. Because the program encouraged her to speak her thoughts and try to have a conversation, she struggled to communicate through text messages and SNS. Sometimes she ask him what he would do about the living expenses, upon which he replies he doesn't have the money. That's the starting point of a fight. She doesn't respond anymore. She cannot create time for conversation, and while she tries to have a better relationship she cannot. She is spending time 'Asking, imagining, answering, and asking and imagining again.' The conversation ends in laughter, which brings her joy.

4.3.2. Case study 2

F has reduced the need to keep an appearance through impractical thinking.

F has retired from the seat of leadership at a school. She had continued a state of maintaining a front. She took part in the program without much expectation, out of curiosity. She found something new from the experience, which was that the life she led was not one which she wanted to lead but something just for show, and felt a sense of meaninglessness. The most significant part was where she looked into her own self symbolized by a figure of a horse. Her true character was sensitive, and she realized that she had hidden this part of her and tried to understand and accept everything. Of course, such an attitude made her leader but it was hard serving the role. Because she did not divide the task and resolved it herself, other people thought her a competent leader. Yet she became scarred by these interactions, although she hid these and continued the relationships with a smile. After retirement, she escaped the pattern and found what a good world it was. However, she is still deemed a generous leader amongst his circle. She is scared whether she could live as her true self.

She applied a play she took part within a program into her every day life. Since it helped to imagine people whom she hated while drumming, she took an old pot at home and started to drum. Upon finding that hate was an emotional choice she made, and by conversing with herself, she could let go the anger and hate. She thought that person whom she'd hated would change but she was mistaken. She felt it foolish that she understood it on her own accord, and felt saddened and wronged. What's the use of determining who did what to whom out of impractical thinking at this old age? She said. She feels less regrets. She finds it funny that she sometimes could sigh and even curse on her own accord. She finds necessary the courage to honestly expose herself and speak up. The previous ways have its good parts too. Through drumming as taught by the program, he finds a source of energy. She continually battles with her lethargic self.

5. Conclusion

If the purpose of women's leadership in the past is to promote gender equality in the organization through the expansion of women's leadership, the purpose of gender integration leadership is to fundamentally change the main structure and culture in the direction of integrating women's and men's experiences and perspectives, to promote gender equality and gender diversity, and to establish gender partnerships[16].

The present research attempted to find whether there was any relevance between integrative play therapeutic counseling programs and the lessening of depression among the elderly who had experienced a sexually unequal society, and whether the experiment group which took part had different results from that which did not take part. For this purpose the present program was conducted upon elders over 63 years of age, and the experiment's effectiveness was examined. In order to find whether there was consistent effects post-experiment, 2 case studies were collected from 2 individuals capable of in-depth interview 6 months after the program's termination.

The present research shows a meaningful decrease in the depression level of the elderly after the integrative play therapeutic counseling program. This coincides with the previous researches(Lim, Hyeonjeong 2007 & Jeong, Changu 2012)[17][18]. Also, in the in-depth case study research among two participants supports the effectiveness of the program. The conclusion is as follows.

First, while forming the program the development stage of the elderly was taken into account and there was focus on the distorted perception and self care parts, which would have affected the result.

Second, seeing the attributes of the program participants, they were relatively well educated and were retirees from professional occupations and leaders in school. Some served co-leaders midst the program's continuation, demonstrating an example and serving cores in positive environment formation. The participants naturally participated eagerly, and were motivated.

Third, the figure play with family symbols were useful activities in finding the dynamics on the participants and their family members. The family members appeared in the form of many animals, and allowed the expression of stories which were left untold, resulting in the soothing of elderly depression.

Fourth, the leaders of each term emphasized through demonstration of mediums the activities of the previous intervals and the purpose of the present program, and such an explanation affected the program's efficiency.

Fifth, at the end of each interval, the elderly exchanged words of sympathy and satisfaction, continually shouting, "Let's put our best foot forward now and today", which was effective within the program.

Sixth, in the part of the activity where a distorted cognitive structure was reformed, the fact that they cheered each other on had a considerable positive effect.

Seventh, the present program showed an effective decrease in the depressive state of the elderly who have a tendency to be depressed, and can be offered as preliminary data in developing the program.

"The present research was done under the support of Kwangju Women's University research fund year 2020(kwu 120-049)"

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7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Author	YHC	-Set of concepts <input checked="" type="checkbox"/> -Design <input checked="" type="checkbox"/> -Getting results <input checked="" type="checkbox"/> -Analysis <input checked="" type="checkbox"/> -Make a significant contribution to collection <input checked="" type="checkbox"/> -Final approval of the paper <input checked="" type="checkbox"/> -Corresponding <input checked="" type="checkbox"/> -Play a decisive role in modification <input checked="" type="checkbox"/> -Significant contributions to concepts, designs, practices, analysis and interpretation of data <input checked="" type="checkbox"/> -Participants in Drafting and Revising Papers <input checked="" type="checkbox"/> -Someone who can explain all aspects of the paper <input checked="" type="checkbox"/>