

International journal of
crisis & safety

Vol. 7 No. 1

1. **Understanding SARS-CoV-2 Variants and Safety Countermeasures for the Fight against Omicron**
- Boksil Hong, Myoungryu Kim
2. **The Effect of Clinical Practice Stress and Department Satisfaction on Nursing Professionalism of Nursing College Students**
- Soonjung Hwang, Myungjin Lee
3. **Crisis & Safety: A Study on the Change of the Urbanization Index according to the Increase or Decrease of Naturalized Plants**
- Hyangju Lee, Changjun Kim, Wonhyeon Lim
4. **A Study on the Relationship between Employment Period and Organizational Satisfaction of Indefinite-Term Contract Workers in Governments: Focusing on Indefinite-Term Contract Worker at the National Agricultural Products Quality Management Service**
- Hyuntae Kim, Yongjin Sa
5. **A Study on the Development Direction of Meal Kit for Modern People in a Health Crisis**
- Jeongryeol Bae, Hyunah Kim
6. **The Influence of Open Parental Communication Ability and Child Ego Resiliency on Children's Anger Expression: A Study on Children in Crisis**
- Eunjin Pyo, Hyeonoh Kim, Suyeon Park
7. **Difference in Treatment Outcome according to Oxygen Supply Time in Patients with Myocardial Infarction**
- Kyengho Yun, Jisook Kang
8. **Crisis of Kim Jong-Un Regime of North Korea and the Safety of North Korean Defectors: An Analysis of Job Involvement of the South Korean Security Police**
- Hwansuk Choi, Sunggu Jo, Byeongchan Kim

Publisher: J-INSTITUTE
ISSN: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: kmr79@hanmail.net

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.01

© 2022 J-INSTITUTE

Understanding SARS-CoV-2 Variants and Safety Countermeasures for the Fight against Omicron

Boksil Hong¹

Cheju Halla University, Jeju, Republic of Korea

Myoungryu Kim^{2*}

Cheju Halla University, Jeju, Republic of Korea

Abstract

Purpose: This study examines the mutation profiles and global prevalence of SARS-CoV-2 variants. We further investigate the viral characteristics of the Delta and Omicron variants, such as epidemiology and transmissibility, disease severity, immune escape and vaccine effectiveness. Moreover, safety countermeasures for the fight against the Omicron variant are explored regarding the new pandemic response strategies focused on medical response and COVID-19 guidelines for quarantine rules.

Method: This study was conducted on Web-based searches about the latest updates COVID-19 from the World Health Organization, Korea Centers for Disease Control and Prevention, and the Ministry of Food and Drug Safety. In addition, we searched for the 'SARS-CoV-2 variant', and "COVID-19 and Delta, or Omicron" in PubMed and then reviewed the selected articles regarding variants of concern, the Delta and Omicron variants.

Results: To date, there are five variants of concern available on the WHO tracking SARS-CoV-2 variants website. The Delta and Omicron variants are of particular concern among variants, and the Omicron variant is rapidly outpacing the Delta variant worldwide to become the dominant circulating variant with a substantial growth advantage having a shorter doubling time. Even though the Omicron variant has shown moderate and lower disease severity than the Delta variant, there is concern about the high possibility of immune evasion, and it is predicted to be the most prevalent variant in the Republic of Korea near future. Therefore, safety countermeasures to contain the spread of the Omicron variant will be implemented for gradual recovery to a new normal life.

Conclusion: Accordingly, along with the domestic efforts such as encouraging third booster vaccination and maintaining high-level quarantine systems, international collaboration, clear and transparent communications, and even achievement of 70% coverage with COVID-19 vaccines in all countries will be necessary to battle against the SARS-CoV-2 variants and to stop the continuous prevalence of Omicron worldwide.

[Keywords] SARS-CoV-2 Variants, Omicron, Delta, Safety Countermeasures, Vaccination

1. Introduction

Over two years of coronavirus disease 2019 (COVID-19) pandemic, there have been 318,648,834 confirmed cases of COVID-19 and 5,518,343 deaths globally, updated by World Health Organization (WHO) until January 14, 2022 [1]. In the Republic of Korea, a total of 683,566 confirmed cases and 6,259 deaths (fatality rate 0.92%) have been reported as of 12 am on January 14, 2022 [2]. To battle severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) and maintain public health, safe and effective vaccines have been considered to control the viral spread and disease's severity, as well as develop herd immunity widely [3]. After the first vaccine was administered in the the United Kingdom (UK, a total of 9,283,076,642 vaccine doses have been administered globally. According to the COVID-19 vaccination program of the Korea Centers for Disease Control and Prevention (KCDC) [4][5][6], a total of 44,471,225 individuals, or about 84.7% of the total population, have been administered the 2nd dose of vaccine until January 14, 2022 [2]. As COVID-19 vaccines are safe and effective, teenagers aged 13 to 18 years

have got vaccinated, 78.4% of teens aged 16 to 18, and 65.9% of teens aged 13 to 15 have been fully vaccinated so far. Moreover, due to the increase of the 3rd dose vaccination rate in the adults aged older than 60 (78.3%), severe cases have been decreased to less than 1,000 patients reported by the Ministry of Food and Drug Safety (MFDS) on January 04, 2022[7]. Despite enormous efforts, such as social distancing, self-quarantine, vaccine pass, and higher vaccination rate[8][9][10][11], the high number of daily new confirmed cases has been reported, peaked in mid-December of last year with more than 7,000 new confirmed cases[2]. Moreover, under the toughest social distancing of level 4 and 10 days of mandatory self-quarantine for all inbound travelers entering Korea, there is still a high incidence of daily new cases of COVID-19 with more than 4,000[2]. Recently, WHO designated a new variant of concern, Omicron, which has several mutations that may alter the virus's behavior on November 26, 2021[1]. With the occurrence of Omicrons, a new wave of COVID-19 infection has been entered globally, and the highly contagious Omicron variant is currently outpacing the Delta variant as a globally dominant COVID-19 strain, as reported by WHO on January 12, 2022[1]. Therefore, the present study summarized the COVID-19 variants, their mutation profiles and global prevalence, and the current dominant SARS-CoV-2 variant in the Republic of Korea. In addition, we further outlined the viral characteristics, which are currently prevalent variants across the entire world, regarding epidemiology and transmissibility, disease severity, immune escape and vaccine effectiveness. Lastly, safety countermeasures for the fight against the Omicron variant were explored regarding the new pandemic response strategies focused on medical response and COVID-19 guidelines for quarantine rules.

2. Updating SARS-CoV-2 Variants

2.1. Understanding SARS-CoV-2 variants

All viruses change over time, and most changes have little effect on their properties. However, some changes may impact virus characteristics, including transmissibility and antigenicity, disease severity, and performance of vaccines[12]. A typical SARS-CoV-2 virus accumulates only two mutations per month in its genome, which is a slower change than the influenza virus[13]. After the first outbreak of SARS-CoV-2, WHO has been monitoring and assessing the evolution of the virus to understand the virus's properties[1]. Firstly, for naming and tracking the variant's genetic lineages, the nomenclature systems were established by Global Initiative for Sharing All Influenza Data (GISAID), Nextstrain, and Pango[14][15]. Classifications of SARS-CoV-2 variants persistently reflect the continuous evolution of circulating variants and their global epidemiological changes, and the current list of variants is available on the WHO tracking SARS-CoV-2 variants website[1]. Ultimately to inform the ongoing responses to the COVID-19 pandemic, WHO divides variants into two stages: variant of interest (VOI) and variant of concern (VOC) based on their virulence and vaccine resistance[1]. A SARS-CoV-2 VOI is a variant with genetic changes that are predicted or known to affect virus characteristics and identified to cause significant community transmission or multiple clusters in various countries[1]. As of January 14, 2022, there are two VOIs, Lambda (C.37), which was initially reported in Peru, and Mu (B.1.621) that was first identified in Colombia[1]. In the case of VOC, it is defined as a SARS-CoV-2 variant in which there is evidence of increased transmissibility and disease severity and impact on diagnostic, treatments, or vaccines, in addition to the possible attributes of VOI[1]. Since WHO has designated a new VOC, named Omicron, there are five VOCs of SARS-CoV-2 variants, as illustrated in <Table 1>, which describes the key properties of SARS-CoV-2 variants, including mutations in spike protein.

Table 1. Currently designated variants of concern of SARS-CoV-2 by WHO.

WHO label	Pango Lineages[14]	GISAID Clade[15]	Spike mutations of interest	Earliest documented samples (country, date)	Date of designation
Alpha	B.1.1.7	GRY	N501Y, D614G, P681H, E484K*	United Kingdom, Sep. 2020	Dec. 18, 2020
Beta	B.1.351	GH/501Y.V2	K417N, E484K, N501Y, D614G, A701V	South Africa, May. 2020	Dec. 18, 2020
Gamma	P.1	GR/501Y.V3	K417T, E484K, N501Y, D614G, H655Y	Brazil, Nov. 2020	Jan. 11, 2021
Delta	B.1.617.2	G/478K.V1	L452R, T478K, D614G, P681R	India, Oct. 2020	VOI: Apr. 4, 2021 VOC: May. 11 2021
Omicron [#]	B.1.1.529	GRA	N501Y, H655Y, N679K, P681H	Multiple countries, Nov. 2021	VUM: Nov. 24, 2021 VOC: Nov. 26, 2021

Note: VOI; variant of interest, VOC; variant of concern, VUM; variants under monitoring. *B.1.1.7+E484K, [#]See TAG-VE statement issued on November 26, 2021[1].

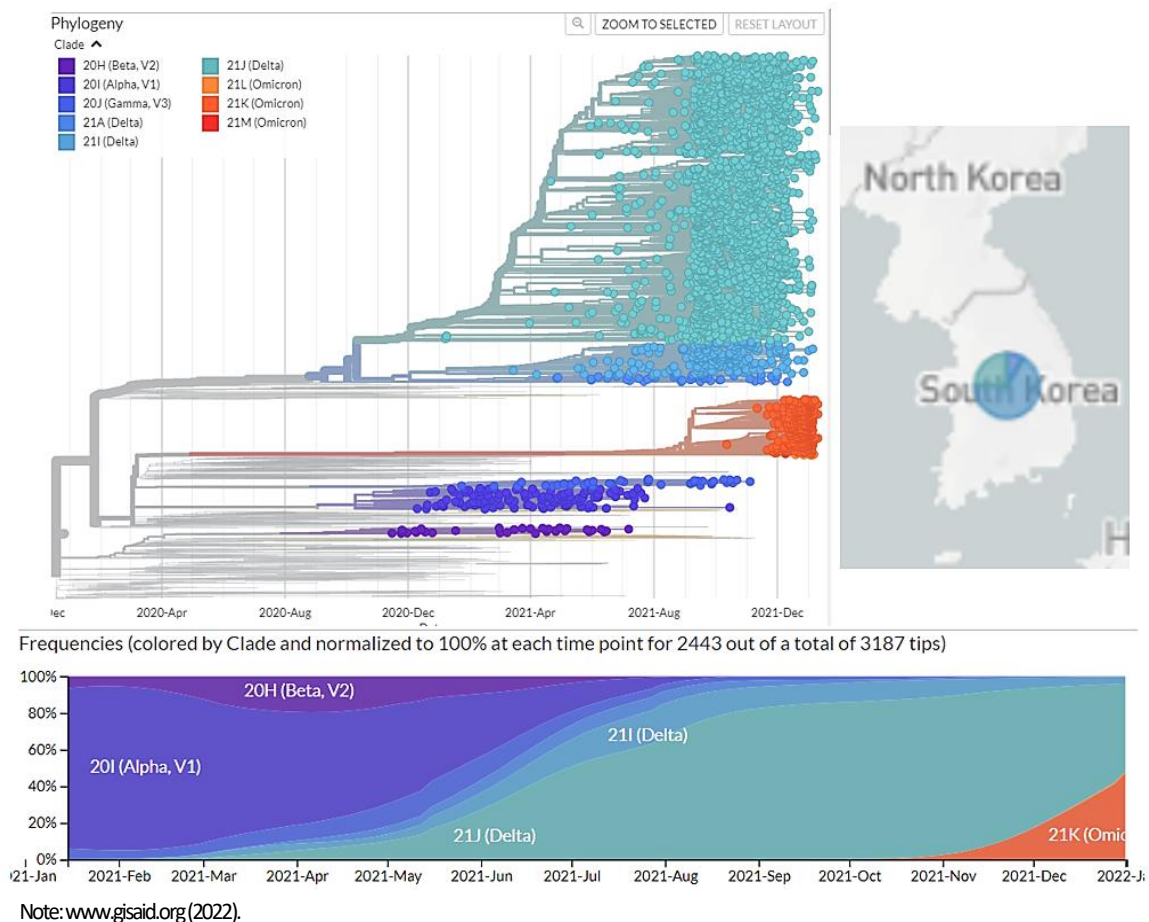
The SARS-CoV-2 virus is an enveloped, single and positive-stranded RNA virus and this zoonotic virus encodes structural proteins, such as viral spike (S) proteins, for entry into target cells[16][17]. With the global transmission of the SARS-CoV-2 virus, the first VOC, known as the Alpha variant (lineage B.1.17) identified in UK on December 14, 2020[18]. The Alpha variant includes 17 mutations in the viral genome, including eight mutations in the S protein[19]. Of those mutations, N501Y enhances virus binding affinity to human angiotensin-converting enzyme 2(ACE2) receptor[19][20], D614G is associated with higher viral loads and increased infectivity[21][22], and P681H is a critical determinant for transmission[23]. Next, SARA-CoV-2 lineage B.1.351 was labeled as the Beta variant, identified in South Africa[24]. The Beta variant harbors nine mutations in the S protein, of which three mutations are located within the receptor-binding domain (RBD), which is responsible for recognizing ACE receptors. With the combination of N501Y, the E484K and K417N mutations further increase the binding affinity to ACE receptors[25][26]. Lineage P.1, designated the Gamma variant by WHO on January 11, 2021, includes 10 mutations in the S protein, and three of these substitutions are located in the RBD[27]. The three mutations (N501Y, K417T, E484K), also found in the Alpha and Beta variants, have been associated with increased binding affinity and transmissibility[19][20][28]. On May 11, 2021, the sublineage B.1.617.2 was designated as a VOC, which is known as the Delta variant[1]. The Delta genome has 17 mutations, of which four within the S protein are of particular concern[29]. The L452R mutation confers a stronger affinity to the S Protein[30][31], and the P681R may boost the viral infectivity of the variant[32][33]. Recently WHO has designated lineage B.1.529 as a VOC, named Omicron, which stands for 'little o' in the 15th letter of the Greek alphabet on November, 2021[1]. The Omicron variant, first detected in South Africa, has at least 30 amino acid substitutions with the four key mutations that may enhance transmission (N501Y, H655Y, N679K, and P681H), which overlap with those in the other VOCs[1][34][35]. As the emergence of VOCs might be associated with new waves of infections across the world[36], the principal concern about VOC is whether it is more infectious or severe than the original virus and whether it can escape vaccine protection.

2.2. Global epidemiology of SARS-CoV-2 variants

Based on the WHO COVID-19 Weekly Epidemiological Update(Edition 74) published January 11, 2022[1], the number of new confirmed cases of COVID-19 has increased remarkably in the past week (January 3-9, 2022), showing a 55% increase as compared to the previous week. Regarding geographic spread and prevalence of VOCs, the Alpha variant showed a drastic reduction after the emergence of Delta in May 2021. As Delta is 2.4 fold more infectious than the original virus and 1.6-fold more contagious than the Alpha variant[34], the delta variant had become the dominant epidemic strain worldwide until December 2021. However, the Omicron

variant has rapidly replaced other variants with a substantial growth advantage having a shorter doubling time as compared to other VOCs. In addition, there is growing evidence that the Omicron variant is able to evade immunity[35]. <Figure 1> shows the current global epidemiology and frequencies of five VOCs of SARS-CoV-2, human coronavirus-2019 (hCoV-19), last updated on January 14, 2022 in GISAID [15]. Based on the WHO COVID-19 weekly epidemiological update, in the previous 30 days, 58.5% were Omicron, 41.4% were Delta, and very low levels (<0.1%) were Alpha, Gamma, and Beta, indicating the Omicron became the dominant circulating variant and declining the prevalence of the Delta variant[1].

Figure 1. Global genomic epidemiology of hCoV-19 until January 3, 2022 (by GISAID analyses, last updated January 16, 2022), showing 2564 of 3022 genomes sampled between September 2021 and January 2022.



In the Republic of Korea, the Omicron variant was first detected in travelers who arrived from Nigeria on November 24, 2021[2]. During the last 7 weeks (November 24, 2021 to January 9, 2022), a total of 2,738 were infected with the Omicron variant. In addition, the detection rate of Omicron cases is rapidly increasing; 1.8% and 4.0% in the 4th and 5th week of December 2021, and 12.5% in the 1st week of January 2022, with two-fold increases in the regional community. Although the Delta variant is currently the dominant variant with less than 5,000 new cases per day <Figure 1>, the Omicron variant is high likely to become the dominant strain by the end of January or February due to two to three times more contagious than the Delta variant. Therefore, the current situation of the Republic of Korea is never at a level of reassurance[2].

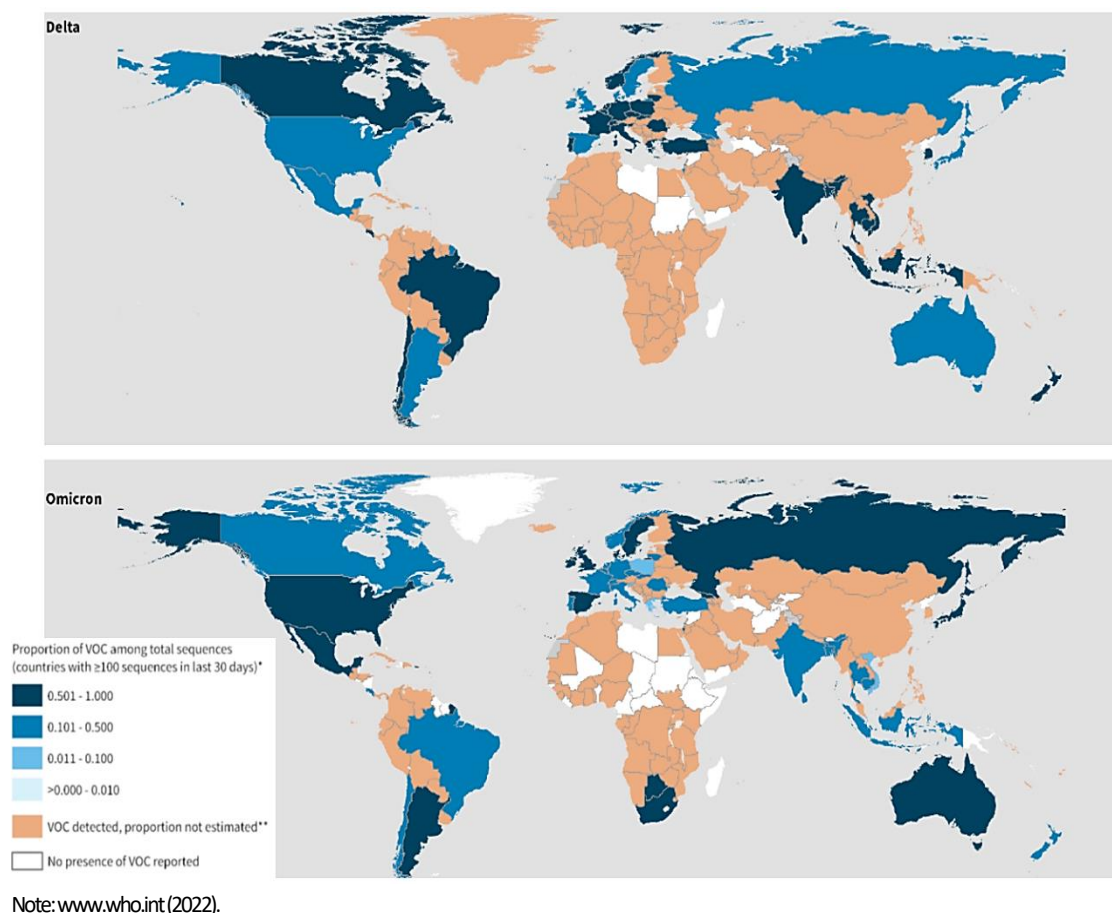
In terms of disease severity among SARS-CoV-2 VOCs, there is increasing evidence that the Omicron variant is less severe than other VOCs[37][38]. Only 4.9% of cases were admitted to the hospital during the Omicron-dominant period, whereas 18.9% and 13.7% were admitted in Beta- and Delta-dominant periods[1][39]. Similarly, fewer patients developed the severe disease; 28.9%, 60.1%, and 66.8% of patients infected with the Omicron, Beta, and Delta variant,

respectively[1]. These results indicate that patients infected with the Omicron variant were 73% less likely to have the severe disease than patients infected with the Delta variant. Moreover, in a non-peer-reviewed retrospective cohort study, the Omicron cohort showed lower risk of an adverse outcome, including admission of emergency department(Risk ratio[PR]=0.30, 95%CI=0.28-0.33), hospitalization (RR=0.44, 95%CI=0.38-0.52), ICU admission (RR=0.33, 95%CI=0.23-0.48), and mechanical ventilation (RR=0.16, 95%CI=0.08-0.32), compared to the Delta cohort[38]. From a non-peer review preprint estimating the household secondary attack rate (SAR), the SAR for the Omicron(31%) was higher than that of the Delta variant (21%), providing evidence that the Omicron variant may have the ability to evade immunity[39]. Taken together, the overall risk related to the Omicron variant remains very high[1].

2.3. Difference in the characteristics of the omicron and the delta variants

As the Omicron and the Delta variant are currently prevalent worldwide, virus characteristics of two VOCs, such as epidemiology and transmissibility, disease severity, immune escape, and vaccine effectiveness, are compared further. Firstly, <Figure 2> shows the prevalence of the Delta and the Omicron variants worldwide, which was calculated as a proportion of VOC sequences among total sequences (357,206) uploaded to GISAID with specimens collected dates from December 12, 2021 to January 10, 2022, excluding low coverage sequences[1]. From the WHO COVID-19 weekly epidemiological update, 58.5% (208,870) sequences were the Omicron variant, whereas 41.4% (147,887) were the Delta variant, implicating the latest Omicron variant has quickly overtaking Delta in terms of viral circulation and becoming dominant around the entire world.

Figure 2. Prevalence of the Delta and the Omicron variants in the last 30 days, as of January 11, 2022, from the WHO COVID-19 weekly epidemiological update (Edition 74).



As shown in <Table 2>, we next summarized the phenotypic characteristics of the Omicron and the Delta variants regarding transmissibility, disease severity, immune escape, and vaccine effectiveness. All previous variants of SARS-CoV-2 cause similar COVID-19 symptoms, ranging from mild symptoms to severe illnesses, which may cause death[34]. The most common symptoms of the Alpha variant are fever, cough, loss of smell and taste, and the signs of the Delta variant appear to be as similar as the original and Alpha variant. On December 16, 2021 by COVID-19 symptoms study, the five symptoms for Omicron infection, such as runny nose, headache, fatigue (either mild or severe), sneezing, and sore throat, were reported[40]. In addition, lower back pain, night sweats, and muscle aches have been identified in patients infected by the Omicron variant. However, the cold-like symptoms are appeared to be the predominant feature of Omicron[40]. Regarding viral transmissibility, several mutations in the Delta (L452R, D614G, P681R) and the Omicron (N501Y, P681H) variant enhance virus binding efficiency with higher viral loads and increased infectivity[19][20][21][22][23][30][31][32][33]. In addition, the variants make more contagious than the original and other variants with a higher R naught (RO) number, which is the way of comparing the biological spreading power of viruses. The RO number of the Omicron variant is around 8 - 15, which is much higher than the original virus (2.5) and the Delta variant (6.5 - 8), according to Ramathibodi Hospital's Center for Medical Genomics. Therefore, the COVID-19 Omicron variant is the second-most contagious virus globally, after the measles virus has the highest average RO number (15 - 18). In terms of disease severity, the Omicron variant is less likely to have severe diseases than other VOCs, indicating the reduced risk of hospitalization[37][38]. However, the SAR for the Omicron (31%) was higher than that of the Delta variant (21%), providing evidence that the Omicron variant may have the ability to increase immune escape by reducing the vaccine's efficiency[35][39]. Therefore, the overall risk related to the Omicron variant remains very high and raises a significant concern worldwide[1].

Table 2. Phenotypic characteristics of the omicron and the delta variants.

WHO label	Delta	Omicron
Symptoms	Fever, cough, loss of smell and taste	Runny nose, headache, fatigue, sneezing, sore throat
Transmissibility	Possible increased risk of transmissibility	Possible increased risk of transmissibility
Disease severity	Possible increased risk of hospitalization	Possible reduced risk of hospitalization and severe disease
Risk of reinfection	Reduction in neutralizing activity	Increased risk of reinfection

Recent studies on the effectiveness and neutralization of COVID-19 vaccines have been reviewed and summarized on VIEW-hub Resources[41]. Currently, 4 COVID-19 vaccines have been approved by MFDS in the Republic of Korea[7]. The impacts of approved these vaccines's efficacy and effectiveness on the Delta and Omicron variants were summarized in <Table 3>. The changes in the virus's spike protein of the Omicron variant could threaten the effectiveness and efficacy of current vaccines and therapeutic antibodies, and even a third booster shot may not adequately protect from the infection of Omicron[42]. When surveyed 43 people infected with Omicron, 3/4 of them were those who completed the 2nd vaccination, and 1/3 were those who completed the third booster vaccination[43]. In addition, two doses of Pfizer vaccine were 70% of the preventive effect on severe disease and only 33% of infection protective effect in patients infected with Omicron, which are lower effect than in patients infected with Delta. Moreover, antibodies from people who received second doses of any of the four vaccines were significantly less effective at neutralizing the Omicron variant compared to the original virus and other VOCs[43]. Even though the Omicron variant is the most complete escape from neutralization, reasonable effectiveness and efficacy of COVID-19 vaccines may be maintained and still benefit from some immunity elicited by vaccination and boosting approaches[43][44].

Table 3. Summary of vaccine performance against the Delta and Omicron variants.

WHO label		ChAdOX1 nCoV-19 (AstraZeneca)	Ad26. COV2.S (Janssen Biotech)	BNT162b2 (Pfizer-BioNtech)	mRNA-1273 (Moderna)
Delta	Severe disease	↔	↓	↔	↔
	Symptomatic disease	↔ to ↓↓	-	↔ to ↓	↔
	Infection	↔ to ↓	↓↓↓	↔ to ↓	↔
	Neutralization	↓	↔ to ↓↓	↔ to ↓	↔ to ↓
Omicron	Severe disease	-	-	↓↓/↓↓↓	-
	Symptomatic disease	↓↓↓	-	↓↓↓	↓↓
	Infection	-	-	↓↓↓	↓↓↓
	Neutralization	↓↓↓	↓↓	↓↓↓	↓↓↓

Note: ↔, <10% reduction or <2-fold reduction in neutralization; ↓, 10 to <20% reduction, or 2 to <5-fold reduction in neutralization; ↓↓, 20 to <30% reduction, or 5 to <10-fold reduction in neutralization; ↓↓↓, ≥30% reduction, or ≥10-fold reduction in neutralization. Studies about vaccine effectiveness and neutralization can be found on the VIEW-hub Resources Library[1].

2.4. Safety countermeasures for the fight against the omicron variant

The WHO chief has said the COVID-19 pandemic would be defeated in 2022, achieving vaccination in 70% of the world's population and working together to contain virus's spread [1]. However, other mutations will continue after Omicron, resulting in persistent infection without stopping [45]. Scientific advisers have warned that COVID-19 will be a threat at least further next five years to settle a predictable endemic state [46]. There are several recommended actions to reduce COVID-19 circulation overall for countries by WHO, including enhancing surveillance and sequencing of cases using risk analysis and science-based approaches [1]. The CDC Center for Forecasting and Outbreak Analytics has developed to prevent severe impacts on the health of individuals and the healthcare system [34]. In the Republic of Korea, 2022 joint action plans for combating COVID-19 were announced by MFDS, the Ministry of Health and Welfare, the Ministry of the Interior and Safety, and the Korea Disease Control and Prevention Agency on December 30, 2021. In addition, the government announced strategies to contain the spread of the Omicron variant for a sustainable recovery of daily life [4][7]. The core tasks for 2022 are to bring a timely recovery to the current crisis and gradual recovery to a new normal life and establish for living with COVID-19 with sustainable disease control and prevention systems. The new pandemic response strategies were established, focusing on medical response and COVID-19 guidelines for quarantine rules to fast and flexible responses on high-risk groups on January 14, 2022 [4]. Strategies were divided into preparation stage (up to 4,000 confirmed cases of Omicron infection per day) and response stage (from 7,000 confirmed cases per day). In a preparation stage against Omicron, the 3T strategy (test, trace, and treatment) for public health measures will be maintained, and quarantine and medical responses will continue to expand infrastructure. Whereas, in the Omicron response stage, prevention of severe disease and autonomy/responsibility-centered approaches will be switched and implemented, instead of the conventional infection control system. To do, countermeasures for each sector, including quarantine, medical response, vaccination and treatment, were prepared, while suppressing the spread of Omicron as much as possible and responding actively against the status of the Omicron outbreak. One of the most significant differences from the previous plans, the PCR negative confirmation requirement has changed to a test within 72 to 47 hours from the departure date and continuously implemented fight circuit breaker measures. In order to preemptively prepare for the surge of Omicron spread, the inspection capacity for PCR test will be expanding, and the PCR diagnostic system will be transiting from anyone can be inspected to the PCR priority targets, who are elderly with a high risk of aggravation and facilities workers vulnerable to infection or

epidemiological connections. Regarding vaccination schedules of COVID-19, vaccination will encourage to minimize those who have not been vaccinated for the 1st and 2nd doses and promptly inoculate for 3rd dose, and the fourth vaccination for individuals with a high-risk will be reviewed at the same time. In addition, COVID-19 vaccination encourages children aged 12-17 to be vaccinated, and MFDS is currently considering and reviewing the approval and vaccination plans for children aged 5-11. In the medical response system field, treating patients in quarantine facilities will be switched to home quarantine and home treatment (or community treatment centers) in asymptomatic or mildly ill COVID-19 patients. The Central Disaster and Safety Countermeasures Headquarters discussed plans to secure additional hospital beds and promote efficient medical service operations for moderately ill or severely ill patients. Moreover, the oral treatment for COVID-19, Paxlovid developed by Pfizer was approved for emergency use in the Republic of Korea on December 27, 2021 after safety and efficacy reviews from MFDS [4]. The edible medicines will be administered first to COVID-19 patients with mild and moderate symptoms who are at high risk of progressing to severe disease within 5 days of symptom onset (except asymptomatic patients), aged over 65 years or immunocompromised, or receiving home treatment or treatment at a residential community treatment center. Taken together, in preparation for the spread of the Omicron variant, the government has announced the safety countermeasures for the fight against Omicron, and is preparing to the paradigm shift of the quarantine and medical response system to fast and flexible methods centered on high-risk groups [4][7].

3. Conclusion

In the present study, we first outlined the phenotypes of the currently designated VOCs of SARS-COV-2. All VOCs significantly increase the viral loads and circulation through enhanced transmissibility, showing a higher diseases severity. The recent two variants, the Delta and Omicron, were further examined to understand their characteristics regarding epidemiology, transmissibility, disease severity, immune escape, and vaccine effectiveness/efficacy. Moreover, safety countermeasures to contain the spread of the Omicron variant for gradual recovery to a new normal life were mentioned regarding the new pandemic medical response strategies.

The early research on the Omicron variant was mainly conducted in South Africa and the United Kingdom. The information on Omicron is progressively gaining more critical features in several countries as the Omicron variant becomes the most prevalent in several countries. More studies are still needed better to understand transmissibility, immune escape, and disease severity of Omicron. Therefore, the characteristics of the Omicron variant and the differences from the previous VOCs will gradually become more evident. From the results of initial research so far, the Omicron variant having a shorter doubling time has a higher propagation power than the Delta variant, and it is predicted to be the dominant variant in the Republic of Korea soon. Even though the Omicron variant has shown moderate and lower disease severity than the Delta variant, there is concern about the high possibility of immune evasion. Due to its high transmissibility, it could lead to many hospitalization and death, putting a burden on the medical system. Many other countries are in the process of strengthening the quarantine policy again from returning to their normal lives. As the current domestic COVID-19 outbreak is at a very high risk, it is very important to delay the spread of the strong Omicron variant as much as possible by increasing the third vaccination rate until the prevalence is reduced. Thus, it has been encouraged and needs to be further emphasized that the third vaccination has the effect of preventing infection, severe disease, and even death. In addition, high-level quarantine systems, such as wearing masks, social distancing, restrictions on private gatherings and large-scale events, need to be maintained and efficiently implemented until more Omicron-related studies are available. With specific and practical measures and the population-based COVID-19 cohort studies in the Republic of Korea, it is necessary to analyze the clinical symptoms and risk factors further to

prevent further complications. Finally, international collaboration, clear and transparent communications, and even achievement of 70% coverage with COVID-19 vaccines in all countries would be desperately necessary to ward off Omicron in the war against COVID-19 that seems never to end.

4. References

4.1. Journal articles

- [3] Barton FH. A New Vaccine to Battle Covid-19. *The New England Journal of Medicine*, 384(5), 470-471 (2020).
- [5] Kim M & Kwon J & Hong B. Current Status of Covid-19 Outbreak and Vaccination in the Republic of Korea. *International Journal of Crisis & Safety*, 6(3), 34-44 (2021). [\[Article\]](#)
- [6] Park IN & Yum HK. Stepwise Strategy of Social Distancing in Korea. *Journal of Korean Medical Science*, 35(28), n264 (2020).
- [8] Park G & Lee W & Lim Y. Covid-19 and Some Implications to AI. *Robotics & AI Ethics*, 5(1), 16-24 (2020). [\[Article\]](#)
- [9] Kim D & Choi J. Government Roles of Policy Networks against Covid-19: Comparing Two Cases in S. Korea. *Protection Convergence*, 5(2), 14-26 (2020). [\[Article\]](#)
- [10] Cho H & Park S & Lim Y. Human Security Task and Prospect on Covid-19 Pandemic. *International Journal of Terrorism & National Security*, 5(2), 48-55 (2020). [\[Article\]](#)
- [11] Lee S. Paradox of Covid-19 Pandemic, Strengthening Neo-Liberalist's Way of Global Governance Building to Overcome Vaccine Nationalism's Politics. *Regulations*, 6(2), 1-9 (2021). [\[Article\]](#)
- [12] Harvey WT & Carabelli AM & Jackson B & Gupta RK & Thomson EC & Harrison EM & Ludden C & Reeve R & Rambaut A & Covid-19 Genomics UK Consortium; Peacock SJ & Robertson DL. SARS-CoV-2 Variants, Spike Mutations and Immune Escape. *Nature Review Microbiology*, 19(7), 409-424 (2021).
- [13] Callaway E. The Coronavirus is Mutating -Does it Matter?. *Nature*, 585(7824), 174-177 (2020).
- [14] Rambaut A & Holmes EC & O'Toole A & Hill V & McCrone JT & Ruis C & Plessis L & Pybus OG. A Dynamic Nomenclature Proposal for SARS-CoV-2 Lineages to Assist Genomic Epidemiology. *Nature Microbiology*, 5(11), 1403-1407 (2021).
- [16] Harrison AG & Lin T & Wang P. Mechanisms of SARS-CoV-2 Transmission and Pathogenesis. *Trends in Immunology*, 41(12), 1100-1115 (2020).
- [17] Du L & He Y & Zhou Y & Liu S & Zheng BJ & Jiang S. The Spike Protein of SARS-CoV -a Target for Vaccine and Therapeutic Development. *Nature Reviews in Microbiology*, 7(3), 226-236 (2009).
- [19] Davies NG & Abbott S & Barnard RC & Jarvis CI & Kucharski AJ & Munday JD & Pearson CAB & Russell TW & Tully DC & Washburne AD & Wenseleers T & Gimma A & Waites W & Wong KLM & Zandvoort KV & Silverman JD & Cmmid Covid-19 Working Group & Covid-19 Genomics UK(COG-UK) Consortium & Diaz-Ordaz K & Keogh R & Eggo RM & Funk S & Jit M & Atkins KE & Edmunds WJ. Estimated Transmissibility and Impact of SARS-CoV-2 Lineage B.1.1.7 in England. *Science*, 372(6538), n3055 (2021).
- [20] Starr TN & Greaney AJ & Hilton SK & Ellis D & Crawford KHD & Dingens AS & Navarro MJ & Bowen JE & Tortorici MA & Walls AC & King NP & Veasler D & Bloom JD. Deep Mutational Scanning of SARS-CoV-2 Receptor Binding Domain Reveals Constraints on Folding and ACE2 Binding. *Cell*, 182(5), 1295-1310 (2020).
- [21] Groves DC & Rowland-Jones SL & Angyal A. The D614G Mutations in the SARS-CoV-2 Spike Protein: Implications for Viral Infectivity, Disease Severity and Vaccine Design. *Biochemical and Biophysical Research Communications*, 538, 104-107 (2021).
- [22] Korber B & Fischer WM & Gnanakaran S & Yoon H & Theiler J & Abfalterer W & Hengartner N & Giorgi EE & Bhattacharya T & Foley B & Hastie KM & Parker MD & Partridge DG & Evans CM & Freeman TM & Silva TI & Sheffield Covid-19 Genomics Group & McDaniel C & Perez LG & Tang H & Moon-Walker A & Whelan SP & LaBranche CC & Saphire EO & Montefiori DC. Tracking Changes

- in SARS-CoV-2 Spike: Evidence that D614G Increases Infectivity of the Covid-19 Virus. *Cell*, 182(4), 812-827 (2020).
- [23] Peacock TP & Goldhill DH & Zhou J & Baillon L & Frise R & Swann OC & Kugathasan R & Penn R & Brown JC & Sanchez-David RY & Braga L & Williamson MK & Hassard JA & Staller E & Hanley B & Osborn M & Giacca M & Davidson AD & Matthews DA & Barclay WS. The Furin Cleavage Site in the SARS-CoV-2 Spike Protein is Required for Transmission in Ferrets. *Nature Microbiology*, 6(7), 899-909 (2021).
- [24] Tegally H & Wilkinson E & Giovanetti M & Iranzadeh A & Fonseca V & Giandhari J & Doolabh D & Pillay S & San EJ & Msomi N & Mlisana K & Gottberg AV & Walaza S & Allam M & Ismail A & Mohale T & Glass AJ & Engelbrecht S & Zyl GV & Preiser W & Petruccione F & Sigal A & Hardie D & Marais G & Hsiao NY & Korsman S & Davies MA & Tyers L & Mudau I & York D & Maslo C & Goedhals D & Abrahams S & Laguda-Akingba O & Alisoltani-Dehkordi A & Godzik A & Wibmer CK & Sewell BT & Lourenco J & Alcantara LCJ & Pond SLK & Weaver S & Martin D & Lessells RJ & Bhiman JN & Williamson C & Oliveira T. Detection of a SARS-CoV-2 Variant of Concern in South Africa. *Nature*, 592(7854), 438-443 (2021).
- [25] Khan A & Zia T & Suleman M & Khan T & Ali SS & Abbasi AA & Mohammad A & Wei DQ. Higher Infectivity of the SARS-CoV-2 New Variants is Associated with K417N/T, E484K, and N501Y Mutants: An Insight from Structural Data. *Journal of Cellular Physiology*, 236(10), 7045-7057 (2021).
- [26] Ramanathan M & Ferguson ID & Miao W & Khavari PA. SARS-CoV-2 B.1.1.7 and B.1.351 Spike Variants Bind Human ACE2 with Increased Affinity. *The Lancet Infectious Diseases*, 21(8), n1070 (2021).
- [27] Faria NR & Mellan TA & Whittaker C & Claro IM & Candido DDS & Mishra S & Crispim MAE & Sales FCS & Hawryluk I & McCrone JT & Hulsmit RJG & Franco LAM & Ramundo MS & Jesus JG & Andrade PS & Coletti TM & Ferreira GM & Silva CAM & Manuli ER & Pereira RHM & Peixoto PS & Kraemer MUG & Gaburo N Jr & Camilo CC & Hoeltgebaum H & Souza WM & Rocha EC & Souza LM & Pinho MC & Araujo LJ & Malta FSV & Lima AB & Silva JP & Zauli DAG & Ferreira ACS & Schnekner RP & Laydon DJ & Walker PGT & Schluter HM & Santos ALPD & Vidal MS & Caro VSD & Filho RMF & Santos HMD & Aguiar RS & Proenca-Modena JL & Nelson B & Hay JA & Monod M & Miskouridou X & Coupland H & Sonabend R & Vollmer M & Gandy A & Prete CA Jr & Nascimento VH & Suchard MA & Bowden TA & Pond SLK & Wu CH & Ratmann O & Ferguson NM & Dye C & Loman NJ & Lemey P & Rambaut A & Fraiji NA & Carvalho MPSS & Pybus OG & Flaxman S & Bhatt S & Sabino EC. Genomics and Epidemiology of the P.1 SARS-CoV-2 Lineage in Manaus, Brazil. *Science*, 372(6544), 815-821 (2021).
- [28] Sabino EC & Buss LF & Carvalho MPS & Prete CA Jr & Crispim MAE & Fraiji NA & Pereira RHM & Parag KV & Peixoto PS & Kraemer MUG & Oikawa MK & Salomon T & Cucunuba ZM & Castro MC & Santos AAS & Nascimento VH & Pereira HS & Ferguson NM & Pybus OG & Kucharski A & Busch MP & Dye C & Faria NR. Resurgence of Covid-19 in Manaus, Brazil, Despite High Seroprevalence. *Lancet*, 397(10273), 452-455 (2021).
- [29] Mohammadi M & Shayestehpour M & Mirzaei H. The Impact of Spike Mutated Variants of SARS-CoV-2 [Alpha, Beta, Gamma, Delta and Lambda] on the Efficacy of Subunit Recombinant Vaccines. *The Brazilian Journal of Infectious Diseases*, 25(4), n101606 (2021).
- [30] Deng X & Garcia-Knight MA & Khalid MM & Servellita V & Wang C & Morris MK & Sotomayor-Gonzalez A & Glasner DR & Reyes KR & Gilwa AS & Reddy NP & Martin CSS & Federman S & Cheng J & Balcerak J & Taylor J & Streithorst JA & Miller S & Sreekumar B & Chen PY & Schulze-Gahmen U & Taha TY & Hayashi JM & Simoneau CR & Kumar GR & McMahon S & Lidsky PV & Xiao Y & Hemarajata P & Green NM & Espinosa A & Kath C & Haw M & Bell J & Hacker JK & Hanson C & Wadford D & Anaya C & Ferguson D & Frankino PA & Shivram H & Lareau LF & Wyman SK & Ott M & Andino R & Chiu CY. Transmission, Infectivity, and Neutralization of a Spike L452R SARS-CoV-2 Variant. *Cell*, 184(13), 3426-3437 (2021).
- [31] Chen J & Wang R & Wang M & Wei GW. Mutations Strengthened SARS-CoV-2 infectivity. *Journal of Molecular Biology*, 432(19), 5212-5226 (2020).

- [32] Davis C & Logan N & Tyson G & Orton R & Harvey WT & Perkins JS & Mollett G & Blacow RM & Covid-19 Genomics UK (COG-UK) Consortium & Peacock TP & Barclay WS & Cherepanov P & Palmarini M & Murcia PR & Patel AH & Robertson DL & Haughney J & Thomson EC & Willett BJ & Covid-19 DelpOyed VaccinE (DOVE) Cohort Study Investigators. Reduced Neutralisation of the Delta (B.1.617.2) SARS-CoV-2 Variant of Concern Following Vaccination. *Plos Pathogens*, 17(12), n1010022 (2021).
- [33] Kupferschmidt K & Wadman M. Delta Variant Triggers New Phase in the Pademic. *Science*, 372(6549), 1375-1376 (2021).
- [35] Hu J & Peng P & Cao X & Wu K & Chen J & Wang K & Tang N & Huang AL. Increased Immune Escape of the New SARS-CoV-2 Variant of Concern Omicron. *Cellular and Molecular Immunology*, 19, 293-295 (2022).
- [36] Kampen JJA & Vijer DAMC & Fraaij PLA & Haagmans BL & Lamers MM & Okba N & Akker JPC & Endeman H & Gommers DAMPJ & Cornelissen JJ & Hoek RAS & Eerden MM & Hesselink DA & Metselaar HJ & Verbon A & Steenwinkel JEM & Aron GI & Gorp ECM & Boheemen S & Voermans JC & Boucher CAB & Molenkamp R & Koopmans MPG & Geurtsvankessel C & Eijk AA. Duration and Key Determinants of Infectious Virus Shedding in Hospitalized Patients with Coronavirus Disease-2019 (Covid-19). *Nature Communicaitons*, 12(1), 267 (2021).
- [37] Rossler A & Riepler L & Bante D & Laer D & Kimpel J. SARS-CoV-2 B.1.1.529 Variant (Omicron) Evades Neutralization by Sera from Vaccinated and Convalescent Individuals. *New England Journal of Medicine*, 386, 698-700 (2022).
- [38] Redd AD & Nardin A & Kared H & Bloch EM & Abel B & Pekosz A & Laeyendecker O & Fehlings M & Quinn TC & Tobian AA. Minimal Cross-over Between Mutations associated with Omicron Variant of SARS-CoV-2 and CD8+ T Cell Epitopes Identified in Covid-19 Convalescent Individuals. *BioRxiv*, n34909772 (2021).
- [39] Kim P & Gordon SM & Sheehan MM & Rothberg MB. Duration of SARS-CoV-2 Natural Immunity and Protection against the Delta Variant: A Retrospective Cohort Study. *Clinical Infectious Disease*, 999, 1-6 (2021).
- [42] Cele S & Jackson L & Khoury D & Khan K & Moyo-Gwete T & Tegally H & San JE & Cromer D & Scheepers C & Amoako DG & Karim F & Bernstein M & Lustig G & Archary D & Smith M & Gangay & Jule Z & Reedoy K & Hwa SH & Giandhari J & Blackburn JM & Gosnell BI & Karim SSA & Hanekom W & NGS-SA Commit-KZN Team & Gottberg A & Bhiman JN & Lessells RJ & Moosa MYS & Davenport MP & Oliveira T & Moore PL & Sigal A. Omicron Extensively but Incompletely Escapes Pfizer BNT162b2 Neutralization. *Nature*, 602, 654-663 (2021).
- [43] Nguyen KH & Yankey D & Lu PJ & Kriss JL & Brewer NT & Razzaghi H & Meghani M & Manns BJ & Lee JT & Singleton JA. Report of Health Care Provider Recommendation for Covid-19 Vaccination Among Adults, by Recipient Covid-19 Vaccination Status and Attitudes. *Morbidity and Mortality Weekly Report*, 70(50), 1723-1730 (2021).
- [44] Gruell H & Vanshylla K & Tober-Lau P & Hillus D & Schommers P & Lehmann C & Kurth F & Sander LE & Klein F. mRNA Booster Immunization Elicits Potent Neutralizing Serum Activity Against the SARS-CoV-2 Omicron Variant. *Nature Medicine*, 8373, 1-4 (2022).
- [45] Gupta RK. Will SARS-CoV-2 Variants of Concern Affect the Promise of Vaccines?. *Nature Reviews Immunology*, 21(6), 340-341 (2021).
- [47] Callaway E. Beyond Omicron: What's Next for Covid's Viral Evolution. *Nature*, 600(7888), 204-207 (2021).

4.2. Additional references

- [1] <https://www.who.int/> (2022).
- [2] <http://ncov.mohw.go.kr/> (2022).
- [4] <https://ncv.kdca.go.kr/> (2022).
- [7] <http://mfds.go.kr/> (2022).
- [15] <https://gisaid.org/> (2021).
- [18] Public Health England. Investigation of novel SARS-CoV-2 variant (2021).

- [34] <https://www.cdc.gov/> (2022).
 [39] <https://www.fhi.no/> (2021).
 [40] <https://covid.joinzoe.com/> (2022).
 [41] <https://view-hub.org/resources/> (2022).
 [46] <https://assets.publishing.service.gov.uk/> (2021).

5. Appendix

5.1. Authors contribution

	Initial name	Contribution
Lead Author	BH	-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 Author*	MK	-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"/>

Publisher: J-INSTITUTE
ISSN: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: milee@wu.ac.kr

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.13

© 2022 J-INSTITUTE

The Effect of Clinical Practice Stress and Department Satisfaction on Nursing Professionalism of Nursing College Students

Soonjung Hwang¹

Vision College of Jeonju, Jeonju, Republic of Korea

Myungin Lee^{2*}

Wonkwang Health Science University, Iksan, Republic of Korea

Abstract

Purpose: The purpose of this study is to understand the effect of clinical practice stress and department satisfaction of nursing students on their nursing professionalism.

Method: This study was conducted on 220 nursing students from two universities located in J city from November 4 to November 29, 2019. The collected data were processed with t-test, ANOVA, Pearson correlation analysis, and regression analysis using the SPSS 18.0 program.

Results: As a result of the study, the clinical practice stress of nursing college students showed a negative correlation with nursing professionalism ($r=.33$, $p<.01$). The department satisfaction of nursing college students showed a positive correlation with nursing professionalism ($r=.65$, $p<.01$). In addition, the department satisfaction of nursing college students showed an influence on nursing professionalism ($\beta=.670$, $p<.001$), and the explanatory power was 42%.

Conclusion: It is hoped that the results of this study can be used as basic data for enhancing department satisfaction and improving the clinical practice curriculum of nursing students in the future by identifying the clinical practice stress and department satisfaction of nursing students and analyzing the factors affecting the nursing professionalism.

[Keywords] Nursing Students, Clinical Practice, Stress, Satisfaction, Nursing Professionalism

1. Introduction

In accordance with the Korea Nursing Assessment Service's policy to improve on-site practical ability, clinical practice education for nursing college students has become more important in the recent nursing education. Nursing students are now required to complete more than 1,000 hours of clinical practice during their bachelor's program, which has further increased the burden on nursing students for clinical practice [1].

Clinical practice stress refers to a state of tension that affects the emotions, thinking processes, and physical conditions experienced by nursing students in relation to clinical practice [2]. In addition, this refers to a condition that interferes with efficiently conducting clinical practice due to negative emotions such as anxiety and fear about clinical practice [3]. Looking at the contents of clinical practice stress, Kim Soon-rye and Lee Jong-eun [4] summarized a total of five areas: practical education environment, undesirable role model, sharing of practice tasks, interpersonal conflict, and conflict with patients. In addition, Hwang Seong-ja [3] summarized a total of three areas: 5 situational factors of medical personnel's attitude, patient and guardian's attitude, practice environment, practice situation, role conflict; 3 personal factors of psychological factors, knowledge and technical factors, and social factors; 2 external factors of assignments and academic schedule.

Clinical practice is a curriculum that develops prospective nurses' practical skills by applying theoretical knowledge and skills acquired in schools to the nursing field and is a learning course that develops the maximum potential of nursing students and develops their creativity and adaptability[5]. This is an important factor that develops them into professional nurses after graduation. However, nursing college students still experience serious tension and stress about the situation in which they actually apply their yet insufficient knowledge and skills in actual nursing situations. It has been reported that they complain of difficulties in adapting to the practice environment during the clinical practice process and experience physical/mental fatigue and helplessness[3][6]. Stress and fatigue that are constantly experienced during clinical practice can be a cause of a decline in their interest and ability in clinical practice and nursing [7]. In addition, this not only lowers their satisfaction with clinical practice and leads to a lack of clinical performance, but can also make it difficult to train excellent nurses with expertise along with lowering the quality of medical services[8].

Nursing students experience stress and psychological anxiety from clinical practice due to unfamiliar environments, lack of confidence, excessive assignments, role conflict, lack of expertise, confusion due to differences in theory and practice, unexpected critical situations, and the burden of forming therapeutic relationships with patients and caregivers. Since clinical practice is conducted within the university curriculum, students are rarely given control over practice institutions, training periods, and clinical practice leaders according to their needs. In addition, since the results of clinical practice experience are evaluated as credits, it causes tremendous stress to nursing students.

When looking at department satisfaction, that is, satisfaction with the major, one is the emotional aspect and the other is the cognitive aspect. The former is the level of enjoyment of various emotions experienced by individuals for their major, and the latter can be said to be the level of perception that the expectations of themselves or those around them have been achieved. Department satisfaction is the degree of subjective satisfaction with the overall daily life related to the department and is affected by the student's expectations for the department's life and individual psychological factors.

Nursing professionalism refers to a systematic view of nursing as a professional, and a professional-conscious view of the nursing activity process and its occupational role [9]. It refers to basic beliefs and values that allow nurses to provide quality nursing with an occupational consciousness[10]. In practice, where complex decision-making situations are gradually increasing, nursing professionalism is closely related to the overall quality of nursing and the future development of nursing professions[11]. This is the core of holistic nursing practice and is directly related to the values of nursing[10]. Failure to establish nursing professionalism leads to conflict, feeling that the nursing profession is insignificant and trivial[12]. The higher the nurse's nursing professionalism, the lower the turnover intention, organizational commitment, job satisfaction, and happiness in clinical fields[13][14][15]. Therefore, in order for nursing college students to quickly adapt and socialize as professional nurses, education for systematic and positive nursing professionalism should be provided along with knowledge and technical education[16].

Nursing professionalism is a systematic view of nursing as a professional and a professional view of the nursing activity process in charge of nursing and its position[9]. It refers to the basic beliefs and values that allow nurses to provide quality nursing with a vocation for their jobs [10]. Views on nursing refers to how to view and think about nursing and is directly related to the values of nursing, that is, ideology, subject, essence, and purpose of nursing. Nursing professionalism is a view that combines views on nursing and professionalism[17]. This is an important concept because personal satisfaction as well as the value of nursing is recognized by the public through it[18]. Eun-ja Yoon et al.[10] classified nursing professionalism into the following areas: "professional self-concept" representing basic qualities such as personality, attitude, and posture that nurses should have; "social awareness" that measures social perception of nursing and

nurses from various aspects; "nursing expertise" that encompasses views on the characteristics of nursing as a professional; "practical roles of nurses" as an act expected to be performed by a nurse; "identity of nursing" that implies autonomy, uniqueness, and independence of nursing within the medical system. Before the development of measurement tools for nursing professionalism, terms for professional attitudes and self-awareness, a sub-area of nursing professionalism were used, and related research was conducted around them.

As nurses establish positive and firm nursing professionalism, they can harmonize with various professionals in the medical field to provide quality nursing services and perform nursing work efficiently[10]. In addition, this increases nurses' organizational commitment and job satisfaction and lowers turnover intention[9]. Considering the increasing number of new nurses unable to overcome the impact in reality in the clinical field and adapt to professional socialization, it is necessary to develop desirable nursing professionalism through nursing education[19]. Nursing students entering the nursing department begin to form nursing professionalism while receiving specialized theoretical and practical education, growing and changing continuously[9]. If a negative image of the job of a nurse is formed even before the values or professional perspectives of nursing are established, conflicts in one's work and lack of pride in one's job as a nurse may arise after becoming one[20].

The main factors influencing the nursing professionalism of nursing college students are self-esteem, self-efficacy, satisfaction with one's major[21][22][23], perception of nurses[11][24][25][26], and clinical practice stress[27]. It is necessary to understand the nature of nursing during the process of socializing nursing students as professional nurses and establish values for nursing on their own. In addition, when providing professional and holistic nursing services to subjects in clinical practice, nursing professionalism as well as nursing knowledge and skills should be based on[27][28]. Nursing college students' nursing professionalism is formed through theoretical and practical curricula. Clinical practice is a very important curriculum that forms values for nursing professionals while confirming and applying theoretical knowledge learned in school in the field. Therefore, research is needed to confirm the degree of nursing professionalism of nursing college students who have experienced clinical practice and to identify factors influencing nursing professionalism among clinical practice experiences[16].

In this respect, in the case of nursing students, it can be seen that understanding the stress of clinical practice of nursing students is more important than anything else. However, studies examining clinical practice stress in terms of department satisfaction are lacking.

2. Purpose of Research

This study aims to provide basic data for enhancing department satisfaction and improving the clinical practice curriculum for nursing students in the future by identifying the clinical practice stress of nursing students and analyzing factors affecting department satisfaction and nursing professionalism.

- 1) Identify the stress of clinical practice, department satisfaction, and nursing professionalism of nursing college students.
- 2) Identify differences in clinical practice stress, department satisfaction, and nursing professionalism according to the general characteristics of nursing students.
- 3) Identify the correlation between clinical practice stress, department satisfaction, and nursing professionalism.
- 4) Identify the effect of clinical practice stress and department satisfaction of nursing students on nursing professionalism.

3. Research Method

The general characteristics of nursing students consisted of a total of 10 questions: gender, age, school year, religion, nursing selection motivation, clinical practice experience, clinical practice satisfaction, clinical practice period, health status, and grades.

3.1. Research design

This study is a descriptive research study to investigate the factors of the effect of clinical practice stress on department satisfaction and nursing professionalism of nursing college students.

3.2. Research tool

3.2.1. Stress of clinical practice

Clinical practice stress was measured using a tool of 24 question items developed by Beck and Srivastava[2] and modified and supplemented by Kim Soon-rye and Lee Jong-eun[4]. This tool is divided into five sub-areas: practical education environment (5 questions), undesirable role model (6 questions), practical work burden (4 questions), interpersonal conflict (4 questions), and conflict with patients (5 questions). This was measured on a 5-point Likert scale ("Strongly disagree" = 1 point, 'Strongly agree' = 5 points), and the higher the total score, the higher the clinical practice stress. In the study of Kim Soon-rye and Lee Jong[4], Cronbach's α was .91, and Cronbach's α of the tools in this study was .91.

3.2.2. Department satisfaction

In order to measure department satisfaction, 27 questions modified and supplemented by Kim and Ha based on Braskamp, Wise[9], and Hengstler's Program Evaluation Survey[29] were used. This tool consists of five sub-factors: general satisfaction on the nursing major (7 questions), perception satisfaction based on social perception (5 questions), satisfaction on the subjects of the nursing major (3 questions), satisfaction with relationship between professors and students (3 questions), and school satisfaction (9 questions). This was measured on a 5-point Likert scale ("Strongly disagree" = 1 point, 'Strongly agree' = 5 points), and the higher the total score, the higher the department satisfaction. In the study of Kim and Ha, Cronbach's α was .92, and Cronbach's α of this study was .94.

3.2.3. Nursing professionalism

The nursing professionalism was measured the tool of 18 question items developed by Yoon Eun-ja et al.[10], revised and supplemented by Han Sang-sook et al.[30]. This tool is divided into five sub-areas: professional self-concept (6 questions), social perception (5 questions), nursing expertise (3 questions), nursing role (2 questions), and nursing identity (2 questions). This was measured on a 5-point Likert scale ("Strongly disagree" = 1 point, 'Strongly agree' = 5 points). Negative questions were reversely calculated. The higher the total score, the higher the nursing professionalism. In the study of Han Sang-sook et al.[16], Cronbach's α was .91, and in this study, Cronbach's α was .90.

4. Data Collection Method

This study was conducted using a structured questionnaire from November 4 to November 29, 2019, targeting nursing students from two universities located in J city. After explaining the purpose and method of the study, personal information protection, and time required for the survey to the study subjects, the questionnaire was distributed after voluntary participation and written consent. It was explained that the collected questionnaire is anonymous, and if they did

not want to participate in the study, they could withdraw it, and there was no disadvantage. It was also explained that the research data were not used except for research purposes, and all research questionnaires were discarded after the study was submitted to the journal. The survey took about 10 minutes, and a small gift was provided to the survey participants.

5. Data Analysis Method

The data collected in this study were analyzed using the SPSS 23.0 program as follows.

- 1) The general characteristics of the subjects were analyzed by real numbers and percentages, mean and standard deviation.
- 2) The subjects' clinical practice stress, department satisfaction, and nursing professionalism were analyzed as mean and standard deviation.
- 3) The t-test was conducted for differences in clinical practice stress, department satisfaction, and nursing professionalism according to the subject's school year.
- 4) The correlation between the subject's clinical practice stress, department satisfaction, and nursing professionalism was analyzed using Pearson's correlation coefficients.
- 5) The effects of clinical practice stress and department satisfaction on nursing professionalism were analyzed using multiple regression analysis.

6. Results

6.1. General characteristics

In terms of the general characteristics of nursing students, there were 207 women (94.1%) and 13 men (5.9%). In terms of age, 77 (35.0%) were aged 21 and 22, followed by 41 (18.6%) aged 24 or older, 18 (8.2%) aged 23, and 7 (3.2%) aged 20. For school year, 108 (49.1%) were juniors and 112 (50.9%) were seniors. For religion, 108 fell to others (49.1%), and there were 80 Christians (36.4%), 23 Catholics (10.4%), 7 Buddhists (3.2%), and 2 Won Buddhists (0.9%). When asked about the motivation for choosing a nursing department, 85 people (38.6%) cited a high chance of employment, 50 people (22.8%) cited "fitting aptitude and hobbies," 48 people (21.8%) cited "recommendation of parents or teachers," 28 people (12.7%) cited "considering high school performance," and 9 cited other motivations (4.1%). All 220 participants (100%) had clinical practice experience. In the case of clinical practice satisfaction, 94 (42.8%) were "neutral", 59 (26.8%) were "satisfied", 47 (21.4%) were "dissatisfied", 10 (4.5%) were "very dissatisfied", and 10 (4.5%) were "very satisfied". For the clinical practice period, 106 people (48.2%) were "more than 6 months", 66 (30.0%) were "3-6 months" and 48 (21.8%) were "less than 3 months". In the case of health status, 93 people (42.3%) were "normal" and 64 people (29.1%) were "bad". In the case of academic performance, 152 students (69.1%) accounted for the majority with GPA of 3.0-3.9 refer to <Table 1>.

Table 1. General characteristics.

Variables	Categories	n(%) or M±SD
Gender	Female	207(94.1%)
	Male	13(5.9%)

Age(year)	20	7(3.2%)
	21	77(35.0%)
	22	77(35.0%)
	23	18(8.2%)
	≥24	41(18.6%)
Academic year	Third	108(49.1%)
	Fourth	112(50.9%)
Religion	Christianity	80(36.4%)
	Catholic	23(10.4%)
	Buddhism	7(3.2%)
	Won Buddhism	2(0.9%)
	Others	108(49.1%)
Motivation for choice of nursing	Grade of high school	28(12.7%)
	Proper aptitude	50(22.8%)
	High employment rate	85(38.6%)
	Advice of teacher and parents	48(21.8%)
	Others	9(4.1%)
Experience of clinical practice	Yes	220(100%)
	No	0(0%)
Practice satisfied	Very dissatisfied	10(4.5%)
	Dissatisfied	47(21.4%)
	Moderated	94(42.8%)
	Satisfied	59(26.8%)
	Very satisfied	10(4.5%)
Practice duration	3 months↓	48(21.8%)
	3~6 months	66(30.0%)
	6 months↑	106(48.2%)
Self-rated health	Very good	9(4.1%)
	Good	31(14.1%)
	Neutral	93(42.3%)
	Bad	64(29.1%)
	Very bad	23(10.4%)
Academic grade	2.0↓	5(2.3%)
	2.0~2.9	39(17.7%)
	3.0~3.9	152(69.1%)
	4.0↑	24(10.9%)

Note: N=220.

6.2. Stress of clinical practice, department satisfaction, nursing professionalism of nursing students

In this study, nursing students' clinical practice stress averaged 3.26 out of 5, department satisfaction averaged 3.21 out of 5, and nursing professionalism averaged 3.77 out of 5 refer to <Table 2>.

Table 2. Stress of clinical practice, department satisfaction, nursing professionalism of nursing students.

Variables	Min	Max	Mean	SD
Stress of Clinical Practice	1.52	5.00	3.26	0.57
Department Satisfaction	1.62	5.00	3.21	0.66
Nursing Professionalism	2.02	5.00	3.77	0.62

Note: N=220.

6.3. Differences in stress of clinical practice, department satisfaction and nursing professionalism according to academic year

The stress of clinical practice in nursing college students was higher among seniors than among juniors ($t=1.27$, $p=.255$). Department satisfaction was higher among juniors than among seniors ($t=2.03$, $p=.159$). As for the nursing professionalism ($t=2.35$, $p=.124$), it was found that juniors were higher than seniors <Table 3>.

Table 3. Differences in stress of clinical practice, department satisfaction and nursing professionalism according to academic year.

Variables	Categories	Stress of Clinical Practice		Department Satisfaction		Nursing Professionalism	
		M±SD	t or F(p)	M±SD	t or F(p)	M±SD	t or F(p)
Academic year	Third	3.24±0.61	1.27	3.24±0.57	2.03	3.64±0.63	2.35
	Fourth	3.30±0.55	(.255)	3.21±0.67	(.159)	3.55±0.68	(.124)

Note: N=220.

6.4. Correlation between stress of clinical practice, department satisfaction and nursing professionalism

The clinical practice stress of nursing students showed a positive-negative correlation with nursing professionals ($r=.33$, $p<.01$), and the department satisfaction of nursing students showed a positive correlation with nursing professionalism ($r=.65$, $p<.01$) <Table 4>.

Table 4. Correlation between stress of clinical practice, department satisfaction and nursing professionalism.

	Stress of Clinical Practice	Department Satisfaction	Nursing Professionalism
Stress of Clinical Practice	1.00	-.33** ($p=.000$)	-.16* ($p=.015$)
Department Satisfaction	-.33** ($p<.001$)	1.00	.65** ($p<.001$)
Nursing Professionalism	-.16* ($p=.015$)	.65** ($p<.001$)	1.00

Analysis method: Pearson correlation coefficient

Note: N=220, * $p<.05$, ** $p<.01$, *** $p<.001$.

6.5. Effect of stress of clinical practice on department satisfaction, nursing professionalism of nursing students

The department satisfaction of nursing college students showed influence on nursing professionalism, and the explanatory power was 42%. According to the results of regression analysis, clinical practice stress ($\beta=.056$, $p=.275$) did not affect nursing professionalism. It was found that the higher the department satisfaction ($\beta=.670$, $p=.000$), the higher the nursing professionalism. Therefore, it can be interpreted that it is important to improve nursing professionalism by improving department satisfaction. As a result of the above study, as a result of examining the degree of clinical practice stress, department satisfaction, and nursing professionalism of nursing college students, it was verified that department satisfaction was a significant factor influencing nursing professionalism <Table 5>.

Table 5. Effect of stress of clinical practice on department satisfaction, nursing professionalism of nursing students.

Dependent Variable	Independent Variable	B	SE	β	t	p	R^2
Nursing Professionalism	Stress of Clinical Practice	.061	.056	.055	1.093	.275	0.42
	Department Satisfaction	.700	.053	.670	13.125	.000	
Analysis method: Regression analysis							

Note: N=220.

7. Discussion

In this study, the relationship between the degree of clinical practice stress, department satisfaction, and nursing professionalism of nursing college students was investigated, and the effects of clinical practice stress and department satisfaction on nursing professionalism were as follows.

In this study, the degree of stress in clinical practice for 3rd and 4th year students of nursing college was 3.26 out of 5. This was higher than the results of 2.8 points of Park Hyun-jung and Oh Jae-woo[27], and 3.02 points of Park Byung-joon, Park Sun-jung, and Jo Ha-na[31]. As in this study, nursing students who have experienced clinical practice usually suffer from more than moderate clinical practice stress, and the subject of this study is thought to have increased the clinical practice stress of nursing students. This is consistent with the research results in the study of Hwang Seong-ja[3] that the unfamiliar hospital environment caused increased clinical practice stress. Generation Z has a stronger motivation for admission to nursing than in the past and has acquired a lot of information about nursing through admission promotional materials and social media, but it is believed that there will be practical difficulties such as work burden on nursing, clinical practice, conflict, assignments, and changes in academic schedules.

This has a great influence on department satisfaction[27][32] and clinical practice satisfaction[7][8][31], and is also reported to have an effect on nursing professionalism[27][31]. Considering that clinical practice must be conducted within the curriculum, it is believed that policy reflection and social and national support from departments and schools that can minimize the stress of clinical practice are essential for nursing students.

The department satisfaction of nursing college students was 3.21 out of 5, indicating that they were experiencing above-average department satisfaction. This is lower than the 3.78 points presented in the study of Cho Jung-ae and Kim Jung-sun[33]. To solve the current problem of nursing manpower shortage, the government is looking for a solution by increasing the number of nursing college students rather than reducing turnover by improving the nurse's salary system and working environment[34]. This study was conducted later than that of Cho Jung-ae and Kim Jung-sun[33]. It is believed that the increase in the number of students due to the increase in the admission quota of nursing colleges not only hinders smooth communication with instructors but also leads to dissatisfaction with the department even within clinical practice, which is an essential curriculum. This situation of dissatisfaction causes negative views and occupational confusion for nurses' job performance and hinders the formation of positive nursing professionalism[35]. Therefore, it is necessary to consider measures for improving department satisfaction so that nursing students can become nurses with the right nursing professionalism and adapt well to the clinical field.

The nursing professionalism score of nursing college students was 3.77 out of 5. This is higher than 3.56 points, which is the result of the study of Hong Sung-sil and Park Mi-jeong[36], and

3.63 points, which is the result of the study of Lee si-ra[37]. It was said that nurses with a positive nursing profession have higher satisfaction with their jobs, better performance ability, and a higher degree of organizational commitment in performing nursing work[38]. Therefore, it is believed that having a positive nursing professionalism from the time of nursing college is the beginning of strengthening the competence of nurses.

As a result of this study, the department satisfaction ($\beta=.670$, $p<.001$) of nursing students showed influence on nursing professionalism. It can be seen that improving department satisfaction with 42% explanatory power is a factor influencing nursing professionalism. This was consistent with the studies of Park Hyun-jung, Oh Jae-woo[27], Park Byung-joon, Park Sun-sung, and Jo Ha-na[31], which are the results of previous studies on nursing professionalism. In the case of department satisfaction, it is reported that department satisfaction is higher in the case of club activities than in the case of lower grades[39]. Studies have shown that satisfaction with the department is high when there is a strong motivation to obtain job-related information and have future confidence in the job[40]. Therefore, it is necessary to provide information on the department from the time of admission and to actively conduct mentoring and direct counseling by professors to solve difficulties in adapting to the department.

In addition, it is necessary to start steps to establish a nursing professional through department events and employment-related programs so that department satisfaction can be increased.

In the case of clinical practice stress ($\beta=.056$, $p=.275$), it was found that it did not affect nursing professionalism. In the case of clinical practice stress, it has a negative correlation and is a factor that affects nursing professionals. This is contrary to the studies of Park Hyun-jung and Oh Jae-woo[27] and Jeon Won-hee[41].

Based on these research results, the clinical practice stress of nursing students includes adaptation to unfamiliar practice environments, weighting physical and mental fatigue, and helplessness caused by deprivation of opportunities to provide direct nursing at the crime scene. However, as a prospective nurse who conducts indirect nursing activities or observations rather than direct nursing activities, the clinical practice of nursing students is considered to be a short time to have a nursing profession that allows them to adapt to the clinical field and demonstrate professional abilities. It is emphasized that nursing professionals obtained through clinical practice are important not only for nursing students but also for new nurses[27]. It is of paramount importance to establish a desirable nursing profession even after becoming a nurse, and this is thought to be obtained through clinical practice-related curriculum throughout nursing college students rather than through an one-time clinical practice curriculum. Therefore, efforts should be made to establish a systematic nursing professional perspective while continuous clinical practice is underway in nursing education.

However, it is necessary to continuously investigate the stress felt in the clinical field from nursing college students to become a nurse, and to conduct follow-up studies to identify the influencing factors of nursing professionalism.

Based on the results of this study, as a result of examining the degree of clinical practice stress, department satisfaction, and nursing professionalism of nursing college students, it was verified that department satisfaction was a significant factor influencing nursing professionalism. Accordingly, measures to improve the department satisfaction of nursing students should be sought, and positive nursing professionalism should be formed through support with professors, classmates, seniors, and juniors to promote them.

8. Conclusion and Suggestion

Suggestions for follow-up studies are as follows. First, since the subjects were students enrolled in nursing departments at two universities located in J city, there is a limit to generalizing the research results, so repeated research and systematic comparative analysis are needed for nursing college students from various backgrounds in various regions.

Second, since this study confirmed the correlation between clinical practice stress, department satisfaction, and nursing professionalism, department satisfaction, and nursing profession, various models are applied to investigate the specific path to causal relationship.

Third, by developing and applying a program that can improve the department satisfaction of nursing students, we propose a follow-up study that can examine the department satisfaction and nursing professionalism of nursing students.

9. References

9.1. Journal articles

- [1] Whang S. The Relationship between Clinical Stress, Self-efficacy, and Self-esteem of Nursing College Students. *The Journal of Korean Academic Society of Nursing Education*, 12(2), 205-213 (2006).
- [2] Beck D & Srivastava R. Perceived Level and Sources of Stress in Baccalaureate Nursing Students. *Journal of Nursing Education*, 30(3), 127-133 (1991).
- [3] Whang S. Development and Verification of a Tool for the Nursing Students' Clinical Stress. *Journal of the Margaret Pritchard College of Nursing*, 14(1), 35-54 (2002).
- [4] Lee J & Kim S. Relationship among Stress, Coping Strategies, and Self-esteem in Nursing Students Taking Clinical Experience. *The Journal of Korean Academic Society of Nursing Education*, 11(1), 98-106 (2005).
- [5] Park J. Nursing Students' Clinical Experiences. *Journal of Advanced Nursing*, 12(1), 27-35 (2003).
- [6] Choi K. A Study on Stress, Self-esteem and Resilience for Korean Nursing Students' Safety Management. *International Journal of Crisis & Safety*, 4(1), 8-18 (2019). [Article]
- [7] Yang N & Moon S. Relationship of Self-leadership, Stress and Satisfaction in Clinical Practice of Nursing Students. *Journal of Korean Academy of Nursing Administration*, 17(2), 216-225 (2011).
- [8] Yu H. Relationship among Stress of Clinical Practice, Practice Satisfaction and Clinical Competence in Nursing Students. *Journal of the Korean Data Analysis Society*, 17(2), 1129-1144 (2015).
- [9] Weis D & Schank M. An Instrument to Measure Professional Nursing Values. *Journal of Nursing Scholarship*, 32(2), 201-204 (2000).
- [10] Yeun E & Kwon Y & Ahn O. Development of a Nursing Professional Values Scale. *Journal of Korean Academy of Nursing*, 35(6), 1091-1100 (2005).
- [11] Ham Y & Kim H. Comparison of Factors Affecting Nursing Professionalism Perceived by Nursing Students Anticipating Graduation according to Nursing Educational System. *Journal of Korean Academy of Fundamentals of Nursing*, 19(3), 363-373 (2012).
- [12] Kang H & Cho K. & Choe N. & Kim W. Reconstruction of Professional Identity in Clinical Nurses. *Journal of Korean Academy of Nursing*, 32(4), 470-481 (2002).
- [13] Cho H & Lee J. A Study on Self-esteem, Nursing Professional Values and Organizational Commitment in a Diploma Nursing Students. *Journal of the Korea Academia-industrial Cooperation Society*, 16(12), 8498-8508 (2015).
- [14] Nam M & Kwon Y. Factors Influencing Happiness Index of Hospital Nurses. *Journal of Korean Academy of Nursing Administration*, 19(3), 329-339 (2013).
- [15] Yoon H & Choi J & Lee E & Lee H & Park M. Effects of Decision Making Competency, Nursing Professionalism, and Job Satisfaction on Turnover Impulse among Nurses. *Journal of Korean Academy of Nursing Administration*, 19(5), 658-667 (2013).

- [17] Hampton G & Hampton D. Relationship of Professionalism, Rewards, Market Orientation and Job Satisfaction among Medical Professionals: The Case of Certified Nurse-midwives. *Journal of Business Research*, 57(9), 1042-1053 (2004).
- [18] Adams D & Miller B. Professionalism in Nursing Behaviors of Nurse Practitioners. *Journal of Professional Nursing*, 17(4), 203-210 (2001).
- [19] Ko Y & Kim I. The Relationship between Professional Nursing Values and Career Preparation Behaviors of Nursing Students. *The Journal of Korean Academic Society of Nursing Education*, 17(1), 62-71 (2011).
- [20] Park H. Correlations among Nursing Professionalism, Critical Thinking Disposition and Self-leadership in Nursing Students. *The Journal of Korean Academic Society of Nursing Education*, 21(2), 227-236 (2015).
- [21] Ahn T & Song Y. Affecting Factors of Nursing Professionalism Perceived by Nursing Students. *Journal of East-west Nursing Research*, 21(1), 10-17 (2015).
- [22] Kim Y. Learning Attitude to an Convergence Evaluation Method for Fundamental Nursing Practice Education, Self-leadership and Academic Self-efficacy in Nursing Students. *Protection Convergence*, 5(2), 70-83 (2020). [\[Article\]](#)
- [23] Kim JH & Kang K & Kim JM & Yun YO & Han JW. Examination of the Role of Self-efficacy and Development of an Integrated Model to Overcome Nursing Staff Shortage Crisis at Small and Medium Sized Hospitals in Korea. *International Journal of Crisis & Safety*, 3(1), 1-16 (2018). [\[Article\]](#)
- [24] Gu H & Lee O. The Correlation between Nurse's Image, Biomedical Ethics and Professionalism in Nursing Students. *Journal of the Korea Academia-industrial Cooperation Society*, 16(11), 7356-7366 (2015).
- [25] Seong J & Yeom E & Do Y. Image of Nurses and Nursing Professional Values Perceived by Nursing Students. *The Journal of the Korea Contents Association*, 14(11), 798-809 (2014).
- [26] Lee JH. The Relations of Nursing Student's Problem Solving Ability, Nurses' Image and Leadership for Patients Safety. *International Journal of Human & Disaster*, 3(2), 14-21 (2018). [\[Article\]](#)
- [27] Park H & Oh J. The Relationships of the Clinical Practice Stress and the Major Satisfaction with the Nursing Professionalism of Nursing College Students. *Journal of Digital Convergence*, 12(12), 417-426 (2014).
- [28] Park MH. Challenges and Prospects of Korean Nursing. *International Journal of Human & Disaster*, 1(2), 5-10 (2016). [\[Article\]](#)
- [29] Kim K & Ha H. A Study of Department Satisfaction Factors of Undergraduate Students. *Korea Journal of Counseling*, 1(1), 7-20 (2000).
- [30] Han S & Kim M & Yung E. Factors Affecting Nursing Professionalism. *The Journal of Korean Academic Society of Nursing Education*, 14(1), 73-79 (2008).
- [31] Park B & Park S & Cho H. The Relationship between Clinical Practice Stress, Satisfaction of Clinical Practice, Clinical Performance Ability and the Nursing Profession in Nursing College Students. *Journal of the Korea Academia-industrial Cooperation Society*, 17(7), 220-227 (2016).
- [32] Nam M & Kim H. Relations between Clinical Practice Emotional Labor, Self Esteem and Major Satisfaction of among Nursing Students. *Journal of Digital Convergence*, 14(1), 263-273 (2016).
- [33] Cho JA & Kim JS. Factors Affecting Nursing College Students' Satisfaction with Their Department. *Journal of the Korea Academia-industrial Cooperation Society*, 17(4), 587-595 (2016).
- [34] Park S. Issues and Challenges of Nursing Workforce Supply to Improve the Quality of Health Care Services. *Korean Journal of Converging Humanities*, 6(1), 31-54 (2018).
- [35] Barron D & West E & Reeves R. Tied to the Job: Affective and Relational Components of Nurse Retention. *Journal of Health Services Research & Policy*, 12(1), 46-51 (2007).
- [36] Hong S & Park M. The Effects of Clinical Practice Stress and Helplessness on Nursing Professionalism among Nursing Students. *Journal of the Korea Contents Association*, 14(12), 369-377 (2014).
- [38] Hallin K & Danielson E. Registered Nurses' Perceptions of Their Work and Professional

- Development. *Journal of Advanced Nursing*, 61(1), 62-70 (2008).
- [39] Choi H. Moderating and Mediating Effects of Nursing Professionalism between Major Satisfaction and College Life Adaptation among Nursing Students. *Journal of the Korea Academia-industrial Cooperation Society*, 18(6), 68-77 (2017).
- [40] Komarraju M & Swanson J & Nadler D. Increased Career Self-efficacy Predicts College Students' Motivation, and Course and Major Satisfaction. *Journal of Career Assessment*, 22(3), 420-432 (2014).
- [41] Jun W. Relationship between the Stress of Clinical Practice and Compassion Competence in Nursing Students: The Mediating Effect of Nursing Professionalism. *Journal of Korean Academic Society of Home Health Care Nursing*, 27(2), 169-178 (2020).

9.2. Thesis degree

- [16] Lee S. The Effect of Clinical Practice Stress and Satisfaction on Nursing College Students and Their Nursing Professionalism. Chung-ang University, Master's Thesis (2016).
- [37] Lee S. Nurse Image, Satisfaction of Major Effect on Nursing Professionalism of Male Students in Nursing. Ajou University, Master's Thesis (2011).

10. Appendix

10.1. Authors contribution

	Initial name	Contribution
Lead Author	SH	-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 Author*	ML	-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"/>

Publisher: J-INSTITUTE
ISSN: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: pm10pm@hanmail.net

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.25

© 2022 J-INSTITUTE

Crisis & Safety: A Study on the Change of the Urbanization Index according to the Increase or Decrease of Naturalized Plants

Hyangju Lee¹

Daegu Haany University, Gyeongsan, Republic of Korea

Changjun Kim^{2*}

Daegu Haany University, Gyeongsan, Republic of Korea

Wonhyeon Lim³

Daegu Haany University, Gyeongsan, Republic of Korea

Abstract

Purpose: This study was based on the flora survey data of 1,200 places (776 map index system numbers) over 12 years in the National Natural Environment Survey, Korea's largest basic research project on natural ecosystems. The researchers conducted this study to analyze the differences in the urbanization index by year, altitude, forest land ratio, and population density, investigate the correlations through curvilinear regression analysis, and predict the changes in the urbanization index.

Method: The Urbanization Index is the ratio of naturalized plants in the research area to the total number of naturalized plant species (321 species) distributed in South Korea. This paper calculated the urbanization index using the method by 'Lim Yangjae' and 'Jeon Uisik.' One-way ANOVA was performed to analyze the differences in the urbanization index by categories. In addition, curvilinear regression analysis was performed to investigate the correlation between urbanization index and categories. The Spss Statistics 21 statistical program performed the above statistical analyses.

Results: The urbanization index showed differences in four categories. In the correlation analysis, the correlation between the urbanization index and the years had a positive correlation in which the urbanization index increases every year. The urbanization index and the altitudes had a negative correlation in which the urbanization index decreases as the altitude increases. The urbanization index and the forest land ratios had a negative correlation in which the urbanization index decreases as the forest land ratio increases. The urbanization index and the population densities had a negative correlation in which the urbanization index decreases as the population density increases, but had a positive correlation in which it increases after a certain point in time.

Conclusion: As a result of synthesizing the analyses, the relational formula created from the correlation analysis with the years was suitable for predicting the urbanization index. By applying the formula $y=1.754+0.465x$ (y =urbanization index, x =year), the results of predicting the urbanization index were at 11.01 in 2025, 13.38 in 2030, 18.03 in 2040, and 22.68 in 2050. The urbanization index increased year by year.

[Keywords] Naturalized Plants, Urbanization Index, National Natural Environment Survey, Change, Prediction

1. Introduction

Naturalized plants are non-native plants that are intentionally or unintentionally introduced from a foreign country and reproduce by adapting to the wild without human help [1]. As overseas exchanges become more active than before and distribution trades increase, the newly introduced exotic plants are changing to naturalized plants, and the range of dispersion is rapidly expanding [2][3][4]. Naturalized plants are distributed even in areas with poor habitat environments, such as ports, roads, landfills, airports, and around houses. They have high competitiveness in securing habitats compared to native species. Because naturalized plants have an

expansive habitat and excellent adaptability, they expand their populations relatively quickly, posing a severe threat to Korea's entire biodiversity and native species[2][5][6][7].

Research on naturalized plants started in the 1960s and has steadily increased since the 2000s[2][8][9]. The direction and scope of research are gradually expanding. Most studies on the distribution of naturalized plants by region dealt with small-scale parts limited to one area. However, Park SH et al. (2002) and Jeong SY (2014) analyzed the total and average species number of naturalized plants in Korea as a whole[2][10][11]. Lee HJ (2018) reported a study on the distribution of naturalized plants by year. Lee HJ visited 80 places in Gyeongsangbuk-do for eight years from 2010 to 2017 and analyzed the species number of naturalized plants identified by year[2][12][13]. Kim BW (2008), Oh CH et al. (2010), Jung SY(2014), and Lee HJ (2018) analyzed the habitat types by classifying them in consideration of the growth environment of naturalized plants. Naturalized plants have been studied intensively in vascular plant research[2][14][15][16]. Research is actively being conducted to analyze the characteristics of naturalized plants in a specific area or to analyze the ecological environment of specific naturalized plants. However, there are not many studies on the urbanization index using naturalized plants[17][18][19][20]. Byun MS et al. (2005) analyzed the naturalization rate and urbanization index by examining vascular plants in the Jeonju Stream area[21][22].

The urbanization index is the ratio of naturalized plants in the research area to the total number of naturalized plant species (321 species) distributed in South Korea. The method by 'Lim Yangjae' and 'Jeon Uisik' is commonly used[23][24][25][26].

This study was based on the flora survey data of 1,200 places (776 map index system numbers) over 12 years in the National Natural Environment Survey, Korea's largest basic research project on natural ecosystems. In this paper, the urbanization index was calculated using the urbanization index formula of 'Lim Yangjae' and 'Jeon Uisik' (1980)[2][27][28]. The researchers conducted this study to analyze the differences in the urbanization index by year, altitude, forest land ratio, and population density, investigate the correlations through curvilinear regression analysis, and predict the changes in the urbanization index.

2. Methods

2.1. Gathering data

This study was based on the flora survey data for 12 years from 2006 to 2017 as the 3rd to 4th National Natural Environment Survey. <Table 1> shows research sites of 1,200 places (776 map index system numbers) by region and year. By region, Gyeongsangbuk-do had the most research sites with 180 places (15.0%). Next, Gangwon-do was with 163 places (13.6%), Jeollanam-do with 159 places (13.3%), and Gyeonggi-do with 144 places (12.0%)[2][29][30]. By year, the research sites of 2017 had the most, with 148 places (12.3%). Next, there were 142 places (11.8%) in 2014, 120 places (10.0%) in 2008 and 2010, respectively, and 117 places (9.8%) in 2009.

Table 1. The number and ratio of research sites by region and year.

Categories	The number of research sites (ratio)
Research sites by region	Seoul 3(0.2), Busan 8(0.7), Daegu 8(0.7), Incheon 37(3.1), Gwangju 4(0.3), Daejeon 8(0.7), Ulsan 13(1.1), Sejong 4(0.3), Gyeonggi 144(12.0), Gangwon 163(13.6), Chungbuk 81(6.7), Chungnam 124(10.3), Jeonbuk 96(8.0), Jeonnam 159(13.3), Gyeongbuk 180(15.0), Gyeongnam 127(10.6), Jeju 41(3.4)
Research sites by year	85(7.1) in 2006, 110(9.2) in 2007, 120(10.0) in 2008, 117(9.8) in 2009, 120(10.0) in 2010, 113(9.4) in 2011, 105(8.8) in 2012, 100(8.3) in 2013, 142(11.8) in 2014, 10(0.8) in 2015, 30(2.5) in 2016, 148(12.3) in 2017.

2.2. Data analysis

The Urbanization Index is the ratio of naturalized plants in the research area to the total number of naturalized plant species (321 species) distributed in South Korea. This paper calculated the urbanization index using the method by 'Lim Yangjae' and 'Jeon Uisik.' The formula is as follows[2][23][31][32].

Urbanization Index (UI) = $S/N \times 100$ (Lim Yang-jae and Jeon Eui-shik, 1980)

S = The number of the naturalized plant species in the research area

N = The total number of the naturalized plant species distributed nationwide

In this study, one-way ANOVA was performed to analyze the differences in the urbanization index by year, altitude, forest land ratio, and population density[2][33][34]. In addition, curvilinear regression analysis was performed to investigate the correlation.

The Spss Statistics 21 statistical program performed the above statistical analyses.

3. Results & Discussion

3.1. Analysis of the urbanization index

3.1.1. Analysis of the urbanization index by year

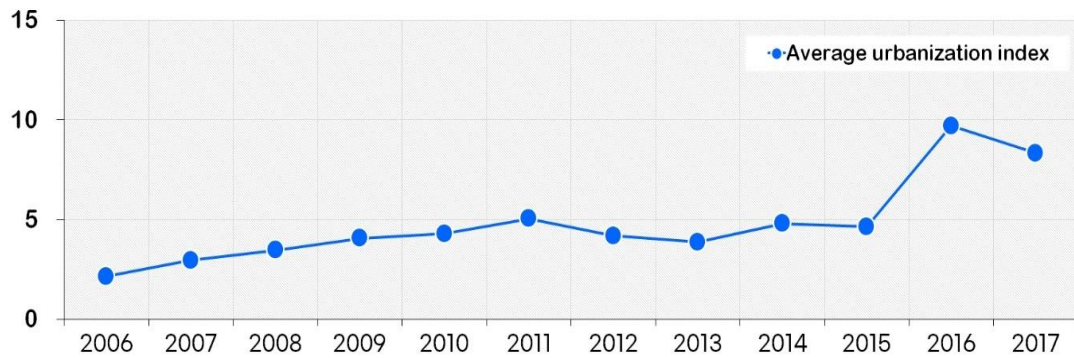
<Table 2> and <Figure 1> show the results of one-way ANOVA analysis to find out whether there are differences in the urbanization index by years. The results of checking the F value and the significance probability for the urbanization index were $F=45.672$ and $p=0.000$. There were differences in the urbanization index by years.

The average urbanization index by year was the highest in 2016 at 9.7. Next, it was at 8.3 in 2017, 5.1 in 2011, 4.8 in 2014, 4.6 in 2015, 4.3 in 2010, 4.1 in 2009, 3.9 in 2013, 3.5 in 2008, 3.0 in 2007 and 2.2 in 2006. This study analyzed that there were differences in the urbanization index by years.

Table 2. The result of one-way ANOVA analysis in the urbanization index by year.

Year	Frequency (times)	Average urbanization index	Minimum urbanization index	Maximum urbanization index	Standard deviation
2006	85	2.16	0.00	5.61	1.38
2007	110	2.96	0.00	16.82	2.73
2008	120	3.46	0.00	10.90	2.42
2009	117	4.06	0.00	13.08	2.87
2010	120	4.29	0.00	13.08	3.07
2011	113	5.05	0.00	16.51	3.10
2012	105	4.18	0.31	9.66	2.12
2013	100	3.88	0.00	12.46	2.29
2014	142	4.80	0.62	14.95	2.55
2015	10	4.64	1.25	7.79	2.14
2016	30	9.70	3.43	16.20	2.96
2017	148	8.33	0.62	18.69	3.95
Total/Average	1,200	4.64	0.00	18.69	3.32
one-way ANOVA analysis	Degree of freedom=11 , $F=45.672$, Probability value .000				

Figure 1. The result graph of one-way ANOVA analysis in the urbanization index by year.



3.1.2. Analysis of the urbanization index by altitude

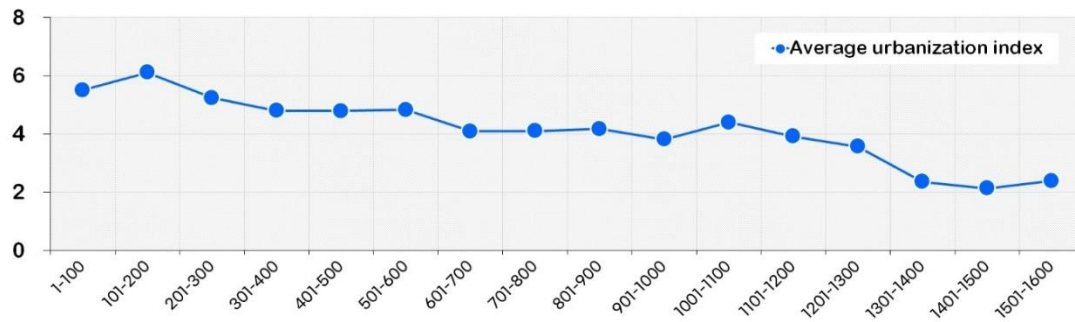
<Table 3> and <Figure 2> show the results of one-way ANOVA analysis to find out whether there are differences in the urbanization index by altitudes. The results of checking the F value and the significance probability for the urbanization index were $F=4.049$ and $p=0.000$. There were differences in the urbanization index by altitudes.

The average urbanization index by altitude was the highest in 101-200m at 6.1. Next, it was at 5.5 in 1-100 m, 5.2 in 201-300 m, 4.8 in 301-600 m, 4.4 in 1001-1100 m, 4.2 in 801-900 m, 4.1 in 601-800 m, and 3.9 in 1101-1200 m. This study analyzed that there were differences in the urbanization index by altitudes.

Table 3. The result of one-way ANOVA analysis in the urbanization index by altitude.

Altitude(m)	Frequency (times)	Average urbanization index	Minimum urbanization index	Maximum urbanization index	Standard deviation
1-100	41	5.5087	.31	16.20	4.11312
101-200	120	6.1059	.00	18.69	4.07992
201-300	102	5.2379	.31	16.20	3.61090
301-400	130	4.7951	.00	16.51	3.33241
401-500	131	4.7870	.00	14.95	3.20531
501-600	154	4.8327	.00	17.45	3.48529
601-700	146	4.0947	.00	15.26	2.90400
701-800	100	4.0966	.00	14.95	3.09771
801-900	82	4.1676	.00	14.33	3.01863
901-1000	66	3.8138	.00	9.97	2.52262
1001-1100	35	4.3970	.31	10.90	2.68493
1101-1200	43	3.9194	.31	10.90	2.35711
1201-1300	29	3.5664	.31	10.90	2.22877
1301-1400	12	2.3624	.00	4.98	1.72409
1401-1500	6	2.1288	.31	4.05	1.49295
1501-1600	3	2.3884	.31	5.30	2.59398
Total/Average	1,200	4.64	0.00	18.69	3.32389
one-way ANOVA analysis	Degree of freedom=15 , $F=4.049$, Probability value .000				

Figure 2. The result graph of one-way ANOVA analysis in the urbanization index by altitude .



3.1.3. Analysis of the urbanization index by forest land ratio

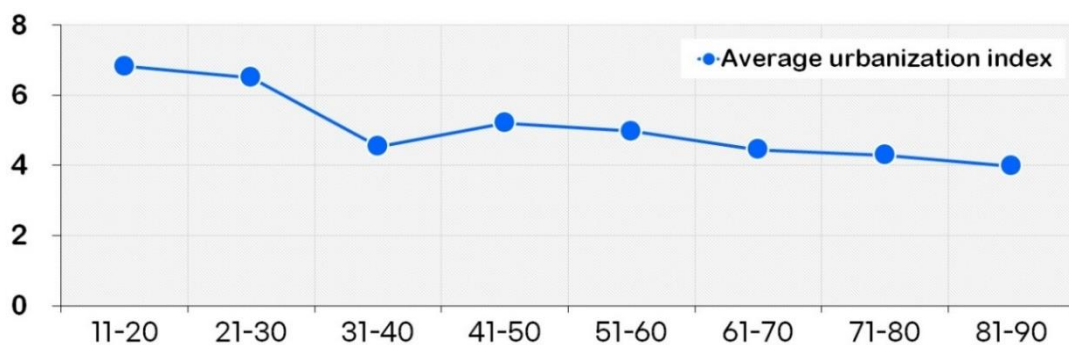
<Table 4> and <Figure 3> show the results of one-way ANOVA analysis to find out whether there are differences in the urbanization index by forest land ratios. The results of checking the F value and the significance probability for the urbanization index were $F=5.075$ and $p=0.000$. There were differences in the urbanization index by forest land ratios.

The average urbanization index by forest land ratio was the highest in 11-20 % at 6.8. Next, it was at 6.5 in 21-30 %, 5.2 in 41-50 %, 5.0 in 51-60 %, 4.5 in 31-40 %, 4.4 in 61-70 %, 4.3 in 71-80 %, and 4.0 in 81-90 %. This study analyzed that there were differences in the urbanization index by forest land ratios.

Table 4. The result of one-way ANOVA analysis in the urbanization index by forest land ratio.

Forest land ratio(%)	Frequency (times)	Average urbanization index	Minimum urbanization index	Maximum urbanization index	Standard deviation
11-20	21	6.8239	.00	13.71	4.46680
21-30	26	6.5061	.31	16.20	4.33846
31-40	118	4.5409	.00	18.69	3.49128
41-50	191	5.2030	.00	16.51	3.94183
51-60	156	4.9744	.00	16.20	3.18943
61-70	291	4.4492	.00	16.20	3.09732
71-80	218	4.2985	.00	17.45	3.18940
81-90	179	3.9820	.00	13.40	2.42800
Total/Average	1200	4.6355	.00	18.69	3.32389
one-way ANOVA analysis	Degree of freedom=7 , $F=5.075$, Probability value .000				

Figure 3. The result graph of one-way ANOVA analysis in the urbanization index by forest land ratio.



3.1.4. Analysis of the urbanization index by population density

<Table 5> and <Figure 4> show the results of one-way ANOVA analysis to find out whether there are differences in the urbanization index by population densities. The results of checking the F value and the significance probability for the urbanization index were $F=3.616$ and $p=0.000$. There were differences in the urbanization index by population densities.

The average urbanization index by population density was the highest in 1601-1800 people/km² at 9.0. Next, it was at 8.3 in 3401-3600 people/km², 6.4 in 401-600 people/km², 6.1 in 3001-3200 people/km², 5.7 in 4801-5000 people/km², 5.3 in 601-800 people/km², 5.2 in 2601-2800 people/km², 5.1 in 201-400 people/km², 4.8 in 1001-1200 people/km², 4.4 in 2801-3000 people/km², and 4.4 in 1401-1600 people/km². This study analyzed that there were differences in the urbanization index by population densities.

Table 5. The result of one-way ANOVA analysis in the urbanization index by population density.

Population density (people/km ²)	Frequency (times)	Average urbanization index	Minimum urbanization index	Maximum urbanization index	Standard deviation
1-200	735	4.2372	.00	17.45	2.92134
201-400	148	5.1318	.00	16.51	3.85987
401-600	81	6.4228	.93	16.20	3.74563
601-800	59	5.3329	.00	13.71	3.47580
801-1000	16	4.2640	.31	9.97	2.47324
1001-1200	38	4.7877	.00	12.46	3.48367
1201-1400	7	3.0708	.93	7.79	2.26387
1401-1600	14	4.3614	.00	8.72	2.32162
1601-1800	4	9.0343	3.43	14.33	4.84621
2401-2600	2	2.4922	.62	4.36	2.64339
2601-2800	45	5.2475	.00	18.69	4.71002
2801-3000	12	4.4393	1.56	9.97	2.65380
3001-3200	2	6.0748	5.92	6.23	.22028
3401-3600	2	8.2555	.31	16.20	11.23441
3601-3800	4	2.2586	.00	4.05	1.69441
4401-4600	9	3.8422	.62	7.79	2.38272
4601-4800	2	2.4922	2.18	2.80	.44056
4801-5000	20	5.6698	.31	14.02	4.36207
Total/Average	1200	4.6355	.00	18.69	3.32389
one-way ANOVA analysis	Degree of freedom=17 , $F=3.616$, Probability value .000				

Figure 4. The result graph of one-way ANOVA analysis in the urbanization index by population density.



3.2. Analysis of the correlation with urbanization index

3.2.1. Analysis of the correlation between urbanization index and years

<Table 6> shows the results of correlation analysis between urbanization index and years. Both the linear regression model and the curvilinear regression model (secondary model) were suitable models, but in the curvilinear regression model (secondary model), the independent variable did not have a significant effect on the dependent variable.

The result of the linear regression model could be expressed in a relational formula as follows. At the value of R^2 , the explanatory power was 22%.

$$y = 1.754 + 0.465x \text{ ----- (Formula)}$$

where y =urbanization index, x =year

This study analyzed that the correlation between the urbanization index and the years had a positive correlation in which the urbanization index increases every year.

Table 6. Analysis of the correlation between urbanization index and years.

Model summary and parameter estimates								
Dependent variable : urbanization index								
Model summary						Parameter estimate		
Equation	R squared	F	Degree of freedom 1	Degree of freedom 2	Probability of significance	Constant term	b1	b2
Linear	.221	340.176	1	1198	.000	1.754 (.000)	.465 (.000)	
Quadratic	.239	187.777	2	1197	.000	3.047 (.000)	.040 (.000)	-.065 (.532)
Independent variable = year								

3.2.2. Analysis of the correlation between urbanization index and altitudes

<Table 7> shows the results of correlation analysis between urbanization index and altitudes. Both the linear regression model and the curvilinear regression model (secondary model) were suitable models, but in the curvilinear regression model (secondary model), the independent variable did not have a significant effect on the dependent variable.

The result of the linear regression model could be expressed in a relational formula as follows. At the value of R^2 , the explanatory power was 3%.

$$y = 5.923 - 0.206x \text{ ----- (Formula)}$$

where y =urbanization index, x =altitude

This study analyzed that the correlation between the urbanization index and the altitudes had a negative correlation in which the urbanization index decreases as the altitude increases.

Table 7. Analysis of the correlation between urbanization index and altitudes.

Model summary and parameter estimates								
Dependent variable : urbanization index								
Model summary						Parameter estimate		
Equation	R squared	F	Degree of freedom 1	Degree of freedom 2	Probability of significance	Constant term	b1	b2
Linear	.039	48.823	1	1198	.000	5.923 (.000)	-.206 (.000)	
Quadratic	.040	25.008	2	1197	.000	6.243 (.000)	.008 (.277)	-.323 (.004)
Independent variable = altitude								

3.2.3. Analysis of the correlation between urbanization index and forest land ratios

<Table 8> shows the results of correlation analysis between urbanization index and forest land ratios. Both the linear regression model and the curvilinear regression model (secondary model) were suitable models, but in the curvilinear regression model (secondary model), the independent variable did not have a significant effect on the dependent variable. The result of the linear regression model could be expressed in a relational formula as follows. At the value of R², the explanatory power was 2%.

$$y = 6.387 - 0.267x \text{ ----- (Formula)}$$

where y=urbanization index, x=forest land ratio

This study analyzed that the correlation between the urbanization index and the forest land ratios had a negative correlation in which the urbanization index decreases as the forest land ratio increases.

Table 8. Analysis of the correlation between urbanization index and forest land ratios.

Model summary and parameter estimates								
Dependent variable : urbanization index								
Model summary						Parameter estimate		
Equation	R squared	F	Degree of freedom 1	Degree of freedom 2	Probability of significance	Constant term	b1	b2
Linear	.019	23.822	1	1198	.000	6.387 (.000)	-.267 (.000)	
Quadratic	.020	12.062	2	1197	.000	6.940 (.000)	.016 (.574)	-.461 (.188)
Independent variable = forest land ratios								

3.2.4. Analysis of the correlation between urbanization index and population densities

<Table 9> shows the results of correlation analysis between urbanization index and population densities. The linear regression model was not suitable, the curvilinear regression model (secondary model) was suitable, and the independent variable had a significant effect on the dependent variable.

The result of the curvilinear regression model (secondary model) could be expressed in a relational formula as follows. At the value of R², the explanatory power was 0.8%.

$$y = 4.278 - 0.007x^1 + 0.191x^2 \text{ ----- (Formula)}$$

where y=urbanization index, x=population density

This study analyzed that the correlation between the urbanization index and the population densities had a negative correlation in which the urbanization index decreases as the population density increases, but had a positive correlation in which it increases after a certain point in time.

Table 9. Analysis of the correlation between urbanization index and population densities.

Model summary and parameter estimates								
Dependent variable : urbanization index								
Model summary						Parameter estimate		
Equation	R squared	F	Degree of freedom 1	Degree of freedom 2	Probability of significance	Constant term	b1	b2
Linear	.003	3.633	1	1198	.057	4.516	.038	
Quadratic	.008	4.743	2	1197	.009	4.278	-.007	.191
Independent variable = population densities.								

4. Conclusion

This study was based on the flora survey data for 12 years from 2006 to 2017 as the 3rd to 4th National Natural Environment Survey. Researchers calculated the urbanization index using the urbanization index calculation formula of 'Lim Yangjae' and 'Jeon Uisik' (1980). This paper predicted the urbanization index by analyzing the difference and correlation analysis of the urbanization index. The difference and correlation analysis of the urbanization index was conducted by year, altitude, forest land ratio, and population density. The results are summarized as follows.

First, the urbanization index showed differences in four categories: year, altitude, forest land ratio, and population density. The average urbanization index by year was the highest in 2016 with 9.7 and the lowest in 2006 with 2.2. The average urbanization index by altitude was the highest at 101-200 m with 6.1 and the lowest at 1401-1500 m with 2.1. The average urbanization index by forest land ratio was the highest at 6.8 in 11-20% and the lowest at 4.0 in 81-90%. The average urbanization index by population density was the highest at 9.0 in 1601-1800 people/km² and the lowest at 2.3 in 3601-3800 people/km².

Second, in the correlation analysis, the correlation between the urbanization index and the years had a positive correlation in which the urbanization index increases every year. The correlation between the urbanization index and the altitudes had a negative correlation in which the urbanization index decreases as the altitude increases. The correlation between the urbanization index and the forest land ratios had a negative correlation in which the urbanization index decreases as the forest land ratio increases. The correlation between the urbanization index and the population densities had a negative correlation in which the urbanization index decreases as the population density increases, but had a positive correlation in which it increases after a certain point in time.

As a result of synthesizing the analyses, the relational formula created from the correlation analysis with the years was suitable for predicting the urbanization index. By applying the formula $y=1.754+0.465x$ (y=urbanization index, x=year), the results of predicting the urbanization index were at 11.01 in 2025, 13.38 in 2030, 18.03 in 2040, and 22.68 in 2050. The urbanization index increased year by year.

An increase in the urbanization index means an increase in naturalized plants that threaten biodiversity and hurt the ecosystem. In addition, the increase in naturalized plants is causing socioeconomic losses such as the spread of diseases and a decrease in crop yields. Therefore, to conserve biodiversity, this study suggests that an appropriate management plan for naturalized plants and research on native plants to replace naturalized plants should be actively conducted.

5. References

5.1. Journal articles

- [3] Oh HK & Sagong JH & You JH. Analysis on Environmental Indices and Naturalized Plants Distributed in Gyeryong-si, Korea. *Korean Journal of Environment and Ecology*, 25(4), 479-489 (2011).
- [4] Lee YM & Park SH & Jung SJ & Oh SH & Yang JC. Study on the Current Status of Naturalized Plants in South Korea. *Korean Journal of Plant Taxonomy*, 41(1), 87-101 (2011).
- [5] Park JC & Lee KM. A Study on Developing Industry Complex: Focusing on Hierarchical Evaluation Model. *Regional Industry Review*, 38(3), 169-188 (2015).
- [6] Lim DO & Ryu YM & Hwang IC. Analysis of the Environmental Index and the Distribution of Naturalized Plants in Large Rivers of Downtown Gwangju Metropolitan City. *Korean Journal of Environment and Ecology*, 18(3), 288-296 (2004).
- [7] Lee HJ & Cheon WK & Lim WH. A Study of Prediction on the Species Number and Naturalization Index of Land Naturalized Plants. *International Journal of Human & Disaster*, 5(1), 10-23 (2020). [\[Article\]](#)
- [8] Jo YJ & Sohn SH & Kim DN. Key Indicators of the Index for a Green City. *Journal of the Urban Design Institute of Korea Urban Design*, 14(6), 111-123 (2013).
- [9] Oh HK & Choi YH & You JH. Research Paper: Analysis of Ecological Index of Plant Using Flora Distributed in Temple Forest. *Journal of Environmental Impact Assessment*, 23(4), 251-270 (2014).
- [10] Song JS & Ahn SH. Synecological Study of the Naturalized Plant Communities in Old-andong City. *Journal of Ecology and Environment*, 22(3), 169-179 (1999).
- [11] Lee HJ & Cheon WK & Lim WH. Human & Disaster: A Study of Prediction on the Species Number and Naturalization Index of Land Naturalized Plants. *International Journal of Human & Disaster*, 5(1), 10-23 (2020). [\[Article\]](#)
- [12] Lee HC. A Study on Developmental Strategies of Policy for Biodiversity Conservation. *Regional Development Institute*, 10(10), 317-334 (2002).
- [13] Jeong JJ & Lee SH. Study of the Extraction of Urbanized Area in Seoul using NDVI and NDBI. *Journal of the Korean Cartographic Association*, 10(2), 79-90 (2010).
- [14] Kim HC & Koh JG & Kim CS & Song CK. Distributional Attribute of Naturalized Plants on the Roadsides in Hallasan National Park. *Korean Journal of Environment and Ecology*, 21(3), 278-289 (2007).
- [15] Lee JK & Shin SK & Nam SK & Park KC. An Analysis of Software Metrics using the SPEM(Software Project Estimation Model). *Electronics and Telecommunications Trends*, 17(5), 107-118 (2002).
- [16] Kwon GS & Cheon WK & Lim WH. A Study on the Actual Condition and Improvement Plan of Hierarchical Safety Management in Natural Parks. *International Journal of Crisis & Safety*, 5(1), 21-34 (2020). [\[Article\]](#)
- [18] Kim HS. Ecological Studies of Naturalized Plants in Soonjukdo. *Journal of Korea Island*, 22(4), 225-235 (2010).
- [19] Lee YM & Park SH & Jung SY & Cho DK. Overview of the Naturalized Plants in Korea. *Korean Journal of Environment and Ecology*, 19(1), 87-89 (2009).

- [20] Kim C & Lee H & Lim W. A Study on the Change in Plants of the Wind Power Complex in Mt. Hyeonjong. *Protection Convergence*, 5(2), 1-13 (2020). [\[Article\]](#)
- [21] Kim HS & Oh CH. Distribution Characteristics of Naturalized Plants According to Characteristics of Landscape Ecology in Rural Village of Korea. *Electronics and Telecommunications Trends*, 25(3), 389-403 (2011).
- [22] Lim WH & Kim TK. A Study on Use Behavior of Visitors of Hamjisan Forest Walkway. *Journal of Forest Recreation in Korea*, 23(1), 23-31 (2019).
- [23] Lee CW & Cho HJ & Kang MJ & Huh MK & Hwang IC & Choi BK. Study of the Status of Naturalized Plants in Busan City, South Korea. *Korean Journal of Life Science*, 25(11), 1244-1254 (2015).
- [24] Park MS & Lim DO & Kim HS. Distribution and Management of Naturalized Plants in the Eastern Area of Jeollanamdo, Korea. *Korean Journal of Plant Resources*, 24(5), 489-498 (2011).
- [25] Kim C & Lee H & Lim W. Improvement Plan Through Nonagreement Consultation Analysis of Small Scale Environmental Impact Assessment. *Public Value*, 6(1), 1-13 (2021). [\[Article\]](#)
- [26] Hong J & Lee H & Cheon W & Lim W. An Investigation on the Differences of Management in Landscape Construction Projects. *Public Value*, 5(2), 32-38 (2020). [\[Article\]](#)
- [28] Lee J & Kwon G & Cheon W & Lim W. A Study on the Revitalization of Forest Management by Improving the Implementation Rate of Forest Projects. *International Journal of Human & Disaster*, 5(2), 1-9 (2020). [\[Article\]](#)
- [29] Cho HS & Cho KH. Current Status of Alien Plants in the Reservoir Shoreline in Korea. *Ecology and Resilient Infrastructure*, 2(4), 274-283 (2015).
- [30] Jeon MJ & Park JS & Lim WH. An Investigation on Developing the Shelter and Safety Facilities of Forest Kindergartens. *International Journal of Protection, Security & Investigation*, 5(1), 42-53 (2020). [\[Article\]](#)
- [31] Kim DE. Management System of Invasive Alien Species Threatening Biodiversity in Korea and Suggestions for the Improvement. *Environmental Impact Assessment*, 27(1), 33-55 (2002).
- [32] Yoon IJ. Legal Issues for the Regulation of Alien Species: Focused on Biodiversity Act of 2012 in Korea. *Environmental Law Research*, 35(2), 95-132 (2002).
- [33] Yeo U & Lee Y & Kim H. A Study on the City Ecological Soundness Index. *Electronics and Telecommunications Trends*, 22(2), 5-17 (2021).
- [34] Kim MH & Cho KJ & Oh YJ & Yang DW & Lee WJ & Park SK & Choi SK & Eo JU & Kim MK & Na YE. Life Form and Naturalization Characteristics of Naturalized Plants in Upland Fields of South Korea. *Journal of Environmental Biology*, 34(2), 63-72 (2016).

5.2. Thesis degree

- [1] Jung SY. A Study on the Distribution Characteristics of Invasive Alien Plant(IAP) in South Korea. Andong National University, Doctoral Thesis (2014).
- [2] Lee HJ. A Study of prediction on the species Number and Naturalization Index of Land Naturalized plants. Daegu Haany University, Doctoral Thesis (2020).
- [17] Lee HJ. A Study on the Management of Naturalized Plants. Daegu Hanny University, Master's Thesis (2018).

5.3. Additional references

- [27] <https://library.me.go.kr/> (2021).

6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	HL	<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*	CK	<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	WL	<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: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: yjsa@kmu.ac.kr

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.37

© 2022 J-INSTITUTE

A Study on the Relationship between Employment Period and Organizational Satisfaction of Indefinite-Term Contract Workers in Governments: Focusing on Indefinite-Term Contract Worker at the National Agricultural Products Quality Management Service

Hyuntae Kim¹

Keimyung University, Daegu, Republic of Korea

Yongjin Sa^{2*}

Keimyung University, Daegu, Republic of Korea

Abstract

Purpose: The primary purpose of this study is to empirically validate the relationship between the employment period and the organizational satisfaction of the indefinite term contract workers of the National Agricultural Products Quality Management Service, which is an agency operating under the auspices of the Ministry of Agriculture, Food and Rural Affairs. Meanwhile, studies on the organizational satisfaction in Korea have focused on public servants or employees of general companies, and the purpose lies with recognizing that there is a lack of studies which statistically validate the relationship between the employment period and the organizational satisfaction of indefinite term contract workers, and making contribution to the improvement of the organizational satisfaction of indefinite term contract workers.

Method: The National Agricultural Products Quality Management Service utilized the results of the 2020 organizational satisfaction survey conducted by Hyundai Research for indefinite term contract workers, and the organizational satisfaction was measured with the average value of all questions of job satisfaction, organizational commitment, organizational communication, fair evaluation and compensation, and by making reference to previous studies, a hypothesis was established that "the number of years of continued service of indefinite term contract workers of the National Agricultural Products Quality Management Service will have a positive (+) effect on the organizational satisfaction".

Results: As a result of the analysis performed of this study, the correlation between the dependent variable for the independent variable (employment period) turned out to have a correlation of approximately -0.218. while the employment period has an effect on the organizational satisfaction, it has a negative (-) effect rather than a positive (+) effect as hypothesized, which suggests that the longer the number of years of continued service, the lower the organizational satisfaction, and which also suggests that the satisfaction with organization is not simply increased by the mission of job and job performance satisfaction which arises the longer one serves for the organization.

Conclusion: The average score of overall job satisfaction excluding the employment period turned out to yield a lower average score for the organizational commitment, communication, and fairness of evaluation and compensation. However, as a result of analyzing the organizational satisfaction of the in-definite term contract workers of the National Agricultural Products Quality Management Service by the section of employment period, it was verified that the organizational commitment and communication and the fair evaluation and compensation were even more correlated with the organizational satisfaction than the job satisfaction such as satisfaction of job and workload.

[Keywords] Non-Term Contract Workers, Indefinite Contract Workers, Organizational Satisfaction, National Agricultural Products Quality Management Service, Employment Period

1. Introduction

In the aftermath of the currency crisis in 2007, the government implemented a non-term contract worker policy to help expand the number of non-term contract workers for the public sector, and those who served continuously for 2 years or longer were converted into the non-term contract workers with guaranteed age of retirement under the name of indefinite contract workers. In accordance with the government policy of converting the non-term contract workers into regular workers with the inauguration of the Moon Jae-in administration in 2017, the Ministry of Employment and Labor published the “Sect Guidelines on the Conversion of Regular Workers for the Public or” in July 2017, and as a result, in the public sector, a policy was implemented to convert the non-term contract workers who were engaged regularly and continuously serving into the regular workers[1][2]. Consequently, according to the “Public Sector Phase 1’s Conversion of Regular Workers for the Public Sector,” as of the end of December 2018, out of 316,000 non-term contract workers in charge of the regular and continuous work in the public sector, 175,000 were decided to be converted into regular workers, among whom, 133,000 people were converted[3].

The Ministry of Employment and Labor induced the enactment and amendment of ordinances, orders, and regulations to change the name of 'indefinite contract workers' to 'GONG-MU-JIK' in order to promote the organizational vitality by revamping the morale of the indefinite contract workers and activating communication within the organization. Each institution came to enact and amend the regulations for operational purposes by using the name 'GONG-MU-JIK.' However, in the case of the central administrative agencies and most local governments, there is no unified wage system for the public servants, and there is a gap in terms of the labor conditions including wages for each central administrative agency and local government[1]. Given such these differences in terms of wages and working conditions for each institution, indefinite term contract workers compare their remuneration and workload with other institutions on their own, and without any objective data, they feel deprived of and dissatisfied with the organization to which they belong. This goes beyond the simple dissatisfaction and spreads distrust among the indefinite term contract workers and public servants or distrust of the organization, thereby becoming a factor which impedes harmony and communication within the organization while affecting service for the public.

Thus far, no separate previous studies have been conducted on the satisfaction status of indefinite term contract workers, and each institution has been limited to the viewpoint of satisfaction with the job itself. Furthermore, most of the studies on the organizational members in other jobs than indefinite term contract workers have dealt with the satisfaction of organizational members in terms of job satisfaction[4]. However, the overall organizational satisfaction ought to be viewed as a broader concept different from the job satisfaction. This means that when considering the overall organizational satisfaction, it would be necessary to review a broader range of factors than the job satisfaction[5]. While various previous studies have been conducted on the effect on the organizational satisfaction, no study has been conducted on the relationship between the employment period and the organizational satisfaction. Given that the relationship between the employment period and the organizational satisfaction of indefinite term contract workers of public institutions requiring a sense of mission for job has elapsed 10 years since the introduction of the indefinite contract workers system, and 5 years have elapsed since the change of name to 'GONG-MU-JIK', and in order to improve quality, it is sought to discover issues and present implications through studies on the employment period and organizational satisfaction.

2. Theoretical Background and Study Hypotheses

2.1. Status of indefinite term contract workers of the national agricultural products quality management service

In the “Comprehensive Measures for Non-term Workers of Public Institutions” for 2006, and according to the policy of 'conversion of fixed-term workers who have served continuously for 2 years or longer into indefinite contract workers,' they were converted as such, and in accordance with the Moon Jae-in administration's "Plan for the Implementation of Conversion of Non-Term Contract Workers into Regular Workers for the Public Sector" in 2017, it was recommended that the 'indefinite contract workers' be classified as regular workers. And the workers be named 'GONG-MU-Jik' for the 'indefinite contract workers' serving at central governmental agencies or local governments[6][7][8]. Accordingly, as of the end of October 2020 at the National Agricultural Products Quality Management Service, 769 people are serving at the Service, headquarter, experiment research institute, 9 provincial offices, and 121 branch offices. Examining in terms of job type, 8 office assistants are serving for the institutional operation 1 assistant for the LMO import approval office work, 1 person assistant for the eco-friendly agricultural product certification support, 53 assistants for the safety inspection of agricultural products, 4 assistants for the LMO test research, 17 assistants for the research of the certification of the origin of livestock products, 17 assistants for the place-of-origin labelling management, 563 registration and management of agricultural business, 90 origin investigators and enforcement assistants, and 6 facility cleaning and management assistants, and hence, in terms of the job classification, 12 clerical assistants, 74 research assistants, and 659 special positions by institution are in service[9].

Eco-friendly agricultural product certification support 1 person, agricultural product safety research assistant 53 people, LMO test research assistant 4 people, agricultural and livestock origin certification research assistant 17 people, agricultural business registration investigator 563 people, origin investigation and enforcement assistant 90 people, facility cleaning and management 6 By job classification, there are 12 office assistants, 74 research assistants, and 659 special positions for each institution[9].

2.2. Duties of indefinite term contract workers of the national agricultural products quality management service

As for the indefinite term contract workers of the National Agricultural Products Quality Management Service, their agricultural business registration, which is undertaken by the largest number of them, or 563 people, is the task of managing the agricultural business database for the registration and management of agricultural business entities, which has been in effect since 2008. They have been in charge of the registered information's quality control through currentization such as the new registration, registration of change and field surveys, and since 2014, a quality control system has been established to analyze the data of the individual agricultural businesses each year, and they have also been responsible for improving the quality of the businesses' DB such as currentization through the logical errors. Following which, 90 people are responsible for the investigation and control of the country of origin of the agricultural and livestock products, providing guidance, investigation, and subsidizing control on the labeling of the country of origin for the agricultural products and their processed products sold in Korea, and the rice, cabbage kimchi, soybeans, and livestock products sold at restaurants, while being charge of providing assistance for their enforcement. As for the research assistants, or 74 indefinite term contract workers, they are in charge of the agricultural analysis assistant work providing support for the research and analysis of hazardous substances (pesticides, heavy metals, and microorganisms, etc.), LMOs, and the origin of agricultural products produced in Korea. Furthermore, there are 12 office assistants and 6 people in charge of cleaning and management of the office building, such as secretarial work, support for LMO import approval, and the international equivalence of the eco-friendly agricultural products.

2.3. Employment period and organizational satisfaction

Employment period is used for the same meaning as the period of service, period of employment, number of years of continued service, and the period of office. The employment period refers to the period from the date of joining the organization until the date of retirement, including the period of service in other departments of the same organization [10]. The employment period is an important part for the members as it is the basis for promotion, wage, vacation, and retirement payment related calculations for the organization, and is also an essential factor for their career management. From the organization's perspective, the voluntary turnover of employees causes many losses, such as loss of talent, consequent job vacancy, negative effects on the other members [11], other new personnel recruitment costs, training costs, and lower productivity [12], and hence, the employee's employment period is an important area for management [13].

Organizational satisfaction is an emotional response towards the pros and cons concerning the organization to which one belongs, and the higher the level of satisfaction with the organization, the higher the motivation for work and the higher the job performance [14]. Organizational satisfaction is the greatest achievement for the organization by economic, technological, and emotional means [15][16][17][18], and it goes beyond the scope of job satisfaction for the members and affects each member of society as a whole. At the same time, it is also a very important concept since it is related to the recent increase in the demand for professionalism [19]. It was claimed that the treatment of organizational members affects the individual satisfaction and further affects the turnover and organizational satisfaction [20]. Hyeonshin Park (2016) developed a statistical model to predict organizational satisfaction through a predictive model study on the overall organizational satisfaction of organizational members, and Soonbok Hong (2011) investigated the effect of organizational culture on organizational satisfaction and job performance for tax officials, while Byeongwon Min (2018) reorganized the relationship between the mission for job and the organizational satisfaction of workers in special occupations by studying the effect of flight cabin crew's mission for job on the organizational satisfaction and their intention for turnover. Saejin Oh, Youngshik Yim, and Byeonghwa Yang (1996) have conducted active studies on organizational satisfaction, such as by validating a measurement model for organizational satisfaction for the public service society and workers in special occupations [14][21][22][23].

This study is one about the organizational satisfaction by examining theories and prior research related to organizational satisfaction based on the data investigating organizational commitment and job satisfaction, internal and external communication related strength, evaluation, and compensation, which seeks to find the relevance to the theoretical background of job satisfaction. It is also the most used factor to measure organizational satisfaction. In most studies, it is believed that a higher satisfaction with the job yields a higher satisfaction with the organization [24][25]. Together with job satisfaction, job commitment has also been widely used to measure the organizational satisfaction, and in general, a high job commitment of the organizational members demonstrates an active work motivation and increases satisfaction with the organization to which they belong [24]. However, since the new job title of indefinite term contract workers was created in 2017, there has been no study on the organizational satisfaction for indefinite term contract workers, and hence, it may be claimed that this study will have an important meaning in connection with the organizational satisfaction for indefinite term contract workers.

When the individuals and the environment are in harmony with each other, the individuals would be satisfied, and to maintain such a state of satisfaction, they would stay and work for the organization. Conversely, if the environment between the individuals and the organization is not in harmony, the individuals would not be satisfied and retire and change their jobs [13].

Such a statement is based on a theory[26] which explains the agreement between the individuals and the environment in terms of 'individual abilities and abilities required by the job' and 'job values related to individual needs and compensation provided by the organization'[26], Career Adaptation Theory (TWA), which is further based on the theoretical background that the indefinite term contract workers with a long employment period will have a greater satisfaction with the organization because the adjustment time to the environment is relatively longer than that of indefinite term contract workers with a short employment period. In this study, the following hypotheses were established and the correlation between the employment period and organizational satisfaction of indefinite term contract workers serving for the National Agricultural Products Quality Management Service are sought to be validated.

H: The number of years of continued service of the indefinite term contract workers of the National Agricultural Products Quality Management Service will have a positive (+) effect on the organizational satisfaction.

3. Method and Results

3.1. Research method and subjects

The data required for this study were the survey data of 745 indefinite term contract workers serving for the National Agricultural Products Quality Management Service's headquarter, experiment research institute, 9 provincial offices, and 121 branch offices by Hyundai Research[27]. The purpose of the survey is to investigate the satisfaction level of the National Agricultural Products Quality Management Service to activate work support and communication, and to improve responsiveness between departments in the future and to contribute to the improvement of overall organizational performance through an organic cooperative relationship.

Among the 745 non-term contract workers working at the National Agricultural Products Quality Management Service, 669 people, or 89.8%, participated in the survey. The survey method was conducted through web-mail, and the survey was conducted for a total of 23 days from October 26 to November 17, 2020. The survey tool is a structured questionnaire, and the collected data went through the editing-coding-key-in-programming process and analyzed by SPSS for win, a statistical package. <Table 1> illustrates the statistical characteristics of the indefinite term contract workers who responded to the questionnaire.

Table 1. Characteristics of research subjects.

Classification		N	Ratio (%)	Average of organizational satisfaction	Standard deviation
Gender	Men	73	10.9	3.240	0.8117
	Women	596	89.1	3.131	0.6846
Age	Under 30s	43	6.4	3.151	0.7845
	30-39	60	9.0	3.195	0.8251
	40-49	273	40.8	3.195	0.6677
	50s or older	293	43.8	3.082	0.6868
Location of service	Headquarters	7	1.0	2.900	0.7506
	Experiment research institute	12	1.8	4.058	1.0405
	Provincial office	155	23.2	3.157	0.7764

	Branch office	495	74.0	3.119	0.6491
Period of continued service	Less than 5 years	201	30.0	3.378	0.7372
	5 years or longer and less than	232	34.7	3.091	0.6853
	10 years or longer	236	35.3	2.994	0.6287

Figure 1. Research model.



3.2. Measurement of variables

As the survey data surveyed at the National Agricultural Products Quality Management Service in 2020, the survey questions of the organizational satisfaction of indefinite term contract workers were 'Not at all (1)', 'Not really (2)', 'Average (3)', 'Kind of (4)' and 'Very much (5)' were measured on a 5-point scale. and the organizational satisfaction was measured as the average value of all questions of job satisfaction, organizational commitment, organizational communication, fair evaluation, and compensation.

The variables measured for the analysis of this study were not measured as objective indicators, yet were based on the subjective perception level of indefinite term contract workers, and to examine the relationship between the variables, 10 indicators including the sub-scales as illustrated in <Table 2> were measured.

Table 2. Analytical results of measurement indicators.

Measured question	Median	Standard deviation
1. Job satisfaction	3.046	0.801
I'm satisfied with my work.	3.368	0.992
Staffs evenly deployed according to the amount of work in the department.	2.462	1.127
I can confidently determine the procedures and methods of conducting my work.	3.300	0.967
2. Organizational immersion	3.149	0.852
I feel a strong sense of belonging for the Service.	3.347	1.000
The values I pursue and the values of the organization are very similar.	2.952	0.891
3. Organizational communication	3.117	0.837
The inter-departmental work information is shared promptly and easily.	3.040	1.003

Smooth communication and cooperation system are maintained.	3.309	0.955
I can actively express opinions when there are unreasonable issues.	2.993	0.911
4. Fair evaluation and compensation	3.327	0.750
Sharing of responsibilities between the organizational members is appropriate and clear.	3.245	0.904
I'm receiving a fair work evaluation in connection with my work and responsibilities.	3.410	0.815

3.3. Analytical results

Examining the average and standard deviation values of the organizational satisfaction for the independent variable (number of years of continued service) included in the analysis of this study of <Table 1>, the organizational satisfaction level of indefinite term contract workers who responded to the questionnaire was the organizational satisfaction of less than 5 years of employment period, rendering 3.378 points, which was higher than normal (3 points), and indefinite term contract workers who have served for 5 years or longer and less than 10 years rendered 3.091 points, which is average (3 points), and those serving for 10 years or longer rendered 2.994 points, which turned out to be lower than the average of 3 points. Furthermore, the correlation between the independent variables and the dependent variables turned out to have a correlation of approximately -0.218 as illustrated in <Table 3>.

Table 3. Correlation.

Variable	Number of years of continued service	Organizational satisfaction
Number of years of continued service		-0.218
Organizational satisfaction	-0.218	

In order to validate the hypothesis on the positive effect of the number of years of continued service at the National Agricultural Products Quality Management Service on the organizational satisfaction, this study performed a regression analysis and analyzed the effect of organizational satisfaction on years of service, while <Table 4> illustrates the results of analyzing the effect of organizational satisfaction on the number of years of continued service. As a result of the organizational satisfaction analysis performed, it turned out that the number of years of continued service and job satisfaction had a significant negative effect ($B=-0.213$, $p=0.000$), which means that the <Hypothesis> of this study could not be adopted.

Table 4. Analysis of the effect of organizational satisfaction on the number of years of continued service.

Satisfaction (Dependent variable)	B	SE	t	p
Constant	3.709	0.247	14.995	0.000
Number of years of continued service	-0.213	0.038	-5.619	0.000
Gender	-0.126	0.086	-1.465	0.143
Age	0.060	0.036	1.667	0.096
Department of service	-0.023	0.052	-0.431	0.662
$R^2=0.054$, $F=9.440$, $p=0.000$				

In <Table 5>, by examining the correlation with organizational satisfaction for each item constituting organizational satisfaction, the results may be used as a reference for improving the

organizational satisfaction of indefinite term contract workers of the National Agricultural Products Quality Management Service.

Table 5. Correlation with organizational satisfaction by question.

Variable	Work satisfaction	Workload	Commitment to work	Strong sense of belonging	Unity of organizational values	Convenience of information sharing	Communication with supervisor	Expression of opinion	Sharing of responsibilities	Fair evaluation	Organizational satisfaction
Work satisfaction											
Workload	0.507										
Commitment to work	0.418	0.296									
Strong sense of belonging	0.570	0.364	0.426								
Unity of organizational value	0.567	0.550	0.406	0.622							
Convenience of information sharing	0.423	0.405	0.373	0.524	0.610						
Communication with supervisor	0.458	0.421	0.356	0.524	0.586	0.684					
Expression of opinion	0.400	0.341	0.388	0.499	0.530	0.580	0.661				
Sharing of responsibilities	0.487	0.447	0.363	0.524	0.606	0.557	0.623	0.564			
Fair evaluation	0.437	0.424	0.322	0.470	0.563	0.493	0.531	0.466	0.520		
Organizational satisfaction	0.724	0.663	0.595	0.754	0.821	0.771	0.795	0.735	0.771	0.701	

4. Discussion

The purpose of this study is, based on the previous studies [21][28] which examined the employment period and organizational satisfaction of existing public servants, and a related study [22] that the longer the employment period, the higher the sense of mission for job would increase organizational satisfaction, to validate, analyze, and statistically validate the relationship between the employment period and the organizational satisfaction of indefinite term contract workers of the National Agricultural Products Quality Management Service.

As a result of the empirical analysis of the organizational satisfaction based on a survey of the indefinite term contract workers' perceptions of job satisfaction and organizational commitment, organizational communication, and fair evaluation and compensation, which are detailed questions which comprise the organizational satisfaction, the indefinite term contract workers of the National Agricultural Products Quality Management Service were verified such that the longer the employment period, the lower the negative effect of organizational satisfaction. This illustrates that, while the employment period has an effect on organizational satisfaction, it has a negative (-) effect rather than a positive (+) effect as hypothesized, suggesting that the longer the employment period, the lower the organizational satisfaction. Furthermore, this suggests that the satisfaction with job satisfaction is not simply increased by the sense of mission for job and job performance satisfaction which arises the longer one serves for the organization.

Studies of the meaning and role of work in the modern society have increased [29][30], and many studies reflect the sense of mission for job to some extent in the process of performing work as a member of an organization, it has been said that the organizational satisfaction is an emotional state that organizational members feel through job performance toward their organization along with their sense of job vocation [22].

Hence, unlike a general study in which employees who have changed or retired are excluded and the organizational satisfaction of the remaining members who are relatively satisfied with their mission for job and job performance is predicted to be high, the National Agricultural Products Quality Management Service's indefinite term contract workers have the tendency to be less satisfied as the employment period increases, and it is also evident that there is a decrease in the satisfaction with the employment period.

If examining the correlation between the organizational satisfaction of each detailed question of the National Agricultural Products Quality Management Service's indefinite term contract workers for each period of the employment period, and referring to <Table 5>, it turned out to have a high correlation such that the questions of the consistency between organizational values and one's own values (0.821), communication with superiors (0.785), information exchange and communication with colleagues (0.771), and clear division of responsibilities among organizational members (0.771) were correlated with organizational satisfaction, and it was verified that the organizational commitment, communication, and fair evaluation and compensation had a higher correlation with organizational satisfaction than job satisfaction such as job satisfaction and workload felt by indefinite term contract workers.

The correlation analysis can only render the extent of correlation between variables through the correlation coefficient, but not the relationship between the variables[23]. However, through the relative correlation between the questions, it is hoped that it will be helpful to find an improvement plan that can increase the organizational satisfaction through their affections for the organization, sense of mission for job, and communication within the organization the longer they serve for the organization in the future.

The analysis targets of the existing organizational satisfaction studies were diverse, such as hospital staff[31], sports agents[32], police officers[33], public officials[34], and taekwondo instructors[35]. However, this study has a theoretical contribution in that it was conducted based on the results of a complete survey of indefinite term contract workers, which had not been analyzed before. Nevertheless, this study can point out a limitation in that it was conducted based on the simple survey results between the employment period and organizational satisfaction of the indefinite term contract workers. In the future follow-up study of indefinite term contract workers, it will be necessary to study to improve the organizational satisfaction of indefinite term contract workers by examining the causal relationship between various variables that tenure has a negative effect on organizational satisfaction.

5. References

5.1. Journal articles

- [1] Kim K & Nam W & Um J. Measures to Improve the Treatment of Indefinite Contract Workers in the Public sector -Focusing on the Establishment of the Public Service System of the Central Government and Local Governments. *Federation of Korean Trade Unions Research Series*, 17(11), 1-200 (2017).
- [3] Kim J. The Study on Operation Status of the Public Employee with No Fixed-term Contract in the Local Government. *Korea Public Administration Quarterly*, 31(3), 431-452 (2019).
- [4] Oh S & Lim Y & Yang B. Organizational Satisfaction Measurement Model Verification Study. *The Korean Journal of Industrial and Organizational Psychology*, 9(1), 1-24 (1996).
- [5] Park H. Predictive Models for Employees' Organization Satisfaction. *Korean Review of Organizational Studies*, 13(3), 45-73 (2016).
- [6] Kim H & Jeong D. Current Status of Employment Management for Indefinite Contract Workers in Public Institutions and Tasks for Improvement. *Monthly Labor Review*, 123, 67-82 (2015).

- [7] Sa Y. The Study on Relationship Between Remuneration, Performance and Evaluation of Indefinite-term Contract Workers in Local Governments. *The Journal of Humanities and Social Science*, 11(4), 2399-2409 (2020).
- [8] Oh S. A Study on the Service Duties for the Indefinite Contract Workers of Government. *Korean Public Personnel Administration Review*, 19(4), 261-278 (2020).
- [10] Auer P & Berg J & Coulibaly I. Is a Stable Workforce Good for Productivity?. *International Labour Review*, 144(3), 319-343 (2005).
- [11] Cho S & Johanson M & Guchait P. Employees Intent to Leave: A Comparison of Intent to Leave Versus Intent to Stay. *International Journal of Hospitality Management*, 28, 372-381 (2009).
- [12] Cloutier O & Felusiak L & Hill C & Pemberton-Jones EJ. The Importance of Developing Strategies for Employee Retention. *Journal of Leadership, Accountability and Ethics*, 12(2), 119-129 (2015).
- [13] Choi J & Seo S. Effect of Millennials's Work Value on their First Tenure –Serial Mediation Effect of Person-job Fit and Job Satisfaction–, *The Journal of Vocational Education Research*, 40(4), 31-55 (2021).
- [14] Lee D. The Effect of Work Ethics on Job Performance, Job Satisfaction and Job Satisfaction. *Korean Journal of Industrial Relations*, 6, 461-480 (1996).
- [15] Lodahl TM & Kejnar M. The Definition of Measurement of Job Invokvement. *Journal of Applied Psychology*, 49(1), 24-33 (1965).
- [16] Meyer JP & Allen NJ. Development of Organizational Commitment during the First Year of Employment: A Longitudinal Study of Pre and Post-entry Influences. *Journal of Management*, 17, 717-733 (1991).
- [17] Mowday RT & Porter LW & Steers RM. The Measurement of Organizational Commitment. *Journal of Vocational Behavior*, 14(2), 224-247 (1979).
- [18] R Kraz. Time and Work: Toward and Integrative Perspective. *Research in Organizational Behavior*, 2, 81-127 (1966).
- [19] Hong S. Effect of the Organizational Culture of the Revenue Officer on Organizational Satisfaction and Job Performance. *The Journal of the Korea Contents Association*, 11(7), 366-373 (2011).
- [20] Gibson JL & Ivancevich JM & Donnelly Jr JH. Organizations: Behavior, Structure, Processes(7th. Ed.). *Relations Industrials*, 47(1), 166-170 (1992).
- [23] Lee C & Lee K. A Study on the Effects of Process-Related Justice on Perceived Union Support. *Journal of Organization and Management*, 26(2), 213-233 (2002).
- [25] Lee Y & Lee S. Effects of Satisfactions with Performance Management and Human Resources Management Systems on Government Organizational Performance and Public Service Satisfaction. *Korean Review of Organizational Studies*, 12(4), 27-63 (2016).
- [26] Dawis RV & Lofquist LH & Weiss DJ. A Theory of Work Adjustment: A Revision. *Minnesota Studies in Vocational Rehabilitation*, 23, n15 (1968).
- [28] Kim B & Joo J & Park H. A Study on the Organizational Satisfaction of Public Officials at the Local Government: Testing the Non-compensatory Model. *Kookmin Social Science Review*, 30(1), 175-196 (2016).
- [30] Hall DT & Chandler DE. Psychological Success: When the Career is a Calling. *Journal of Organizational Behavior*, 26(2), 155-176 (2005).
- [31] Kim M & Kim E. The Effects of Internal Marketing and Career Motivation for the Protection of Dermatology Hospital Workers on Job Satisfaction and Organizational Commitment. *Protection Convergence*, 6(2), 46-60 (2021). [Article]
- [32] Choi H & Lee C. The Effect of the Sports Agents Perception Due to the Sports Agent Regulation on the Expected Role and the Expected Job Satisfaction. *Regulations*, 6(3), 1-9 (2021). [Article]
- [33] Jo SG & Kim DJ. Factors of Job Satisfaction in Members Republic of Korea National Intelligence Organizations: Focusing on Police Intelligence Agency. *International Journal of Police and Policing*, 1(1), 10-19 (2016). [Article]
- [34] Sa Y. The Study on Relationship between Satisfaction with Flexible-work Arrangement, Job Satisfaction and Decision Making. *Public Value*, 6(3), 41-48 (2021). [Article]

- [35] Mok J & Kwon J. Research Regarding the Job Satisfaction of Taekwondo Instructors and the Revitalization of Taekwondo Center. *International Journal of Martial Arts*, 6(1), 55-65 (2021).
[Article]

5.2. Thesis degree

- [21] Kim HJ. A Study on the Job Satisfaction Level of Education Public Service in Accordance with Collective Agreement -Focusing on Sejong Special Autonomous City. Chungnam National University, Master's Thesis (2021).

5.3. Books

- [24] Kim H. Administrative Organization and Bureaucratic Behavior. Top Books (2012).

5.4. Additional references

- [2] Ministry of Employment and Labor. Guidelines for Conversion of Temporary Workers to Regular Workers in the Public Sector (2017).
[9] Chungnam National University Industry-academic Cooperation Foundation. Agricultural Business Registration Workload Analysis for the Operation of Appropriate Manpower for Indefinite Contract Workers (2020).
[22] Min B. A Study on the Influence of the Vocational Calling in Flight Attendants to Quality of Organizational Satisfaction and Turnover Intention. Proceedings of the Korean Society for Human Resources Development Academic Research Presentation (2018).
[27] Hyundai Research. National Agricultural Products Quality Management Service Organizational Satisfaction Survey Results (2020).
[29] Colozzi EA & Colozzi LC. College Students Callings and Careers: An Integrated Values-oriented Perspective. American Psychological Association (2000).

6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	HK	-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 Author*	YS	-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"/>

Publisher: J-INSTITUTE
ISSN: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: gusdk8910@hanmail.net

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.48

© 2022 J-INSTITUTE

A Study on the Development Direction of Meal Kit for Modern People in a Health Crisis

Jeongryeol Bae¹

Papachocolate, Anyang, Republic of Korea

Hyunah Kim^{2*}

Dreamcook, Seoul, Republic of Korea

Abstract

Purpose: Recently, domestic and foreign food consumers are pursuing the minimization of meal time and convenience of cooking, and the consumption behavior is increasing take out, delivery, and HMR purchases. The purpose of this study is to investigate the opinions of the expert group on the commercially available meal kit to help a lot with the eating habits of modern people and to suggest the development direction of the meal kit in the future.

Method: Create a questionnaire and make up a group of experts consisting of 4 cooking and food service management professors, a sales manager of a meal kit related developer, a menu development manager, and 13 other meal kit operators, for a total of 17 people, January 3-6th 2022, Individual surveys were conducted for about 2 hours, and the results were derived using spss program.

Results: As a result of an interview with an expert group, it is necessary to develop a granular health friendly meal kit for the low salt, high protein, low fat, low sugar, vegan, dieter, exerciser, and the elderly using eco-friendly materials.

Conclusion: This study aims to present the development direction of meal kit as low sugar, low salt, high protein, low fat, vegan, dieter, exercise machine, and elderly meal kit. In addition, in order to develop meal kit products that are beneficial to consumers' health and environment, product development using eco-friendly packaging containers should be carried out. It is also important to understand the segmented needs of consumers.

[Keywords] Meal Kits, Development Direction, Organic Food, Low Salt, Low Sugar

1. Introduction

Recently, domestic and foreign food consumers are pursuing the minimization of meal time and convenience of cooking[1], and the consumption behavior is increasing take out, delivery, and HMR purchases[2]. HMR is classified into RTE (Ready to Eat), RTP (Ready to Prepare), RTC (Ready to Cook), and RTH (Ready to Heat) according to the characteristics of the type. Among them, the meal kit is the RTC type. It is growing faster due to social changes such as an increase in the number of wards and an aging population[3][4]. Since the ingredients, seasonings, and recipes are fixed, the meal kit is not difficult to cook, and preprocessed healthy and fresh ingredients can be easily cooked in a short time, and the consumer base is expanding accordingly[5]. In addition, premium meal kit and upgrades are receiving more attention in the food industry [6], and meal kit is playing an important role in the growth of restaurant companies in the fundamental situation of COVID-19[7].

Modern people are at great risk to their health due to excessive work and stress. In addition, most people talk about mental and physical fatigue due to the prolonged COVID-19 pandemic

[8][9]. In particular, as the radius of activity decreased, physical activity decreased, causing obesity[9]. obesity is well known to cause diabetes, high blood pressure, and various cancers due to various illnesses[10]. In addition, obesity is directly associated with diabetes[11]. Not only that, the World Health Organization (WHO) has classified obesity as a chronic disease that must be treated, which has further increased health concerns in modern society[12][13]. Focusing on proper eating habits and diet as a way to improve obesity[14], proper physical activity is required[15], and eating habits must be improved even in a busy life to control weight[16]. Excessive intake of sodium induces the development of adult diseases such as hypertension and stroke, increases the risk of obesity[17], and requires the consumption of low sugar foods to reduce the sugar that causes obesity and diabetes. It has been reported that chronic diseases can be prevented if sugar intake is not reduced[18].

However, the types of HMR stomachs currently on the market are unreliable to consumers due to nutrition and safety[19], and while HMR is convenient to cook, consumers' perception that it is not very useful for health is expanding and it is healthy. Needs improvement with beneficial ingredients and recipes[20]. Also, as the size of the meal kit market is fragmented and the consumption value changes, the need for healthy meal kit development is emphasized [19], and the nutrition index and consumption behavior of the meal kit report significant results. Although the effects of HMR on overall health functionality have been studied, there is a lack of research on health development directions for and meal kit[21][22][23][24][25].

Therefore, this study purpose to investigate a meal kit that is easy to purchase and easy to cook. It purpose to help modern people have a proper and healthy diet in the meal kit market, where demand is increasing and rapidly growing. We would like to conduct a deep interview centered on a group of experts who want to present the development direction of the meal kit, derive the results, and present the strategy and direction for the development of the meal kit that is useful for health, and will provide the basic data of the domestic meal kit market in the future.

2. Methods

2.1. FGI composition of questionnaire

This study consisted of 22 questions in order to find out the future direction of the future development of the meal kit based on the opinions of experts in the relevant field. The questionnaire consists of 3 items of Menu (Various kinds: Korean food, Western food, Chinese food, etc., New menu release, Easy access to new foods), Purchase(Buy on-line, Buy off-line, Save time on food purchases, Reliable brand) 4 items, Satisfaction with the price(Taste for the price , Quantity for price) 2 items, Safety(Sanitarily manufactured, Eco-friendly (organic) ingredients used, Indication of origin of ingredients, Expiration date indication, Nutritional information , Eco-friendly Packaging Container) 6 questions, Cooking (Reduction of time to clean ingredients before cooking, Cooking Convenience, Reduce cooking time, Food quality after cooking, Food waste reduction, Post-processing after cooking: cleaning time) 6 questions and was composed of a 5-point scale (1 point is strongly unsatisfactory, 5 points are strongly satisfactory). The future development direction freely described what the experts thought and summarized the results[26].

2.2. FGI test

Researchers conducted a deep interview method in which respondents were asked questions and recorded, and the time required for the interview was about 2 hours (January 3-6, 2022). As for the content of the interview, we first presented interview guidelines for the selection

attributes of meal kit products, asked for an explanation of the study, the reason for the interview, and prior consent to the recording of the interview content, and then proceeded with the interview. There were a total of 17 experts, including cooking, eating out professors, 4 meal kits related development and sales managers, self-employed people, and menu development managers (Two researchers interviewed eight and nine people, respectively).

2.3. Data analysis

Statistical processing of this study was done using SPSS Statistics (ver. 22.0, IBM Corp., Armonk, NY and Mplus 8.0). The graph was performed using an Excel program.

3. Results

3.1. Purchasing behavior for meal kit

Various kinds were 4.24, 'New menu release' was 'new menu release' and 'easy access to new foods' was 4.47, and it was found that they were relatively satisfied with the meal kit. When purchasing 'on-line' and 'off-line', the results are the same as 3.94, and 'save time on food purchases' is 4.65, which shows that the time to buy ingredients is relatively reduced. It was also investigated that the 'reliable brand' is considered to be important at 4.47. The 'taste for the price' was relatively satisfactory at 4.47, and the 'quantity for the price' was 3.94 which was not satisfactory. The 'sanitarily manufactured' was 4.35, the 'indication of origin of ingredients' was 4.47, the 'expiration date indication' was 4.65, and the 'nutrition information' was 4.29. 'Eco-friendly (organic) ingredients' used is displayed as 3.47 and 'eco-friendly packaging container' is displayed as 3.59, and it was investigated that this part needs to be complemented. 'Reduction of time to clean ingredients before cooking' and 'cooking convenience' and 'reduce cooking time to clean ingredients before cooking' were found to be very satisfying at 4.82, and Food quality after cooking, Food waste reduction, 'post-processing after cooking (cleaning time)' were also found to be very satisfying. Finally, 'future development direction' presented various development directions, but most of them were about health oriented product development. Opinions were presented on the development of meal kits that were subdivided into various product groups such as low salt, high protein, low fat, low sugar, vegan, dieter, and exerciser. In addition, opinions were also presented on the development of premium products using only elderly meal kit, diabetes and high blood pressure meal kit, organic ingredients, and products with certification marks using ecofriendly packaging containers. Also, opinions on the use of packaging that helps the environment were also presented. In addition, there were opinions on intergenerational studies (generation x, generation m, and generation z). In addition, meal kit made from local agricultural products to reduce carbon, microwave-only meal kit, and meal kit using alternative meat were presented, and opinions on zero-waist meal kit exclusively for meal kit was also presented.

Table 1. Purchasing behavior and consumption status for meal kits.

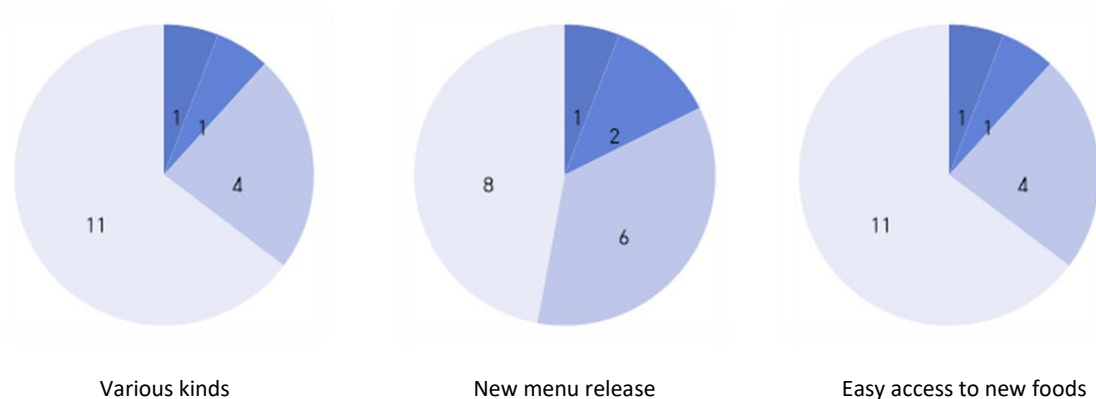
	Item	Means±S.D.
Menu	Various kinds (Korean food, Western food, Chinese food, etc.)	4.24±0.90
	New menu release	4.47±0.87
	Easy access to new foods	4.47±0.87
Purchase	Buy on- line	3.94±1.39
	Buy off -line (supermarkets, meal-kit stores, etc.)	3.94±1.34
	Save time on food purchases	4.65±0.78
	Reliable brand	4.47±0.80

Satisfaction with the price	Taste for the price	4.47±0.80
	Quantity for the price	3.94±1.08
Safety	Sanitarily manufactured	4.53±0.62
	Eco-friendly (organic) ingredients used	3.47±1.12
	Indication of origin of ingredients	4.47±0.71
	Expiration date indication	4.65±0.49
	Nutritional information	4.29±0.92
	Eco-Friendly Packaging Container	3.59±1.12
Cooking	Reduction of time to clean ingredients before cooking	4.82±0.39
	Cooking Convenience	4.82±0.39
	Reduce cooking time	4.82±0.39
	Food quality after cooking	4.24±0.83
	Food waste reduction	4.59±0.61
	Post-processing after cooking (cleaning time)	4.65±0.49

3.1. 'Strongly satisfactory' results for meal kits

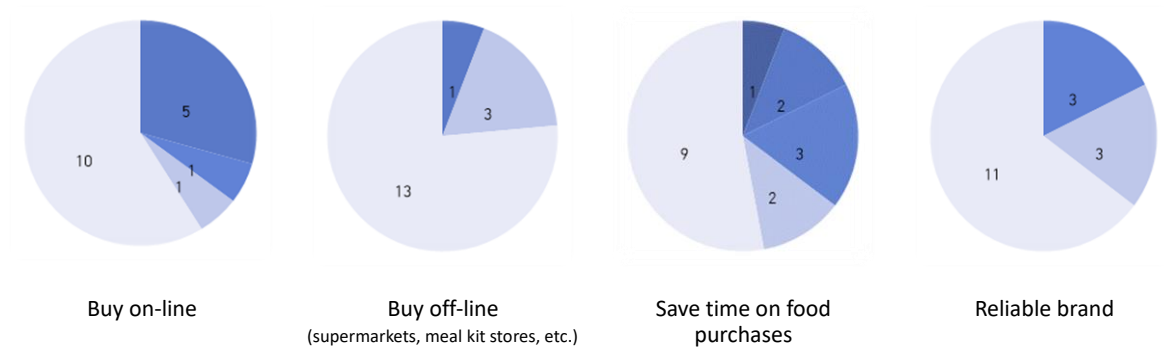
As a result of the ethnicity of the meal kit menu, 11 people reported that they were very satisfied with 'various kinds', 8 people said that they were 'new menu release', and 11 people said that they were very satisfied with 'easy access to new foods'. Currently, various types of meal kits are available, including Korean, Chinese, Western, Japanese, and snacks. In the next study, it is thought that it would be good to investigate the desired menu by age group. In addition, consumers prefer RMR meal kits, not HMR, so it would be nice to conduct research on RMR meal kits menu types, purchases, and consumers.

Figure 1. Menu.



As for the purchase of the meal kit, 10 people 'buy on-line' and 13 people 'buy off-line'. 9 people gave the highest score for 'save time on food purchases' and 11 people for 'reliable brand'. It is thought that it is necessary to study how much time is saved when purchasing a meal kit rather than purchasing each food through comparative research on consumers' food purchase time. In the case of online purchases, delivery may be delayed due to problems such as a parcel delivery strike, so it is necessary to think about new ways to sell online. In addition, it will be important to develop a meal kit to help the green environment by operating a zero waist store to reduce waste.

Figure 2. Purchase.



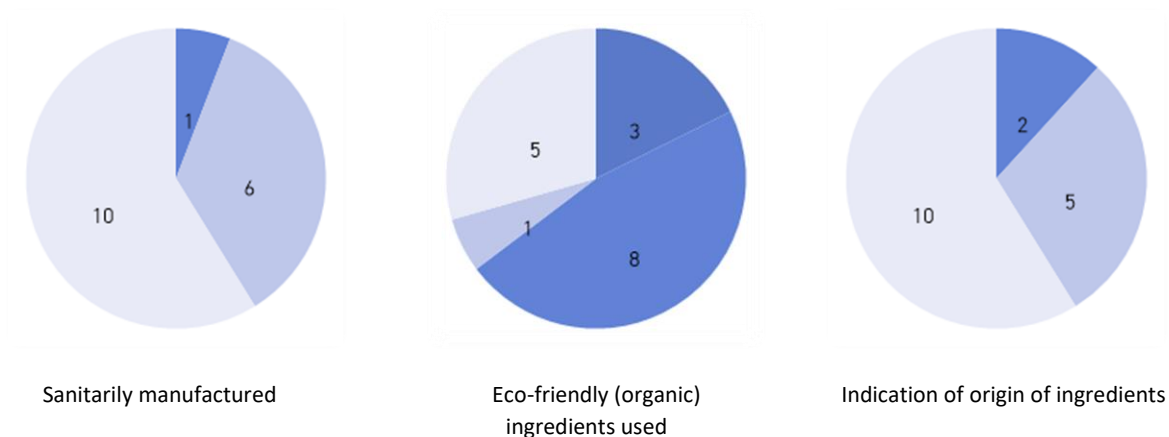
As for the price and quantity satisfaction of the meal kit, it was found that 10 people were satisfied with taste for the price and 7 people said that they were satisfied quantity for the price. Kim & Lee (2021) reported that people purchase meal kits for meals. Therefore, it is thought that it is necessary to develop taste in order to increase the satisfaction of the meal kit [27]. Korean food considers the quality of cooking the most important and determines consumption [28]. Therefore, it is also important to improve the quality of Korean meal kits.

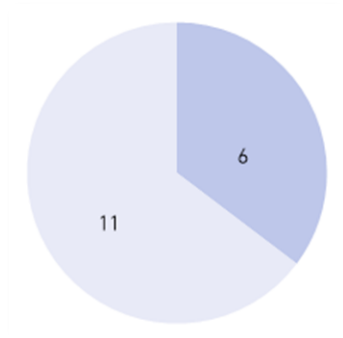
Figure 3. Satisfaction with the price.



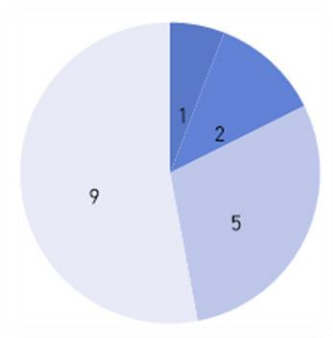
In addition, 10 people for 'sanitarily manufactured' meal kit, 8 people for 'eco-friendly (organic) ingredients used', 10 people for 'indication of origin of ingredients', 11 people for 'expiration date indication', 9 people for 'nutritional information', 9 people for 'eco-friendly packaging container' was surveyed by 5 people and it was found that 'eco-friendly (organic) ingredients' used should be reinforced or 'eco-friendly packaging container' should be reinforced.

Figure 4. Safety.

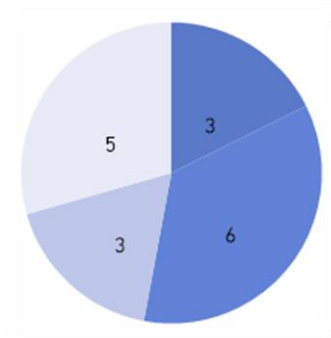




Expiration date indication



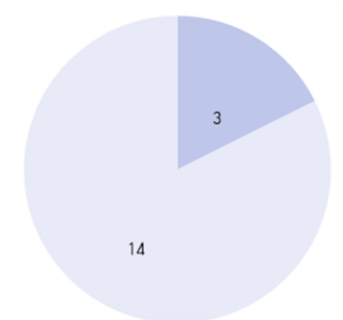
Nutritional information



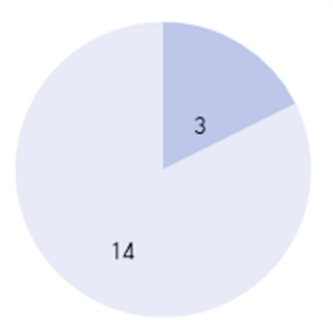
Eco-friendly packaging container

`Reduction of time to clean ingredients before cooking`, `cooking convenience, and `reduce cooking time` of meal kit were all very satisfied by 14 people, `food quality after cooking` by 8 people, `food waste reduction` and `post-processing after cooking (cleaning time)` by 11 people. It was found that people were very satisfied. Compared to other items, the quality of food after cooking shows lower satisfaction, so it is thought that research on the quality of food after cooking the meal kit should continue in the future.

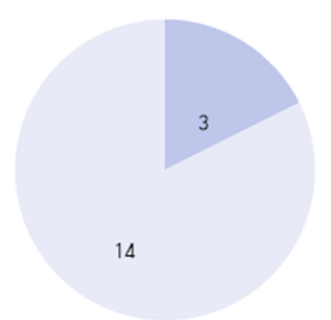
Figure 5. Cooking.



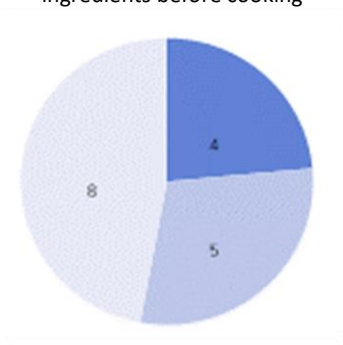
Reduction of time to clean ingredients before cooking



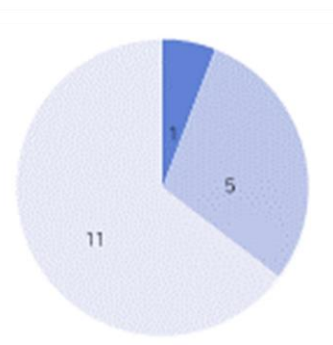
Cooking convenience



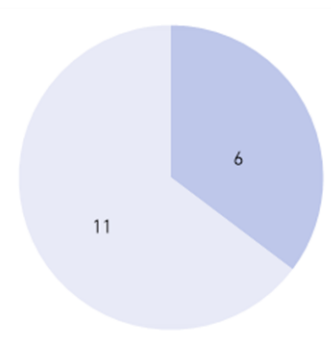
Reduce cooking time



Food quality after cooking



Food waste reduction



Post-processing after cooking (cleaning time)

- 1point (strongly unsatisfactory)
- 2point (unsatisfactory)
- 3point (normal)
- 4point (satisfactory)
- 5point (strongly satisfactory)

4. Conclusion

In this research on meal kit, we conducted deep interviews centered on a group of experts and derived the results in order to present the future development direction for meal kits that are easy to purchase, easy to cook, and in increasing demand. I would like to provide basic materials for the domestic meal kit market. A total of 22 questions were asked by a group of 17 experts, and the results of summarizing their opinions are as follows.

They were relatively satisfied with the various kinds of meal kit, new menu release, and easy access to new foods. The meal kit reduces the time to purchase ingredients, and the cases of on-line and off-line purchases were similar. Also, the reliable brand was considered important. In addition, although the price of the meal kit was relatively satisfactory, the quantity of the meal kit was not satisfied, and the sanitarily manufactured, indication of origin of ingredients, expiration date indication, and nutritional information were relatively satisfactory, but eco-friendly (organic) ingredients used and ecofriendly packaging container were investigated as requiring supplementation.

Reduction of time to clean ingredients before cooking, cooking convenience and reduce cooking time were very satisfactory, and food quality after cooking, food waste reduction, and post-processing after cooking (cleaning time) were also satisfactory. Lastly, in the future development direction, various development directions were presented, and the content related to health oriented product development was the most. By segmenting consumer needs, such as low sugar, vegan, dieter, exerciser, various product groups were produced, and packaging aimed at single person households was drawn as a conclusion. In addition, opinions on the use of eco-friendly packaging that help the environment, such as a meal kit for the elderly, a meal kit for diabetes and high blood pressure, development of premium products using only organic ingredients, and products that use eco-friendly packaging and have a certification mark attached, are also presented. As a result of a detailed satisfaction survey, it was found that the currently commercially available meal kit products were satisfactory.

Therefore, the development direction of the meal kit is low sugar, low salt, high protein, low fat, vegan, dieter, exerciser, meal kit for the elderly, etc. Previous studies also reported the need to improve with ingredients and recipes beneficial to health[20], and the need for health helping meal kit development was emphasized[19], so the subdivision of meal kit and health related development directions. It is thought that further research should be carried out. In addition, the development of products using eco-friendly packaging containers should be carried out to develop a meal kit product that is beneficial to consumers' health and the environment. It is also important to understand the segmented needs of consumers. The eco-friendly containers are important when purchasing milk kits, so companies have a good image of using eco-friendly packaging containers to consumers through improvement and promotion of their use in eco-friendly packaging containers[29]. In addition, consumers consider the origin of food ingredients important[30], so it would be nice to conduct research on the manufacture of meal kits according to food mile.

This study has the following limitations. First, in-depth interviews were conducted with a group of experts, and all consumer opinions were not reflected. Therefore, various studies should be conducted, such as purchasing meal kit by generation X, M, and Z, purchasing meal kit by gender, purchasing meal kit by workplace women and housewives, classifying them by age group, and purchasing meal kit by purpose. Second, research on RMR as well as HMR is currently conducted, so it is necessary to understand consumers' needs in more detail and strive to develop meal kits.

5. References

5.1. Journal articles

- [1] Chung HC & Kim CW. A Study on the Meal Kit Product Selection Attributes on Purchasing Behavior and Satisfaction. *Journal of the Korea Contents Association*, 20(6), 381-391 (2020).
- [2] Kim TH & Park JH. A Study on the Consumer Attitude and Purchase Intention for Functional Home Meal Replacement. *Korean Food Marketing Association*, 36(3), 93-121 (2019).
- [3] Oh WK & Hong JY. IPA Analysis on Selection Attributes of RTC (Ready To Cook) Type Milk Kit HMR (Home Meal Replacement). *Culinary Science & Hospitality Research*, 25(11), 69-81 (2019).
- [4] Kim CW & Lee KY. Subjectivity Type Analysis Study of Single-person Households on Meal Kit Products of Food Service Industry. *Journal of the Korea Contents Association*, 20(4), 406-415 (2020).
- [5] Lee YN & Jang HJ & Choi YW & Choi YS & Oh JE. A Study on the Consumer Perception and Importance-performance Analysis of the Vegetarian Meal-kit Development. *Journal of the Korea Contents Association*, 21(3), 324-335 (2021).
- [6] Lee EY & Kim YM & Choi MK. Meal Kit Purchasing Behavior and Relationship with the Nutrition Quotient of Young Adults in Chungnam. *Journal of Nutrition and Health*, 54(5), 534-546 (2021).
- [7] Lee GT. A Study on the Consumer Perceptions of Meal-kits using Big Data: Anticipating after the Covid-19 Pandemic Ends. *International Journal of Tourism and Hospitality Research*, 35(11), 227-239 (2021).
- [8] Hyun AH & Cho JY. Effect of 8 Weeks Un-tact Pilates Home Training on Body Composition, Abdominal Obesity, Pelvic Tilt and Strength, Back Pain in Overweight Women after Childbirth. *Korean Society of Exercise Physiology*, 30(1), 61-69 (2021).
- [9] Kim HJ & Kwon KH. A comparative Study on Non Invasive Cavitation Ultrasound to Improve Abdominal Obesity in Middle Aged Men after Coronavirus Infection. *Journal of the Korean Society for Wellness*, 16(4), 365-370 (2021).
- [10] Park JM & Park SK & Lee MS. Effects of Combined Exercise Training on Obesity Indices and VEGF and Endothelin-1 in Obese Middle Aged Women. *International Journal of Martial Arts*, 3(2), 7-13 (2018). [\[Article\]](#)
- [11] Lee CY. Warnings Given to Koreans in Health Status Only in Comparison to Modern Americans. *Korean Society of Food Science and Technology*, 41(1), 63-67 (2008).
- [12] Park MH. Current Condition and Supporting Service Measures of Childhood, Adolescent Diabetes Patient in Republic of Korea: Focused on the Sport. *International Journal of Sport*, 1(1), 31-35 (2016). [\[Article\]](#)
- [13] Park S & Lee J & Byeon Y. A Phenomenological Study on the Elderly's Experience of Participating in National Based Health Exercise. *Public Value*, 5(2), 23-31 (2020). [\[Article\]](#)
- [14] Park JK & Hong AR. An Analysis of Korean Dance Research Trends Related to Obesity and Eating Disorders. *The Korean Journal of Arts Education*, 17(4), 137-150 (2019).
- [15] Cheon W & Park J. The Effects of Saturated and Unsaturated Fat Intake on the Skeletal Muscle's LPL mRNA Expression in Rats. *Kinesiology*, 6(4), 33-44 (2021). [\[Article\]](#)
- [16] Park CM & Yoon HS. Depression and Stress Level according to BMI. *International Journal of Human & Disaster*, 3(2), 18-24 (2018). [\[Article\]](#)
- [17] Byeon YS & Kim HY. Antioxidative Characteristics of Dried Type Sodium Reduced Chicken Bibimbap Using Dandelion Complex Extract Powder of AF-343 as a Home Meal Replacement. *Korean Society of Food and Cookery Science*, 31(3), 378-386 (2015).
- [18] Lim HJ & Kim JH. Quality Characteristics Activities of Low Sugar Aronia Syrup Added with Aspartame. *Journal of the Korea Society of Computer and Information*, 26(2), 183-191 (2021).
- [19] Yi KY. A Study on the Strategic Response to the Growth of HMR Market. *The Korean Society of Management Consulting*, 20(1), 381-391 (2020).
- [20] Kim DS & Kim CW. Effect of HMR Meal Kit Product Selection Attributes on Consumers Satisfaction and Other Recommendation Intention. *Journal of the Korea Contents Association*, 21(1), 258-267 (2021).

- [21] Baek NG. The Effects on Psychological Benefit and Repurchase of HMR Premium Products -The Case of Peacock, Yorihada All about Food Customers. *Korea Customer Satisfaction Management Association*, 21(3), 43-68 (2019).
- [22] Nam SM & Hong WS. Consumer Needs for HMR Product Development of Chinese Elderly Consumers. *Journal of the Korean Society of Food Culture*, 36(5), 441-454 (2021).
- [23] Ra HN & Byeon YS & Kim EK & Oh SB & Kim HY. Quality Characteristics of Turmeric Reinforced Curry Rice for Health Functional Heating Type HMR using Fermented Turmeric. *The East Asian Society of Dietary Life*, 49(3), 324-330 (2021).
- [24] Choi YG & Choi HI & Kim SM & Kim HJ & Lim SB & Oh MC. Digestibility and Antioxidant Activity of Instant Cooked Rice with Seaweed for Home Meal Replacement. *The Korean Society of Fisheries and Aquatic Science*, 53(3), 395-402 (2020).
- [25] Hong JH & Park SY & Lee SH & Kim HY. Quality Characteristics of HMR Type Pork Restructured Jerky with Various Levels of Mustard Powder. *Journal of the Korean Society of Food Science and Nutrition*, 49(6), 625-630 (2020).
- [26] Kim HA & Bae JR & Song CR. A Study on Meal Kit Consumption Behavior and IPA of Women in Their 30s. *Culinary Science & Hospitality Research*, 27(11), 97-104 (2021).
- [27] Kim SS & Lee SJ. The Effect of Meal Kit Product Attitude on the Behavior Intention: Focused on the Moderating Effect of Individual Characteristics. *Culinary Science & Hospitality Research*, 27(7), 1-10 (2021).
- [28] Kim EJ & Kim MJ & Lee SM. The Influence of Select Attributes of Side-dish Stores on Economic Value, Store Trust and Word of Mouth. *Culinary Science & Hospitality Research*, 24(7), 119-125 (2018).
- [29] Lee YN & Jang HJ & Choi YW & Choi YS & Oh JE. A Study on the Consumer Perception and Importance Performance Analysis of the Vegetarian Meal Kit Development. *Journal of the Korea Contents Association*, 21(3), 324-335 (2021).
- [30] Jun JW. A study on Side Dish Selection Attributes of Korean Restaurant using IPA. *Culinary Science & Hospitality Research*, 24(9), 127-133 (2018).

6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	JB	-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*	HK	-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"/>

Publisher: J-INSTITUTE
ISSN: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: hongartedu@daum.net

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.57

© 2022 J-INSTITUTE

The Influence of Open Parental Communication Ability and Child Ego Resiliency on Children's Anger Expression: A Study on Children in Crisis

Eunjin Pyo¹

Hosan University, Gyeongsan, Republic of Korea

Hyeonoh Kim^{2*}

Hosan University, Gyeongsan, Republic of Korea

Suyeon Park³

Hosan University, Gyeongsan, Republic of Korea

Abstract

Purpose: The purpose of this study is to explore variables related to children's anger expression and prevent improper style of anger expressing style, which provides theoretical data in developing programs to train children to express anger appropriately.

Method: The survey was conducted self-reporting among 862 students in 5th and 6th grades from 5 elementary schools in D city. These collected data using STAXI-K(State-Trait Anger Expression Inventory), PACI(Parent-Adolescent Communication Inventory), and ER (Ego-Resiliency Scale), were statistically processed and analyzed based on SPSS24.0 and AMOS 24.0.

Results: The results were as follows: First, parental open communication ability and children's ego resiliency directly affect their anger expression(anger-out) and suppression(anger-in). Second, children's ego resiliency has an indirect influence on anger management. Also, parents' open communication skills directly impact child ego resiliency. Finally, this study identified the variables influencing children's anger expression. In contrast, the influence of these variables was different respectively on anger expression(anger-out), anger suppression(anger-in), and anger management.

Conclusion: The findings of this study suggest that the variables, including parental open communication ability, the environmental factor, and children's ego resilience, the individual factor, play a significant role in children's anger expressing style, which they can describe, explain, predict, and control their emotion. Among these variables, open parental communication had the most decisive influence directly on anger-out, and anger suppression(anger-in), which indicates that parents need to talk with their child smoothly for their child to express their anger effectively.

[Keywords] Anger Expression(Anger-Out), Anger Suppression(Anger-In), Anger Management, Open Parental Communication, Children's Ego Resiliency

1. Introduction

The number of 'Scary juvenile delinquents' is gradually increasing these days. Recently, the overall volume and severity of juvenile crime have gradually increased. At the same time, these teenagers tend to have much fewer feelings of guilt and a sense of responsibility compared to before. Violence in early adolescence refers to aggressive behavior. In this age, 'anger' is pointed out as a primary factor of violence and should be managed beforehand[1].

Children who are in 5th or 6th grade are in the period of transition between childhood and adolescence. They are going through many physical changes and often experience higher stress levels coming from an academic burden, family and friend relationships, appearance, or problems in the online world, which highly impact their growth and adaptation. In the past, research

*This Paper Summarizes Eunjin Pyo's Daegu Catholic University Doctoral Thesis.

on maladaptation of late school-aged children focused mainly on aggression, hostility, and impulsivity. However, it has expanded to anxiety, depression, stress, and finally to 'anger.' This change has been made after the concept that anger might act as a mechanism on the dysfunctional expression of child prevailed. Acquiring social skills, which are the basis of human relationships, language skills, and cognitive ability, is needed in this period. Since teens spend six years of elementary school, they go through various changes. Also, puberty today begins around 12 or 13 (5th, 6th grade) on average, and more children are moving into puberty at a younger age[2].

Since the variables related to anger vary widely, these variables draw different influences depending on the variables and how each variable acts in a combined way. Therefore, human behavior cannot always be explained solely by individual characteristics; instead, one also needs to consider the environmental factor with the characteristics to predict and explain human[3].

The parent-child relationship has a quantitatively different influence on children's anger expression than all other relationships and significantly influences growth and a pattern of behavior[4][5]. With various experiences with parents, children learn how to express and feel anger and regulate their emotions under certain circumstances. In other words, parent-child relationships influence the anger experience and expression heavily. However, only a few studies investigate children's anger with several parental factors and parenting attitudes. Therefore, this relationship needs to be approached from various perspectives.

During adolescence's psychological and situational transition period, teenagers often need parents' logical and rational attitudes, with active support and secure attachment through affection[6]. However, not all children exhibit adverse emotional problems such as depression or anger under stress and difficult situations. Some people accept and handle the changes and stressful situations well[7]. Every person shows different coping mechanisms in managing and accepting the same stressful situation[8]. and ego resiliency is a significant variable explaining this difference. This variable can explain children who have adequate coping strategies under anger, stress, challenges, or dangerous situations without showing physical and mental symptoms[9]. The concept 'ego resilience' can be understood as an internal characteristic that can be easily changed under the environmental context and consistently developed.

In this study, open parental communication was set as an environmental variable, and for the individual variable, the ego resiliency of the child was selected. Most of the studies about the relationship between the style of anger expression with the potentially correlated variables have only analyzed the subfactors of the anger expression style, could not subdivide anger-out, anger-in, anger management precisely. Therefore, this study tried to consider both the individual and environmental variables in an integrated perspective.

2. Experimental Method

2.1. Subjects

The participants of this study were a total of 862 students in the 5th and 6th grades of five elementary schools located in D city. In order to accurately measure an index fit and parameters of the Structural Regression Model, the minimum study subject condition, the ratio of parameters to the number of test subjects, 1:15-20 was applied[3][10]. Among 925 subjects, several students who 1) disagreed, 2) did not have parent's consent, or 3) did not answer faithfully, were excluded and a total of 862 student's data were collected. There were 428 (49.7%) male students and 434 (50.3%) female students, with 445 (51.6%) students in the fifth grade and 417 (48.4%) in the sixth grade.

2.2. Instruments

2.2.1. STAXI-K (state-trait anger expression inventory-korea)

In order to measure children's anger expression, STAXI-K (State-Trait Anger Expression Inventory-Korea) was used. STAXI-K is a measure modified by Jeon Gyeongmu, Kim Dong-yeon, and Lee Joonseok[11] to fit the sentiments and culture of Korea. The original scale, which Spielberger has invented, was designed to assess anger experience (trait anger, state anger) and anger expression (anger-out, anger-in, and anger management). However, the anger experience scale was excluded in this study. The questions are a total of 8 each (anger-out, anger-in, and anger management), which are a single-dimensional scale consisting of a single factor. Using 'Radical algorithm,' the package variables of these three components were set as the indicator variable of anger expression.

The questions were measured on a 5-point Likert scale (24 questions) in a self-reporting way, with choosing one from 'Strongly disagree' (1 point), 'Disagree' (2 points), 'Neutral' (3 points), 'Agree' (4 points), and 'Strongly Agree' (5 points). The total score ranges from 8 to 40, and the higher score indicates that the child expresses anger well.

To verify the reliability of the extracted factors (anger expression), Cronbach's alpha coefficient was used. In addition, confirmatory factor analysis (CFA), which Raykov[12] suggested, was used to verify the latent variables (anger-out, anger-in, and anger management).

2.2.2. PACI (parent-adolescent communication inventories)

In order to measure parental open communication ability, a revised version of PACI (Parent-Adolescent Communication Inventories) was initially developed by Barnes and Olson (1982) and revised by Min Hyeyoung[13] and Baek Seung-mi[14] to make it appropriate for the elementary school students. This study focused more on figuring out how children perceive the conversation with their parents than observing the parent-child communication style objectively. Therefore, only the questionnaire for children was used to find out parent-child communication style from the child's point of view.

To verify the reliability of the extracted factors (parental open communication ability), Cronbach's alpha coefficient was used. Construct reliability based on the confirmatory factor analysis (CFA), which Raykov[12] suggested was used to verify the latent variables of parental open communication ability.

2.2.3. Ego resilience scale of children

The Ego Resilience Scale: ER 89 of Block and Kremen (1996) used in this study is a restructured version of the guidelines by Yoo Seongkyung and Shim Hyewon[15] to suit the purpose of the study. Therefore, in this study, 14 questions on the self-elasticity of children (unidimensional scale) were aggregated into two parcels, 'ego resilience 1,' and 'ego resilience 2,' using a radial algorithm. These two variables were set as indicator variables of emotional clarity. This scale has a total of 14 questions, with a total score ranging from 14 to 60, and the higher the score, the higher the child's self-elasticity.

To verify the reliability of the indicator variables ('ego resilience 1,' and 'ego resilience 2'), Cronbach's alpha coefficient was used. In addition, construct reliability based on the confirmatory factor analysis (CFA), which Raykov[12] suggested, was used to verify the latent variables of ego resilience.

2.3. Data analysis

2.3.1. Preliminary study

The preliminary study was carried out on October 4, 2017, with 5th and 6th elementary school graders of D city to find out whether the measurement tools of anger expression, open parental communication, ego resilience, and cognitive emotion regulation strategies were appropriate. With 90 copies, excluding nine unreliable responses, 81 copies were analyzed using SPSS 24.0. To estimate the inter-item consistency of the indicator variables, Cronbach's alpha coefficient was used, and construct reliability: CR was verified by confirmatory factor analysis (CFA), which Raykov[12] suggested. It was found that both the Cronbach coefficient of all indicator variables and construct reliability were .70 above.

2.3.2. Main study

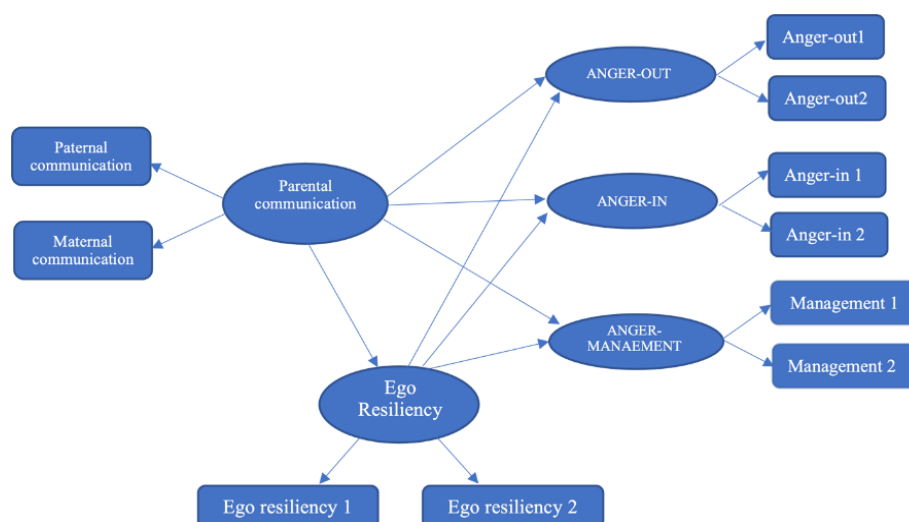
The institutional review board (IRB) of Daegu catholic university deliberated on the ethical and scientific validity of research purpose, protocols, and questionnaire in November 2016. After the preliminary study, the study was carried out from October 11 to October 20, 2017.

This study was measured in the child's self-report method. Since there is a risk of showing social desirability bias and positive orientation, it was specified in the directive that there are no correct or incorrect answers. Also, to prevent the positive orientation, positive and negative questions were randomly arranged, and the number of questions was reduced to set the questions. Before proceeding with the study, the purpose and method of the study were delivered to the homeroom teachers, vice-principal and principal orally in advance and were summarized in writing and informed again to the homeroom teachers. Using the class break time, 5th, 6th graders participated in the survey under the homeroom teacher's supervision, and certain school supplies were provided to the participants. The parental consent form was sent to each household with the research paper. Parents who agreed to the study signed the paper, and the form was delivered to the researcher.

2.4. Data analysis

As for the data processing, a statistical model was set as the following procedure below and analyzed using AMOS 24.0. First, a statistical model was set as shown in <Figure 1> to analyze the direct effects of parental open communication and self-elasticity perceived by children, which was the cause variables of anger expression. Then, to measure latent variables including anger-in, anger-out, and anger management, these three variables were subdivided into two (anger-in 1,2/ anger-out 1,2/ anger management 1,2) and set as the indicator variables, respectively. Finally, paternal, maternal communication was set as the indicator variables of parental open communication skills. The same goes with ego-resiliency shown below.

Figure 1. Statistical model.



Following the two steps, the measurement model confirmation, and the structural regression model verification (Moon Soobaek, 2009; Kline, 2011), with the measurement variable conformity assessment, convergent validity and discriminant validity of measurement model were verified through confirmatory factor analysis of AMOS 24.0 and estimated the measurement model fit(conformity) and parameter. The goodness of fit between the measurement model and the structural regression model was evaluated by Chi-square (χ^2), Normed Chi-square (NC), the 90% confidence interval for the Steiger-Lind (1980) RMSEA index, Tucker index (TLI: Tucker-Lewis Index), Comparative fit index (CFI), and the standardized root mean squared residual (SRMR). Also, the statistical significance of the parameter was verified at the significance level of .05. In addition, the phantom variable was used to figure out the indirect effect. After setting up the indirect effect estimated model, bootstrapping procedure of the AMOS 24.0 program was used and verified the statistical significance at the significance level of .05 as well.

3. Results

3.1. Cross-correlation matrix & descriptive statistics between the measurement variables

<Table 1> shows the results of the cross-correlation matrix between the measurement variables sampled from 862 children, the estimated average, standard deviation, skewness, and kurtosis.

Table 1. Cross-correlation matrix and descriptive statistics between the measurement variables.

Measurement variable	Paternal communication	Maternal communication	Ego resiliency1	Ego resiliency2	Anger -out1	Anger -out2	Anger -in1	Anger -in2	Anger management1	Anger management2
Paternal communication	1.00									
Maternal communication	.69	1.00								
Ego resiliency1	.44	.43	1.00							
Ego resiliency2	.38	.34	.68	1.00						
Anger-out1	-.23	-.24	-.20	-.15	1.00					
Anger-out2	-.26	-.29	-.24	-.21	.60	1.00				
Anger-in1	-.39	-.43	-.38	-.28	.35	.40	1.00			
Anger-in2	-.35	-.36	-.34	-.28	.41	.44	.69	1.00		
Anger management1	.17	.19	.31	.35	-.33	-.38	-.16	-.19	1.00	
Anger management2	.13	.13	.31	.36	-.14	-.25	-.08	-.14	.55	1.00
Average	74.42	73.59	26.34	25.49	10.10	10.02	9.58	9.81	13.77	13.47
Standard deviation	14.02	13.52	4.26	4.21	2.81	2.92	2.99	2.80	2.49	2.20
The number of cases	862	862	862	862	862	862	862	862	862	862
Skewness	-.35	-.21	1.17	-.18	.31	-.02	.20	.08	-.28	-.17
Kurtosis	-.18	-.59	12.03	-.30	-.17	-.58	-.41	-.30	.39	.43

3.2. Fit(conformity) and parameter estimates on the measurement model

To evaluate the estimation and conformity of the structural regression model, it was converted into a measurement model following the two-step estimation of models (Moon Soobaek, 2009).

3.2.1. The result of conformity assessment on the measurement model

For the conformity assessment on measurement model, Chi-square (χ^2), Normed Chi-square (NC), the 90% confidence interval for the Steiger-Lind (1980) RMSEA index, Tucker index (TLI: Tucker-Lewis Index), Comparative fit index (CFI), and the standardized root mean squared residual (SRMR) were used. As Table 5 shows, all conformity indices, including RMSEA, met the evaluation standard well.

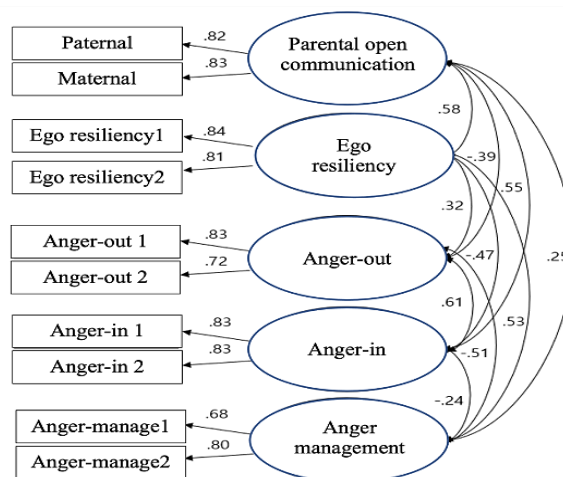
Table 2. The conformity index of the measurement model.

Model	NPAR	DF	CMIN	NC	TLI	CFI	SRMR	RMSEA(.07)	
								LO90	HI90
Measurement model	45	75	265.84	3.54	.95	.96	.04	.05	.06

3.2.2. Estimated parameters regarding the measurement model

As all the goodness-of-fit indices of the measurement model were found to be good, the results of estimated parameters of the measurement model through confirmatory factor analysis are shown in <Figure 2>.

Figure 2. Estimated parameter of the measurement model.



<Figure 2> shows that the correlation coefficient between latent variables (parent open communication, ego-resilience, anger-out, anger-in, and anger expression) was between .24 and .74. Since the factors set in the model are the subscales to measure the construct, the correlation coefficient of latent variables should be .85 or less for discriminant validity [3][10]. If the correlation coefficient of latent variables is .85 or above, it means two latent variables are measuring the same factor. This study showed the correlation coefficients between the latent variable scale under .85, which means it satisfied the discriminant validity. The observed variables used to measure the latent variable are the indicated variables [3]. The average factor loading between latent and indicated variables should be at least .50 to fit the convergent validity. First, the factor loading of the latent variable for the parent's open communication ability relationship was .83 for the paternal communication and .82 for the maternal communication. Second, the

factor loading of the latent variable for ego-resiliency was .84 for ego-resiliency1 and .81 for ego-resiliency2. Lastly, the factor loadings of the latent variables for anger-out, anger-in, and anger management were as follows; anger-out1 .72, anger-out2 .83, anger-in1 .83, anger-in2 .83, anger management1 .68, and management2 .80. The factor loadings of indicated variables for latent variables should be at least .50 on average. Thus, the convergent validity of each latent variable above satisfies the standard.

3.2.3. Decomposition of a total effect into direct and indirect effects

By measuring the structural regression model of the final research model, the effects of the relationship between the presented variables were verified. These effects were decomposed into direct and indirect effects, and the result is shown in <Table 3> below.

Table 3. Decomposition of a final research model into direct and indirect effect: results.

Variable			standardized coefficient (β)			Unstandardized Coefficient (B)		
			Total effect	Direct effect	Indirect effect	Total effect	Direct effect	Indirect effect
Parental open communication	→	Ego resiliency	.58 *	.58 *		.18 *	.18 *	
Ego resiliency	→	Anger-out	-.17 *	-.17 *		-.10 *	-.10 *	
Ego resiliency	→	Anger-in	-.20 *	-.20 *		-.15 *	-.15 *	
Ego resiliency	→	Anger management	.53 *	.43 *	.10 *	.28 *	.22 *	.53 *
Parental open communication	→	Anger-out	-.44 *	-.34 *	-.10 *	-.08 *	-.06 *	-.02 *
Parental open communication	→	Anger-in	-.58 *	-.47 *	-.12 *	-.13 *	-.11 *	-.03 *
Parental open communication	→	Anger management	.34 *		.34 *	.06 *		.06 *

Note: Figures are rounded to two decimal places, * $p < .05$.

As shown in <Table 3>, the parameter of the total, direct, and indirect effects of the structural regression model, the final research model, was verified following the statistical procedures. At the significance level of .05, the significance is verified by statistical methods. The results are as follows:

a) The total effect of the related variables affecting the 'Anger management' variable was ego resiliency ($B = .28$, $p < .05$) and open parental communication ($B = .06$, $p < .05$) in order. b) The total effect of the related variables affecting the 'Anger-in' variable was open parental communication ($B = -.13$, $p < .05$) and ego resiliency ($B = -.15$, $p < .05$) in order. c) The total effect of the related variables affecting the 'Anger-out' variable was open parental communication ($B = -.08$, $p < .05$) and ego resiliency ($B = -.10$, $p < .05$) in order. d) The related variable affecting 'Ego resiliency' was open parental communication ($B = .18$, $p < .05$).

3.2.4. A test of significance of the research model indirect effects

The research problem in this study is whether it directly affects each variable. However, the significance and possibility of indirect effects can also be studied through a new hypothesis that indirect effects may exist beyond the scope of direct effects between variables [3]. In this study, an indirect effect model was set up using the Phantom variable to determine the incidental, indirect effect. Next, the indirect effect was projected through the bootstrapping procedure of the AMOS24.0 program. <Table 4> below shows the results of the statistical test of significance.

Table 4. Estimation of a final research model's indirect effect & the results of a statistical significance test.

Variables					The coefficient of indirect effect		
					B	S.E.	p
Parental open communication	→	Ego resiliency	→	Anger-out	-.02 *	.007	.019
Parental open communication	→	Ego resiliency	→	Anger-in	-.03 *	.008	.002
Parental open communication	→	Ego resiliency	→	Anger management	.04 *	.008	.002

Note: Figures are rounded to two decimal places, * $p < .05$.

The results are as follows:

a) 'Parental open communication ability' indirectly affects 'anger-out' ($B = -.02$, $p < .05$) through ego-resiliency. b) 'Parental open communication ability' indirectly affects 'anger-in' ($B = -.03$, $p < .05$) through ego resiliency. c) 'Parental open communication ability' indirectly affects anger management ($b = .04$, $p < .05$) through ego resiliency. d) Therefore, 'Parental open communication ability' does indirectly affect 'anger-in,' 'anger-out,' 'anger management' through ego resiliency.

4. Discussion

This study sought to examine a direct effect between each variable. However, the significance and possibility of indirect effects can also be discussed and studied through a new hypothesis that indirect effects may exist beyond the scope of direct effects between variables. For example, based on the fact that there was little direct correlation between parents' open communication skills and anger control, statistical tests were conducted through the Phantom variable to find out a more comprehensive range of indirect effects.

4.1. The influence of parental open communication ability on child anger expression

It was turned out that parental open communication ability directly influences child anger expression, especially on anger-out and anger-in. The more parents communicate openly and effectively with their children, the more they express or repress their anger less. When parents and children feel stable and continue a smooth conversation, relationships between parents and children will significantly improve. As a result, the degree of anger-in and out of the child will decrease. Conversely, communication between parents and children that is ineffective or negative can lead children to express their rage or suppress anger.

When children begin to feel that they are having open communication with their parents, they start to express anger appropriately to others. This study result is in line with studies showing that open parental communication has a significant correlation between anger-in and out [16][17][18][19][20]. and that parent-child communication affects children's negative emotional [21].

On the contrary, the study showed that parents' open communication ability did not directly affect anger management. It is partially consistent with the results of one study suggesting that there is little correlation between anger management and paternal communication style [17]. Considering that the correlation between the two variables is not established because not only the direct effect between the variables but also indirect effect through other variables or third variables have an effect [3], open parental communication can have an indirect influence on child anger management through other variables.

Therefore, it is important to make parents aware of their pivotal role of open communication,

prevent children's maladaptive expression of anger, and provide information to form the proper expression of anger.

4.2. The influence of child ego resiliency on child anger expression

It was turned out that child ego resiliency directly affects child anger expression, which means children with higher ego resiliency can control their anger more adequately. The results of this study are similar to those of the previous studies on the correlation between child ego resiliency and anger expression[22] and on switching distorted thoughts about an angering event in mind can prevent negative way of interpreting anger[23].

In addition, studies show that children's ego resilience and anger management have a significant correlation[24] and that children with high ego resilience adapt and manage a stressful situation more efficiently and show high anger managing ability are in line with the result of this study[25][26][27]. It means that the higher the child's ego resiliency, the higher the child's anger managing ability, which children can easily control their anger in their way. Furthermore, ego resiliency is an internal characteristic of an individual which can be changed and developed. Therefore, improving child ego resiliency is needed to protect their rights in any situation.

4.3. The influence of parental open communication ability on child ego resiliency

It was turned out that parental open communication ability directly influences child ego resiliency. These findings were consistent with previous literature showing that affectionate parenting and open communication positively affect child ego resiliency and self-conception[28][29][30][31]. It is also in line with a study that shows child ego resiliency declines as parents show more dysfunctional communication, including evaluation, criticism, and appeasement[32]. Furthermore, a study that revealed maternal meta emotion philosophy and child's ego resiliency has a significant correlation[33].

Hence, parents must consider ways to build an environment where children can express themselves openly and freely. In addition, it will help children build ego resiliency and emotion managing ability to cope with stressful situations adaptively.

4.4. Integrated anger expression in the research model

Based on the study's findings, both direct and indirect effects of child anger expression were verified through the structural model. In addition, the structural relationship between child anger expression and potentially related variables and indirect effects were also found.

The findings of this study suggest that the variables, including parental open communication ability, the environmental factor, and children's ego resilience, the individual factor, play a significant role in children's anger expressing style. Open parental communication did not influence child anger management, indirectly affecting child ego resiliency.

In other words, children's ego resiliency is a mediator variable that mediates parents' open communication with child anger management. Since parents' open communication positively affects developing child ego resiliency, it eventually helps control the anger. So, unfortunately, no previous studies are examining the mediating effect of child ego resiliency that comparing the results of the previous studies with those of this study would be difficult. However, the result of some precedent studies shows similar context: children whom their parents have taught about conversation considering the perspectives of others had higher ego resiliency, which affects positively on emotional intelligence[34] and maternal affectionate, caring increases child emotion regulation through child self-esteem[35][36]. Thus, to increase the level of anger control in children, parents need to communicate openly and soundly with their children. However, the study also suggests that improving children's ego resiliency is pivotal.

The results were as follows: First, parental open communication ability and children's ego resiliency directly affect their anger expression(anger-out) and suppression(anger-in). Second, children's ego resiliency has an indirect influence on anger management. Also, parents' open communication skills directly impact child ego resiliency. Finally, this study identified the variables influencing children's anger expression. In contrast, the influence of these variables was different respectively on anger expression(anger-out), anger suppression(anger-in), and anger management.

The findings of this study suggest that the causing variables, including parental open communication ability, the environmental factor, and children's ego resilience, the individual factor, play a significant role in children's anger expressing style. Furthermore, open parental communication had the most substantial influence directly on anger-out and anger suppression(anger-in), which indicates that parents need to talk with their child smoothly to interpret and express their anger effectively. Therefore, practical measures such as parent education programs teaching parenting methods or parent counseling programs are needed. Also, for children, early childhood education aims to control anger, which can cause conflicts with peers. It can help children build positive emotions throughout adolescence and adulthood and help social adaptation[37].

5. References

5.1. Journal articles

- [2] Part M. Update in the Etiology and Treatment of Sexual Precocity. *Occurrence and Reproduction*, 10(4), 215-225 (2006).
- [4] Kwon HS. Research on Conditions of School Verbal Violence to Children from Multi-cultural Family and Countermeasures. *International Journal of Criminal Study*, 3(1), 21-25 (2018). [Article]
- [5] Bae J & Kim Y. Youth Mental Health Crisis and Countermeasure in Korean. *International Journal of Human & Disaster*, 1(1), 13-18 (2016). [Article]
- [6] Son B. The Effects of Desirable Parenting Attitudes upon Life Satisfaction in Early Adolescence: The Mediating Effects of School Adjustment and Ego-resilience and Multiple Group Analysis across Gender. *Korea Youth Research Institute*, 23(1), 149-173 (2012).
- [7] Park Y & Hyun E. Ego-resilience and Stress Coping Styles of Adolescents. *Korea's Journal of Management*, 25(6), 83-94 (2007).
- [8] Kim J. Parents -Communication Between Children and Stress and Stress Response Behaviors in Middle School Students. *Consulting Psychology Research*, 7(1), 96-124 (2005).
- [9] Block JH. & Block J. The Role of Ego-control and Ego-resiliency in the Organization of Behavior. *The Minnesota Symposia on Children Psychology*, 13, 39-101 (1980).
- [11] Jeon G & Kim D & Lee J. Korean Version Status-characteristic Anger Expression Scale(STAXI-K) Development Research: IV = Development of the STAXI-K: IV. *Art Therapy Research*, 7(11), 33-50 (2000).
- [12] Raykov T. Estimation of Congeneric Scale Reliability using Covariance Structure Analysis with Nonlinear Constraints. *British Journal of Mathematical and Statistical Psychology*, 54, 315-325 (2001).
- [15] Yu S & Shim H. Explore the Psychological Protection Factors of Adaptive Flexible Youth. *Educational Psychology Research*, 16(4), 189-206 (2002).
- [18] Park H & Ha J. The Effects of the Parents -Adolescents Communication Level and Adolescent's Emotional Autonomy on Anger Impression Method and Juvenile Delinquency. *Korea Youth Research Institute*, 18(2), 89-110 (2007).
- [23] Kordich H & Pearson J. Partnerships to Enhance Children's Resilience. *Canadian Child Care Federation*, 32-34 (2008).
- [24] Gong S & Moon H. Mediating Effects of Ego-resilience on the Relationship between Parental Conflicts and Anger Control in Children. *Children and Rights*, 19(4), 687-707 (2015).

- [29] Min H. The Relation between Juvenile Delinquency and Parent - Adolescent Communication. *Family Cohesion and Adaptability Children's Journal*, 13(1), 112-124 (1992).
- [31] Lee HS & Sunwoo HJ. Relationship between Parent Communication Style and Stress Coping Styles in Adolescence: The Mediating Effects of Ego-resiliency. *Korean Family Journal*, 49(6), 109-122 (2011).
- [34] Yang H & Yang S. The Mediating Effects of Children's Ego-resilience on the Relationship between Parents' Person-oriented Guidance and Children's Emotional-intelligence. *Children's Journal*, 34(2), 83-99 (2013).
- [35] Cho S & Lee K. Effects of Maternal Parenting, Self-esteem and Emotion Regulation Strategy on Emotion Regulation of Children. *Journal of Korean Family Association*, 48(5), 61-72 (2010).
- [36] Lim Y & Lee M. Implications of Emotional Coaching and Integrated Art Therapy Teaching Method on Leadership Education in the AI Era. *Robotics & AI Ethics*, 5(2), 42-49 (2020). [\[Article\]](#)
- [37] Kang Y. A Design on Teaching and Learning Method for Creative Talent in the Fourth Industrial Revolution. *International Journal of Human & Disaster*, 5(1), 1-9 (2020). [\[Article\]](#)

5.2. Thesis degree

- [1] Han D H. The Effects of Anxiety, Depression, and Self-esteem on the Anger Expression of Adolescents. Seoul Women's University, Master's Thesis (2009).
- [13] Min H. Family System Types and Parent-adolescent Communication. Yonsei University, Master's Thesis (1991).
- [14] Baek S. Relationship Between Parent-child Communication and Child's Multiple Intelligences. Seoul National University, Master's Thesis (2003).
- [16] Na S. Children's Anger Expression According to Their Perfectionism and Parent-child Communication Style. Catholic University, Master's Thesis (2006).
- [17] Park S. The Effect of College Students' Perceived Parent-adolescent Communication Style and Parenting Attitude on Anger Expression. Dong-a University, Master's Thesis (2009).
- [19] Jeong J. The Relationship between the Communication of Parent-child and Dysfunctional Anger Expression in Adolescents: The Mediating Effect of Internalized Shame. Sungshin Women's University, Master's Thesis (2015).
- [20] Kim M. The Relationships of Parent-child Communication Types and Peer Relationship Quality to Anger Expression in. Dankook University, Master's Thesis (2012).
- [21] Shin J. Relationship among Parent-adolescent Communication, Perfectionism and Emotional Expressiveness. Hongik University, Master's Thesis (2002).
- [22] Park H. The Structural Relationship Among Resilience, Anger Thought and Anger Expression in Mothers of Young Children. Hanyang University, Doctor Thesis (2014).
- [25] Kim Y. The Relationship among Parent's Marital Conflict and Self-control, Way of Anger Expression by University Students. Gunyang University, Master's Thesis (2012).
- [26] Lee J. The Effect of Parenting, Social Support and Ego-resilience of Single-parent-family Children on the Psychological Adjustment . Hanyang University, Master's Thesis (2007).
- [27] Jung Y. The Effect of Parenting Attitude Perceived by Adolescents on the Anger Control. -The Mediating Effects of Ego. Yeongnam University, Master's Thesis (2013).
- [28] Kwon H. Grounded Theory Approach to the Phenomenon of Teenage-girls' Anger. Doctor Thesis (1995).
- [30] Song J. The Effects of Parent-child Communication and Children's Ego-resilience on Emotional Intelligence. Ewha Women's University, Master's Thesis (2014).
- [32] Kim H. The Relationship among Parents' Dysfunctional Communication Perceived by Adolescents their Perfectionism and Ego-resilience. Korea University, Master's thesis (2005).
- [33] Shin J. Relations between Maternal Meta-emotion Philosophy, Children's Resilience and Severity of Anger. Seoul Women's University, Master's Thesis (2015).

5.3. Books

- [3] Mun S. Understanding and Applying Structured Modeling (2009).

[10] Kline R. Principles and Practice of Structural Equation Modeling (2011).

6. Appendix

6.1. Authors contribution

	Initial name	Contribution
Lead Author	EP	-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*	HK	-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	SP	-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: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: jskang@wku.ac.kr

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.69

© 2022 J-INSTITUTE

Difference in Treatment Outcome according to Oxygen Supply Time in Patients with Myocardial Infarction

Kyengho Yun¹

Wonkwang University, Iksan, Republic of Korea

Jisook Kang^{2*}

Wonkwang University, Iksan, Republic of Korea

Abstract

Purpose: The purpose of this study was to compare the effects of oxygen therapy on cardiac status and therapeutic outcomes after percutaneous coronary intervention (PCI) and to reduce unnecessary oxygen supply. Our intervention focused on reducing the six hours of oxygen therapy that was previously available to two hours.

Method: A non-equivalent control group non-synchronized design was used. After IRB approval, we started experimental study. Total 42 patients participated in this study, 12 in the experimental group and 30 in the control group. The experimental group received oxygen for 2 hours and the control group was compared to the experimental group by chart review of patients who maintained oxygen for 6 hours. We measured Ejection Fraction (EF) by Echo-cardiogram and Myocardial Condition by Myocardium SPECT. We also checked hospital days by reviewing medical chart. For the analysis, descriptive statistics, X2 test, and t-test were used for statistical analysis with SPSS 23.0 program.

Results: The test in Myocardium SPECT showed no significant difference in Myocardial condition between the experimental group and the control group. Especially, 'stress defect' among the test items was significantly lower in the experimental group than in the control group ($t=2.118$, $p=.040$). In addition, there was no significant difference in the hospital day in the experimental group and the control group ($t=-0.341$, $p=.735$).

Conclusion: Therefore, it is recommend to maintain oxygen therapy for 2 hours reduced and compared previous oxygen therapy protocol.

[Keywords] Myocardial Infarction, Oxygenation, Percutaneous Coronary Intervention, Oxygen Supply Time, Treatment

1. Introduction

1.1. Background

The major causes of death in Korea are cancer, heart disease, cerebrovascular disease and pneumonia in that order, of which the mortality rate from heart disease was 60.4% per 100,000 people in 2019, a significant increase from 45.0% a decade ago [1]. Among them, cardiovascular disease or coronary artery disease (CAD), a leading cause of heart disease, develops atherosclerosis in the coronary artery, thus the oxygen supply to the heart muscle is not smoothly provided, and causes angina and myocardial infarction [2]. In the case of patients with acute myocardial infarction, it is critical to reopen the coronary artery blood flow within a short time after the onset as reported that the majority of patients die before arriving at the hospital due to arrhythmia such as ventricular fibrillation or ventricular tachycardia occurring within 1 hour after the onset. In acute myocardial infarction, myocardial necrosis gradually progresses over time as the coronary artery is completely closed by a thrombus caused by rupture of the coronary atherosclerotic plaque. So the treatment should be initiated within 6 hours at the latest after onset [3].

The general treatments of coronary artery disease are usually divided into drug therapy to control risk factors and symptoms, and percutaneous coronary intervention (PCI) to prevent the progression of ischemia and infarction. Percutaneous coronary intervention (PCI) is a surgical procedure in which a stent is inserted into the narrowed intima of blood vessels. Through this, the blood flow to the heart is increased by keeping the coronary artery vessels from narrowing [4].

Patients who have undergone coronary intervention may experience complications such as death, stroke, contrast-induced nephropathy, and catheter insertion site bleeding [5] during the procedure. In order to prevent and manage this, they enter the intensive care unit with consciousness and receive nursing care [6].

Nursing at this time is aimed at nursing patients in acute phase, nursing to prevent complications, nursing to prevent recurrence, and rehabilitation nursing. As acute nursing, the nurse admits the myocardial infarction patient to the cardiology intensive care unit to provide immediate and intensive care and treatment, oxygenates and helps to oxygenate the damaged heart under the complete rest, reduces physical and mental stress, observes pain control, ECG observation, vitality symptom assessment, diet control, and intake and excretion balance, and offers emotional support as keeping a close watch on diseases and complications of treatment [3]. And appropriate nursing education that reflects these factors is necessary [7]. In particular, it is common to carry out the oxygen therapy in cardiology intensive care units to help oxygenate the damaged heart [8].

Oxygen therapy is one of the most generally performed nursing practices in hospitals, and is essential for proper oxygenation of patients and maintaining airway openness [9][10]. As such, in the medical environment, oxygen is very commonly medicated to patients, but it is often overdosed or incorrectly prescribed by medical team, and the oxygenation process and its effects have not been adequately evaluated [11]. Excessively administered oxygen causes overproduction of reactive oxygen species (ROS), and the occurrence of oxidative stress, caused by this, is known to play an important role in the development and progression of various heart diseases [12]. The American College of Cardiology (ACC) and the American Heart Association (AHA) stated that in STEMI patients' guidelines, it is sensible to provide supplemental oxygen to all patients for the first 6 hours [13]. Accordingly, in many hospitals, oxygen was uniformly provided to all patients for 6 hours under the prescription of a cardiologist after coronary intervention.

Oxygen has been administered to all suspected patients of acute myocardial infarction for about 100 years to date, and this treatment was based on the belief that oxygen supplementation would improve the prognosis by improving oxygen supply to the ischemic myocardium. However, this is not built on specific evidence, and the aforementioned physiological changes are relevant for some patients with hypoxia. Much of the data suggests that oxygen therapy may be harmful to other patients [14]. In fact, according to Rawles, Kenmure et al (1976) [15], a double-blind study was conducted with randomly extracted 200 patients under suspected myocardial infarction admitted to the hospital, and 6 L/min of oxygen was provided with a mask or compressed air for the first 24 hours to determine the effects of oxygen. Excluding 43 patients found to have no myocardial infarction, the incidence of arrhythmia and mortality was higher in the oxygen-treated group than in the untreated group. In the oxygen-treated group, 11 out of 80 (11.25%) were dead, and in the untreated group, 3 out of 77 (3.8%) died. In addition, a research of Dion Stub (2014) [16] reported that in STEMI patients without hypoxia, oxygen supplementation therapy could increase early myocardial damage, and the size of myocardial infarction also grew after 6 months assessed. This excessive oxygen therapy has the potential to damage the myocardium due to coronary vasoconstriction and increased oxidative stress. Nevertheless, it was general to unconditionally administered to patients with acute myocardial

infarction[17]. Besides, the protocols for performing oxygen therapy after coronary intervention to acute myocardial infarction vary from doctor to doctor and from institution to institution.

According to the European Society of Cardiology (ESC) guideline 2017[18], it was suggested that oxygen is administered to hypoxia patients with less than 90% oxygen saturation (Class Ic), and that oxygenation is prohibited for patients with more than 90% oxygen saturation (Class IIIb). Under this guideline, oxygen supply for 6 hours, which had been performed to patients with coronary intervention due to acute myocardial infarction over the past many years, did not have to be supplied to patients with oxygen saturation of 90% or more. However it is pressure for many medical teams to refrain from supplying oxygen, which has been practiced for a long time, and there are no attempts have been made to stop the therapy, and even there are practically non-existence of data or research results related to such part in Korea. On this, a study is needed to confirm the effect of oxygen in patients with acute myocardial infarction and to provide evidence on adequate oxygen supply in order to prepare guidelines for oxygen supply after intervention in patients with acute myocardial infarction,

Therefore, this study was attempted to evaluate the oxygen supply manual suggested in the protocol after coronary intervention developed in the cardiology intensive care unit of a university hospital, and to establish a basis for appropriate oxygen supply.

1.2. Purpose of study

The purpose of this study was to investigate the effect of oxygen therapy on the heart condition according to the time difference of the therapy and to clarify the distinction in treatment outcomes in adult patients who were diagnosed with myocardial infarction (STEMI) and were admitted to the cardiac intensive care unit through coronary intervention. The specific purpose of the study is as follows.

Firstly, compare the difference in myocardial status according to the oxygen supply time.

Secondly, compare the difference in days of hospital stay according to the oxygen supply time.

1.3. Hypothesis

1) There will be no difference in myocardial status between the experimental group (2 hours oxygen therapy) and the control group (6 hours oxygen therapy).

2) There will be no difference in days of hospital stay between the experimental group (2 hours oxygen therapy) and the control group (6 hours oxygen therapy).

2. Methods

2.1. Research design

This research is a non-equivalent control, designed to determine the effect of oxygen therapy on the heart condition and differences in treatment outcomes according to the time difference of oxygen therapy in adult patients diagnosed with myocardial infarction (STEMI) and admitted to the cardiac intensive care unit after coronary intervention. This is a similar experimental study using a nonsynchronized design with a non-synchronized control group. In addition, the composition of clinical questions for conducting this study is as follows.

P(participant): Adult patient diagnosed with myocardial infarction and admitted to the cardiac intensive care unit after coronary intervention

I(Intervention): 2-hour oxygen therapy that is modified from the oxygen therapy protocol used in the existing cardiac intensive care unit.

C(comparison): 6-hour oxygen therapy, a traditional oxygen therapy protocol currently performed in the cardiac intensive care unit of a university hospital.

O(outcome): No difference in heart condition according to oxygen supply time

2.2. Subject of research

The subject of this study is an adult patient admitted to the cardiac intensive care unit after undergoing coronary intervention with acute myocardial infarction diagnose. Specific selection and exclusion targets are as follows.

Research subject selection criteria

- 1) Patients who understand the purpose of the study, agree to participate in this research, and voluntarily sign the consent form
- 2) Adults over the age of 19 years old
- 3) Persons who have undergone coronary intervention for acute myocardial infarction and are hospitalized in the intensive care unit
- 4) Persons who have been confirmed by a cardiologist for the research participation
- 5) Patients with more than 90% oxygen saturation at the time of visit (Pulse oximetry result)

Subject exclusion criteria

- 1) Persons who do not agree to participate in the research
- 2) Persons with poor consciousness such as dementia or cognitive impairment
- 3) Persons who have lung disease or who continuously need oxygen supply due to the worsening of the patient's condition after the medical procedure

2.3. Data collection

This study was conducted under the IRB approval (WKUH 2018-03-010-003) at W U niversity Hospital. The experimental group data was collected from 22 adult patients who agreed to participate in the study and who were diagnosed with myocardial infarction (STEMI) and admitted to the cardiac intensive care unit with coronary intervention after June 15, 2018. In this to-be treated experimental group, when the patient entered the cardiac intensive care unit, the oxygen saturation was measured, the purpose and method of study were explained, then the research was conducted by receiving the written consent of the participation from the subjects. As a control group, 30 persons who met the selection criteria were selected among underwent patients with coronary intervention from March 1, 2017 to February 28, 2018, and the data was collected through medical records. Myocardial enzymes, Myocardium SPECTRUM, echocardiographic results, and Major Adverse Cardiac Events (MACE) were collected same as experimental group. The consent process for the control group was exempted as the study used the existing medical records without collecting identification information.

2.4. Experimental treatment

After written consent of the experimental group, 2 L/min of oxygen adjuvant therapy was performed through Nasal Cannula for 2 hours based on the admission time, and the therapy was discontinued after 2 hours. Then, 48 hours after the procedure, blood tests (myocardial enzymes), Myocardium SPECT, and echocardiography were performed, and MACE and the days of hospital stays were checked until discharge.

2.5. Research methods

1) Myocardium SPECTRUM(M-SPECT)

The nuclear cardiology test is a functional imaging method to image myocardial blood flow, glucose metabolism, myocardial sympathetic distribution, cell and gene tracking, myocardial contractile performance, and myocardial movement. Among them, Myocardial SPECTRUM(M-SPECT) routinely images myocardial blood flow, myocardial movement, and contractile performance. M-SPECT is a proven technology that is cost effective in controlling ischemic heart disease in combination with coronary angiography.

M-SPECT shows how much blood flow is flowing through each part of the myocardium during load and rest. M-SPECT utilizes the property that radioactive isotopes are injected intravenously and then flows into the myocardium along the myocardial bloodstream and does not flow out after being ingested into the myocardium. In this case, the isotope is absorbed only in the live heart muscle. If an angina state, that is, myocardial ischemia, is induced by exercise load or drugs, isotopes are not absorbed by the ischemic myocardium, so the infarct area can be identified. After M-SPECT, the image shows the blood flow in each area of the myocardium as the relative intensity of radiation. The relative intensity of radioactivity is indicated by the brightness of the color on the screen. When the blood flow to the myocardium is not smooth due to the narrowing of the coronary artery, the myocardium with normal brightness at the rest is defected with dark-looking in the load. In addition, it is possible to evaluate the blood flow of the heart and the viability of the myocardium after administration of a coronary dilator, so that the evaluation and prognosis are determined before and after coronary artery bypass grafting or coronary intervention. The M-SPECT image used in this study was Phillips' Forte model.

2.6. Data analysis

The data collected in this research were computerized using SPSS WIN 24.0. As a result of the normality test of the data the normal distribution was confirmed, so the parametric statistical method was selected.

Firstly, the homogeneity test with the general characteristics of the study subjects was compared with the Chi-square test.

Secondly, the homogeneity test with the disease-related characteristics of the study subjects was compared with the Chi-square test.

Thirdly, the difference in myocardial status between the experimental group and the control group was analyzed by independent t-test.

Fourthly, the difference in length of stay between the experimental group and the control group was analyzed by independent t-test.

3. Results

3.1. Homogeneity test for general characteristics of the subject

The homogeneity test for the general characteristics of the subject is shown in <Table 1>.

There were no significant differences between the experimental group and the control group in the sex, Body Mass Index(BMI)-physiological indicators, oxygen saturation, blood pressure and pulse, and diagnosis of hyperlipidemia in the current history, history of heart disease, smoking history, and history of taking statin drugs.

Table 1. Homogeneity of general characteristics between control and experimental group.

Characteristics	Category	Experimental (n=12)	Control (n=30)	χ^2 or t	p
		n(%) or Mean \pm SD	n(%) or Mean \pm SD		
Gender	Male	8(66.7)	25(83.3)	1.414	.234
	Female	4(33.3)	5(16.7)		
Age (yr)		72.67 \pm 16.27	57.3 \pm 11.13	-3.528	.001**
Body Mass Index (kg/m ²)		19.71 \pm 2.73	20.25 \pm 2.83	0.570	.572
o2 Sat(%)		96.17 \pm 3.33	97.07 \pm 1.39	1.251	.218
Vital sign	Systolic Blood Pressure (mmHg)	113.75 \pm 16.91	125.53 \pm 21.37	1.704	.096
	Diastolic Blood Pressure (mmHg)	72.50 \pm 11.21	78.80 \pm 12.64	1.504	.140
	Heart Rate (/min)	79.91 \pm 12.34	79.97 \pm 15.62	0.010	.992
Hypertension	Yes	9(75)	8(26.7)	8.311	.004**
	No	3(25)	22(73.3)		
Diabetes Mellitus	Yes	6(50)	3(10)	8.145	.004**
	No	6(50)	27(90)		
Dyslipidemia	yes	0(0)	2(6.7)	0.840	.359
	No	12(100)	28(93.3)		
Old Stroke	yes	3(25)	0(0)	8.077	.004**
	No	9(75)	30(100)		
Smoking (within 1month)	Yes	3(25)	11(36.7)	0.525	.469
	No	9(75)	19(63.3)		
Coronary Artery Disease	Yes	1(8.3)	4(13.3)	0.204	.651
	No	11(91.7)	26(86.7)		
Medication	Anti coagulant	5(41.7)	1(3.3)	10.286	.001**
	No	7(58.3)	29(96.7)		
	Anti hypertension	9(75)	5(16.7)	13.125	<.001***
	No	3(25)	25(83.3)		
	Statin	2(16.7)	2(6.7)	0.995	.319
	No	10(83.3)	28(93.3)		

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

On the other hand, the mean age of the experimental group was higher with 70.64 \pm 15.44 years old, and 57.3 \pm 11.13 years old in the control group, and it showed a significant difference between the two groups. There were also differences in the medical history; hypertension was 13 subjects (59.%) in the experimental group and 8 subjects (26.7%) in the control group, with diabetes 8 subjects in the experimental group (36.4), and 3 subjects (10%) in the control group, in a stroke 3 subjects in the experimental group (13.6%), and 0 subject (0%) in control group. In addition, difference was also showed in administration history with antithrombotic drugs administration in 6 subjects (27.3%) in the experimental group, and 1 subject in the control group (3.3%), and for antihypertensive drugs, 13 subjects (59.1%) in the experimental group, and 5 subjects (16.7%) in the control group. This was a difference that appears because the experimental group in this study was older than the control group as the underlying disease and drug use increased with age [19].

3.2. Homogeneity test on disease-related characteristics of the subject

The homogeneity test for the subject's heart disease-related characteristics is shown in <Table 2>.

As a result of coronary angiography of the experimental group and the control group, there was no significant difference in procedure blood vessel, shape, and number of inserted stents. Also no significant difference showed in Platelet, High Sensitivity C-Reactive Protein(hsCRP), Creatine Kinase Myocardial Bound(CKMB), Troponin T, Total Cholesterol, Triglyceride, High Density Lipoprotein(HDL) Cholesterol, Low Density Lipoprotein(LDL) Cholesterol, Hemoglobin A1c(HbA1c), Brain Natriuretic Peptide(BNP) from the blood test between the two groups, but Hemoglobin in the experimental group was noticeably lower with 13.85 ± 1.98 than the control group with 15.00 ± 1.23 . In the echocardiography, no significant difference was found in cardiac output rate between the two groups.

Table 2. Homogeneity of general characteristics between control and experimental group.

Characteristics	Category	Experimental (n=12)	Control (n=30)	χ^2 or t	p
		n(%) or Mean±SD	n(%) or Mean±SD		
Angiography					
Target Vessel	LAD	4(33.3)	20(66.7)	3.976	.138
	LCX	2(16.7)	2(6.7)		
	RCA	6(50.0)	8(26.7)		
Target lesion type	B1	0(0)	4(13.3)	1.983	.371
	B2	10(83.3)	20(66.7)		
	C	2(16.7)	6(20.0)		
Total stent number		1.25±0.62	1.33±0.55	0.429	.670
Blood Test					
	Hemoglobin(g/dℓ)	13.64±1.95	15.00±1.23	2.279	.009**
	Platelet(*10 ³ /μℓ)	246.75±64.03	236.47±49.33	-.560	.579
	hsCRP (mg/L)	16.30±20.10	18.12±36.90	.160	.873
	CKMB (ng/mℓ)	24.62±37.26	40.71±76.46	.693	.492
	Troponin T (ng/mℓ)	1.07±1.88	0.63±1.61	-.754	.455
	Total cholesterol (mg/dℓ)	194.91±46.40	202.93±49.93	.479	.634
	Triglyceride (mg/dℓ)	176.17±101.73	154.77±71.37	-.775	.443
	HDL cholesterol (mg/dℓ)	44.67±13.08	49.77±8.37	1.510	.139
	LDL cholesterol (mg/dℓ)	127.33±40.43	129.40±45.38	.137	.892
	HbA1c (%)	6.51±1.23	6.06±1.11	-1.158	.254
	BNP (pg/mL)	231.48±303.47	157.02±495.45	-.484	.631
	Echo EF (%)	49.68±9.98	47.82±9.46	-.567	.572

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

3.3. M-SPECT test results difference of the experimental group and the control group

M-SPECT test results difference of the experimental group and the control group is

as shown in <Table 3>.

The difference in myocardial status between the experimental group and the control group was confirmed by the M-SPECT item. As a result, there was no difference between the two groups with Summed Stress Score(SSS) ($t=1.274$, $p=.209$), Summed Rest Score(SRS) ($t=0.716$, $p=.297$), and Summed Difference Score(SDS) ($t=0.875$, $p=.386$). However, as a check of the degree of myocardial infarction, the experimental group was significantly lower with 24.45 ± 22.26 than the control group with 38.23 ± 27.0 in the stress defect ($t=2.014$, $p=.049$), while the rest defect ($t=1.391$, $p=.172$) was not shown significant difference. Also, no significant difference was found in Summed Motion Score (SMS) ($t=0.709$, $p=.481$), Summed Thickening Score(STS) ($t=1.166$, $p=.251$), End Diastolic Volume(EDV) ($t=1.834$, $p=.074$), End Systolic Volume(ESV) ($t=1.792$, $p=.081$), (ejection Fraction(EF) ($t=0.393$, $p=.696$).

Table 3. Comparison of M-SPECT results in experimental and control group.

Category	Experimental (n=12)	Control (n=30)	t	p
	Mean \pm SD	Mean \pm SD		
Summed Stress Score	13.50 \pm 17.81	19.93 \pm 13.27	1.285	.206
Summed Rest Score	12.25 \pm 17.54	16.80 \pm 13.85	0.891	.378
Summed Difference Score	0.83 \pm 0.94	2.47 \pm 2.80	1.964	.057
Stress Defect	19.67 \pm 21.75	38.23 \pm 27.00	2.118	.040*
Rest Defect	21.00 \pm 24.40	33.40 \pm 26.71	1.391	.172
Summed Motion Score	15.42 \pm 20.00	19.77 \pm 16.06	0.739	.464
Summed Thickening Score	10.58 \pm 11.85	14.80 \pm 10.07	1.166	.251
End Diastolic Volume	90.25 \pm 34.32	113.17 \pm 37.40	1.834	.074
End Systolic Volume,	42.75 \pm 18.80	60.63 \pm 32.30	1.792	.081
Ejection Fraction	47.50 \pm 19.03	49.37 \pm 11.34	0.393	.696

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

3.4. Difference in hospital stay between the experimental group and the control group

The difference in hospital stay days between the experimental group and the control group is as shown in <Table 4>.

There was no statistically significant difference ($t=-.178$, $p=.860$) between the experimental group and the control group, with 4.55 ± 1.57 days for the experimental group and 4.47 ± 1.59 days for the control group.

Table 4. Comparison of M-SPECT results in experimental and control group.

Category	Experimental (n=12)	Control (n=30)	t	p
	Mean \pm SD	Mean \pm SD		
Hospital day	4.67 \pm 2.02	4.47 \pm 1.59	-.341	.735

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

4. Discussion

In this research, the difference in myocardial status and length of stay in 6 hours oxygen therapy and 2 hours oxygen therapy was compared on the subjects with a diagnosis of myocardial infarction and hospitalization in the cardiac intensive care unit after coronary intervention. There was no significant difference between the two groups in the length of stay, which is the outcome of patient treatment. As a result of performing the M-Spectrum test to confirm myocardial condition, a significant difference between the two groups showed in the stress defect category. The stress defect represents the area of the defect part that occurs in the heart by loading stress through a drug on the heart, and the 2 hour oxygen therapy was significantly lower rather than the 6 hour oxygen therapy. This is because excessively administered oxygen causes overproduction of reactive oxygen species (ROS), and the occurrence of oxidative stress due to this, is found to play an important role in the development and progression of various heart diseases which can be explained based on the research of Nordberg J et al.(2001)[12]. In addition, the myocardium was found to be significantly larger in the control group than in the experimental group, so it is considered that the risk of developing oxygen toxicity and left ventricular remodeling or heart failure may be increased. Although the condition of the myocardium can be influenced not only by oxygen but also by several factors, this study implies that the oxygen supply time does not cause the difference in myocardial condition.

This research applied 2 hours of oxygen therapy to patients with acute myocardial infarction, and this suggests that it may be unnecessary oxygen therapy as comparing with the case of not receiving oxygen supplementation therapy for patients with acute myocardial infarction without hypoxia in foreign)[16]. Therefore, follow-up studies that do not provide guidelines to adequately supply oxygen to patients after interventional surgery due to acute myocardial infarction are needed. As such, it is believed that the maturity of evidence-based nursing can be further improved if continuous research and evidence that can be applied immediately to clinical practice are presented.

In addition, a nasal cannula is used to supply oxygen to a patient with acute myocardial infarction. In this case, the patient complained of nasal dryness, dry neck, headache, and chest discomfort in a study by Campbell et al.(1988)[20][21]. In practice, the majority of patients complain of such discomfort in the clinical field, so if minimal oxygen supply is acceptable, this can be used as a basis for the effect of reducing discomfort and intervention in oxygen therapy.

5. Conclusion

This research was attempted to evaluate the oxygen supply manual that suggested in the protocol after coronary intervention developed in the cardiology intensive care unit of the university hospital, and to provide the basis for adequate oxygen supply. The difference of myocardial status and hospital stay was compare under the adjusted oxygen supplying time from previous 6 hours to 2 hours. As a result, there was no significant difference in overall myocardial status and hospital stay. Therefore, the oxygen supply time did not affect the myocardial condition, and it presented the basis for adequate oxygen supply in consideration of patient's discomfort and economic aspects.

Based on these results, the following suggestions are made.

Firstly, in terms of nursing practice, we suggest follow-up observation of myocardial status, complications, and hospital stay as 2 hours of oxygen therapy after coronary intervention due to acute myocardial infarction.

Secondly, in terms of nursing research, continuous review and repeated study are n

needed for researches that do not provide oxygen therapy to patients without hypoxia after coronary artery intervention due to acute myocardial infarction.

6. Limitation

This study was a one-time study in which oxygen therapy was applied to patients with myocardial infarction at different times, and there is a limit to generalization to all myocardial infarction patients, so a repeat study is suggested in the future. In addition, in this study, there was a difference in the underlying disease and drug intake according to age, so additional research is needed to supplement data.

7. References

7.1. Journal articles

- [2] Lee K & Sung K. Factors Influencing Health Behavior Adherence in Middle and Old Aged Men Who Underwent Percutaneous Coronary Intervention. *Korean Journal of Rehabilitation Nursing*, 2, 87-94 (2019).
- [3] Kang K & Kim O & Choi S & Kim E & Park Y & Cho Y & Hwang H & Ko T. Effect of the Six Sigma Protocol on the Time Required to Get STEMI Patients to Reperfusion Therapy Via PTCA. *Journal of The Korean Society of Emergency Medicine*, 21(4), 429-436 (2010).
- [5] Smith S & Dove J & Jacobs A & Kenney J & Kereiakes D & Kern M. ACC/AHA Guidelines of Percutaneous Coronary Interventions (Revision of the 1993 PTCS Guidelines) Executive Summary. A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines(Committee to Revise the 1993 Guidelines for Percutaneous Transluminal Coronary Angioplasty). *Journal of the American College of Cardiology*, 37(8), 2215-2239 (2001).
- [6] Park J & Kim E & Park C. The Effects of the Slow Stroke Back Massage on Discomfort in Patients Following Percutaneous Transluminal Coronary Angioplasty. *Clinical Nursing Research*, 45(3), 162-171 (2004).
- [7] Shin H & Park S. Needs Analysis of Adult Learners at Technical Colleges for Improvement of Lifelong Education Center Programs in Korea: With Priority Given to Needs, Importance, Requests for Improvement and Requests for Supplementation Includes Safety. *International Journal of Crisis & Safety*, 4(1), 37-47 (2019). [Article]
- [8] Lee M & Hwang S. Influencing Factors on Knowledge Attitude and Performance of CPR of Faculty and Staff. *International Journal of Crisis & Safety*, 6(4), 50-63 (2021). [Article]
- [10] Kang K & Nam K & Kim J & Ju S & Kim H. Development of ICT-based Simulation Scenarios against the Crisis of Dyspnea Patients. *International Journal of Crisis & Safety*, 4(1), 28-36 (2019). [Article]
- [11] Akbar F & Campbell A. Oxygen Therapy in Hospitalized Patients: The Impact of Local Guidelines. *Journal of Evaluation in Clinical Practice*, 12(1), 31-36 (2006).
- [12] Nordberg J & Arner E. Reactive Oxygen Species, Antioxidants, and the Mammalian Thioredoxin System. *Free Radical Biology Medicine*, 31(11), 1287-1312 (2001).
- [13] Antman EM & Anbe DT & Paul Wayne Armstrong PW & Bates ER & Green LA & Hand M & Hochman JS & Krumholz HM & Kushner FG & Lamas GA & Mullany CJ & Ornato JP & Pearle DL & Sloan MA & Smith SC & Antman EM & Smith SC & Alpert JS & Anderson JL & Faxon DP & Fuster V & Gibbons RJ & Gregoratos G & Halperin JL & Hiratzka LF & Hunt SA & Jacobs AK & Ornato JP. ACC/AHA Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction -Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 1999 Guidelines for the Management of Patients With Acute

- Myocardial Infarction). *Journal of the American College of Cardiology*, 44(3), 671-719 (2004).
- [14] Kones R. Oxygen Therapy for Acute Myocardial Infarction -Then and Now. A Century of Uncertainty. *The American Journal of Medicine*, 124(11), 1000-1005 (2011).
- [15] Rawles J & Kenmure A. Controlled Trial of Oxygen in Uncomplicated Myocardial Infarction. *British Medicine Journal*, 1, 1121-1123 (1976).
- [16] Stub D & Smith K & Bernard S & Bray JE & Stephenson M & Dip G & Cameron P & Meredith I & Kaye DM. A Randomized Controlled Trial of Oxygen Therapy in Acute Myocardial Infarction Air Verses Oxygen in Myocardial Infarction Study (AVOID Study). *American Heart Journal*, 163(3), 339-345 (2012).
- [17] Cabello JB & Burls A & Emparanza JI & Bayliss SE & Quinn T. Oxygen Therapy for Acute Myocardial Infarction. *Cochrane Database of Systematic Reviews*, 12, n7160 (2016).
- [18] Borja I & Stefan J & Stefan A & Manuel J & Chiara B & Héctor B & Alida L & Filippo C. 2017 Esc Guidelines for the Management of Acute Myocardial Infarction in Patients Presenting with ST-segment Elevation: The Task Force for the Management of Acute Myocardial Infarction in Patients Presenting with ST-segment Elevation of the European Society of Cardiology(ESC). *European Heart Journal*, 39(2), 119-177 (2017).
- [19] Bai X & Shin H. A Scientometrics Research on Physical Activity and Health Risks of the Elderly. *International Journal of Crisis & Safety*, 6(2), 46-55 (2021). [Article]
- [20] Campbell E & Baker M & Crites-Silver P. Subjective Effects of Humidification of Oxygen for Delivery by Nasal Cannula: A Prospective Study. *Chest*, 93(2), 289-293 (1988).
- [21] Kim W & Kang J. Impact of Oral Care Protocol on the Oral Safety & Nutritional Status of Lung-cancer Patients under Anticancer Chemotherapy. *International Journal of Crisis & Safety*, 4(1), 19-27 (2019). [Article]

7.2. Thesis degree

- [9] Lee N. Perception on the Care for Oxygen Therapy among Hospital Nurses. Hanyang University, Doctoral Thesis (2014).

7.3. Books

- [1] National Statistical Office. Cause of Death in 2020 (2021).
- [4] The Korean Society of Cardiology. Recommendation for Standard Treatment of Coronary Intervention (2013).

8. Appendix

8.1. Authors contribution

	Initial name	Contribution
Lead Author	KY	-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*	JK	-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"/>

Publisher: J-INSTITUTE
ISSN: 2189-7603

Website: j-institute.org
Editor: admin@j-institute.org

Corresponding author*
E-mail: skcho@ikw.ac.kr

DOI Address:
dx.doi.org/10.22471/crisis.2022.7.1.80

© 2022 J-INSTITUTE

Crisis of Kim Jong-Un Regime of North Korea and the Safety of North Korean Defectors: An Analysis of Job Involvement of the South Korean Security Police

Hwansuk Choi¹

Jeonju University, Jeonju, Republic of Korea

Sunggu Jo^{2*}

Kyungwoon University, Gumi, Republic of Korea

Byeongchan Kim³

Kyungwoon University, Gumi, Republic of Korea

Abstract

Purpose: The purpose of this study is to recognize the importance of the security police officers' work or job involvement by examining the difference in terms of the job involvement according to the general characteristics of the South Korean security police, and furthermore, present the basic data for the organizational operation and improving the work efficiency of members.

Method: In this study, 100 trainees of the Police Human Resources Development Institute, a police institute of education in Korea in 2020, were surveyed and the convenience sampling method was used for the sampling method, followed by the Self-Administration Method. An investigation was conducted. Among the collected questionnaires, 91 questionnaires were used as valid samples, except for the data with insincere responses or omission of some of the details of the survey. The measurement tool is a questionnaire, and the data processing is a statistical package program, SPSS 23.0 Program, and the frequency analysis was performed to examine and understand the general characteristics, while the Cronbach's α coefficient was calculated to validate the reliability of the questionnaire. The confirmatory factor analysis was performed to classify the job involvement related factors, and the t-Test and the one-way ANOVA were performed to examine and understand the difference in terms of the job involvement of the security police according to the general characteristics.

Results: In this study, the confirmatory factor analysis was performed to validate the conceptual validity of the measurement tool, and the concept reliability was all over 0.8, and the mean variance (AVE) values all exceeded 0.5, and hence, the concentration validity for all variables was evidently secured. Furthermore, the reliability of the questionnaire turned out to be .798 of Cronbach's α coefficient. As an empirical result, the difference in the job involvement according to general characteristics is, first, the difference in terms of the job involvement of the security police according to gender is higher in women than in men. Second, there was no significant difference in the job involvement of the security police according to age in the difference in terms of the job involvement of the security police according to age. Third, the difference in the job involvement of the security police according to educational background is higher than high school graduates with community college, 4 year college, and graduate degrees. Fourth, the difference in terms of the job involvement of the security police according to the number of employees in the affiliated organization is higher than that of 21 or more people than 10 people or less, 11 or more people and 15 people or less, and 15 or more people and 20 people or less. Fifth, there is no difference in the job involvement of the security police according to the area of service.

Conclusion: As a result of the research process it turned out that there was a difference in the job involvement of the security police according to gender, educational background, and the number of employees in the affiliated organization, and there was no difference in terms of the job involvement according to age and the area of service. Hence, based on the in-depth and various studies related to job involvement according to the characteristics of the study subjects, a plan ought to be presented to enable the security police to more fully perform their original duties.

[Keywords] South Korea, Security, Police, Security Police, Job Involvement

1. Introduction

Security police macroscopically means the police in charge of protecting the Constitution and blocking the elements which threaten the national safety, existence, and function of the Republic of Korea in advance, and it also refers to the police who carry out their duties for protecting the person of the North Korean defectors who entered into South Korea[1][2]. Furthermore, the security police are used to carry out very comprehensive activities including industrial security and security surveillance as well as security activities based on the National Security Act[3]. In this respect, in order to protect the national legal interests, such as the people, territory, and the sovereignty of the nation, and protect the social safety and order, information and intelligence collection activities and security investigation activities to prevent social harm or crime in advance, are carried out and in preparations for the future unification related foundation, play the roles of enhancing professional competence, establishing a system for regular cooperation among related organizations, and managing and supporting the North Korean defectors[4][5][6]. The scope of the security police's work is also proportional since the concept of security is so broad, including not only the threat of the use of force, but also the removal of vulnerabilities such as non-military threats or risks such as political democracy, economic market economy system, social community maintenance, and safe survival environment maintenance[7][8][9][10].

The role of the security police is specified by a number of individual laws in addition to the Police Act and the Act on the Performance of Duties by Police Officers. Most notably, the Criminal Act, National Security Act, Security Surveillance Act, Act on Protection and Settlement Support for North Korean Defectors, National Intelligence Service Act, and the Information and Security Business Planning and Coordination Regulations, and other various sub-laws such as the Security Business Regulations specify individual regulations for the security police's activities, and such laws form the main legal grounds for the security police's activities[11]. Among which, the roles and duties of the security police are clearly defined in the organization of the National Police Agency and its affiliated agencies. According to this system, the basic job areas of the security police include planning and education on security police work, guidance on security surveillance, management of the North Korean defectors and security measures, guidance and coordination of investigations on security criminals such as spies, and security, and on top of being in charge of many tasks, such as collection and analysis of related information, the security police's work related to inter-Korean exchanges, work related to important counter-espionage such as espionage, and the work related to the investigation of important left-wing criminals, the importance of their work is very high[12][13][14][15].

According to such role of the security police, the importance of work is increasing day by day, and in particular, in the process of unification, it is necessary to be able to actively respond to rapid changes in the context of the North Koreans' mass defection, and for building a solid foundation for the future unification, a permanent cooperation system between the relevant institutions should also be established[16][17].

As such, the duties of the security police, which are responsible for protecting the Constitution and blocking harmful factors which threaten the national safety and existence of the Republic Of Korea, are so diverse and very large, yet the reality is that there is no study conducted on their job satisfaction and commitment. Hence, in this study, by examining and understanding the difference in terms of the job involvement according to the general characteristics of the security police, the importance of the security police and its organizational members' work or job involvement was recognized, and furthermore, this study was intended to be used to present the basic data for the organizational operation and improvement of the work efficiency of the members.

2. Research Methods

2.1. Subjects and sampling technique

The purpose of this study is to secure bioethics and safety and also contribute to the improvement of the public health and quality of life, including the Act on Bioethics and Safety, as well as the secrets of individuals, corporations, or organizations collected for the purpose of compiling statistics throughout the study, while the basic data belonging to this category are never used for any purposes other than for the academic research, and are used solely for the statistical data processing, and research is conducted in accordance with Article 13 (Protection of Confidentiality) of the Statistical Act, which guarantees the absolute confidentiality of personal information. Hence, in this study, the researcher personally visited the Police Human Resources Development Institute, where the subjects were trained, explained the overall purpose of the study and the contents of the questionnaire to the Director of the Institute, and secured their review and approval. Furthermore, the purpose of the study and the contents of the questionnaire were explained in detail to the trainees who were the subjects of the study before proceeding with the questionnaire, and only the subjects who agreed to complete the questionnaire provided their questionnaires which were taken.

Through this process, in this study, 100 trainees of the Police Human Resources Development Institute, a police institute of education in Korea in 2020, were surveyed and the convenience sampling method was used for the sampling method, and the Self-Administration Method was used for the survey. Among the collected questionnaires, 91 questionnaires were used as valid samples, except for the data with insincere responses or omission of some of the contents of the survey.

Table 1. Survey subjects.

	Description	N (%)	Total
Gender	Male	61(67.0%)	91
	Female	30(33.0%)	
Age	20s	7(7.7%)	91
	30s	28(30.8%)	
	40s	30(33.0%)	
	50s or older	26(28.6%)	
Education	High school	14(15.4%)	91
	Community college	30(33.0%)	
	4 year college	43(47.3%)	
	Graduate school	4(4.4%)	
The number of police officers in the organization	10 or less	18(19.8%)	91
	11 or more and 15 or less	42(46.2%)	
	16 or more and 20 or less	24(26.4%)	
	More than 21	7(7.7%)	
Service location	Tier 1 areas (big cities)	80(87.9%)	91
	Tier 2 areas (small/medium-sized cities)	11(12.1%)	

2.2. Measuring instrument

The measuring tool used for this study was a questionnaire, and as for the job involvement factors, the questionnaires used for the studies of Freeney & Tiernan (2009), Saks (2006), Padmakumar & Gantasala (2011), Miri Yoon, Yaeji Nam, Saehee Hong (2019), Jongjeong Lee, Jaeyeop Jeong, and Dalyeop Lee (2018), and Hoseong Jeon and Haedeok Song (2018) were revised and supplemented to suit the purpose of this study [18][19][20][21][22][23]. In particular,

as a result of the confirmatory factor analysis performed in the study of Hoseong Jeon and Haedeok Song (2018), the construct reliability (CR) turned out to be .918, and the average variance extracted (AVE) turned out to be .790, while the Cronbach's α coefficient turned out to be .859, respectively[19].

2.3. Analysis of data

The data processing for this study was performed by the SPSS 23.0 Program, a statistical package program, and the statistical validation was performed according to the purpose of data analysis as follows.

First, the frequency analysis was performed to examine and understand the general characteristics using the SPSS/PC+23.0 program.

Second, to validate the reliability of the questionnaire, the Cronbach's α coefficient was calculated.

Third, the confirmatory factor analysis was performed to classify the job involvement factors.

Fourth, the t-Test and the one-way ANOVA were performed to examine and understand the difference in terms of the job involvement of the security police according to the general characteristics.

3. Results

3.1. Validity and reliability of the questionnaire

In this study, the confirmatory factor analysis was performed to validate the conceptual validity of the measurement tool, and the intensive validity was reviewed through the construct reliability (C.R.) and the average variance extracted (AVE). All of the concept reliabilities turned out to be 0.8 or higher, and all of the mean variance (AVE) values exceeded 0.5, and hence, it can be seen that the concentrated validity of all variables is secured. Furthermore, the reliability of the questionnaire turned out to be .798 for the Cronbach's α coefficient.

Table 2. Factor analysis and reliability of job involvement.

Questions	C.R	AVE	Cronbach's α
Q-1. I feel the love of family for my current job.	0.951	0.789	0.798
Q-2. I feel such a strong sense of affiliation for my current job.			
Q-3. I feel such a strong emotional attachment for my current job.			
Q-4. My current job is worth working hard with devotion.			
Q-5. I feel much pride since I can help realize the public interest by performing the organization's work.			

3.2. Differences in the job involvement of the security police according to general characteristics

Table 3. Differences in job involvement for the security police by gender.

		N	M	SD	t-value	sig
Q-1	Male	61	2.918	0.55663	1.257	0.577
	Female	30	2.7667	0.50401		

Q-2	Male	61	3.0492	0.58953	0.884	0.994
	Female	30	2.9333	0.58329		
Q-3	Male	61	3.0164	0.74144	-0.333	0.026
	Female	30	3.0667	0.52083		
Q-4	Male	61	3.2623	0.65579	1.136	0.166
	Female	30	3.1	0.60743		
Q-5	Male	61	3.2623	0.65579	0.894	0.253
	Female	30	3.1333	0.62881		

Note: A: Male, B: Female.

<Table 3> illustrates the fact that women were higher than men at the 5% level for Q-3 as a result of analyzing the difference in terms of the job involvement of the security police by gender.

<Table 4> illustrates the fact that there was no significant difference in the job involvement of the security police according to age as a result of analyzing the difference in terms of the job involvement of the security police according to age.

<Table 5> illustrates the fact that, as a result of analyzing the difference in terms of the job involvement of the security police according to educational background, as for Q-3, community college graduates, 4 year college graduates, and graduate school graduates turned out to be higher than high school graduates at the 1% level.

<Table 6> illustrates the fact that as a result of analyzing the difference in terms of the job involvement of the security police according to the number of employees in the organization, as for Q-1, 21 or more people turned out to be higher than 10 people or less, 11 or more people and 15 people or less, and 15 or more people and 20 people or less.

<Table 7> illustrates the fact that there was no difference in the job involvement of the security police according to the area of service as a result of analyzing the difference in terms of the job involvement of the security police according to the area of service.

Table 4. Differences in job involvement for the security police by age.

		N	M	SD	F	sig	post hot
Q-1	20s	7	2.7143	.75593	1.886	.138	
	30s	28	2.7143	.46004			
	40s	30	2.9000	.40258			
	50s or older	26	3.0385	.66216			
Q-2	20s	7	2.5714	.53452	2.448	.069	
	30s	28	2.9286	.60422			
	40s	30	3.0333	.41384			
	50s or older	26	3.1923	.69393			
Q-3	20s	7	2.5714	.78680	2.736	.058	
	30s	28	2.8929	.62889			
	40s	30	3.0667	.58329			
	50s or older	26	3.2692	.72430			
Q-4	20s	7	3.0000	.81650	1.474	.227	

Q-5	30s	28	3.1429	.59094	1.41	.245	
	40s	30	3.1333	.62881			
	50s or older	26	3.4231	.64331			
Q-5	20s	7	3.1429	.69007	1.41	.245	
	30s	28	3.0714	.71640			
	40s	30	3.200	.55086			
	50s or older	26	3.4231	.64331			

Note: A: 20s, B: 30s, C: 40s, D: 50s or older.

Table 5. Differences in job involvement for the security police by educational background.

		N	M	SD	F	sig	post hot
Q-1	High school	14	2.7143	.61125	1.401	.248	
	Community college	30	2.7667	.50401			
	4 year college	43	2.9767	.46231			
	Graduate school	4	3.0000	1.15470			
Q-2	High school	14	2.7857	.57893	1.867	.141	
	Community college	30	2.9667	.61495			
	4 year college	43	3.0698	.55185			
	Graduate school	4	3.5000	.57735			
Q-3	High school	14	2.4286	.64621	5.727	.001	B,C,D>A
	Community college	30	3.0667	.63968			
	4 year college	43	3.1628	.61452			
	Graduate school	4	3.5000	.57735			
Q-4	High school	14	3.0714	.73005	.794	.501	
	Community college	30	3.1333	.57135			
	4 year college	43	3.2791	.59062			
	Graduate school	4	3.5000	1.29099			
Q-5	High school	14	3.0714	.61573	.542	.655	
	Community college	30	3.2000	.66436			
	4 year college	43	3.2558	.65803			
	Graduate school	4	3.5000	0.57735			

Note: A: High school, B: Community college, C: 4 year college, D: Graduate school.

Table 6. Difference in job involvement of the security police according to the number of employees in the affiliated organization.

		N	M	SD	F	sig	post hot
Q-1	10 or less	18	2.7222	.57451	5.463	.002	D>A,B,C
	11-15	42	2.7857	.41530			
	16-20	24	2.9167	.58359			
	More than 21	7	3.5714	.53452			
Q-2	10 or less	18	2.7778	.64676	3.023	.054	
	11-15	42	2.9524	.49151			

	16-20	24	3.1667	.63702			
	More than 21	7	3.4286	.53452			
Q-3	10 or less	18	2.7222	.75190	1.944	.128	
	11-15	42	3.0476	.58236			
	16-20	24	3.2083	.65801			
	More than 21	7	3.1429	.89974			
Q-4	10 or less	18	3	.76696	2.215	.092	
	11-15	42	3.1905	.63392			
	16-20	24	3.25	.44233			
	More than 21	7	3.7143	.75593			
Q-5	10 or less	18	3.0556	.63914	.724	.540	
	11-15	42	3.2143	.68202			
	16-20	24	3.2917	.55003			
	More than 21	7	3.4286	.78680			

Note: A: 10 or less, B: 11-15, C: 16-20, D: More than 21.

Table 7. Differences in job involvement for the security police by area of service.

		N	M	SD	t-value	sig
Q-1	Tier 1 areas(big cities)	80	2.8875	.52756	.919	.161
	Tier 2 areas(small/medium-sized cities)	11	2.7273	.64667		
Q-2	Tier 1 areas(big cities)	80	3.0625	.58122	2.312	.516
	Tier 2 areas(small/medium-sized cities)	11	2.6364	.50452		
Q-3	Tier 1 areas(big cities)	80	3.1000	.64827	2.642	.374
	Tier 2 areas(small/medium-sized cities)	11	2.5455	.68755		
Q-4	Tier 1 areas(big cities)	80	3.2500	.60588	1.669	.153
	Tier 2 areas(small/medium-sized cities)	11	2.9091	.83121		
Q-5	Tier 1 areas(big cities)	80	3.2625	.63133	1.719	.73
	Tier 2 areas(small/medium-sized cities)	11	2.9091	.70065		

Note: A: Tier 1 areas (big cities), B: Tier 2 areas (small/medium-sized cities).

4. Discussion

In connection with the results of this study, which demonstrated the fact that there was a difference in the job involvement of the security police according to gender, educational background, and the number of employees in the affiliated organization, and the fact that there was no difference in terms of the job involvement according to age and area of service, the fact that any organization and any member of any organization may be involved with several subjects at the same time ought to be remembered, and in order to understand the involvement in greater detail, it is necessary to examine and understand various aspects and also examine the different effects of each type of involvement[24][25].

Job involvement means that an employee deploys his or her cognitive, emotional, and behavioral energy at the same time while performing the relevant job[26], and as a construct of job

involvement, it may also be defined as an emotional state in which an employee is energetic and devoted and devoted to his or her own job[27]. Furthermore, job involvement is a characteristic and clear structure consisted of cognitive, emotional, and behavioral elements, and it can also be divided into job involvement and organizational commitment[28]. Job resources increase the level of job involvement and have a positive effect on the individual level of outcome variables such as the organizational level of performance and personal growth and development[29]. Job involvement, in which employees themselves deploy their own physical, cognitive, and emotional energy into their job, carries a very important meaning in securing the organizational competitiveness[30], and the employees' job involvement has a negative influence on the intention of transfer as it turned out[31][32].

Furthermore, in connection with job involvement, it was verified that the organizational culture has a positive effect on job involvement, which can be inferred that it has an effect of improving job competency in that a moderate level of job demand strengthens the adaptability and concentration for the job[33].

Job involvement not only helps one examine and understand how central the value of work is in the daily life, and carries a characteristic which does not change easily[34], but also enables them to perceive their job as something pleasurable and their own values and self concept, further encouraging to become involved with their job[35]. Furthermore, as the job is a very important part of life, they will make an effort to create organizational performance through their job involvement, and will also perform their job with a positive attitude even in an uncertain situation.

Hence, in this study, the difference in terms of the job involvement of the security police according to gender, educational background, and the number of employees in the affiliated organization turned out not only in terms of the development of a unique organizational culture due to the special work of the security police organization, but also in an innovative organizational culture, and the organizations provide freedom and opportunities for their members, and hence, their involvement in the organization increases. In this respect, it may be interpreted that the differences were demonstrated according to the gender, educational background, and the number of organizational members. The organizational members' job involvement is influenced by their emotional state such as organizational commitment due to job satisfaction and their own professional situation formed by the members of the organization[36], and in this study, the job involvement according to the individuals' general characteristics varies, yet in their organization, that is, in the security police organization, the allocation of duties through the organizational culture which has been based on appropriateness, professionalism, and efficiency, etc., and the job satisfaction as per the performance of roles would have had a positive impact on the individuals' job including their perception of their organization as its members.

5. Conclusion

The purpose of this study is to help them recognize the importance of job or job involvement of the security police members by examining and understanding the difference in terms of the job involvement according to the general characteristics of the South Korean security police, and furthermore, present the basic data for the organizational operation and the improvement of work efficiency of the members.

The subjects of this study were 100 trainees of the Police Human Resources Development Institute, a police institute of education in Korea in 2020. The convenience sampling was used for the sampling method, and the self-administration method was used for the survey conducted. Among the collected questionnaires, 91 questionnaires were used as valid samples, except for the data with insincere responses or omission of some of the contents of the survey.

The conclusions secured based on such research process are as follows.

First, the difference in terms of the job involvement of the security police by gender is larger for women than for men.

Second, there was no significant difference in the job involvement of the security police according to age in the difference in terms of the job involvement of the security police according to age.

Third, the difference in the job involvement of the security police according to educational background is larger for the community college graduate, 4 year college graduates, and graduate school graduates or higher than the high school graduates.

Fourth, the difference in terms of the job involvement of the security police according to the number of employees in the affiliated organization is larger for 21 or more people than 10 people or less, 11 or more people and 15 people or less, and 15 or more people and 20 people or less.

Fifth, there is no difference in the job involvement of the security police according to the area of service.

Hence, based on the in-depth and various studies related to the job involvement according to the characteristics of the study subjects, a plan ought to be presented to enable the security police to better complete their original duties.

6. References

6.1. Journal articles

- [1] Lee JC & Lee JW. Performance Management of the Security Police: An Analysis of Performance Measurement (2007-2019). *The Korean Association of Police Science Review*, 22(3), 177-210 (2020).
- [2] Cho D. A Study on the Personal Protection of North Korean Defectors. *Journal of The Korean Society of Private Security*, 15(3), 101-120 (2016).
- [3] Jung Y. Problems and Improvement Methods on Personal Protection for North Korean Defectors. *Korean Journal of Public Safety and Criminal Justice*, 27(4), 175-198 (2018).
- [4] Cho D. A Study on the Plan of Early Settlement North Korean Defectors. *Korean Police Studies Review*, 14(2), 427-450 (2015).
- [5] Lee S & Shin H. Plans to Enhance the Capability of the Security Police to Prevent Social Deviance of North Korean Defectors. *Journal of Korean Public Police and Security Studies*, 9(4), 45-66 (2013).
- [6] Jeon W. An Analysis of Human Relationship between North Korean Defectors and South Korean Policemen in Charge. *Korean Unification Studies*, 4(1), 29-36 (2000).
- [7] Adams J. Virtual Defense. *Foreign Affairs*, 80(3), 98-112 (2001).
- [8] Valasek T. New Threats, New Rules: Revising the Law of War. *World Policy Journal*, 20(1), 17-24 (2003).
- [9] Han JT. The Effects of Organizational Justice on Organizational Citizenship Behavior of the Korean Police Officers: Mediating Effect of Supervisor Trust Investigation. *International Journal of Police and Policing*, 5(1), 47-65 (2020). [\[Article\]](#)
- [10] Kim H. North Korean Defectors: Perceptions According to the Size of Manpower of the Constituents of the Security Police Organization and Their Service Location. *Regulations*, 6(3), 73-87 (2021). [\[Article\]](#)
- [11] Kim TM & Park HY. Characteristics of Legal System Related to Security in Republic of Korea. *International Journal of Protection, Security & Investigation*, 2(1), 25-32 (2017). [\[Article\]](#)

- [12] Nam J. Change of the Security Police and Policy Implications since Lee Myung-bak Government. *Journal of Korean Criminological Association*, 6(1), 3-34 (2012).
- [13] Lim C. The Measures for Effective Protection and Support of North Korean Defectors by Security Police. *The Police Science Journal*, 11(4), 89-119 (2016).
- [14] Lee S & Baek S & Jo S. A Study on Role Conflict of Korean Security Police -Focusing on Working Period-. *Regulations*, 6(1), 43-54 (2021). [\[Article\]](#)
- [15] Jang S & Shi H. Study about Problem and Efficient Improvement Plan for the Resident Escaping from North Korea's Actual Management Condition of Protection. *Journal of Korean Public Police and Security Studies*, 13(2), 91-116 (2016).
- [16] Nam J. Human Security and Security Police's Supporting Activities for the Defectors from North Korea. *Korean Police Studies Review*, 7(4), 63-94 (2008).
- [17] Chang N & Nam J. A New Security Paradigm for the Korean National Police and the Role of the Security Police. *Korean Police Studies Review*, 8(2), 123-152 (2009).
- [18] Freeney YM & Tiernan J. Exploration of the Facilitators of and Barriers to Work Engagement in Nursing. *International Journal of Nursing Studies*, 46(12), 1557-1565 (2009).
- [19] Saks AM. Antecedents and Consequences of Employee Engagement. *Journal of Managerial Psychology*, 21(7), 600-619 (2006).
- [20] Padmakumar R & Gantasala VP. The Role of Employee Engagement in Work-related Outcomes. *Interdisciplinary Journal of Research in Business*, 1(3), 47-61 (2011).
- [21] Yoon M & Nam Y & Hong S. A Research of Disabled Employee on the Structural Relationship between Self-efficacy and Disability Acceptance: The Serial Multiple Mediation Effect of Job Engagement and Job Satisfaction. *Disability & Employment*, 29(2), 105-134 (2019).
- [22] Lee J & Jung J & Lee D. A Study on the Job Satisfaction of Wage Workers with Disabilities: Focusing on the Paths of Job Engagement. *Journal of Rehabilitation Research*, 22(3), 41-68 (2018).
- [23] Jun H & Song H. Organizational Silence, Work Engagement, Turnover Intention, Organizational Justice. *The Korean Journal of Human Resource Development Quarterly*, 20(2), 87-112 (2018).
- [24] Moon Y. Reliability And Validity Of The Multiple Commitment Scale: Focused On Moon Y. The Organizational Commitment, Career Commitment, and Job Commitment. *Journal of Human Resource Management Research*, 18(3), 1-24 (2011).
- [25] Kim S & Kim J. A Study of Hotel Employees' Multi-foci Commitment Influence on Team Performance: Job Commitment, Career Commitment, and Team Commitment. *Journal of Tourism Management Research*, 24(7), 113-132 (2020).
- [26] Kahn W. A. Psychological Conditions of Personal Engagement and Disengagement at Work. *Academy of Management Journal*, 33(4), 692-724 (1990).
- [27] Schaufeli W & Bakker A. Job Demands, Job Resources, and Their Relationship with Burnout and Engagement: A Multi-sample Study. *Journal of Organizational Behavior*, 25(3), 293-315 (2004).
- [28] Saks A. Antecedents and Consequences of Employee Engagement. *Journal of Managerial Psychology*, 21(7), 600-619 (2006).
- [29] Schaufeli W & Taris T & Van Rhenen W. Workaholism, Burnout, and Work Engagement: Three of a Kind or Three Different Kinds of Employee Well-being?. *Applied Psychology*, 57(2), 173-203 (2008).
- [30] Eldor L & Harpaz I. A Process Model of Employee Engagement: The Learning Climate and Its Relationship with Extra-role Performance Behaviors. *Journal of Organizational Behavior*, 37(2), 213-235 (2016).
- [31] Ram P & Prabhakar G. The Role of Employee Engagement in Work-related Outcomes. *Interdisciplinary Journal of Research in Business*, 1(3), 47-61 (2011).
- [32] Lu L & Lu A & Gursoy D & Neale N. Work Engagement, Job Satisfaction, and Turnover Intentions: A Comparison between Supervisors and Line-level Employees. *International Journal of Contemporary Hospitality Management*, 28(4), 737-761 (2016).
- [33] Bae S & Seo Y & Yu H. The Relationship among Organizational Trust, Hierarchical Organizational Culture, Job Burnout, Job Engagement and Turnover Intention: Multi-group Analysis by

- Manufacturing and Non-manufacturing. *Journal of Vocational Education & Training*, 24(2), 151-178 (2021).
- [34] Jeong E. The Relationship Among Self-management, Job Involvement, and Non-financial Management Performance of a Manager in a Small-sized Foodservice Enterprise. *Journal of Tourism Sciences*, 42(9), 157-173 (2018).
- [35] Suh C. A Study on the Structural Relation of Hotel Business to Ethical Leadership, Trust in Superiors, Job Satisfaction, and Job Involvement. *Korean Journal of Hospitality and Tourism*, 22(1), 43-59 (2013).
- [36] Ha K & Ka K & Kim J. Effects of the Work Ethic in Private Security Guards on Job Attitude and Job Involvement are Investigated. *International Journal of Criminal Study*, 1(2), 24-29 (2016). [\[Article\]](#)

7. Appendix

7.1. Authors contribution

	Initial name	Contribution
Lead Author	HC	-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*	SJ	-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	BK	-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 Kyungwoon University Research Grant in 2022.