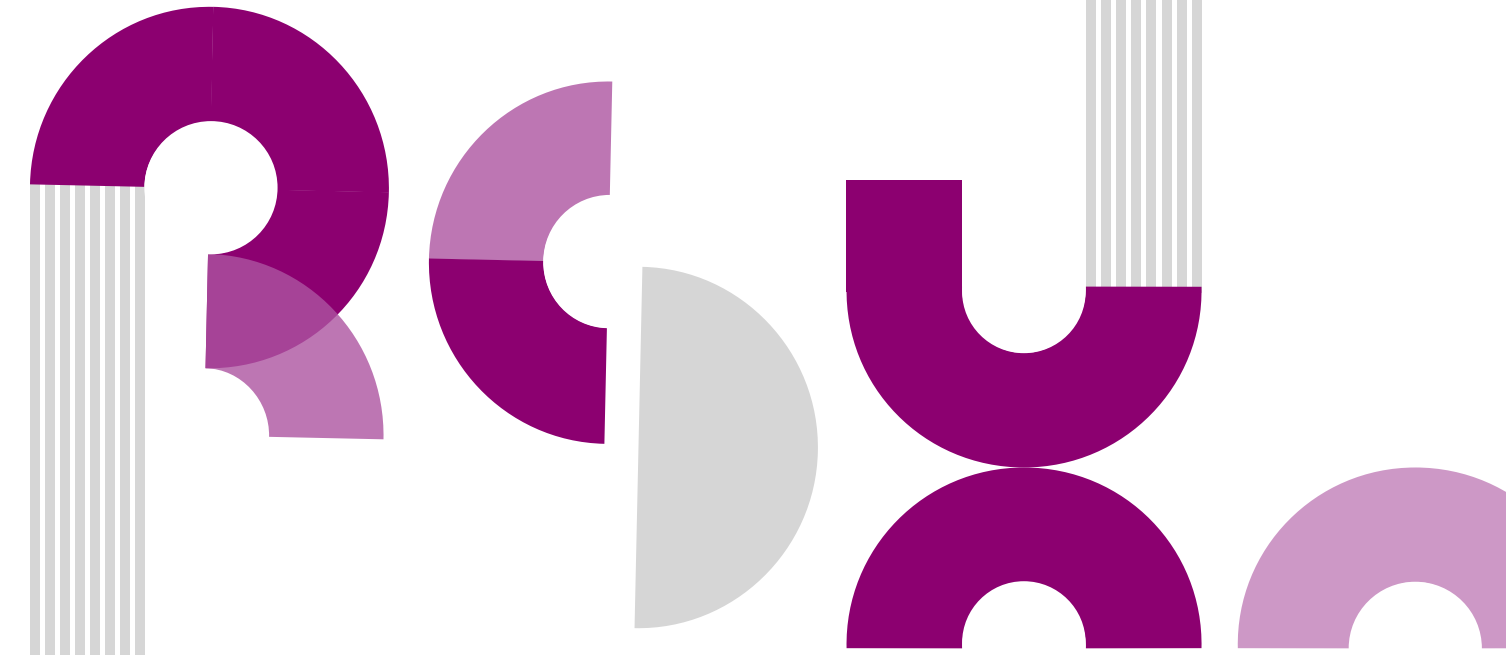


RCPHN

Research in Community and Public Health Nursing

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Aims and Scope

The Research in Community and Public Health Nursing (RCPHN) is the official journal of the Korean Academy of Community Health Nursing.

RCPHN is a peer-reviewed journal published quarterly by the Korean Academy of Community Health Nursing.

RCPHN coverage includes theoretical, practical, and educational issues related to community and public health nursing. Articles include original research articles, reviews, and editorials. This journal aims to provide worldwide access to timely research and practice features of use to community health nurses, educators, school health teachers, occupational nurses, and administrators in the field of community and public health nursing.

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Original Articles

- 241 Experience Related to Acceptance of Illness among People with Early-Stage Dementia: A Phenomenological Study
Jaewon Park
- 255 Good subjective health status and health-related quality of life in people with chronic kidney disease: A secondary analysis using the Korea National Health and Nutritional Examination Survey in 2019 and 2020
Jena Lee, Yujin Suh
- 267 Development and Effectiveness of a Basic Epidemiological Investigation Simulation Program of Emerging Respiratory Infectious Diseases for Nursing Students: Application of Standardized Patients
Jiyun Park, Gye Jeong Yeom
- 281 A Multi-component Living Lab on Health Engagement for Advancing Self-care Agency among Migrant Workers in South Korea: A mixed methods study
Youlim Kim, Hyeonkyeong Lee, Sookyung Kim, Junghee Kim
- 294 Relationships of Self-leadership, Working Environment, and Professionalism among School Health Teachers
Joohee Kim, Young Ko
- 307 Factors Related to Smoking Relapse Within Six-Months of Smoking Cessation Among Inpatients
Ji Eun Bae, Chul-Woung Kim, Seung Eun Lee, Myungwha Jang
- 320 Factors affecting cultural adaptation stress by gender among multicultural adolescents in Korea
Seungwoo Han

Experience Related to Acceptance of Illness among People with Early-Stage Dementia: A Phenomenological Study

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Purpose: This study aims to describe the structure of the experience related to acceptance of illness among people with early-stage dementia (PWED).

Methods: Participants were six people who had Alzheimer's disease or vascular dementia. Their clinical dementia rating scores were 0.5 or 1. Data were collected from individual in-depth interviews. The collected qualitative data were analyzed based on Giorgi's descriptive phenomenological method.

Results: The five constituents and eight sub-constituents were derived from the experience related to acceptance of illness among PWED; 'Facing the changed me,' 'Facing changes in roles and relationships with others,' 'Conflict between recognizing and denying dementia in daily life,' 'Perceiving the limits and accepting dementia,' and 'Reconstructing daily life for the prolongation of the current health status.'

Conclusion: This study contributes to the expansion of the in-depth understanding of the experience related to acceptance of illness among PWED. The results of the study will be helpful as basic data for community health nurses to develop interventions to improve acceptance of illness of PWED.

Keywords: Aged; Dementia; Qualitative Research

Introduction

Dementia is a clinical syndrome characterized by cognitive decline, and it is caused by various causes, including Alzheimer's disease and vascular dementia [1,2]. Since dementia causes a decline in cognitive functions including memory, a decline in the ability to perform activities of daily living (ADL), changes in emotions and behaviors, and limitations on social participation [1], it is a major cause of disabilities and dependence in daily life in elderly people [1]. Currently, the international community is paying attention to dementia due to the increase of the number of people with dementia as a result of the growth of the elderly population [1]. Many countries around the world are making efforts for the improvement of quality of life among people with dementia as well as the prevention, treatment, and management

of dementia [3].

Dementia can be divided into early, middle, and late stages according to the levels of cognitive function, the ability to perform ADL, and independence [4]. People with early-stage dementia (PWED) are able to perform ADL relatively independently, compared to those with middle-stage or late-stage dementia [4]. But due to progressive cognitive decline, they experience the gradual functional decline in the ability to perform daily activities and their roles in daily life, limitations on participation in social activities, and the gradual reduction of control over behavior [5,6]. Moreover, unlike other chronic diseases, dementia is characterized by the cognitive decline that precedes a decline in physical function [4]. For this reason, PWED experience greater confusion due to changes in their daily life resulting from cognitive decline rather than physical health problems [4]. They tend to

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think their confusion results from some other problem and attempt to fix the situation rather than regarding their symptoms as the symptoms of a disease [4].

Acceptance refers to recognizing and actively accepting a situation rather than changing the situation, when an individual is put in a situation that may pose a psychological threat to the person [7]. Since acceptance leads individuals to actively accept what they are experiencing as it is rather than making unnecessary judgements about the current feeling, thoughts or emotions [8], it has therapeutic effects regarding the enhancement of quality of life. For this reason, this aspect of acceptance has been applied in health-related fields [9]. Acceptance of illness means accepting disease as well as the reality related to disease, including negative thoughts, emotions, and changes caused by disease [10]. Research on acceptance of illness has been conducted in relation to various chronic diseases, such as cancer [10,11], heart failure [12], diabetes [13], chronic respiratory disease [14], end-stage renal disease [15], and chronic pain [16]. According to the results of previous studies, acceptance of illness reduces psychological pain and distress as well as anxiety and depression in patients [10,11,13,15], and influences the physical, emotional, and social functions of patients [12]. These findings indicate that acceptance of illness is closely related to the quality of life of patients [12-15]. Although acceptance of illness has important meaning for patients with chronic diseases [12], among previous studies on dementia, only one study [17] reported that emotional adaptation to disease is one of the major attributes that determines the emotional well-being of people with dementia. Moreover, it is difficult to find studies that conducted an in-depth exploration of acceptance of illness in people with dementia.

Until the 1980s, research on dementia was based on the biomedical perspectives that conceptualized dementia as neurological damage [18], and these studies of dementia based on biomedical perspectives brought about the development of pharmaceutical interventions [19]. However, biomedical perspectives are focused on the functional loss and decline of people with dementia and the experience of caregivers [2,18]. Therefore, some researchers pointed out the limitation of biomedical perspectives in that they cannot sufficiently explain dementia [19-21]. Subsequently, research on dementia has been gradually expanded to the perspectives that acknowledge the importance of the psychosocial factors, humanity, experiences, and well-being of people with dementia [2,18-21]. Recently, person-centered care has been emphasized, and the concept of person-centered care was proposed by Kitwood [22,23]. Kitwood [22,23] also regarded people with dementia as beings with subjectivity and psychoso-

cial needs, and maintained that it is necessary to explore their experiences. Some researchers raised questions about the reliability of the reports of people with dementia who have cognitive impairment [21]. However, in recent years, social consensus has been largely reached regarding the view that the essential nature of experience should be explored from the perspective of people with dementia who directly experience the phenomenon [21]. Further, the World health organization (WHO) also suggests that when researchers attempt to understand vivid experiences related to dementia, it is imperative to investigate the phenomenon through people experiencing dementia [1]. As a result, qualitative research on the self-reported experiences of people with dementia has been increasing.

Previous studies on the experience of people with dementia explored the following experiences related to dementia: the experiences of living with dementia [5,24], shame and loss [6], adaptation to dementia symptoms [25], strategies for coping with dementia symptoms [26], and experiences of dementia diagnosis [27]. In addition, some previous studies conducted the synthesis of the findings of primary qualitative studies on the experiences of people with dementia, and these studies analyzed qualitative findings mainly focused on relationships [28], lived space [29], lived time [30], or coping strategies [31]. There were also studies that conducted the synthesis of the experiences of dementia diagnosis [32,33]. However, there have been few studies to explore the experience of acceptance of illness among people with dementia, so there are limitations on gaining an understanding of the experience. Nevertheless, acceptance of illness is important for PWED because it helps them to get used to limited independence and increasing dependence on others in daily life due to the disease [14], and it contributes to the reduction of pain and distress related to various changes caused by dementia [10]. Furthermore, PWED tend to think that there is something wrong and struggle to fix the situation rather than accepting dementia, but at the same time, they want to know how to adapt to changes occurring together with the disease [4]. Based on the findings of prior studies described above, acceptance of illness should be viewed as a prerequisite for the improvement of quality of life among PWED, and there is a need to explore the experience of acceptance of illness from the perspective of people with dementia prior to the development of interventions or strategies for acceptance of illness among PWED.

Therefore, this study attempted to explore the experience of acceptance of illness in PWED by applying the descriptive phenomenological method proposed by Giorgi [34,35]. On the basis of Husserl's phenomenology [35-37], Giorgi proposed a phe-

nomenological method for exploring the fundamental nature of the experiences that individuals go through in the world of everyday life [35,37]. Based on Husserl's epistemology, Giorgi claims that insubstantial phenomena, such as dreams, hallucinations, and memory, are experienced through individuals' consciousness [35], and thus he emphasizes qualitative research as a method for gaining knowledge about empirical phenomena [35]. In addition, according to Giorgi's descriptive phenomenological method, researchers should concentrate on participants' statements themselves and the meanings of the statements rather than the truthfulness or falsity of the statements [34], and describe participants' experience in a detailed and concrete manner [35]. In this way, Giorgi's descriptive phenomenological method presents a method of qualitative research and phenomenological research without resorting to biomedical models and the paradigms of natural sciences based on empiricism [36], and it allows researchers to focus on the subjects of experience and their experiences [34,35,38]. In this respect, Giorgi's phenomenological approach provides validity for the inquiry of the experiences of people with dementia.

This study aimed to explore the structure and meaning of the experience of acceptance of illness in PWED by applying Giorgi's descriptive phenomenological method [34,35]. Through this inquiry, this research sought to present a deeper understanding of the experience of acceptance of illness in PWED and the results of this study are expected to contribute to presenting a theoretical basis for the development of nursing practice and interventions for helping PWED to accept their dementia more actively.

Methods

1. Study design

This study is a qualitative research to investigate the structure of the experience of acceptance of illness in PWED by applying a phenomenological method.

2. Participants

The participants of this study were people with early-stage dementia registered at a dementia care center located in Seoul. Initially, participants were selected by the following inclusion criteria: (1) a diagnosis of Alzheimer's or vascular dementia; (2) a Clinical Dementia Rating (CDR) of 0.5 (suspected dementia) or a CDR of 1 (mild dementia). In addition, to select participants who can give an account of their experience in a psychologically stable condition, participants were limited to people who were diagnosed with dementia at least 6 months ago. Peo-

ple diagnosed with dementia at least 6 months ago were recruited because a previous study [39] reported that people who were diagnosed with dementia less than 6 months ago patients are at high risk for suicide due to a high level of stress and emotional pain caused by dementia diagnosis. Those who had difficulty communicating verbally due to other physical diseases or were diagnosed with psychiatric diseases were excluded. Participants were selected by a purposive sampling method from elderly people who were using a dementia care center, understood the purpose of this study, and gave consent to data collection. More specifically, the people who met the inclusion criteria of this study and were judged to be able to understand and adequately answer the questions of interviews were recommended by the person in charge of the cognitive rehabilitation program. A total of six people were recommended, and the researcher met them individually, and gave them explanations about the researcher, the purpose of the study, the method of research participation, and the reason why they were recommended as participants. All of the six people fully understood the researcher's explanations, and voluntarily agreed to participate in the study, so they were all selected as participants.

3. Data collection

Data was collected through individual interviews with the participants by the researcher from October 14, 2015 to April 5, 2016. All of the six participants completed interviews without dropping out or refusing to participate. Interviews were conducted on the days when the participants visited the dementia care center to participate in the cognitive rehabilitation program. Each interview lasted for one hour or for one and a half hour, and two or three interviews were performed for each participant depending on participants. For the interview location, interviews were conducted in the education room or the interview room of the dementia care center that the participants used every week to ensure that participants would feel comfortable during interviews and respond to interviews in a natural situation. Interview guidelines created in advance were used to prevent omitting questions during interviews and proceed with interviews in a natural manner. The interviews were recorded using a recording device, and the participants' non-verbal messages observed by the researcher during the interviews as well as the researcher's impressions about the participants and their statements during the interviews were recorded in interview notes.

The researcher started interviews with participants using questions about common topics such as the weather, their mood, and their special experiences during the past week. The order of the

questions was flexibly changed according to the flow of the conversation to ensure natural interviews. During the first interview, participants were asked questions about their general characteristics, such as gender, age, the type of dementia, time elapsed since dementia diagnosis, and the presence of other diseases, and the conversations about these questions were helpful in leading conversations about dementia naturally during the interviews. According to the descriptive phenomenological method suggested by Giorgi [35], to explore the essential nature of the experience of acceptance of illness by using the research question “Please tell me about the situations related to the experience of accepting the disease called dementia in your daily life”, specific interview questions were designed to elicit narratives about the essential elements of experience, such as the subject of experience, the experienced object, temporality, spatiality, relationships between oneself and others, the meaning of life for the subject, and value judgements of the subject [37] (Table 1). The researcher transcribed recordings within 3 days from the date of data collection, and tried to exactly transcribe what participants said by comparing the content of recordings with transcripts. Any matters requiring additional confirmation were included in the questions of the subsequent interview, and data collection was conducted until data saturation was reached.

4. Data analysis

Data analysis was conducted along with data collection in a cyclic manner, and carried out according to Giorgi’s descriptive phenomenological method [34,35]. Prior to data analysis, the researcher’s assumptions and preconceptions about PWED, which were formed based on previously obtained knowledge and experiences, were described and revealed. The researcher had the following assumptions and preconceptions about PWED: ‘PWED probably tried to deny their situation when they were given a dementia diagnosis’; ‘PWED will have anxiety and fear about the progress of the disease’; ‘All the thoughts and behaviors of PWED will be focused on dementia after dementia diagnosis’; and ‘PWED will try to avoid expressing or disclosing anxiety about the possibility of their disease getting worse to others’. If the assumptions and preconceptions of the researcher are involved in data analysis, they interfere with the exploration of the essential nature of experience. Therefore, in the process of data analysis, the researcher made a conscious effort not to allow the researcher’s assumptions and preconceptions to influence data analysis by writing them down and bracketing them [35].

In the first phase of data analysis, to obtain an understanding of the overall content of the statements of participants, the re-

Table 1. Interview Questions

- The doctor says you have dementia. What do you think? Why? (Subject)
- What do you think about ‘dementia’? (Object)
- Have you ever seen a dementia patient? Based on this, what about dementia? (Object)
- Do you think you currently have dementia? (Subject, Object)
- What is different from before? (Temporality)
- Have you ever lost your way? Please tell me about the situation at the time. What thoughts or feelings did you have when faced with that situation? (Spatiality)
- How are your relationships with other people, such as family and friends? (Relationship with yourself or others)
- If your relationships with others have changed, how have they changed? (Relationship with yourself or others)
- What events or changes have you experienced in your daily life since being diagnosed with dementia? Please be specific about this. (Subject, Temporality, Spatiality, Relationship with yourself or others)
- What thoughts or feelings did you have when faced with that event or change? (Subject, Temporality, Spatiality, Relationship with yourself or others)
- How do you feel about the fact that you have dementia? (Meaning of life, Value evaluation)
- What is your life like as a person with dementia? (Meaning of life, Value evaluation)
- How is dementia affecting your life? (Value evaluation)
- Please tell me about your daily life living with dementia including daily routine. (Overall)
- What is your major challenge related to dementia? (Overall)

searcher was immersed in the situations described by participants and repeatedly read transcripts until the researcher gained a clear perception of the overall experience of participants. In the second phase of data analysis, classification of meaning units from an academic perspective was performed. The researcher slowly read the statements of participants from a perspective of nursing science, and indicated the parts showing changes in meaning using underlines and parenthetical marks and wrote brief memos about the essential element of experience that particular statements constituting a meaning were related to. A total of 195 meaning units were finally derived through several repeated analyses and checking processes. The third phase of data analysis is the stage of transforming meaning units into academic terms. Starting with the first transformation process of changing meaning units expressed in the first person into third-person expressions, the transformation of meaning units into academic terms was performed a total of six times through reflection and free imaginative variation. In terms of validity, the process of transforming meaning units into academic terms, the process of deriving constituents, and the final results were reviewed by 3 ex-

perts in the field of nursing who were well versed in qualitative research methods and research on dementia. The fourth phase of data analysis is the stage of describing the structure of experience. In this stage, the finally transformed meaning units and constituents were compared and contrasted from an integrated perspective, and they were described by synthesizing them into a single structure about the experience of acceptance of illness of PWED. The descriptions of the structure of experience were revised a total of three times. Each time they were revised, they were reviewed by 5 experts in the areas of qualitative research and research on dementia.

5. Research preparations

The researcher completed a course on qualitative research methodology as part of doctoral coursework, faithfully carried out preparations as a researcher in qualitative research through opportunities for studying and practicing qualitative research methods, including participation in academic conferences and seminars, and published research papers applying qualitative research methods in academic journals. The researcher has also been continuously making efforts to expand theoretical sensitivity to dementia and people with dementia by continuously conducting research on dementia and practical guidance for undergraduate courses implemented in nursing homes. In addition, the researcher participated in the process of tests for diagnosing dementia for 6 hours a week for about 6 months with the permission of the director of the dementia care center, who gave approval for data collection. This process served as a training process for the researcher to increase an understanding of the symptoms and responses of people with dementia, elicit in-depth accounts from participants during interviews, and naturally maintain the flow of interviews by flexibly responding to the reactions of participants. Additionally, the researcher participated in the cognitive rehabilitation program and the exercise program for 1 hour per week for 4 months with the permission of the director and the person in charge of the cognitive rehabilitation program of the dementia care center. This process helped to narrow emotional distance and form a mutual trust relationship between participants and the researcher.

6. Ethical considerations

This study was conducted after obtaining approval from the Institutional Review Board of Korea University (1040548-KU-IRB-15-181-A-1). In this study, the following efforts were made to adhere to research ethics. First, considering participants' poor memory, they were reminded of interview appointments a few

days before conducting interviews in order to reconfirm interview appointments and their consent to research participation. Second, participants were given explanations about the researcher, the purpose of the study, the reason they were recommended as participants, recording interviews, how to store the research data, protection of confidentiality and anonymity, and their right to refuse to participate or withdraw from research at any time without any disadvantages. Then, it was checked whether they understood the explanations about research by asking them about the content. After it was confirmed that they understood all the important matters regarding research participation and voluntarily agreed to participate, written informed consent was obtained from them, and then interviews with them were conducted. Third, during the interviews, participants were asked one question at a time in easy-to-understand and concrete language expressions, and they were given sufficient time to answer. In addition, when participants were having trouble finding right words or expressions, clues for them or expected words were given so that they could participate in the interview without feeling frustrated. Fourth, even when participants repeatedly say the same thing or gave a wrong or illogical response to a question, the researcher listened to what they said until they finished talking without interrupting them. Lastly, while conducting the interviews with participants, the researcher paid attention to whether they felt tired or their state of mind in the process of the interview, and a small amount of money was paid to the participants as a token of appreciation.

7. Ensuring the quality of research

To ensure the quality of research, evaluation criteria proposed by Lincoln & Guba [40] were applied. First, to ensure the credibility of the study, the researcher tried to gain a sufficient understanding of participants and form a trust relationship with them by participating in tests for diagnosing dementia, the cognitive rehabilitation program, and the exercise program for several months prior to data collection. On the other hand, according to Giorgi's descriptive phenomenological method, research results are derived based on the researcher's academic perspective, and the experiences and meanings derived from an academic perspective are different from the raw experiences and meanings as experienced by the participants, and thus it has been suggested that it is not appropriate to confirm research results through participants [41]. Therefore, in this study, the process of confirming research results with participants was not conducted. Instead, to make up for this omission of the process of checking research results with participants, participants were asked the same question two or

three times by expressing it in different ways, and it was checked whether their responses were consistent in order to ensure the authenticity of collected data. Data saturation was ensured by finishing interviews when it was confirmed that new information was not derived any more for each participant during the second or the third interview depending on individual participants.

To secure transferability, participants were selected by a purposive sampling method, questions were created to reveal the essential elements of experience, and the researcher tried to sufficiently describe the experience of acceptance of illness of PWED from an integrated perspective through faithful immersion in the statements of participants. In addition, to secure dependability, during the processes of data collection and analysis, the researcher recorded the processes performed and rational bases for them by writing research notes, and conducted an external audit by getting the content of research notes reviewed by a fellow researcher who had the experience of qualitative research and did not participate in this research. Additionally, to secure confirmability, the researcher's assumptions and preconceptions about PWED were disclosed in advance by describing them, and the researcher tried to prevent them from intervening in this study during the entire process of research. In addition, to confirm whether research results were derived based on collected data without any interventions of the researcher's preconceptions, an external audit for the research process and results was conducted by experts well versed in qualitative research methods and research on dementia.

Results

The general characteristics of the participants are shown in Table 2. The core themes of the experiences of acceptance of illness in PWED were derived as five constituents and 8 sub-constituents. The five constituents of the experience of acceptance of illness in PWED were as follows: 'Facing the changed me', 'Facing changes

in roles and relationships with others', 'Conflict between recognizing and denying dementia in daily life', 'Perceiving the limits and accepting dementia', and 'Reconstructing daily life for the prolongation of the current health status.' The results of this study showed that the participants were not able to do what they needed to do because of poor memory, and were faced with the experience of finding themselves getting lost and having difficulty finding their way around familiar spaces, the changed roles of themselves and their family members, and changes in the relationships with friends. In particular, as they were faced with their changed selves, they could not help but agree that they had dementia. Also, they looked back on their past life in search of the causes of their disease, and when they found the causes of their dementia, they acknowledged that they became dementia patients. Meanwhile, participants got to think about the nature of dementia, and it occurred to them that as far as they knew, dementia is a disease that make people behave unpredictably and irrationally, causes pain to the family, and imposes a huge burden on the family. Then, in light of the fact that they did not show such behavioral symptoms of dementia, they could not acknowledge the fact that they had dementia. In this way, participants experienced a tight conflict between the recognition and denial of dementia within themselves. However, since participants knew that dementia progressed with time and would continue to progress, they realized their limits and accepted the fact that they were dementia patients. In addition, they filled their daily life with healthy lifestyle and efforts to prevent or delay memory decline in the hope that they could slow down or stop the progress of dementia and maintain their current health status (Figure 1).

Constituent 1. Facing the changed me

1) Forgetting to do things due to poor memory

The participants came to have difficulty continuously remember some information and recalling it. They found that the flow of thoughts was not maintained due to poor memory. They found

Table 2. The Participants' Characteristics

Participant	Gender	Age (yr)	Marital status	Education	Inmate	Length of time diagnosed with dementia (month)	Dementia type	Other disease
1	Female	74	Married	College	Spouse	19	VD	None
2	Male	73	Married	College	Spouse	19	AD	MI
3	Female	76	Divorced	Elementary school	None	27	AD	Hyperlipidemia
4	Male	79	Married	College	Spouse	9	AD	HTN
5	Male	73	Married	College	Spouse and Child	9	AD	HTN, DM
6	Male	76	Married	Elementary school	Spouse	7	AD	Hyperlipidemia, HTN, DM

VD = Vascular dementia; AD = Alzheimer's dementia; MI = Myocardial infarction; HTN = Hypertension; DM = Diabetes mellitus.

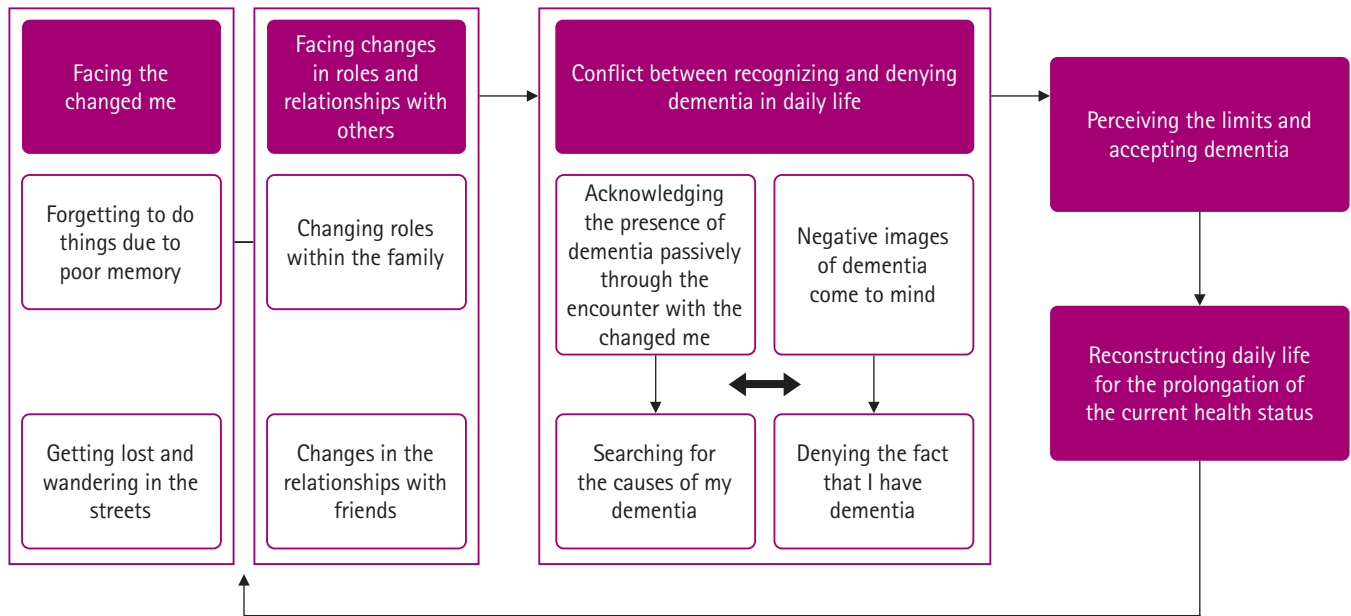


Figure 1. Experience related to acceptance of illness among people with early-stage dementia.

themselves frequently forgetting to do what they had to do because the connection between thought and action was previously naturally achieved without any efforts but was now disrupted by poor memory.

“A little bit these days ... I now forget things often unless I write them down. Even recently, during Chuseok, we were holding a memorial service for ancestors, I had bought persimmons (for the ancestral rite), but I couldn’t remember where I put them, and I even forgot buying them. However, afterwards, when I opened the door of the refrigerator for kimchi after finishing the memorial service, I found that they were in the refrigerator. Since then, I often get startled whenever similar things happen.” (Participant 1)

“Now, I can’t remember things, I can’t. I need to, hmm, re-, remember all the things that happened yesterday, but I can’t remember them. I can’t remember things like what I did yesterday. I fail to keep appointments all the time.” (Participant 4)

2) *Getting lost and wandering in the streets*

The participants found themselves getting lost and having trouble finding their way around the places that they usually frequented or they found themselves standing in a place other than their intended destination. They felt confused when they found it difficult to find their way around familiar places where they had lived so far.

“That day, I was going alone, ... strangely, □□□, I couldn’t find that place. ... ‘Uh, this is strange ... here, □□□ is only several

stops away, why can’t I remember (how to go there)? I thought to myself like this, and I stood at a bus station like this. ... That man told me, ‘You took the wrong bus, you should have taken the bus on the other side of the street, but because you took a bus here, you couldn’t find the place.’ ... I felt confused and frustrated, ... ‘Ah, why I suddenly, it’s the path I use every day, why, why can’t I find my way around here like this?’ When I think about that, I feel so upset and frustrated that I feel like I’m gonna die soon, literally. Indeed, this feeling is beyond words.” (Participant 3).

Constituent 2. Facing changes in roles and relationships with others

1) *Changing roles within the family*

The participants realized that other family members got to take over their roles that they had performed so far in the daily life of the family. In addition, on the basis of the reduced functional abilities of the participants, their family members restricted or intervened in the things they had done independently, which led to conflicts between the participants and their family members.

“For me, now, my seals, my bankbooks, and my money and other things in the bank, all the financial matters, my wife manage and take care of them. ... And my daughter came and said to me several times, ‘Let Mom do that, you don’t know anything, but why are you making a fuss? ... So, we quarreled or argued a lot” (Participant 4)

2) Changes in the relationships with friends

The participants became conscious of the fact that they had dementia, whenever they met their friends. As their friends became aware that the participants had dementia or they noticed the participants' illness through their changed behaviors, they felt that there were changes in their friends' attitude toward them. Now, they felt uncomfortable in their relationships with friends, experienced emotional damage, and thus gradually came to avoid meeting their friends.

"The day after tomorrow, again, I have to go to see my college friends, I haven't yet decided whether to go there or not. . . . My old image, the way they saw me in the past, it would be ruined. The thought spoils the fun. . . . My image they previously had about me seem to be going downhill. I feel upset about that." (Participant 5).

"I quit (meeting people) a lot. Because, I have no choice but to, this, now, because I have dementia . . . When people talk about things like that, I feel annoyed. I feel bad, and I often get upset by what they say." (Participant 1)

Constituent 3. Conflict between recognizing and denying dementia in daily life

1) *Acknowledging the presence of dementia passively through the encounter with the changed me* When the participants encountered changes in themselves during their daily lives, they could not help but agree that they had dementia. In particular, as they found themselves unable to perform daily tasks smoothly, they had no choice but to acknowledge that they had dementia.

"The path I walk every day, . . . I need to walk the same path every day, but strange, strangely enough, I found myself waking in this direction. . . . The senior welfare center is located there, but I found myself standing on a different path. Oh, my gosh, that's when I realized. I thought to myself, 'Oh, my . . . I seems to have dementia . . .'" (Participant 3)

2) Searching for the causes of my dementia

After agreeing to the fact that they had dementia, this acknowledgement led participants to search for the reasons why they developed dementia. The participants looked back on their past life, searching for the causes of their dementia. Then, when they found the cause of their disease in their past life, they acknowledged that they had dementia.

"Indeed, totally bewildering. Hmm, . . . I had a lot of hobbies, and I also did all of them earnestly, how did this happen, ah, what did I do, in my life, what did I do wrong? I thought a lot about that. . . ." (Participant 1)

"Among my siblings, three of them are still alive, ah, two of them,

my second older sister and my eldest brother. These two people are still alive, and they don't have dementia. But I have dementia. But I, I regret that. I drank a lot. Hmm, . . . My brother was a heavy drinker, but he quit drinking when he was young. I almost, I quit drinking when I had some health problems, though. . . . Because I did so, I drank, that I drank too much, that's the reason I have this disease, I admit this." (Participant 5)

3) Negative images of dementia come to mind

Meanwhile, the participants got to think about what disease dementia is, and naturally, negative images related to dementia occurred to them. For the participants, dementia was regarded as a socially inappropriate state that is manifested as concrete behaviors, such as constantly asking for food even after having a meal, yelling at people, going outside abruptly, and aggression. In addition, they thought of dementia as a disease that causes pain to the family and imposes a burden on the family because of irrational behaviors, and they also perceived it as a disease for which there is no cure but which not lead to death easily.

"For the people I saw on TV, well, some people run away, hmm, some people give their family a hard time, hmm, just, some woman beats her husband, some people ask for meals, and having just finished a meal, they say they haven't eaten anything yet. When I see things like that, I don't like it. I feel uncomfortable. Because of that, so, I know, dementia is, how terrible it is. . . . So, I get to think about the great trouble the family members would have, how many difficulties they would have" (Participant 3).

4) Denying the fact that I have dementia

Since they did not show such symptoms of dementia, they would not admit that they had the same condition as dementia. Therefore, they separated themselves from dementia, claiming that their health problems were not related to dementia, and they had a normal healthy state.

" . . . When I compare myself with that person, there are moments when I think 'I am, better than that (person), huh, am I like that?' I feel like 'But, I am not like that . . .'" (Participant 5)

"Even now, I, things like this math, . . . Huh! Ah, things like this, 2, 3, 5, 7, 9, and 2, 4, 6, 8. Well, I got every question right. Ah, this is, the cog-, they do cognitive tests, right? Then, I thought to myself, 'That is doing a cognitive test', and I easily write down without hesitation, almost nor- . . . like a normal person! However, the doctor seems to think that I have the disease." (Participant 2)

Constituent 4. Perceiving the limits and accepting dementia

Nevertheless, participants knew that their health status was grad-

ually getting worse with the elapse of time. They also knew that dementia would keep progressing in the rest of their life. While observing their health status getting worse gradually, participants realized their limits that they could not overcome even by great efforts, and thus they accepted the fact that they had dementia.

"Ah, indeed, it does progress! This disease is, however hard I, this, I come here, try hard, and take medicine, nevertheless, it is slowly progressing, I think like that. Ah, so, I have accepted it." (Participant 1)

Constituent 5. Reconstructing daily life for the prolongation of the current health status

The participants could not just sit idle helplessly and wait for their dementia to get worse. Therefore, they reconstructed their daily life in the hope that their dementia would progress as slowly as possible or would not get worse any more, and thus they could maintain their current health status. Efforts to maintain healthy lifestyle, repeatedly reminding themselves of the information they need to remember, and training for maintaining current memory capacity, such as recording and checking things, became an important part of daily life for the participants.

"I really hate doing exercises, but because they say exercises are good for health, because they say they are good for dementia, so I walk for exercise." (Participant 1)

"I try to think about things again and again, I try not to forget about things, ... when I make an appointment, not to forget that appointment, ..., I write it on a piece of paper or in a pocket planner, and like this, I attach it. ... So, I always carry a pocket planner with a large size like this." (Participant 2).

Discussion

In this study, the experience of acceptance of illness in PWED was found to have a structure with the following sequentially appearing constituents: 'Facing the changed me', 'Facing changes in roles and relationships with others', 'Conflict between recognizing and denying dementia in daily life', 'Perceiving the limits and accepting dementia', and 'Reconstructing daily life for the prolongation of the current health status.' However, in the experience of acceptance of illness in PWED, five constituents do not always occur sequentially in one direction, but the experience has a cyclic structure in which PWED perceive their limit and accept dementia, also engage in the reconstruction of daily life to maintain their current health status, meanwhile, face the changed 'me' and changes in their roles and relationships with others once again, and thus experience the conflict between the recognition and denial of dementia again. A study on patients with chronic

pain [16] also found that the participants who once accepted their pain returned to the state of non-acceptance, and that pain acceptance is a continuous and dynamic process that requires a long period of time until patients understand and completely accept pain. These research findings show that acceptance of illness cannot be achieved in a short period of time, and it is a task that must be accomplished with patience from a long-term perspective. Therefore, to help PWED to accept their disease, it is necessary to explore methods to help them to accept changes in themselves by gaining an understanding of characteristics and symptoms of the disease, use strategies for responding to changes caused by dementia and maintaining current health status, and at the same time, recognize their dementia more easily and more comfortably. In addition, to help them to accept dementia in a more stable and comfortable manner in the process of perceiving their limit and accepting dementia, it is necessary to take a multi-dimensional approach including cognitive, psychological and social support from a long-term perspective [16].

In the first constituent, participants reported facing changes in themselves. More specifically, they found themselves unable to do what they needed to do due to poor memory, and they had the experience of getting lost and not finding their way in a familiar space where they went very often. Dementia patients' cognitive decline and reduced control over their behavior [6] and their recognition of changes in themselves in relation to limitations on daily activities due to functional declines are common experiences in people with dementia, so they were also reported by other previous studies [5,24]. In addition, changing roles in the family revealed by the second constituent in this study are similar to the findings of previous studies. More specifically, some prior studies [5,24] also reported the experiences of changing roles in people with dementia, such as the experience of decision-making about daily activities that is limited or conducted by other family members and the experience of the transition of roles such as driving to the spouse even though they performed the roles before dementia diagnosis.

It should be noted that these changes experienced by people with dementia are linked to the loss of independence and the increase of dependence on others [5]. In addition, it is also necessary to pay attention to the finding that it has been shown that although people with dementia show a decline in abilities and functions for ADL, they hope to maintain their daily life autonomously and independently, and further want to be helpful to their family in other ways [24]. Furthermore, people with dementia experience sadness, the decrease of self-confidence, and a reduction in self-esteem due to the loss of independence [5].

Therefore, to help PWED to accept their disease, there is a need to focus on the balance between independence and dependence. For PWED, leading them to adapt to a new way of living by informing them about tools and strategies that can help them to overcome limitations in ADL and perform independent activities will help them to accept changes in daily life. According to a previous study, family members play an important role in helping people with dementia maintaining balance between independence and dependence [16]. Therefore, it is primarily required for family members to understand the feelings and needs of people with dementia regarding changes arising due to dementia. In addition, their family members should try to give people with dementia opportunities to perform daily activities independently, and provide support for them so that they can perform daily activities for themselves if possible. It is thought that such help and support can contribute to the acceptance of illness of PWED because they can increase the family members' understanding of people with dementia and facilitate family interactions including respect toward each other as shown in a previous study [42].

In the second constituent of the experience of acceptance of illness, participants reported that they came to avoiding meeting people because they perceived changes in their friends' attitudes toward them in relationships with friends, and they became uncomfortable about relationships with friends. These results are similar to the findings of some previous studies. For example, a study of people with dementia showed that people with dementia became conscious of others' gazes or perceptions regarding matters such as how they look to others or whether others already know that they are dementia patients [24]. Also, another previous study of people with dementia found that people with dementia isolate themselves from the world as they become reluctant to go out to avoid others' negative gazes and sympathy [6]. Based on these findings, it can be inferred that PWED go through internal and external conflicts regarding maintaining their value and others' respect toward them in their social relationships including relationships with friends [24]. On the other hand, a prior research revealed that while they are trying to hide their symptoms and dementia diagnosis from others, they feel like they are being observed by others, and feel loneliness at the same time [24]. In addition, a prior study reported that people with dementia usually find it difficult to tell others about the sadness and frustrations they experience in the process of struggling to restore daily life disrupted by dementia, and they consider it more difficult to talk about them to friends in particular [24]. In the light of these research results, a warm gaze, understanding, and receptive attitude toward PWED from other people that

they encounter in social relationships [9] are considered to be essential elements for acceptance of illness in PWED. Giving help and support to PWED rather than prejudices and stigma toward them will help them to accept their disease because such support would allow them to disclose their disease more comfortably and live in the local community receiving help from others.

The third constituent of the experience of acceptance of illness showed that there is a tense internal conflict between the recognition and denial of dementia in the participants. In agreement with these results, some previous studies reported similar findings. For example, a previous study described that although people with dementia knew that they had dementia, they denied the fact that they were dementia patients, and avoided using the word dementia [19]. In addition, another prior study reported that when they were faced with a situation when they could not perform daily activities normally, they attempted to avoid the embarrassing situation by resorting to humor or laughing it off and thus separated themselves from dementia [6]. These findings suggest that PWED cannot easily acknowledge the fact that they have dementia even though they have been diagnosed with dementia by a doctor and have been receiving regular checkups and taking medications. This is presumed to be due to the negative social perceptions of dementia. In this connection, as shown in the results of this study, dementia has been described as 'senility' or 'irrational behaviors due to old age' for a long time, and mass media has depicted dementia with a focus on behavioral and psychological symptoms such as aggressiveness, wandering, hallucinations, and delusion. These misconceptions and inaccurate depictions of dementia have led to the formation of a negative perception of dementia not only among people with dementia but also in the society as a whole. Moreover, negative perceptions of dementia lead people with dementia to regard dementia as a stigma rather than a disease, and thus make it more difficult for them to accept the disease.

The results of this study showed the tight battle between the recognition and denial of dementia in PWED. According to a previous study of patients with chronic pain [16], patients with chronic pain also experience the conflict between the acceptance and non-acceptance of chronic pain for a long time. These results indicate that patients experience a conflict between the recognition and denial of their disease for a long time. On the other hand, considering a prior study's finding that a proper understanding of disease is an attribute of disease acceptance [9], it is considered essential for acceptance of illness for PWED to recognize dementia as a disease and have an accurate understanding of dementia. Therefore, nurse should provide continuous educa-

tion and counselling so that PWED will have a correct understanding of dementia and gain proper insight into the disease, and change their perceptions about dementia into positive and receptive ones [19]. In addition, it is necessary to provide emotional support to PWED while they go through an internal conflict between the recognition and denial of disease. Although policies and campaigns to improve the perceptions of dementia have been continuously implemented at a national level, in order to allow people with dementia to accept dementia more comfortably and live well with dementia, each local community should make more active efforts to build a supportive environment [2].

In the fourth constituent, the participants realized limitations with the elapse of time, and accepted the fact that they were dementia patients. Similarly, in a study that explored the experiences of patients with terminal cancer [43], acceptance of illness was defined as 'having to accept' reality because the participants could not fight and survive their disease. To help PWED to accept their illness, community health nurses are expected to continuously provide them with nursing care including education, counseling, and support. However, especially when PWED accept their illness, nurses need to provide active support and assistance for them so that they will not perceive acceptance of illness as giving up or a crisis. In addition, it is necessary to ensure that acceptance of illness will not be limited simply to the recognition of limitations in people with dementia. In other words, it is necessary to help people with dementia to spend the rest of their life as a meaningful time by finding the meaning of life and looking for and performing things they can do for their family and others for the rest of their life [43].

Meanwhile, for the participants of this study, time simply meant the progress of dementia, but negative emotions such as fear were not observed. On the other hand, some previous studies [5,24] reported that people with dementia perceived the rest of their life as a fearful time due to the possibility of the complete loss of cognitive function and the uncertainty about how long it would take for their disease to reach the late stage of dementia. In addition, a study revealed that people with dementia considered euthanasia because they feared that they would eventually become 'a burden' on their family [5].

Although there are some discrepancies in the research findings of existing studies, for people with dementia, time is considered to have meaning as qualitative time depending on the severity of illness and functional abilities. In other words, in PWED, the quality of time is thought to be proportional to the severity of their illness and inversely proportional to the level of

remaining functional abilities. Therefore, if advance care planning, including better disease management plans, plans for the rest of their life, and preparations for death, is implemented together with people with dementia from an early stage of dementia [5], it will not only help PWED to accept their illness but also help people with dementia to arrange the rest of their life and prepare for good death.

In the final constituent, it was found that participants fill their daily life with efforts to change their lifestyle into healthy ones and the activities of training to prevent memory loss in the hope that they could maintain their current health status. These efforts of people with dementia were also shown by previous studies reporting that people with dementia use auxiliary tools such as calendars, diaries, and tablet PCs, post notes at various places in the house, and try to maintain a positive state of mind [5,24]. Meanwhile, people with dementia want to stay in the community as long as possible [5]. To this end, all the members of the community should provide adequate help to them without any prejudices, and create a community encouraging the participation of people with dementia [5], and there is also a need to develop technologies to support their healthy daily life [1]. This approach is consistent with the change in the international community's approach toward dementia care from the maintenance of cognitive function and the reduction of behavioral changes in people with dementia to the improvement of quality of life and strategies for living positively with dementia [1]. In a dementia-friendly community [3], PWED are likely to accept their illness more easily.

The participants of this study were able to express their situations, feelings, and thoughts and even describe their evaluations about themselves and their past life and their hopes for the future. In this respect, it is thought that this study has contributed to the presentation of the feasibility and validity of the research participation of PWED. In addition, through the identification of the constituents of the experience of acceptance of illness of PWED, this study presented a comprehensive understanding of the experience, and revealed the aspects which require interventions. However, one of the limitations of this study is that the participants were selected among elderly people using a single dementia care center. Therefore, the experience reported by participants may be different from the experience of PWED not using a dementia care center or those residing in nursing homes, so this should be taken into account in the interpretations of the results of this study.

Conclusions

This study explored the experience of accepting illness of PWED, including the essential elements of the experience, from a holistic perspective. The results of this study can be utilized as empirical data for the development of supportive interventions that can help PWED to incorporate their disease into their life and improve their quality of life. Based on the results of this study, the following suggestions are presented. First, it is necessary to conduct research to develop interventions for acceptance of illness of PWED, based on the constituents identified in this study. Second, the care of people with dementia is a long-term process in the context of the relationship between people with dementia and caregivers. Therefore, there is a need to conduct research on the experience of acceptance of illness in the context of care by recruiting people with dementia and their family caregivers together as participants so that they will pair up and participate together in research.

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Conflict of interest

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Authors' contributions

Park, Jaewon contributed to conceptualization, data curation, formal analysis, methodology, visualization, writing-original draft, review & editing, investigation, and validation.

Data availability

Please contact the corresponding author for data availability.

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Good subjective health status and health-related quality of life in people with chronic kidney disease: A secondary analysis using the Korea National Health and Nutritional Examination Survey in 2019 and 2020

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Purpose: This cross-sectional study aimed to describe subjective health status of people with chronic kidney disease (CKD), identify factors that affect good subjective health status and investigate the relationship between good subjective health status and health-related quality of life (HRQOL) in people with CKD.

Methods: This secondary analysis utilized data from the Korean National Health and Nutrition Examination Survey in 2019-2020. Participants ($N=295$) had an eGFR of ≤ 59 mL/min/1.73 m². Descriptive and inferential statistics were used to analyze the data. Univariate and multivariate logistic regression analyses were performed to identify factors affecting good subjective health status and examine the association between good subjective health status and HRQOL.

Results: Among all participants, 61.4% had good subjective health status, and the HRQOL index was 0.88 in people with CKD. Household income, activity limitation, stress, and the number of comorbidities in people with CKD were associated with good subjective health status. People with better subjective health status were more likely to be satisfied with self-care, usual activities, and pain/discomfort in HRQOL.

Conclusion: Good subjective health status is associated with better HRQOL. Therefore, subjective health status should be assessed early, and a nursing intervention program should be developed considering factors that can improve subjective health status in people with CKD.

Keywords: Kidney Failure, Chronic; Quality of Life; Health Status

Introduction

1. Background

Chronic kidney disease (CKD) is defined as the presence of an estimated Glomerular Filtration Rate (eGFR) of 59 mL/min/1.73 m² or less that persists for 3 months or more [1], and the prevalence of CKD is estimated to be around 11% of the world's population [2]. In Korea, according to data from 2021 National Health Statistics Reports, the prevalence of CKD is 8.4% in people aged

19 and older and 38.5% in people aged 60 and older [2]. In the U.S., the prevalence of CKD is reported to be 14% in the total population and 33.7% in people aged 65 and older [3]. In Korea, with rapid population aging, the prevalence of CKD in the elderly population is relatively higher than in other countries, leading to an increase in social medical expenditure and mortality, so CKD is emerging as a national health problem [2,4,5].

Subjective health status is an indicator of the overall assessment of physical, physiological and psychosocial health, and it reflects a

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complex notion of health [4-8]. It is currently being used as the most common and highly predictive indicator of health status despite the limitation that individuals may overrate or underrate their own health through subjective assessment [8-10].

For CKD patients, to prevent uremia due to impaired kidney function, they are required to steadily perform self-care as well as health-related activities such as medication adherence, exercise therapy, and dietary regimen, based on the proper perception and evaluation of their health status [4]. However, in CKD patients, the mortality rate was reported to be 2-3 times higher in the group with poor subjective health status than in the group with good subjective health status [5]. In addition, emergency situations such as hyperphosphatemia, hyperkalemia, and metabolic acidosis occur frequently in CKD patients due to ingrained lifestyle habits and the failure of the kidneys to remove waste from the body [4-8]. On the other hand, patients with good subjective health status were found to show voluntary and cooperative behaviors suitable for given situations to maintain or promote health [9,10]. This was attributed to the fact that since subjective health status includes well-being, the group with good subjective health status showed an active attitude toward both interactions with medical staff and modifying lifestyle [5-10].

In a study of 366 CKD patients conducted in Korea [4], 42.9% of CKD patients rated their subjective health status as poor, and this result is similar to 43.1% reported by a study of 1,268 nephrology patients in the U.S. [7]. Generally, 47-53% of CKD patients are reported to assess their subjective health status as poor, and it has been found that CKD patients are more likely to evaluate subjective health status negatively than patients with other chronic diseases [7].

According to previous studies, factors that may affect subjective health status in CKD patients include sociodemographic indicators, such as gender [4,5], age [5,7], household income level [4], education level [4,5], the presence of household members [4], as well as health-related indicators, such as activity limitation [7,8], the frequency of alcohol consumption [4,5,11], stress [7], the number of comorbidities [5,10,11], and eGFR [5,7]

CKD poses a threat to life regarding the symptoms of uremia, and it is accompanied by a combination of various problems, such as fear of death, loss of the function of a body part, pain, financial difficulties, and emotional problems such as stress, depression, and anxiety, so it has a negative impact on quality of life [4,5,7,8,10,11]. In overseas studies that assessed quality of life in CKD patients using EuroQol 5-Dimension (EQ-5D), the score for quality of life was reported as 0.81 points [12] and 0.75 points [13], and these results indicate that the level of quality of

life in CKD patients [12,13] is relatively lower, compared to 0.82 points in a domestic study of patients with complex chronic diseases [14].

According to previous studies, the presence of a chronic disease may reduce the level of subjective health status [6], but if individuals perceive their subjective health status positively, it can give them a strong motivation for health management, and lead individuals to have a positive self-image [15-18]. Regarding previous studies on the impact of subjective health status on health-related quality of life in CKD patients, a study of patients with stages 4-5 CKD found that patients with better subjective health status were 2.88 times more likely to show improvement in health-related quality of life (HRQOL) [6]. Similarly, Lee & Chun [15] also reported that subjective health perception had a significant direct impact on quality of life in stroke patients, and a better subjective health perception was associated with a higher level of the practice of both health-promoting activities and activities promoting changes in individual habits as well as environmental changes. Therefore, since quality of life in CKD patients is not determined only by physical aspects, it is necessary to consider the meaning and influencing factors of subjective health status. However, although foreign researchers studied the meaning of subjective health status as a health indicator in CKD patients [6,7,8,10,11], and reported that subjective health status is an important factor affecting HRQOL, and there is a need to investigate the impact of subjective health status [6,19], in Korea, despite the increased awareness of the importance of subjective health status, there have been few studies that supported the relationship between subjective health status and quality of life. Therefore, this study attempted to investigate influencing factors for good subjective health status in CKD patients by using data from the 8th (2019-2020) National Health and Nutrition Examination Survey with the aim of providing basic data for the development of nursing interventions for the promotion of HRQOL.

2. Objectives

This study aimed to investigate subjective health status and health-related quality in patients with CKD, identify influencing factors for good subjective health status, and examine the effects of good subjective health status on HRQOL.

Methods

1. Study design

The present study is a secondary data analysis study conducted using raw data collected in the first and second years (2019-

2020) of the 8th (2019-2020) National Health and Nutrition Examination Survey (NHANES) [20] in order to identify influencing factors for good subjective health status, and examine the effects of good subjective health status on HRQOL among patients with CKD.

2. Participants

The participants of this study were selected from the participants of the 8th (2019-2020) National Health and Nutrition Examination Survey (NHANES), which was a general population survey conducted by a stratified sampling method. Among 15,469 participants of the 8th (2019-2020) NHANES, 12,739 adults aged 19 or older were first extracted. Then, out of the 12,739 people, 347 patients with stages 3-5 CKD (\leq eGFR 59ml/min/1.73 m²) who needed tests and treatment for complications [1] were extracted. Then, 259 patients were finally selected as participants by excluding people with missing data in sociodemographic data and responses to health questionnaire items (Figure 1).

3. Measures

1) Sociodemographic characteristics

The general characteristics of participants examined in this study are as follows: gender, age, household income level, education

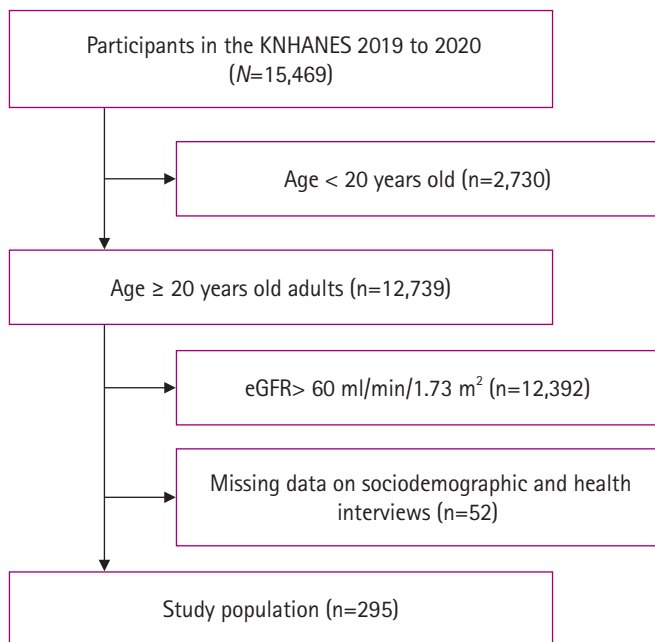


Figure 1. Flow chart for study population
eGFR=estimated Glomerular Filtration Rate; KNHANES=Korea National Health and Nutrition Examination Survey.

level, and the presence of household members.

2) Health-related characteristics

The health-related characteristics of participants examined in this study were activity limitation, alcohol drinking frequency, stress, the number of comorbidities, and eGFR. eGFR was calculated by the CKD Epidemiology Collaboration (CKD-EPI) equation using serum creatinine values. For females, if the serum creatinine level is \leq 0.7 mg/dL, GFR is calculated as follows: $GFR = 142 \times (sCr/0.7)^{-0.241} \times (0.9938)^{age} \times 1.012$; if the serum creatinine level is $>$ 0.7 mg/dL, GFR is calculated as follows: $GFR = 142 \times (sCr/0.7)^{-1.200} \times (0.9938)^{age} \times 1.012$. For males, if the serum creatinine level is \leq 0.9 mg/dL, GFR is calculated as follows: $GFR = 142 \times (sCr/0.9)^{-0.302} \times (0.9938)^{age}$; and if the serum creatinine level $>$ 0.9mg/dL, GFR is obtained as follows: $GFR = 142 \times (sCr/0.9)^{-0.302} \times (0.9938)^{age}$ [1]. In this study, according to the definition presented by the National Kidney Foundation of the U.S., the Stages 3-5 of CKD were defined as follows: Stage 3: eGFR of 30-59 ml/min/1.73 m²; Stage 4: eGFR of 15-29 ml/min/1.73 m²; Stage 5: eGFR $<$ 15 ml/min/1.73 m² [1].

3) Subjective health status

Subjective health status was measured on a 5-point scale ('very good, good, moderate, poor, and very poor') by using the question "What do you think of your usual health?" In this study, based on a previous study [22], to increase statistical power and the accuracy of interpretations, the level of subjective health status was dichotomously divided. In other words, the responses of 'very good, good, and moderate' were categorized as 'good', and the responses of 'poor and very poor' were categorized as 'poor'. In addition, Ambagtsheer et al. [23] reported that questionnaire items on subjective health status were found to have a sensitivity value of 62.5%, a specificity value of 93.6%, positive predictive value of 67.5%, and a negative predictive value of 92.2%.

4) Health-related quality of life (HRQOL)

HRQOL was measured using a Korean version of the EuroQol-5 Dimension (EQ-5D). This scale is composed of 5 subdomains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each subdomain was measured on a 3-point scale ('no problems', 'some problems', and 'severe problems'). In this study, the level of quality of life was dichotomously divided into 'no problems' and 'some problems' by categorizing 'some problems' and 'severe problems' into 'some problems.' The Korean Disease Control and Prevention Center applies a weighting for-

mula to calculate the EQ-5D index values for Koreans. If the scores of all the five items is 1, the EQ-5D index value becomes 1, and if the scores of all the five items are 3, which indicates the poorest health status, the EQ-5D index value is adjusted to -0.17 [23]. Regarding the reliability of the tool, Limin et al. [24] reported that the value of overall percent agreement was calculated as 86-94%, the value of kappa as 0.79-0.85, and the intraclass correlation coefficient as 0.98

4. Data collection and analysis

The data collection of the first and second years (2019~2020) of the 8th National Health and Nutrition Examination Survey was carried out from January 1, 2019 to December 31, 2020. The raw data was collected by a health questionnaire survey, health examination survey, and a nutrition survey. The health questionnaire survey was conducted in the form of a self-report survey on the domains of health behaviors such as smoking and drinking, and health check-ups were performed by methods such as physical measurement and blood tests. The NHANES data were collected by selecting the samples that are representative of the entire population of Korea by a probability sampling method, and statistical analysis for complex sampling data was performed. This study analyzed the data collected in 2019 and 2020, and used the integrated weight of the data collected for two years. Also, data analysis was performed by specifying the stratification variables and cluster variables presented by the Korea Disease Control and Prevention Agency. Data analysis was conducted using SPSS/Win 27.0 (IBM Corp., Armonk, NY, USA), and the sociodemographic characteristics, subjective health status, and HRQOL of the participants were analyzed using descriptive statistics. Based on a previous study [25], to increase statistical predictive power, a univariate logistic regression analysis was first performed to identify factors affecting good subjective health status in the participants. Then, a multivariate logistic regression analysis was conducted using statistically significant variables identified through the univariate logistic regression analysis. In addition, to examine the impact of good subjective status on HRQOL, a univariate logistic regression analysis was performed, and only statistically significant variables among the subdomains of HRQOL were entered into a multivariate logistic regression analysis. This regression analysis was conducted after controlling for variables affecting HRQOL, such as gender, age, household income level, educational level, the presence of household members, activity limitation, the frequency of alcohol consumption, stress, the number of comorbidities, and eGFR. Regarding subjective health status, the odds ratio for good subjective health status was

estimated by using poor subjective health status as the reference category. As for quality of life, the odds ratio for 'no problems' was estimated by using 'some problems' as the reference category. The odds ratio (OR) and 95% confidence interval (CI) were calculated using the multivariate logistic regression analysis, and the significance level for statistical tests was set at $< .05$.

5. Ethical considerations

This study received a review exemption determination from the Public Institutional Review Board designated by the Ministry of Health and Welfare (IRB No.: P01-202306-01-008), and this research was conducted after obtaining approval regarding the use of data from the National Health and Nutrition Examination Survey (NHANES) after submitting the non-disclosure (confidentiality) agreement and the data use agreement in accordance with the raw data use procedures of the NHANES of the Korea Disease Prevention and Control Agency.

Results

1. Sociodemographic and health-related characteristics of CKD patients

With respect to the sociodemographic characteristics of the participants, the participants of this study consisted of 162 males (54.9%), and 133 females (45.1%), so the proportion of males was greater. The mean age of the participants was 70.74 years, and the 70-79 age group made up the largest proportion (41.4%). As for household income level, people in the low household income group made up 49.8% of the participants. Regarding education level, people with the education level of middle-school graduation or lower accounted for 69.1%. For the number of household members, people with one or more household members constituted 74.9% of the participants. With respect to health-related characteristics, 243 persons (82.3%) had no activity limitations, and 153 persons (51.9%) were nondrinkers. Regarding the stress level, people with a low level of stress accounted for the largest proportion (85.1%). In terms of the number of comorbidities, patients with three comorbidities were 145 persons (49.2%), accounting for the largest proportion. The mean value of eGFR was 47.70 ml/min/1.73 m², and the patients with an eGFR of 30-59 ml/min/1.73 m² (stage 3 CKD) were 269 persons (91.2%), taking up the vast majority of the participants. As for subjective health status, patients with good subjective health status were 181 persons (61.4%). The mean score for HRQOL was 0.88 points, and the patients who perceived that they had 'some problems with HRQOL' were 167 persons

(56.6%), accounting for a relatively high proportion (Table 1).

2. Factors affecting good subjective health status in CKD patients

To identify factors affecting good subjective health status in CKD

patients, univariate and multivariate logistic regression analyses were conducted. First, as a result of a univariate logistic regression analysis, the high household income group was found to better subjective health status than the low household income group (95% CI = 1.17~8.40, $p = .023$). Also, the group with no

Table 1. General Characteristics of People with Chronic Kidney Disease (N=295)

Variables	Categories	M ± SD	n (%)
Gender	Men		162 (54.9)
	Women		133 (45.1)
Age (years)	< 60	70.74 ± 0.72	21 (7.1)
	60-69		72 (24.4)
	70-79		122 (41.4)
	≥ 80		80 (27.1)
Household income	Low		147 (49.8)
	Middle		116 (39.3)
	High		32 (10.9)
Education	≤ Middle school		204 (69.1)
	High school		53 (18.0)
	≥ College		38 (12.9)
Household members	Yes		221 (74.9)
	No		74 (25.1)
Activity limitation	Yes		52 (17.7)
	No		243 (82.3)
Alcohol drinking (times/week)	≥ 2/week		42 (14.2)
	< 2/week		100 (33.9)
	Non-drinker		153 (51.9)
Stress	Much		44 (14.9)
	Little		251 (85.1)
Number of comorbidities	0		20 (6.7)
	1		53 (18.0)
	2		77 (26.1)
	≥ 3		145 (49.2)
eGFR (mL/min/1.73 m ²)	30-59	47.70 ± 0.76	269 (91.2)
	15-29		20 (6.8)
	< 15		6 (2.0)
SHS	Good		181 (61.4)
	Poor		114 (38.6)
HRQOL	No problem	0.88 ± 0.01	128 (43.4)
	Having problem		167 (56.6)
Mobility	No problem		165 (59.3)
	Having problem		130 (40.7)
Self-care	No problem		253 (86.7)
	Having problem		42 (13.3)
Usual activity	No problem		229 (78.2)
	Having problem		66 (21.8)
Pain/discomfort	No problem		190 (65.8)
	Having problem		105 (34.2)
Anxiety/depression	No problem		247 (84.2)
	Having problem		48 (15.8)

eGFR=estimated Glomerular Filtration Rate; SHS=subjective health status; HRQOL=health-related quality of life.

activity limitation was shown to have better subjective health status than the group with activity limitation (95% CI = 3.53~18.75, $p < .001$). The group of people drinking alcohol less than 2 times per week was found to have better subjective health status than the group of nondrinkers (95% CI = 0.92~4.45, $p = .011$). Also, the group with a low level of stress was shown to have better subjective health status than the group with a high level of stress (95% CI = 1.28~5.46, $p = .009$). Additionally, the group with one comorbidity (95% CI = 1.71~19.63, $p = .005$) and the group with no comorbidities (95% CI = 1.71~19.63, $p = .005$) were found to have better subjective health status than the group with three comorbidities.

A multivariate logistic regression analysis was performed by entering variables identified as significant variables in the univariate logistic regression analysis, such as household income level, activity limitation, the frequency of drinking alcohol, stress, and the number of comorbidities. As a result, the high household income group was 2.55 times more likely to have good subjective health status than the low household income group (95% CI = 1.05~6.21, $p = .040$). The group with no activity limitation was 6.20 times more likely to have good subjective health status than the group with activity limitation (95% CI = 2.43~15.85, $p < .001$). Also, the group with a low level of stress was 2.46 times more likely to have good subjective health status than the group with a high level of stress (95% CI = 1.08~5.61, $p = .032$), and the group with no comorbidities was 5.11 times more likely to have good subjective health status than the group with 3 comorbidities (95% CI = 1.60~16.32, $p = .006$). However, in the case of the frequency of drinking alcohol, there were no significant differences in subjective health status between the nondrinker group and the group of people drinking two or more times per week (95% CI = 0.65~3.23, $p = .367$) and between the nondrinker group and the group of people drinking less than two times per week (95% CI = 0.87~2.86, $p = .132$) (Table 2)

3. The impact of good subjective health status on HRQOL in CKD patients

To examine the impact of good subjective health status on HRQOL, univariate and multivariate logistic regression analyses were conducted, and the results showed that subjective health status had a significant effect on self-care, usual activities, and pain/discomfort among the subdomains of HRQOL.

First, a univariate logistic regression analysis for the effects of subjective health status on the subdomains of HRQOL was performed. As a result, compared to the poor subjective health status group, the good subjective health status group was found to be

more likely to have no problems in self-care (95% CI = 1.77~9.87, $p = .001$), usual activities (95% CI = 1.64~6.40, $p = .001$), pain/discomfort (95% CI = 1.56~4.83, $p < .001$), and anxiety/depression (95% CI = 1.42~5.81, $p = .003$), which are the subdomains of HRQOL.

Next, a multivariate logistic regression analysis was conducted after controlling for variables influencing HRQOL, such as age, gender, household income level, education level, the presence of household members, activity limitation, stress, the number of comorbidities, and eGFR. As a result, the good subjective health status group was found to be more likely to have no health problems in the subdomains of HRQOL than the poor subjective health status group. More specifically, compared to the poor subjective health status group, the good subjective health status group was 3.03 times more likely to have no problems in self-care (95% CI = 1.12~8.19, $p = .029$), and was 2.52 times more likely to have no problems in usual activities (95% CI = 1.11~5.71, $p = .027$). Also, the good subjective health status group was 1.99 times more likely to have no problems in pain/discomfort (95% CI = 1.04~3.83, $p = .039$). However, subjective health status was found to have no significant effect on anxiety/depression (95% CI = 0.72~3.36, $p = .264$) (Table 3).

Discussion

In this study, 61.4% of participants rated their subjective health status as good. This percentage is higher than the results of some prior studies. Specifically, studies by Yoo, Kim & Kim [4] and Lee et al. [7] on CKD patients reported the proportion of patients with good subjective health status as 57.1% and 56.9%, respectively. These differences in research results may be attributed to the findings of previous studies [4,5] that there were significant gender differences in subjective health status, and males evaluated subjective health status more positively. Actually, in this connection, it has been reported that women tend to show higher prevalence rates of chronic diseases and higher healthcare utilization, indicating that women actually have more vulnerable physical health than men, and women also tend to be more sensitive to the same health problems and evaluate their health negatively [26]. In this study, the proportion of male participants (54.8%) was higher than that of females, and it is considered necessary to conduct further research on the impact of gender differences in biological and sociocultural health attitudes on subjective health status.

In this study, the score for quality of life in CKD patients was 0.88 points, and this is slightly higher than the results of some

Table 2. Influencing Factors for Good Subjective Health Status in People with Chronic Kidney Disease, using Univariate and Multivariate Logistic Regression (N=295)

Variables	Categories	SHS			
		Unadjusted		Adjusted	
		OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>
Gender	Men	1.15 (0.70~1.88)	.576		
	Women	(reference)			
Age (years)	< 60	0.94 (0.29~3.01)	.912		
	60-69	0.73 (0.36~1.47)	.381		
	70-79	0.77 (0.39~1.51)	.446		
	≥ 80	(reference)			
Household income	High	3.13 (1.17~8.40)	.023	2.55 (1.05~6.21)	.040
	Middle	1.18 (0.68~2.05)	.561	0.97 (0.52~1.81)	.934
	Low	(reference)			
Education	≤ Middle school	0.93 (0.41~2.14)	.868		
	High school	1.52 (0.57~4.10)	.403		
	≥ College	(reference)			
Household members	Living together	1.50 (0.83~2.71)	.182		
	Living alone	(reference)			
Activity limitation	No	8.14 (3.53~18.75)	< .001	6.20 (2.43~15.85)	< .001
	Yes	(reference)			
Alcohol drinking	≥ 2 times/week	2.02 (0.92~4.45)	.081	1.45 (0.65~3.23)	.367
	< 2 times/week	2.02 (1.18~3.47)	.011	1.58 (0.87~2.86)	.132
	Non-drinker	(reference)			
Stress	Little	2.64 (1.28~5.46)	.009	2.46 (1.08~5.61)	.032
	Much	(reference)		(reference)	
Number of comorbidities	0	5.79 (1.71~19.63)	.005	5.11 (1.60~16.32)	.006
	1	2.26 (1.01~5.09)	.048	2.02 (0.96~4.25)	.065
	2	1.20 (0.63~2.32)	.577	1.16 (0.56~2.43)	.688
	≥ 3	(reference)			
eGFR (ml/min/1.73 m ²)	30-59	4.61 (0.74~28.78)	.101		
	15-29	2.11 (0.25~17.53)	.488		
	< 15	(reference)			

CI=confidence interval; OR=odds ratio; eGFR=estimated Glomerular Filtration Rate; SHS=subjective health status.

Note. Reference group of SHS: poor, Comparison group of SHS: good.

previous studies [12,13]. In the prior studies of CKD patients, Jafari et al. [12] and Wen et al. [13] measured quality of life in patients receiving hemodialysis among CKD patients, and they reported the score for quality of life as 0.82 points and 0.75 points, respectively. These differences in research results may be attributed to the fact that the previous studies [12,13] enrolled CKD patients receiving hemodialysis as the participants, and did not precisely present the stages of CKD of patients, and information on whether each individual is receiving dialysis or not is not available in the NHANES data. However, a study of 3216 patients with chronic diseases in Korea [14] reported the score for quality of life as 0.82 points, and a study of 1932 patients with

chronic diseases conducted in Singapore [27] reported the score for quality of life as 0.94 points. In terms of quality of life in patients with chronic diseases, the results of this study are considered similar to these two previous studies.

In this study, factors affecting good subjective health status in CKD patients were identified as household income level, activity limitation, stress, and the number of comorbidities. In addition, a high household income level, the absence of activity limitation, less stress, and a fewer number of comorbidities were associated with better subjective health status. More specifically, in this study, the high household income group was 2.55 times more likely to have good subjective health status than the low house-

Table 3. Association of Good Subjective Health Status with Health-Related Quality of Life in People with Chronic Kidney Disease, using Univariate and Multivariate Logistic Regression (N=295)

Variables	HRQOL									
	Mobility		Self-care		Usual activities		Pain/discomfort		Anxiety/depression	
	OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>	OR (95% CI)	<i>p</i>
Unadjusted model										
SHS										
Good	1.69 (0.96~2.98)	.068	4.18 (1.77~9.87)	.001	3.24 (1.64~6.40)	.001	2.75 (1.56~4.83)	<.001	2.87 (1.42~5.81)	.003
Poor (ref.)	1		1		1		1		1	
Adjusted model										
SHS										
Good	1.34 (0.69~2.60)	.391	3.03 (1.12~8.19)	.029	2.52 (1.11~5.71)	.027	1.99 (1.04~3.83)	.039	1.55 (0.72~3.36)	.264
Poor (ref.)	1		1		1		1		1	

CI=confidence interval; OR=odds ratio; ref=reference; SHS=subjective health status; HRQOL=health-related quality of life.

Note. Adjusted variable: gender, age, household income, education, household members, activity limitation, alcohol drinking, stress, number of comorbidities, and estimated Glomerular Filtration Rate (eGFR).

Reference group of SHS: poor, Comparison group of SHS: good. Reference group of HRQOL: having problem, Comparison group of HRQOL: no problem.

hold income group. Similarly, Yoo, Kim & Kim [4] reported that the group with a household income less than the mean value is 1.19 times more likely to have poor subjective health status than the group with a household income level equal to or higher than the mean value. Thus, regarding the results about the household income level, the results of this study support the findings of previous studies. The above-mentioned findings about the household income level can be attributed to the fact that higher household income levels are associated with higher accessibility to appropriate healthcare and prevention services, and lower household income levels are linked to indifference to health checkups and the maintenance of unhealthful health behaviors [5,10]. With respect to activity limitation, in this study, the group with less activity limitation was 6.20 times more likely to have good subjective health status, and this result was similar to the findings of previous studies. For example, Lee et al. [7] reported that people with less limitation on activities of daily living (ADL) are 8.29 times more likely to have good subjective health status. In relation to activity limitation, decreased physical function and reduced independence in daily life were reported to be associated with poor subjective health status as well as related physical symptoms in CKD patients, so they were found to be major variables related to subjective health status [7,8]. As for the frequency of drinking, in this study, the results of multivariate logistic regression analysis showed that it did not have a significant effect. On the other hand, Kim & Kim [4] reported that people drinking 2 or more times per week are 0.87 times likely to have poor subjective health status. Similarly, Ko et al. [5] reported the like-

lihood as 0.71 times, and Robinson-Cohen et al. [11] reported it as 0.7 times. Regarding these results, it has been suggested that the moderate drinking group is more likely to rate their subjective health status as good due to the finding that since moderate drinking (consumption of about 30g of alcohol) increases high density lipoprotein cholesterol (HDL) levels and reduces platelet aggregation, it helps to prevent cardiovascular diseases [21]. However, according to in a recent study [28], there is insufficient evidence to medically support the health benefits of drinking, and drinking may rather increase risks for binge drinking, depression, and complications of diseases. Therefore, further research is required to analyze the effects of the frequency of alcohol consumption. Regarding stress, in this study, patients with lower stress levels were 2.46 times more likely to assess their subjective health status as good. In agreement with this study, Lee et al. [7] reported that individuals with lower stress are 1.67 times more likely to perceive subjective health status as good. In particular, according to previous studies, stress caused by illness negatively affects physical and mental health, and if the patient perceives stress, the endocrine system may be disturbed for physical adaptation to stress, which may result in decreased immune responses [7,8]. In addition, it has been reported that changes in daily life due to CKD may be associated with the changes of body image and self-concept and even treatment non-adherence as well as the burden of disease, and these findings indicate the importance of stress management [7,8]. With respect to the number of comorbidities, in this study, the absence of comorbidities was associated with a 5.1 times greater likelihood of good subjective

health status. This finding is consistent with a study by Swetalina et al. [10], which reported that the absence of comorbidities was associated with a 5.1 times greater likelihood of good subjective health status. Ko et al. [5] reported that the presence of diabetes in CKD patients was associated with a 1.65 times greater likelihood of poor subjective health status, and the presence of hypertension was linked to a 1.29 times greater likelihood of poor subjective health status. Likewise, in a previous study of CKD patients, Robinson-Cohen et al. [11] also found that the group with hypertension and the group with diabetes are 2.23 times and 2.79 times more likely to have poor subjective health status, respectively, compared to the group without hypertension or diabetes. Therefore these findings indicate that hypertension and diabetes, which are reported to be the most common comorbidities of CKD patients [2], are significant influencing factors for the subjective health status of CKD patients [5,11]. As the number of comorbidities increases, healthcare utilization and medical cost increase which leads to a financial burden of patients [5]. In particular, as the increase of comorbidities entails the increase of dietary regimen, exercise therapy, and drug regimen that patients need to manage for themselves, and if patients neglect disease management, it may result in the occurrence of complications or the aggravation of disease. For these reasons, the number of comorbidities has been reported as a major influencing factor of subjective health status [10,11].

In this study, In CKD patients, the good subjective health status group was associated with a greater likelihood of having no health problems in the subdomains of HRQOL. Specifically, the likelihood of having no health problems was 3.03 times, 2.52 times, and 1.99 times greater, respectively, for self-care, usual activities, and pain/discomfort among the subdomains of HRQOL. Similarly, Grove et al. [6] measured quality of life in CKD patients by using the 36-item Short Form Health Survey (SF-36), and found that quality of life is 2.88 times more likely to be promoted in better subjective health status. Self-care is to actively participate in disease treatment, spontaneously identify one's own health problems, and practice the knowledge, education, and skills necessary for health management, and it has been reported that the comprehensive examination and evaluation of one's health status are prerequisites for self-care [24,27,29]. In this regard, it has been reported that a more positive perception of one's health status is more likely to motivate people to change ingrained lifestyle habits in a desirable direction [27,29]. These research results about self-care suggest that good subjective health status is also an important factor for the practice of self-care. In addition, regarding usual activities, CKD

patients reported that decreased renal function may lead to decreased in muscular and skeletal function [7], but a previous study reported that if individuals' health evaluation is positive, CKD patients are likely to have a higher level of satisfaction with maintaining and performing independent daily activities, including activities related to diet, clothing, and residence [13]. These findings are thought to suggest that although the ability to perform ADL has been decreased, good subjective health status may promote social relationships such as leisure activities and social gatherings, and thus, it leads patients to experience more psychological stability [14]. Therefore, even among patients with the same disease and the same symptoms, the level of satisfaction with daily life may be different among individuals, so there is a need to consider personalized intervention preventions. With respect to pain/discomfort, it was difficult to find previous studies on the relationship between subjective health status and pain as a subdomain of quality of life. However, the results of this study suggest that since the perception of pain is based on individuals' subjective emotional experiences, it is closely related to psychological and emotional environments, and positive health perceptions and attitudes are important for quality of life, including pain. In particular, the decrease in kidney function causes muscle and nerve damage, which are accompanied by discomfort such as muscle atrophy, muscle cramps, and pain [8,10,28]. Considering this fact, there is a need to analyze the relationship of health assessment including these physical symptoms with pain/discomfort experienced in daily life in future studies. The results of this study suggest that subjective health status has a significant impact on quality of life, and it may have a greater effect on quality of life than the presence of illness among CKD patients. Although it is not easy for CKD patients to change their ingrained lifestyle habits, it is noteworthy that the positive evaluation of health status is likely to lead them to recognize the importance of health as the subjects of life, and motivate them to practice more health-promoting behaviors. Therefore, it is necessary to actively utilize the findings about the impact of the positive evaluation of health status in the interventions for CKD patients. More specifically, the local community should help CKD patients practice health-related behaviors to maintain their health on their own by implementing an early assessment of subjective health status, and promoting positive subjective health status, and these efforts are expected to contribute to the improvement of CKD patients' self-care ability and well-being.

Conclusions

This study attempted to investigate factors affecting good subjective health status and the effects of good subjective health status on health-related quality of life (HRQOL) in CKD patients. As a result, factors affecting good subjective health status were identified as a high household income level, the absence of activity limitation, a low level of stress, and a small number of comorbidities. In addition, the results of this study showed that CKD patients with better subjective health status are more likely to have higher satisfaction in self-care, usual activities, and pain/discomfort among the subdomains of HRQOL. Based on the results of this study, the following suggestions are presented. First, it is necessary to verify the predictability of subjective health status in CKD patients by including objective health measurement variables such as the presence of dialysis, the treatment history of comorbidities, and the presence of the experience of hospital admission. Second, although this study elucidated the relationship between subjective health status and HRQOL in CKD patients, this study is a secondary data analysis and thus had limitations in investigating causal relationships. For this reason, further research is required to clarify the causal relationships between subjective health status and HRQOL. Third, considering that the improvement of quality of life is the ultimate goal of CKD patients, to achieve the improvement of quality of life in CKD patients, a follow-up study is required to develop nursing intervention programs that can implement the early assessment of subjective health status and consider and reflect the factors for promoting subjective health status based on the assessment results.

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Conflict of interest

The authors declared no conflict of interest.

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Authors' contributions

Lee, Jena contributed to conceptualization, data curation, formal

analysis, funding acquisition, methodology, project administration, visualization, writing - original draft, review & editing, investigation, resources, software, supervision, and validation. Suh, Yujin contributed to conceptualization, data curation, formal analysis, funding acquisition, methodology, project management, visualization, writing-original draft, review & editing, investigation, resources, software, supervision, and validation.

Data availability

Please contact the corresponding author for data availability.

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Development and Effectiveness of a Basic Epidemiological Investigation Simulation Program of Emerging Respiratory Infectious Diseases for Nursing Students: Application of Standardized Patients

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Purpose: This study aimed to develop a simulation-based education program of emerging respiratory infectious diseases using standardized patients for nursing students, and to test the effects on basic epidemiological investigation performed while wearing Level D Personal Protective Equipment (PPE).

Methods: A total of 64 senior nursing students were recruited and assigned to either the experimental group (n=33) or a control group (n=31) in May 2022. This program was developed based on the analysis, design, development, implementation, and evaluation model. The analysis phase consisted of a literature review and target group survey. In addition, learning objectives and a structure were designed, and a scenario was developed with expert consulting. In the implementation phase, the program was conducted the course of 3 hours. The evaluation phase involved verification of the effects on clinical performance, self-efficacy, and anxiety related to basic epidemiological investigation, as well as an assessment of satisfaction with the program.

Results: There were significant differences between the experimental and control groups in clinical performance ($Z=-2.15, p=.010$) and anxiety related to basic epidemiological investigation ($Z=-4.02, p<.001$). However, there was no significant difference in self-efficacy related to basic epidemiological investigation.

Conclusion: The results indicate that this simulation-based education program was effective in improving clinical performance and reducing anxiety related to basic epidemiological investigation of nursing students. In addition, this program is expected to be widely used as an epidemiological investigation education for the initial prevention of infectious diseases.

Keywords: Emerging Infectious Diseases; Epidemiology; Patient Simulation; Students, Nursing

Introduction

Infectious diseases are a kind of social disaster, and disaster management regarding infectious diseases is being implemented at a national level [1]. In addition, a systematic management system for infectious diseases has been established and operated to prevent the outbreak and spread of infectious diseases [1]. When a public health crisis due to infectious diseases occurs, it is neces-

sary to take appropriate measures to prevent the spread of infectious diseases based on prompt epidemiological investigations and the identification of the causes [2,3]. In particular, since emerging respiratory infectious diseases may cause respiratory complications caused by new pathogens and have the possibility of group outbreaks, it is important to take early action to identify the cause through epidemiological investigations and prepare measures for responses to the epidemic risk and the occurrence

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of an epidemic [4,5].

Epidemiological investigations refer to activities for identifying the scale of the outbreak and tracing the source of infections to prevent the occurrence and spread of infectious diseases when patients with infectious diseases are found [6]. To perform these epidemiological investigations, professional workforce such as infectious disease specialist and epidemiological investigation officers are essentially required [7-9]. Basic epidemiological investigations are conducted through phone calls and interviews, and they include the examination of travel history about the outbreak areas, the epidemiological association of the presumed infection route, and clinical symptoms, and the investigation of contacts based on personal statements in addition to the examination of the personal information of persons under investigation. Each guideline of emerging infectious diseases includes a basic epidemiological investigation report form that enables the classification of cases for the diagnosis and reporting of cases according to the definitions of cases of infectious diseases. On the other hand, an in-depth epidemiological investigation involves activities such as checking whether the results of basic epidemiological investigations are correct or there is any missing information, cross interviews with contacts, and the identification of the source and route of infections by the investigation through the Epidemiological Investigation Support System (EISS) [10]. As described above, a basic epidemiological investigation is the stage for presenting criteria for testing prior to diagnostic tests, detecting suspected cases at an early stage, and reporting them, and it is an activity that requires various capabilities such as clinical decision making, communication, and disaster management. Also, it is an important part of the initial response for preventing the spread of infectious diseases in a disaster crisis situation arising from the outbreak of infectious diseases, and it is also a component of performance that nurses must have when they work in accordance with the temporary duty order under the Infectious Disease Control and Prevention Act [11-14].

Simulation education is an educational method that integrates theoretical knowledge and practical coping abilities through the use of equipment and role play in safe virtual situations similar to actual situations, and it has been shown to improve coping capacity and practical competence in disaster nursing education including responses to the outbreaks of infectious diseases [15-18]. In particular, with respect to basic epidemiological investigation competency required to assess and appropriately respond to the suspected cases of infectious diseases, it has been reported that a better ability to effectively interact with persons under investigation and a higher level of self-efficacy were linked to a lower level

of anxiety about infection control, and as a result, they were also associated with a higher level of clinical performance competency [7,17,19]. Thus, there is a need to develop and apply educational methods for improving the ability to perform basic epidemiological investigations by implementing simulation education that allows participants to apply knowledge and skills in safe virtual situations from the stage of education for undergraduate students [14,20]. In addition, it is necessary to apply educational methods using verbal and non-verbal expressions through standardized patients in relation to epidemiological relatedness and clinical symptoms in the implementation of basic epidemiological investigations that inevitably need to rely on the statements of persons under investigation. However, a review of the previous studies that conducted a systematic literature review on disaster education for nursing students [14,21,22] showed that there has not been sufficient research on interventions for strengthening the ability to perform basic epidemiological investigations for the early detection of suspected of contracting infectious disease in relation to responses to infectious disease disasters.

Therefore, this study attempted to develop a scenario on the basic epidemiological investigations of emerging respiratory infectious diseases for nursing students, and examine the effects of simulation education using standardized patients (SPs) on clinical performance, self-efficacy, and anxiety related to basic epidemiological investigations among nursing students with the aim of providing a simulation education program that can be utilized as an educational material on the basic epidemiological investigations of emerging respiratory infectious diseases for nursing students.

Objectives

This study aimed to develop and apply a simulation education program using standardized patients on basic epidemiological investigations regarding emerging respiratory infectious diseases, and investigate the effects of the developed program on clinical performance, self-efficacy, and anxiety among nursing students. The specific objectives of this study are as follows.

- 1) To develop a simulation education program using standardized patients on the basic epidemiological investigations of emerging respiratory infectious diseases;
- 2) To examine the effects of a simulation education program on basic epidemiological investigations using standardized patients on clinical performance, self-efficacy, and anxiety related to basic epidemiological investigations among nursing students.

Research hypotheses

H1. The experimental group that received simulation education on basic epidemiological investigations using standardized patients will show a greater improvement in clinical performance related to basic epidemiological investigations than the control group.

H2. The experimental group that received simulation education on basic epidemiological investigations using standardized patients will show a greater improvement in self-efficacy related to basic epidemiological investigations than the control group.

H3. The experimental group that received simulation education on basic epidemiological investigations using standardized patients will show a greater decrease in anxiety related to basic epidemiological investigations than the control group.

Methods

1. Study design

This study is a quasi-experimental research using a non-equivalent control group pretest-posttest design, and this research was conducted to develop and apply a simulation education program using standardized patients on the basic epidemiological investigations of emerging respiratory infectious diseases, and verify the effectiveness of the developed simulation education program.

2. Participants

The participants of this study were nursing students attending a university in Incheon, and they were selected through an open recruitment from the senior students who took a community nursing course. After providing sufficient explanations about this study to the eligible students, only persons who understood the purpose of the study and voluntarily agreed to participate in the study were recruited. For the voluntary participation of students, participants were recruited by the researcher, who was not a faculty member of the university. The sample size was calculated using the G*power 3.1.9.7 Version, and the minimum sample size was determined as 26 persons per group by using a significance level of .05, an effect size of .80, and a power of .80. Considering the dropout rate, 35 persons for each group were recruited by convenience sampling. Afterwards, 6 persons withdrew from this research during the intervention period because they were absent from education due to their job interviews. Finally, 33 persons in the experimental group participated in simulation education using standardized patients, and 31 persons in the control participated in demonstrations and simple practice training. As a result, the data collected from a total of 64 participants were used for analysis (Figure 1).

3. Development procedure

In this study, the development of the simulation education program was carried out, based on the ADDIE instructional design model comprised of 5 phases: Analysis, Design, Development, Implementation, and Evaluation [23].

1) Analysis phase

(1) Data collection through a literature review

A review of recent domestic and foreign studies was conducted to identify research trends and educational needs regarding education on infectious diseases and disaster education. This review of previous studies showed that there is a need to provide nurses with education for strengthening the disaster coping capacity from the stage of undergraduate education in order for nurses to have the capacity to play a central role in disaster crisis situations [14,20,21]. In addition, it was found that simulation education is recommended as an educational method that can complement clinical practice since it allows repetitive practice in a safe educational environment similar to clinical settings, and that there is a need to apply simulation education as a method to enhance nursing students' basic epidemiological investigation competency related to the outbreaks of infectious diseases, and examine the effects of simulation education [15-18].

(2) Examination and selection of learners' educational needs

To select the education topic of the scenario of simulation education, previous studies on education on infection control and disaster responses for healthcare professionals after the outbreak of COVID-19 [24-26] were examined, and the interview with the expert focus group consisting of two epidemiological investigation officers and two nursing professors as well as interviews with 5 nursing students were performed. As a result, case classification and responses regarding emerging infectious diseases through basic epidemiological investigations including the epidemiological investigations of infectious diseases and the methods of donning and doffing personal protective equipment (PPE) were selected as the education topic.

2) Design phase

(1) Setting and specification of educational objectives

Based on Bloom's taxonomy, educational objectives were determined as follows: the cognitive objective was set as being able to explain the basic principles of infection control of medical institutions, the affective objective was set as being able to classify patients according to case definitions, and the psychomotor objectives were set as being able to provide appropriate information to

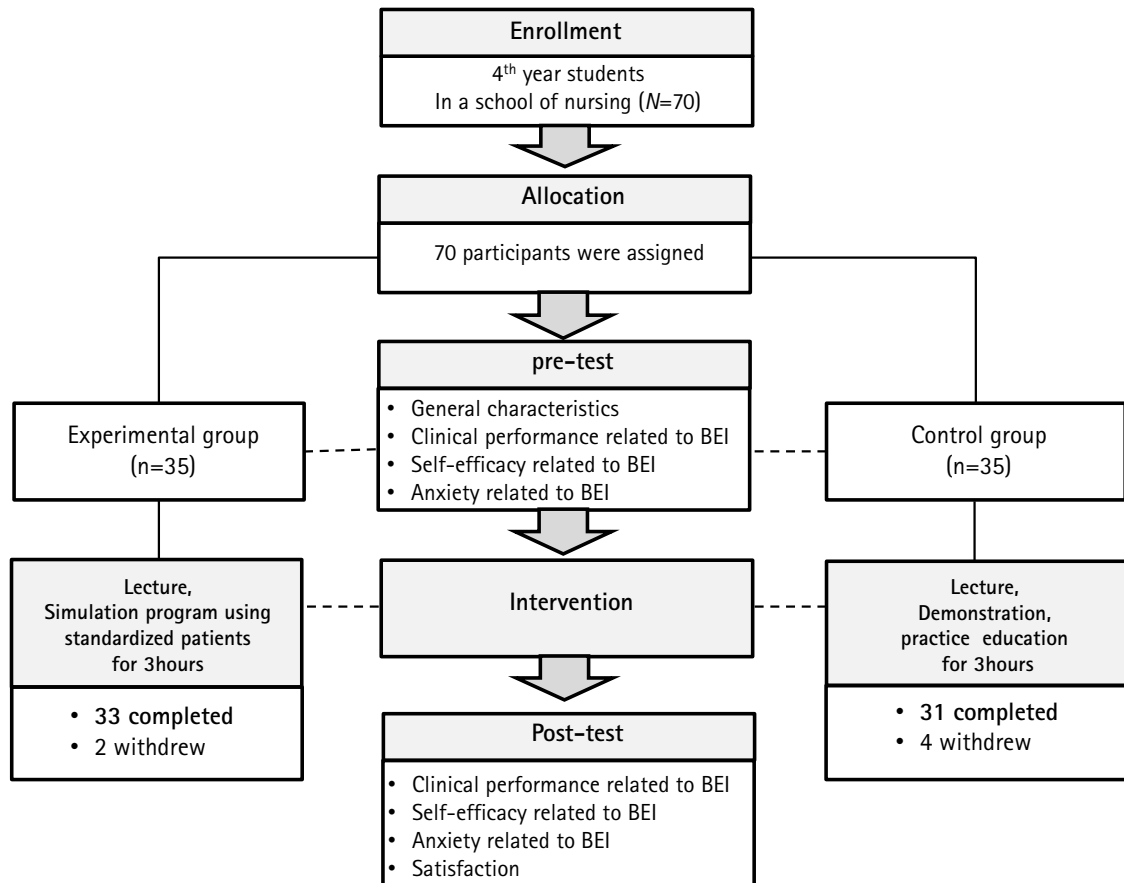


Figure 1. Flow diagram of the study participants. BEI=Basic epidemiological investigation

suspected of contracting infectious disease (including patients under investigation, PUI) and being able to have therapeutic communication with patients [27].

(2) Design of educational content and operation methods

In this study, the content of theoretical education was composed of criteria for the classification of infectious diseases in accordance with the Infectious Disease Control and Prevention Act, rational bases for epidemiological investigations, the method of epidemiological investigations, the method of donning and doffing personal protective equipment (PPE), an overview of negative pressure isolation rooms, and environment and waste management. The simulation scenario was created as a hypothetical situation where a basic epidemiological investigation is conducted on hypothetically posited cases of an imported emerging infectious disease (tentatively called Indian flu), and the scenario included case classification according to the guidelines for responses to the outbreak of a Group 1 emerging infectious disease

and the reporting and quarantine of patients under investigation immediately after the classification of cases into suspected of contracting infectious disease. The content of the education program was designed based on guidelines for responses to emerging respiratory infectious diseases, guidelines for isolation precautions for medical institutions, standards of ventilation for medical facilities, standards of personal protective equipment (PPE), and the information material on the methods of donning and doffing PPE (level D) distributed by the Korea Disease Control and Prevention Agency [28-31].

The total education time for the education program developed in this study is 3 hours, and it includes 15 minutes for orientation, 60 minutes for theoretical education prior to simulation education, 15 minutes for pre-briefing, 30 minutes for the operation of BEI simulation including donning and doffing PPE, and 30 minutes for debriefing. The participants were divided into four-member teams, and they were given explanations about the simulated situation, the first and final steps of the simulation, the

movement path, and preparation items during pre-briefing. As for the standardized patient (SP), a person who completed the SP training course, and received prior training regarding the scenario of this study performed the role of a suspected of contracting infectious disease. Simulation starts with putting on personal protective equipment (PPE) in the anteroom, and, as the next step, an epidemiological investigation with the patient under investigation is performed in the screening room. The simulation process is finished when education participants take off PPE after guiding the suspected of contracting infectious disease into the negative pressure isolation room following case classification. A part of the simulation area was designated as the negative pressure isolation room by dividing the space by using curtains and posing a sign indicating the negative pressure isolation room, and to visually check the performance of donning and doffing PPE, florescent lotion was applied after putting on PPE, the remaining florescent lotion was examined after taking off PPE. Based on the Gather-Analyze-Summarize (GAS), the debriefing process was composed of three steps: description, analysis, and application [32,33]. The details of the BEI simulation education program developed by this study are presented in Table 1. On the other hand, the practice training of the control group consisted of completing a BEI form through a team learning process according to the scenario and performing case classification according to case definitions. In additions, the participants in the control group also performed donning and doffing PPE, but the education program for the control group did not include the pro-

cess of checking florescent material unlike the program of the experimental group.

(3) Design of the education evaluation tool

Satisfaction with the education program was assessed immediately after the completion of simulation education by using a tool developed by Yoo [34], which was composed of 24 questions. The assessment of learners' satisfaction was designed to make it possible to obtain detailed feedback through open-ended questions and interviews.

3) Development phase

(1) Development of the scenario about an emerging respiratory infectious disease

The case of the scenario was hypothetically posited through the researcher's modification and supplementation of the situation of reported cases of COVID-19, based on the imported confirmed cases of COVID-19. To reproduce the situation of an epidemiological investigation performed by making an inquiry with a suspected of contracting infectious disease, verbal and nonverbal expressions were used by applying standardized patients. The BEI form was created as a form suitable for the hypothetical case of an emerging respiratory infectious disease (tentatively referred to as Indian flu) by modifying and complementing the BEI form for COVID-19 to make it suitable for the cases of a hypothetical emerging respiratory infectious disease presented in the scenario. The design of the scenario was conducted using the scenario

Table 1. Composition about Basic Epidemiological Investigation Simulation Program of Emerging Respiratory Infectious Diseases

Contents	Time	Method
1. Orientation	15 minutes	
2. Theory education	60 minutes	Lecture
Infectious disease prevention and control act		
BEI method for infectious diseases		
How-to donning and doffing PPE		
Environment and medical waste management		
Understanding the structure of negative pressure isolation facilities		
3. Break	15 minutes	
4. Pre-briefing	15 minutes	
5. Simulation operation	30 minutes	Simulation
Donning PPE		*Operate in a group of 4 people
BEI(SP assessment and writing BEI form)		
Doffing PPE		
6. Debriefing	30 minutes	
7. Closing	15 minutes	

BEI=Basic epidemiological investigation; PPE=Personal protective equipment; SP=Standardized patient.

composition template that is used at C University in Seoul. This module includes the simulation topic, class operation, scenario situations (for professors, for students, and for SPs), BEI forms (for students and for SPs), training scripts for standardized patients (SPs), and the debriefing plan. In addition, guidelines on responses to emerging respiratory infectious diseases were created in consideration of the situation of the scenario developed in this study in order to lead participants to perform case classification and patient isolation after conducting basic epidemiological investigations regarding suspected cases. The researcher is currently working as an epidemiological investigation officer of a national government institution, majored in simulation, and completed courses on simulation teaching methods, simulation operation, and SP education and training as part of the doctoral program in order to prepare in advance for this research.

(2) Expert consultation and verification of content validity

The verification of content validity of the developed simulation education program on the basic epidemiological investigations of emerging respiratory infectious diseases was performed through the analysis of the content validity index (CVI). This verification of content validity was performed by six experts, and they consisted of an infection control nurse, an officer of a national government institution, two epidemiological investigation officers of local governments, and two nursing professors. The content validity of each item was measured on a 4-point Likert scale ranging from 1 point (= 'Not valid at all') to 4 points (= 'Very valid'), and the CVI of this study was 0.9~1.0. Based on the feedback that the time for scenario operation would be insufficient among experts' comments, the final scenario was completed by removing the processes of selecting PPE and reporting the infectious disease.

4) Implementation phase

Prior to implementation, a preliminary experiment on the developed simulation education on basic epidemiological investigations of emerging respiratory infectious diseases was conducted in C University located in Seoul for 3 days from April 27 to 29, 2022. A total of 13 participants were recruited, and they were divided into 3 teams.

5) Evaluation phase

After the completion of education, the comparison of the levels of satisfaction with education between the experimental and control groups was made. The level of satisfaction with education was 4.85 ± 0.30 points out of 5 in the experimental group, and

4.58 ± 0.32 points in the control group ($t = -3.54, p < .001$). Specifically, the feedback obtained through open-ended questions and interviews included the following opinions: 'The application of standardized patients made me feel like it was a real situation'; 'I found it useful to have the opportunity to trace epidemiological relatedness through debriefing'; 'Actually donning PPE and checking it through florescent lotion led me to think that I need to be more careful'; 'Through discussion and reflection during debriefing, I realized that it is also necessary to pay attention to the non-verbal expressions of standardize patients.' Regarding aspects that need to be improved, the following suggestions were given: 'It would be better if students are given an opportunity to introduce themselves to each other as well as a longer break and a sufficient time to prepare for the next class.' In addition, the instructor performed the overall evaluation about the levels of accomplishment of educational objectives, time management, and problems in the process of proceeding with education according to the scenario. The results of evaluation of the effectiveness of simulation education are described in the section about the verification of effectiveness.

4. Measures

1) Clinical performance related to basic epidemiological investigations

The assessment tool for clinical performance related to basic epidemiological investigations (BEI) was developed by the researcher in the design phase. This scale contains a total of 40 questions, and it is composed of questions on five subdomains of clinical performance as follows: 12 questions on donning PPE, 12 questions on basic epidemiological investigations, 3 questions on the isolation of suspected patients, 10 questions on doffing PPE, and 3 questions on environment and waste management. Regarding the content validity of the developed questions and the categorization of them, the analysis of CVI by 6 experts was conducted, and the six experts consisted of an infection control nurse, an epidemiological investigation officer of a national government institution, two epidemiological investigation officers of local governments, and two nursing professors. Then, the questions were finally selected through face validity analysis in the evaluation stage. Regarding the reliability of the tool, the value of Cronbach's α was calculated as .97.

2) Self-efficacy related to basic epidemiological investigations

Self-efficacy related to basic epidemiological investigations was measured using a modified version of the self-efficacy scale used by Jung [36]. Jung [36] developed a Korean modified version of the scale developed by Sherer et al. [35] by revising and comple-

menting the original tool. The tool used in this study was created by the researcher by remodifying the version created by Jung [36] to make it suitable for basic epidemiological investigations, and this scale consists of a total of 17 questions. Each item is assessed on a 5-point Likert scale ranging from 1 point (= 'Not confident at all') to 5 points (= 'Very confident'). Higher scores indicate higher levels of self-efficacy. As for the reliability of the tool, the value of Cronbach's α of the original tool was reported as .86, and the value of Cronbach's α was calculated as .94 in this study.

3) Anxiety related to basic epidemiological investigations

Anxiety related to the performance of basic epidemiological investigations was measured using a modified version of the infection-related anxiety assessment tool presented by Kim et al. [19]. The modified version used in this study was created by the researcher by modifying and complementing the original tool in consideration of the content of the performance of basic epidemiological investigations and exposure to the risk for infection in the process. The content validity of the used instrument was confirmed through the verification of experts. Higher scores indicate higher levels of anxiety. The scale used consists of 4 questions, and each item is rated on a 10-point numeric rating scale (0 points: 'Not anxious at all'; 5 points: 'Moderately anxious'; 10 points: 'Very anxious'). The value of Cronbach's α was reported as .97 by the creator of the tool, and it was calculated as .89 in this study.

5. Data collection

Data was collected from May 1 to 20, 2022. The education program was carried out by assigning 16~17 students per session, so a total of four sessions were delivered by performing two sessions for each group. To block the ripple (imitation) effect among participants, the education sessions of experimental and control groups were performed separately on different dates, and participants were not informed in advance about which group they were assigned to. A pre-survey was conducted using a structured self-administered questionnaire among the students who voluntarily agreed to participate the day before the implementation of the education program, and a post-survey was conducted immediately after the completion of the education program. For fairness, the control group that participated in demonstrations and simple practice training was also given simulation education after the post-test survey. In addition, it was explained to the students that the education program and surveys related to this study were all conducted for the purpose of research, and they were not re-

lated to the marks or grades of college courses or the evaluation of practice education.

6. Data analysis

The collected data was analyzed using SPSS Statistics 26.0. As a result of conducting the Shapiro-Wilk test prior to analysis, the p-value for the dependent variable was calculated as less than .05, so analysis was conducted using nonparametric tests. The preliminary test of the homogeneity of two groups was performed using the Chi-squared test and the Mann Whitney U test. To test hypotheses, the Wilcoxon signed-rank test was used for the within-group comparison and the Mann Whitney U test was used for testing for differences between two groups.

7. Ethical considerations

For the ethical protection of the rights of participants, this study was conducted after obtaining approval from the Institutional Review Board of Chung-Ang University (IRB No. 1041078-202201-HR-029). The voluntary participation of study participants, the protection of anonymity and confidentiality, possibility of withdrawal from research, and no disadvantages and no harm arising from research were specified in the participation information sheet, and written informed consent was obtained from participants after explaining the content of the participation information sheet to them.

Results

1. Verification of the homogeneity of participants

To verify the homogeneity of two groups for general characteristics, the comparison of age ($Z = 13.45$, $p = .265$), gender ($\chi^2 = 0.27$, $p = .603$), the number of the experience of participation in simulation education ($\chi^2 = 2.19$, $p = .140$), and academic performance ($\chi^2 = 0.02$, $p = .877$) were conducted, and it was found that there were no significant differences. In addition, to examine the homogeneity of the values of research variables prior to the intervention, the comparison of clinical performance related to BEI ($Z = 45.98$, $p = .473$), self-efficacy related to BEI ($Z = 35.14$, $p = .462$), and anxiety related to BEI ($Z = 14.65$, $p = .840$) between two groups was conducted, and the results showed that there were no significant differences (Table 2).

2. Verification of hypotheses

1) Verification of Hypothesis 1

In this study, Hypothesis 1 was postulated as follows: The experimental group that received BEI simulation education using stan-

Table 2. Homogeneity Test between Experimental and Control Groups ($N=64$)

Variables	Category	Exp.(n= 33)	Cont.(n= 31)	χ^2 or Z	p
		Median (IQR) (range) or n (%)			
Age (year)		24 (22~26) (22~35)	22 (22~24) (21~36)	13.45	.265
Gender	male	7 (21.2)	5 (16.1)	0.27	.603
	female	26 (78.8)	26 (83.9)		
Number of the experience of participation in simulation education	2	11 (33.3)	16 (51.6)	2.19	.140
	3	22 (66.7)	15 (48.4)		
Academic performance	Rating \geq 3.5	19 (59.4)	19 (61.3)	0.02	.877
	Rating < 3.5	13 (40.6)	12 (38.7)		
Clinical performance related to BEI		2.60 (1.90~3.07)	2.70 (2.15~3.03)	45.98	.473
Donning PPE		2.50 (1.88~2.04)	2.83 (2.25~3.08)	29.63	.432
BEI (SP assessment and writing BEI form)		2.58 (1.88~3.04)	2.67 (2.00~3.08)	25.70	.642
Isolation of suspected patients		2.33 (1.67~3.00)	2.00 (1.67~2.67)	6.63	.577
Doffing PPE		2.80 (1.95~3.15)	2.80 (2.00~3.20)	24.30	.559
Environment and medical waste management		2.33 (2.00~3.00)	3.00 (2.00~3.33)	8.22	.512
Self-efficacy related to BEI		2.88 (2.29~3.29)	3.00 (2.24~3.65)	35.14	.462
Anxiety related to BEI		28.00 (23.50~32.00)	28.00 (24.00~31.00)	14.65	.840
Contact with suspected patients		8.00 (7.00~9.00)	7.00 (7.00~8.00)	3.25	.861
BEI (SP assessment and writing BEI form)		7.00 (5.50~8.00)	7.00 (6.00~9.00)	5.65	.467
Donning and doffing PPE		8.00 (5.00~8.00)	7.00 (5.00~8.00)	4.87	.676
Environment and medical waste management		7.00 (6.00~8.00)	7.00 (6.00~8.00)	7.79	.351

Exp.=Experimental group; Cont.=Control group; BEI=Basic epidemiological investigation; PPE=personal protective equipment; SP=Standardized patient.

standardized patients will show a greater improvement in clinical performance related to basic epidemiological investigations than the control group. The results of data analysis revealed that the score for clinical performance related to BEI was increased by 2.15 points (1.75~2.86) in the experimental group and by 1.63 points (1.33~2.13) in the control group after education, compared to the pre-intervention scores. The analysis for significance of differences between the two groups revealed that there were significant differences between the two groups, so Hypothesis 1 was supported. Regarding the sub factors of clinical performance, there were significant differences between two groups in donning PPE ($Z = -2.14$, $p = .033$), basic epidemiological investigation ($Z = -2.80$, $p = .005$), and environment and waste management ($Z = -2.74$, $p = .006$), but there was no statistically significant difference between two groups in the isolation of suspected patients ($Z = -1.51$, $p = .131$) and doffing PPE ($Z = -1.78$, $p = .075$) (Table 3).

2) Verification of Hypothesis 2.

Analysis of the collected data was conducted to test the Hypothesis 2 that the experimental group that received BEI simulation education using standardized patients will show a greater im-

provement in self-efficacy related to basic epidemiological investigations than the control group. The analysis results showed that the score for self-efficacy related to basic epidemiological investigations was increased by 1.76 points (1.03~2.44) in the experimental group and by 1.53 points (1.00~2.06) in the control group, but there was no significant difference between the two groups ($Z = -0.79$, $p = .432$). As a result, Hypothesis 2 was not supported (Table 3).

3) Verification of Hypothesis 3

In this study, Hypothesis 3 was postulated as follows: The experimental group that received BEI simulation education using standardized patients will show a greater decrease in anxiety related to the clinical performance of basic epidemiological investigations than the control group. The results of analysis of the collected data revealed that the score for anxiety was decreased by 18.00 points on average (-23.00~-13.50) in the experimental group and by 10.00 points on average (-16.00~-6.00) in the control group after education, compared to the pre-intervention scores, and there was a significant difference between two groups ($Z = -4.02$, $p < .001$). In other words, the results of this study supported Hypothesis 3. Regarding the sub factors of anxiety, there were significant differ-

Table 3. Comparison of Clinical Performance, Self-efficacy, and Anxiety between Experimental and Control Groups (N=64)

Variables	Groups	Before	After	Z (p)	Difference (After-before)	Z (p)
		Median (IQR)	Median (IQR)		Median (IQR)	
Clinical performance related to BEI	Exp. (n = 33)	2.60 (1.90~3.07)	4.85 (4.41~5.00)	-5.01 (< .001)	2.15 (1.75~2.86)	-2.51 (.012)
	Cont. (n = 31)	2.70 (2.15~3.03)	4.23 (4.10~4.78)	-4.86 (< .001)	1.63 (1.33~2.13)	
Donning PPE	Exp. (n = 33)	2.50 (1.88~2.04)	4.92 (4.63~5.00)	-5.01 (< .001)	2.42 (1.67~2.96)	-2.14 (.033)
	Cont. (n = 31)	2.83 (2.25~3.08)	4.50 (4.17~4.92)	-4.86 (< .001)	1.75 (1.25~2.42)	
BEI (SP assessment and writing BEI form)	Exp. (n = 33)	2.58 (1.88~3.04)	4.83 (4.38~5.00)	-5.01 (< .001)	2.00 (1.58~2.92)	-2.8 (.005)
	Cont. (n = 31)	2.67 (2.00~3.08)	4.17 (3.92~4.58)	-4.86 (< .001)	1.33 (0.92~2.17)	
Isolation of suspected patients	Exp. (n = 33)	2.33 (1.67~3.00)	5.00 (4.00~5.00)	-4.99 (< .001)	2.33 (1.50~3.17)	-1.51 (.131)
	Cont. (n = 31)	2.00 (1.67~2.67)	4.00 (3.67~5.00)	-4.87 (< .001)	2.00 (1.33~2.33)	
Doffing PPE	Exp. (n = 33)	2.80 (1.95~3.15)	4.90 (4.40~5.00)	-5.02 (< .001)	2.00 (1.60~2.85)	-1.78 (.075)
	Cont. (n = 31)	2.80 (2.00~3.20)	4.30 (4.10~4.90)	-4.81 (< .001)	1.60 (1.00~2.20)	
Environment and medical waste management	Exp. (n = 33)	2.33 (2.00~3.00)	5.00 (4.00~5.00)	-4.87 (< .001)	2.00 (1.67~3.00)	-2.74 (.006)
	Cont. (n = 31)	3.00 (2.00~3.33)	4.33 (4.00~5.00)	-4.83 (< .001)	1.67 (1.00~2.00)	
Self-efficacy related to BEI	Exp. (n = 33)	2.88 (2.29~3.29)	4.71 (4.06~5.00)	-4.86 (< .001)	1.76 (1.03~2.44)	-0.79 (.432)
	Cont. (n = 31)	3.00 (2.24~3.65)	4.59 (4.00~5.00)	-4.68 (< .001)	1.53 (1.00~2.06)	
Anxiety related to BEI	Exp. (n = 33)	28.00 (23.50~32.00)	11.00 (7.50~12.00)	-5.01 (< .001)	-18.00 (-23.00~-13.50)	-4.02 (< .001)
	Cont. (n = 31)	28.00 (24.00~31.00)	16.00 (15.00~20.00)	-4.71 (< .001)	-10.00 (-16.00~ 6.00)	
Contact with suspected patients	Exp. (n = 33)	8.00 (7.00~9.00)	2.00 (2.00~3.50)	-5.04 (< .001)	-5.00 (-6.00~4.00)	-4.45 (< .001)
	Cont. (n = 31)	7.00 (7.00~8.00)	5.00 (4.00~6.00)	-4.29 (< .001)	-3.00 (-4.00~-2.00)	
BEI (SP assessment and writing BEI form)	Exp. (n = 33)	7.00 (5.50~8.00)	3.00 (2.00~3.00)	-4.88 (< .001)	-4.00 (-6.00~3.00)	-3.92 (< .001)
	Cont. (n = 31)	7.00 (6.00~9.00)	5.00 (4.00~6.00)	-4.45 (< .001)	-2.00 (-4.00~1.00)	
Donning and doffing PPE	Exp. (n = 33)	8.00 (5.00~8.00)	3.00 (1.50~3.00)	-4.92 (< .001)	-4.00 (-6.00~3.00)	-2.95 (.003)
	Cont. (n = 31)	2.80 (2.00~3.20)	4.30 (4.10~4.90)	-4.81 (< .001)	1.60 (1.00~2.20)	
Environment and medical waste management	Exp. (n = 33)	7.00 (6.00~8.00)	3.00 (2.00~3.00)	-4.88 (< .001)	-4.00 (-6.00~3.00)	-2.41 (.016)
	Cont. (n = 31)	7.00 (6.00~8.00)	4.00 (3.00~5.00)	-4.22 (< .001)	-3.00 (5.00~1.00)	

Exp.=Experimental group; Cont.=Control group; BEI=Basic epidemiological investigation; PPE=personal protective equipment; SP=Standardized patient.

ences in all of the following sub factors of anxiety: anxiety about infection due to contact with suspected patients ($Z = -4.45, p < .001$), anxiety about the performance of basic epidemiological investigations ($Z = -3.92, p < .001$), anxiety about infection due to donning and doffing PPE ($Z = -2.95, p = .003$), and anxiety about infection due to environment management and medical waste disposal ($Z = -2.41, p = .016$) (Table 3).

Discussion

This study developed and applied a simulation education program on the basic epidemiological investigations (BEI) of emerging respiratory infectious diseases for nursing students to improve BEI performance competency and effective prepare for responses to disasters and crises due to the outbreak of infectious diseases and verified the effectiveness of the developed simulation education among nursing students. In this study, the devel-

opment of simulation education was carried out according to the ADDIE instructional design model by systematically developing a scenario and subsequently operating the simulation education program. This simulation education made it possible to realistically reproduce social disaster situations such as the outbreak of infectious diseases, which are difficult to reproduce in existing demonstrations and simple practice education. In particular, the simulation education program developed in this study reflected nursing students' educational needs regarding education on infection control by including donning and doffing PPE and the performance of patient isolation in addition to basic epidemiological investigations. Therefore, this simulation education program can be utilized for the enhancement of both BEI competency and infection control competency needed for initial infection control measures in the case of disaster and crisis responses.

The analysis of the effects of simulation education developed in this study revealed that the experimental group showed a

greater improvement in clinical performance related to BEI than the control group. These results are consistent with the previous studies that reported that simulation education resulted in significant differences in clinical performance between groups [19,21,37]. In particular, this study increased the fidelity of simulation education by applying standardized patients in basic epidemiological investigations, which inevitably rely on the statements of patients under investigation, and provided an environment similar to clinical settings, and these factors are thought to have contributed to the improvement of clinical performance in the experimental group.

Meanwhile, in this study, the level of self-efficacy related to BEI was increased in both groups after education, compared to the pre-intervention scores, and there was no significant difference between two groups. These results are in agreement with the findings of Kim et al. [19]. In a prior study by Kim et al. [19], the experimental group participated in an infection control education program using SP, while the control group participated in peer role-play practice. In this study, the lack of significant differences in self-efficacy between two groups is presumed to be related to the team-based practice of the control group. More specifically, when the control group performed the simple practice about completing BEI forms about the cases presented to them, the participants of the control group were divided into teams with 4-5 members. This team-based practice is presumed to have induced cooperative learning among peers and have contributed to the increase of self-efficacy for BEI. Actually, in this study, the mean scores for self-efficacy related to BEI in the experimental and control groups were 4.71 points and 4.59 points out of 5, respectively, and these scores are relatively higher than the mean scores of 3.52~3.56 points reported in previous studies [38,39]. Therefore, there is a need to consider education programs including peer-led debriefing and team debriefing to promote cooperation in the learning process in the future development of simulation education programs.

In this study, although both groups showed a significant decrease in the level of anxiety related to BEI after education, compared to pre-intervention survey results, the experimental group showed a greater decrease in the level of anxiety, and there was a significant difference between two groups. These results are consistent with the previous studies that reported a reduction in anxiety after simulation education [15,19]. In the experimental group, among the sub factors of anxiety, anxiety about infection due to contact with suspected patients showed the greatest reduction. This greater decrease in anxiety about contact with suspected patients in the experimental group is thought to be related

to the specific method of simulation applied to the experimental group. In other words, participants in the experimental group performed a face-to-face assessment of the SP by wearing PPE prior to the patient assessment, and their simulation included the process of checking the fluorescent material after doffing PPE. The results about anxiety reduction through simulation education are consistent with the findings of Yoo [40]. In a study of nursing students' educational needs regarding education on infection control, Yoo [40] reported that nursing students were found to have the highest educational need for the domain of the importance and performance of donning and doffing Level D PPE. The results about anxiety of this study are also in agreement with the findings of Ji and Seo [41]. Ji and Seo [41] conducted research on simulation education using SP about nursing care of patients on contact precautions, and reported that simulation education performed by wearing PPE showed satisfactory educational effects in terms of contact with actual people and the performance of nursing care of patients on contact precautions. On the other hand, in a study conducted before the outbreak of COVID-19, Kim et al. [19] reported that simulation education on infection control did not lead to any significant changes in anxiety about contact with patients with respiratory infectious diseases as a sub factor of anxiety after. The study results of Kim et al. [19] may be attributed to the following reason. It seems that since only an N95 mask and gloves were worn as PPE during simulation in the study, the simulation was not effective in the reduction of anxiety related to contact with patients with respiratory infectious diseases. Due to the recent COVID-19 pandemic, there is an increased need for education on the nursing of patients with emerging respiratory infectious diseases, and this study developed and applied simulation education tailored to the educational needs of nurses such as the method of donning and doffing personal protective equipment. In view of the results of this study and the current situation, there is a need for further research to develop various scenarios by reflecting the social changes and educational needs of nurses.

In the evaluation phase after the completion of education programs, simulation education was found to have an effect on satisfaction with education. The significantly higher level of satisfaction with education in the experimental group may be attributed to the following reasons. First, the need for education on the method of epidemiological investigations and infection control has been increased in nursing students due to the recent COVID-19 pandemic situation [40]. In addition, participants participated in simulation education wearing PPE by applying standardized patients, and this application of standardized pa-

tients made them feel like they were in a real situation. In particular, while participants in the control group immediately presented epidemiological relatedness (contact with a confirmed patient) and clinical symptoms, those in the experimental group experienced nonverbal expressions as well as the investigation process including the examination of the incubation period and checking the epidemiological association with standardized patients, and they had the opportunity for reflection through debriefing. The responses to open-ended questions among the survey items showed that the above-mentioned processes in the experimental group increased the level of satisfaction of learners. In this respect, it is considered meaningful that this study induced reflection through systematic and structured debriefing. In the future, there is a need for instructors to lead a stepwise analysis by varying the level of reflection facilitation depending on the degree of immersion in debriefing among participants who do not have the previous experience of simulation education.

In a previous study on infection control education for nurses, Yang [17] conducted research on education for the nurses of medical institutions regarding writing BEI forms and the subsequent measures such as the isolation of patients, testing, and environment management, and this prior study was focused on education for the control of further infectious disease spread at the stage of the community spread of an infectious disease. In contrast, this study conducted research on education on the importance of community nurses' initial basic epidemiological investigations by comprehensively checking the stages and guidelines of the crisis warning system regarding infectious diseases and performing case classification in a situation where the transmission of emerging respiratory infectious diseases does not occur in Korea. The BEI of emerging respiratory infectious diseases is one of initial infection control and prevention measures, and it is an important step for the early detection of suspected patients and the prevention of further spread or outbreaks by investigating the epidemiological relatedness and clinical symptoms in compliance with guidelines changed according to the situation of outbreaks of infectious diseases and the results of epidemiological investigations from the beginning of the occurrence of emerging infectious diseases. Nurses and students must be equipped with capabilities and expertise through crisis response training and the process of responding to infectious diseases in normal times in preparation for disasters. Also, this education on infection control and how to respond to infections should be carried out through participatory simulations rather than lecture-based education, and lead students to learn a series of processes in which they recognize and report problems, perform necessary actions,

and resolve problems about patients on their own [41]. However, since nursing students may be exposed to danger in the process of participating in practice training in actual clinical situations, this study attempted to provide a safe simulation environment for nursing students and integrate knowledge and skills related to basic epidemiological investigations. This study also developed and applied an education program based on the guidelines and cases of emerging infectious diseases, and the education program developed by this study will hopefully contribute to the early detection of infectious diseases and the prevention of the spread of the diseases through the enhancement of BEI competency required to respond to disaster crises caused by emerging infectious diseases in the future.

Conclusions

This study developed a simulation education program on basic epidemiological investigations (BEI), based on the guidelines and cases of emerging respiratory infectious diseases, and this simulation education program includes the performance of BEI, donning and doffing PPE, and the isolation of suspected patients. To evaluate the effectiveness of the developed BEI simulation education program, this study operated the developed BEI simulation education program using standardized patients (SP), and assessed clinical performance related to BEI, self-efficacy related to BEI, and anxiety related to BEI in the experimental and control groups. As a result, simulation education using SP was found to be more effective in the improvement of clinical performance and the reduction of anxiety than education using only demonstrations or simple practice. If the simulation education program developed by this study is utilized for the improvement of BEI competency needed for responses to disaster crises due to emerging infectious diseases, it is expected to contribute to the early detection of infectious diseases and the prevention of their spread in the future. This study has limitations in generalizing research findings since participants were recruited only from nursing students attending a single university located in Incheon. Moreover, in this study, the clinical performance competency for BEI was assessed using a self-administered survey, so there is a need to objectively measure the clinical performance ability for BEI in actual healthcare settings. Based on the results of this study, simulation programs at various levels for learners such as nurses and epidemiological investigation officers should be developed, and there is also a need for replication studies to examine learning effects. In addition, further research should be conducted to evaluate the actual effectiveness of the developed sim-

ulation education program in terms of the control of infectious diseases through early infection control measures and the prevention of the spread of emerging infectious diseases after the implementation of the developed BEI simulation education program.

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Conflict of interest

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Authors' contributions

Park, Jiyun contributed to conceptualization, data curation, formal analysis, funding acquisition, methodology, project administration, visualization, writing-original draft, investigation, software, and supervision. Yeom, Gye Jeong contributed to writing – review & editing, resources, visualization, and validation.

Data availability

Please contact the corresponding author for data availability.

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A Multi-component Living Lab on Health Engagement for Advancing Self-care Agency among Migrant Workers in South Korea: A mixed methods study

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Purpose: Migrant workers battle to access health services and adapt to a new culture. Self-care agency can be essential for health self-management. This study examines the effects of a health engagement program to improve self-care agency using a living lab approach among migrant workers living in South Korea.

Methods: This study used a mixed-methods design, including a non-equivalent pre-post-test control group and three focus group interviews. Participants included 42 migrant workers from nine countries recruited via flyers, posters, and internet bulletins posted by a migrant community organization. During the 12 weeks, only the intervention group participants received four workshops addressing healthy physical activity, healthy dietary habits, effective cultural adaptation, stress management, and two outdoor cultural activities. They also participated in focus group interviews after the second, third, and fourth group activities and discussed the benefits of healthy behaviors and specific ways to implement them in real life.

Results: Participants in the intervention group showed an increase in self-care agency, health literacy, and acculturation after the 12-week intervention. Themes were derived based on the lessons from living lab activities, barriers to health behavior practices, and methods to overcome these.

Conclusion: This study demonstrated that multi-component intervention using a living lab effectively increased migrants' participation in health promotion activities by strengthening health in their self-care agency. The qualitative and living lab approach effectively obtained comprehensive results on strategies to enhance healthy behavior engagement.

Keywords: Transients and migrants; Health promotion; Self-care; Health behavior; Community

Introduction

International migration is a worldwide phenomenon, and the various health issues of migrants have become a significant public health concern [1]. Many studies have reported healthcare access for inequalities between migrants and non-migrants [2]. Specifically, limitations in the mental health services usage, language and communication barriers, limitations in primary health care

services, and discrimination was prominent. Migrant workers face a significant risk of deteriorating physical and mental health from high levels of physical work, unstable legal status, language barriers, discrimination and culture difference [2]. A study on healthcare behaviors and primary care among migrants found that approximately 30% of respondents reported problems with their self-care activities, such as prescribed medication intake, regular exercise, and monitoring health [3].

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Self-care agency is defined as the complex acquired ability engaging in self-care for maintaining and promoting well-being [4]. Individuals determine their well-being through health-seeking behaviors that involve preventing diseases, care for family, access to and health services [5]. However, in the case of migrant workers, the essential behaviors are limited due to acculturation, which is a multidimensional cultural and psychological change process that results from a contact between two or more different cultures and groups [6]. Consequently, migrant workers with low level of acculturation are likely to have poor health outcomes such as low sleep quality and self-rated health [7]. Considering the vulnerability of migrant workers to cultural adaptation and its expected negative health outcomes, cultivating self-care agency seems to be utmost.

Social support is another key factor that reduces acculturative stress, depression, perceived discrimination and increase psychological well-being among migrants [8,9]. Furthermore, social support that arises from active participation in host community activities is known to promote a sense of community [10], which facilitates cultural adaptation among migrants [10]. Compared to native ethnic population, low health literacy of migrant workers greatly increased the risk of physical and mental health issues [11] as limiting to understanding, evaluation, and application of health information for health care-related decision-making, disease prevention, and health promotion.

To our knowledge, intervention programs for migrant workers were primarily focused on workplace safety education, health promotion such as walking and stretching exercises, or disease prevention such as malaria and sexually transmitted infections [12], and are targeted to improve on psychosocial outcomes [13]. To promote engagement in healthy behaviors for migrants, it is essential to gain migrants' perspectives on self-management. Therefore, in-depth research is needed to emphasize the migrants' health perspective and barriers to healthcare access and increase their self-efficacy toward health management. To encourage migrant workers to engage in health promoting behaviors, it is vital to make them understand its relevance to their lives and empower them to gain control over their environment. The living lab approach is an innovative way of identifying engagement strategies by brainstorming with participants [14]. Living lab is a user-centered environment where users and producers jointly investigate solutions in real-life settings [15]. Especially, it was reported that living lab approaches are more appropriate used to investigate health problems in vulnerable groups [15]. It is also necessary to investigate how migrant workers engage in health promotion behavior. Mixed-methods research practices

combine quantitative and qualitative evaluation approaches to understand better research outcomes than when individually used, making it apt to explore living lab interventions effects that co-create interactions in multiple stakeholders and an in-depth understanding of the intervention effects by exploring the participants' lived experiences [16].

Health engagement is people's willingness and ability to actively participate in their health and navigate health care services [17], which includes confidence to autonomously manage their health and health literacy [18]. This study aimed to examine the effects of a multi-component health engagement program to improve self-care agency using a living lab approach among migrant workers. Using a mixed-method study design, we applied six principles (multi-method approach, users' engagement, multi-stakeholder participants, real-life settings, co-creation, and innovation activity) of a living lab [15] to provide intervention for migrant workers and evaluated its effects.

Methods

1. Study design

This study evaluated the effect of a health engagement program for migrant workers using a concurrently embedded mixed-method design combining quantitative (a quasi-experimental research) and qualitative (focus group interviews) research (Figure 1).

2. Study sample

Participants were recruited through invitations on flyers, posters, and internet bulletins of social welfare institutes for migrant workers. The inclusion criteria were migrant workers who were legally employed adults under 40 years of age working full-time, with intermediate-level Korean or Level 3 or higher qualifications in the Test of Proficiency in Korean (TOPIK) and possess a smartphone and the ability to use mobile applications. TOPIK Level 3 is equivalent to intermediate-level Korean language proficiency, ensuring the ability to perform essential language functions necessary for using various public facilities and maintaining social relations without any difficulty for a fully functioning daily life. Illegal migrants and those who had participated in other health promotion programs in the preceding three months were excluded. We initially recruited 66 migrant workers for study participation; however, 19 did not meet the inclusion criteria, and 5 dropped out during the intervention. According to the recruitment order, we assigned them to the intervention ($N=25$) or control groups ($N=22$). Finally, data from 42 workers were analyzed, excluding 5 workers who dropped out during the 12-week

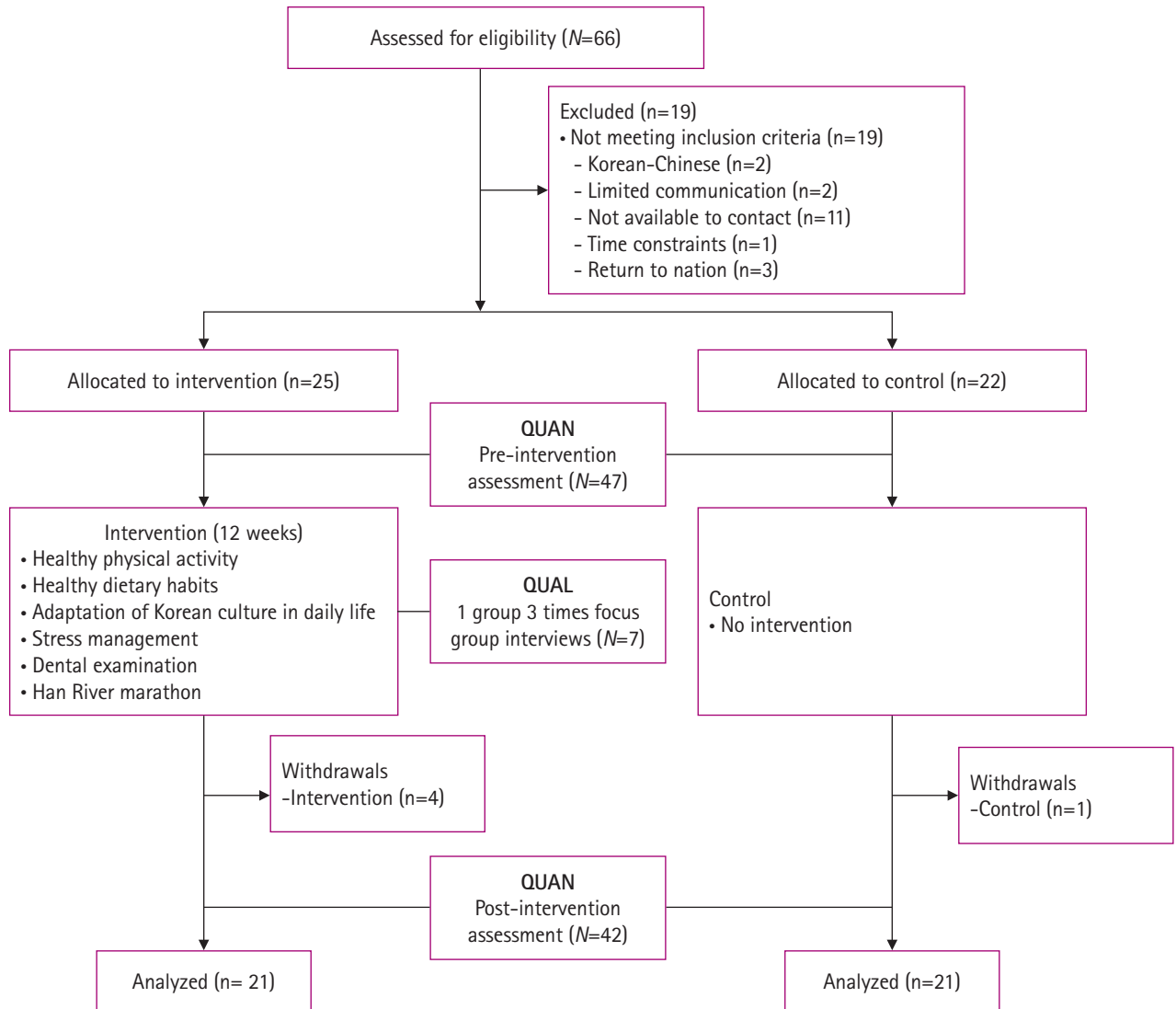


Figure 1. Intervention design of mixed methods study.

intervention period (Intervention group: $N = 21$, Control group: $N = 21$). The number of adequate samples required for data analysis was verified by the post hoc test for Wilcoxon-Mann-Whitney test analysis using the G*Power 3.1.9.2 software. The study's primary outcome, the effect size of the self-care agency, was 1.11, and the significance level was .05, with 21 people in each group; as a result of testing, the statistical power was 92.8%, indicating that the sample size was appropriate.

3. Intervention

3.1. Multi-component intervention for health engagement

This intervention was developed to increase self-care agency in health-promoting lifestyles among migrant workers by refocus-

ing health engagement from the workplace to the individual and strengthening health literacy and health behavior (Table 1). Based on the practical guidelines of the living lab approach [14], which suggested ideas for migrant workers' program participation, this study included multi-component strategies such as health community activities and cultural community activities that the participants could realistically practice and benefit from health. According to a literature review related to self-care [19], some studies applied multi-component interventions to promote self-care and healthy behaviors. Defining a multi-component intervention as an intervention that includes at least two components and settings [20,21], this study consisted of health community activities composed of four sessions and cultural commu-

Table 1. Multi-component intervention for health engagement

Session	Month	Topic	Contents	Time
-	6	Orientation	<ul style="list-style-type: none"> • Introduction to research • Self-introduction • Pre-survey 	90 min
Health community activity 1	6	Healthy physical activities	<ul style="list-style-type: none"> • Stretching and muscular exercise for preventing occupational musculoskeletal diseases • Home training at work or home 	90 min
Health community activity s 2	7	Acculturation	<ul style="list-style-type: none"> • Information on cultural festivals held at the Han River 	90 min
Health community activity 3	7	Healthy dietary habits	<ul style="list-style-type: none"> • Salty taste preference test • Adequate sodium meal recipes 	90 min
Health community activity s 4	8	Stress management	<ul style="list-style-type: none"> • DISC personality types test • Conversation techniques to understand other people's personality 	90 min
Cultural community activity 1	6	Cultural activities using community resources 1	<ul style="list-style-type: none"> • University campus tour & dental check up 	60 min
Cultural community activity s 2	7	Cultural activities using community resources 2	<ul style="list-style-type: none"> • Participating in the Han River night race marathon with peer 	60 min
-	8	Completion ceremony	<ul style="list-style-type: none"> • Program completion ceremony • Post-survey 	110 min

nity activities including two outdoor activities. To increase the participation of migrant workers in health engagement program, participants freely shared thoughts and opinions about health topics of interest and cultural adaptation activities during orientation. We consisted of the health engagement program based on participants' opinions confirmed during the orientation and data [22] on the health status of migrant workers who reported musculoskeletal injuries, cultural barriers, negative mental health, and so on. During the 12-week intervention period, a total of six sessions, consisting of four health community activities (healthy physical activity, healthy dietary habits, acculturation, and stress management) in the form of workshops involving discussion and practice and two cultural community activities (university tour and dental check-up and marathon participation in a community sports event) in the form of outdoor activities, using community resources were organized. In particular, to increase the accessibility of intervention participation for hard-to-reach groups, this program was conducted with the cooperation of the Korea Foreign Worker Support Center, which is mainly used by participants.

3.2. Health community activities

All sessions were based on living lab principles, which encouraged participants to solve their health concerns independently. To ensure that participants recognized that the process of participating in the intervention was related to real-life and health in

Korea, they discussed their thoughts and how they could apply them to their lives after each session. The first session on "Healthy physical activities" comprised stretching and muscle exercises for migrant workers. The participants learned stretching and muscle exercise movements under the coaching of exercise prescription experts, followed by a discussion about exercise benefits and specific ways to implement them in real life. The second session on "Healthy dietary" comprised information dissemination on a low-sodium diet intake to help cultivate healthy dietary habits. The participants assessed their taste in salt intake with sample foods and were invited to discuss their usual dietary behaviors and healthy dietary practices. Additionally, participants were asked to consult the Ministry of Food and Drug Safety website to find restaurants serving low sodium meals in their neighborhood. The third group activity session on 'Access to community resources' aimed to stimulate participants' interest in Korean cultural events and enhance access to community resources by introducing 80 community programs to enable early adaptation and migrant workers' assimilation into Korean society. Lastly, the participants were introduced to stress management techniques based on a better understanding of their personalities and others using DISC [23], a test tool used for understanding propensity and classifying behavior into four personality types (i.e., Dominant, Influencer, Steady, and Conscientious) to improve communication methods with peers of different personality types. At the session end, participants could identify and understand their

personality type and that of others; how migrant workers can communicate better to establish good interpersonal relationships with others was also discussed.

3.3. Cultural community activities

The contents and location of the cultural activities were decided based on participants' preferences and previous studies that reported a positive correlation between migrants' participation in cultural activities in the host country and life satisfaction [24,25]. First, based on the study [26] that a higher level of acculturation has a positive effect on health promotion behavior, this study collected opinions from young participants around the age of 30 and conducted a campus tour of a university located in a major tourist attraction in Seoul. The researchers informed them about its history and culture. Additionally, during the tour, they participated in the university hospital's free dental care program and received education on the importance of regular dental care, which motivated them to engage in healthy behaviors. Second, a marathon along the Han River was organized; by combined participation in the five-kilometer marathon, participants and researchers could appreciate the benefits of community resources to organize physical activities and cultural events.

4. Study Measures

4.1. Health promotion lifestyle

The health promotion lifestyle profile was developed by Walker et al. [27] and initially comprised 26 items, but was later shortened [28]. This is a four-point Likert scale (1 = never, and 4 = routinely), with higher total scores representing better lifestyle conditions for improving health. Cronbach's α was .70 in this study.

4.2. Health literacy

The health literacy scale was developed by An and Yang [29] to measure the ability of migrant married women to read, write, understand, and use health information. The questionnaire comprises ten items on a five-point Likert scale (0 = strongly disagree, and 4 = strongly agree). The mean level of health literacy in migrant workers and married women (original study cohort) with intermediate-level Korean was found to be similar. Cronbach's α was .71 in this study.

4.3. Self-care agency

Self-care agency was measured using the Appraisal of Self-Care Agency Scale-Revised (ASAS-R) revised by Sousa et al. [30] and translated into Korean by Kim [31]. The questionnaire com-

prised 15 items that required responses on a five-point Likert scale (1 = strongly disagree, and 5 = strongly agree). Scores for self-care agency were directly proportional to the total score. Cronbach's α was .70 in this study.

4.4. Sense of Community

Sense of community was measured using the Korean version of the Brief Sense of Community Scale (BSCS), which was based on the scale developed by Peterson et al. [32] and modified [33]. The scale includes eight items, which had to be rated on the five-point Likert scale (1 = strongly disagree, and 5 = strongly agree). Some of the BSCS items were changed for the study's purposes, such as 'peer or friend' to 'neighborhood' and 'peer group' to 'neighbor'. The sense of community score was directly proportional to the total score. Cronbach's α was .87 in this study.

4.5. Social support

Social support was measured using a scale developed [34] and reconstructed [35]. This scale includes 12 items: there were four questions each on support from the family, support from meaningful others, and support from friends. Each response was measured on a five-point Likert scale (1 = strongly disagree, and 5 = strongly agree). Scores for social support were directly proportional to the total score. Cronbach's α was .88 in this study.

4.6. Acculturation

Acculturation was measured using a modified and translated Korean questionnaire [36] based on Barry's East Asian Acculturation Measurement [37]. This scale includes ten items measured on a five-point Likert scale (1 = strongly disagree, and 5 = strongly agree). The acculturation level was directly proportional to the total score. Cronbach's α was .72 in this study.

4.7. Focus group interviews

Focus group interviews were conducted to freely discuss individual experiences, perceptions, and knowledge related to the intervention through active interaction with participants [38]. It included an opening question, an introductory question, a transitional question, key questions, and a final question. Key questions were: "What are the useful conjectures found in this today's health community activity?" "What are the barriers to engaging in healthy behavior in your daily life?" and "How can we overcome barriers and to engage in healthy behavior?"

5. Data collection

This study was conducted from June-September 2019. Research-

ers trained in ethics explained the study purpose, method, and the process to participants before data collection.

All participants participated in two surveys: pre-test and post-test. Quantitative data were collected using self-reported questionnaires. Participants who did not understand the questionnaire were provided explanations in person by trained research assistants. Qualitative data were collected on aspects not measured by the survey to supplement the questionnaire results. Due to cooperation in the interview schedule and additional ethical deliberation by the Institutional Review Board, focus group interviews were conducted on the topic with an average of 7 migrant workers only in the 2nd, 3rd, and 4th out of the 4 health community activities. Interviews were conducted in three 40-minute rounds by doctoral students trained in qualitative research methodology. Since migrant workers have slower speech delivery in Korean, interview data were not recorded but transcribed on the spot.

6. Data analysis

Quantitative data were analyzed using SPSS Statistics 25.0 (IBM Corp, Armonk, NY, USA). All continuous variables were described as mean \pm standard deviation and categorical variables as frequency. Kolmogorov-Smirnov or Shapiro-Wilk normality verification was conducted, and finally, a non-parametric statistical analysis was selected. Group differences were analyzed using the independent t-test, Mann-Whitney's U-test, and the Chi-squared test or Fisher's exact test. The pre-and post-intervention scores of variables were compared and analyzed using Wilcoxon's signed-rank test. The comparison between the two groups for the mean difference of variables pre-and post-intervention was analyzed using Mann-Whitney's U-test. For the effect size of the study intervention, Cohen's *d* was calculated due to similar sample sizes among the two groups (<https://www.socscistatistics.com/effectsize/default3.aspx>). Cohen's *d* value was interpreted as the effect size of .20 as a 'small,' .50 as a 'medium,' and .80 as a 'large.' A *p*-value $< .05$ indicates statistical significance.

Qualitative data were analyzed using qualitative content analysis (QCA); this is based on the context wherein the content was created to derive meaningful interpretations of the themes identified by a systematic reduction of the content [39]. The two researchers read and verified interview transcripts to study migrants' health engagement experience and willingness to participate in the health behavior program. Meaningful data from the transcripts were extracted, compared, contrasted, and classified, and the main concepts and themes were derived. Additional themes were made to check the validity of the analytical methods

used, and the results were further reviewed by one nursing professor with qualitative research experience. The themes that emerged from the analysis were finally agreed upon after discussion between the researchers.

7. Ethical Consideration

Ethical approval was obtained from the Institutional Review Board of the Yonsei University, Seoul, Korea (IRB No.Y-2019-0019). This study was performed following the principles of the Declaration of Helsinki and written informed consent was obtained from study participants.

Results

1. Participants

Table 2 gives the general characteristics of the participants. The intervention group's mean age and controls were 29.52 ± 3.71 years and 30.67 ± 4.88 years, respectively ($p = .363$). Participants' sex had a higher proportion of males in both groups ($p = .513$). Both groups had a high percentage of participants from countries in the WHO Western Pacific Region (i.e., Cambodia, Mongolia, and Vietnam). The mean duration of their stay in Korea was 59.57 ± 39.49 months in the intervention group and 57.86 ± 37.13 months in the control group ($p = .950$). The mean number of months worked at the current job was 43.14 ± 23.95 in the intervention group and 37.95 ± 25.35 in the control group ($p = .339$). The mean time spent working per day was 8.95 ± 1.99 hours in the intervention group and 9.12 ± 1.45 hours in the control group ($p = .629$). The number of graduates with more than a high school education was 18 (85.7%) in the intervention group and 21 (100.0%) in the control group ($p = .072$). Regarding the type of job, skilled labor accounted for the largest proportion in both groups. Most participants in both groups were unmarried. The number of participants who smoked was one (4.8%) in the intervention group and two (9.6%) in the control group ($p = .737$). Regarding alcohol intake frequency, the number of participants who consumed less than two glasses per month formed the largest proportion in both groups. There was no statistically significant difference in general characteristics between the intervention and control groups (Table 2).

2. Comparison of changes between groups

Table 3 shows the mean scores for health promotion lifestyle, self-care agency, health literacy, social support, sense of community, and acculturation from baseline to week 12 in both groups. Self-care agency scores at week 12 compared to baseline signifi-

Table 2. General Characteristics of Participants (N=42)

Demographics	Intervention (n = 21)		Control (n = 21)		U	t	p
	n (%)	M ± SD	n (%)	M ± SD			
Age		29.52 ± 3.71		30.67 ± 4.88	184.50		.363
Sex						0.43	.513
Male	13 (6.19)		15 (71.4)				
Region						0.11	.739
Western pacific	14 (66.7)		15 (71.4)				
Southeast	7 (33.3)		6 (28.6)				
Duration of stay (months)		59.57 ± 39.49		57.86 ± 37.13	218.00		.950
Duration of job (months)		43.14 ± 23.95		37.95 ± 25.35	182.50		.339
Working time (hr/day)		8.95 ± 1.99		9.12 ± 1.45	203.00		.629
Education						3.23	.072
≥ High school	18 (85.7)		21 (100.0)				
Type of job						1.97	.417
Office	3 (14.3)		5 (23.8)				
Skilled labor	17 (81.0)		13 (61.9)				
Others	1 (4.8)		3 (14.3)				
Marital status						0.39	.533
Married	8 (38.1)		10 (47.6)				
Smoking	1 (4.8)		2 (9.6)			2.22	.737
Alcohol intake frequency/months						2.22	.528
1-2 times	10 (47.6)		10 (47.6)				
3-4 times	6 (28.6)		7 (33.3)				
> 5 times	5 (23.8)		4 (19.0)				

Table 3. Comparison of Outcome Variables between Groups (N=42)

Variables	Intervention (n = 21)				Control (n = 21)				Differences		Effect size Cohen's d
	Mean ± SD				Mean ± SD				U	p	
	Pre	Post	Z	p	Pre	Post	Z	p			
Health promotion lifestyle	77.19 ± 8.54	80.71 ± 7.89	2.25	0.025	77.10 ± 8.32	78.33 ± 6.81	1.80	0.073	156.00	0.103	0.35
Self-care agency	51.24 ± 5.13	55.57 ± 5.62	3.39	<.001	53.62 ± 6.71	52.90 ± 6.17	0.53	0.598	82.50	<.001	1.11
Health literacy	21.00 ± 6.63	24.71 ± 5.24	2.86	0.004	24.36 ± 4.25	23.68 ± 4.33	0.75	0.454	91.50	<.001	1.06
Social support	46.81 ± 7.58	47.62 ± 6.48	0.26	0.794	47.76 ± 8.06	48.86 ± 6.43	1.44	0.149	199.50	0.584	0.05
Sense of community	25.33 ± 8.64	29.71 ± 6.50	2.71	0.007	22.48 ± 6.23	24.90 ± 5.14	2.79	0.005	193.00	0.484	0.30
Acculturation	3.02 ± 0.67	3.23 ± 0.50	2.38	0.017	2.96 ± 0.36	2.93 ± 0.38	0.16	0.873	119.00	0.010	0.62

cantly increased in the intervention group than in the control group (U = 82.50, $p < .001$). Compared to the control group, health literacy and acculturation scores over the 12 weeks were significantly increased in the intervention group (U = 91.50, $p < .001$; U = 119.00, $p = .010$, respectively). However, changes in health promotion lifestyles, social support, and sense of community scores in the two groups were not significant. In the control group, the level of sense of community at week 12 significantly increased compared to baseline (Z = 2.79, $p = .005$). The largest effect size was for self-care agency (Cohen's d = 1.11), with the

smallest effect size for social support (Cohen's d = 0.05).

3. Qualitative content analysis of the health engagement intervention

Various themes were derived based on responses to key questions used in the three focus group discussions with participants in the intervention group (Supplementary material 1), and the topics included a healthy diet, acculturation, and stress management. For each activity, themes were derived based on the lessons learned from living lab activities, barriers to health behavior

practices, and methods to overcome these.

1) *Awareness of health and acculturation-related information*

Participants in the health community activities shared what they felt the useful things while participating in each activity. Those who participated in a health community activity on healthy diets said they learned how to estimate their sodium intake using the sodium preference assessment test and had understood the negative health effects of excessive sodium intake. The following themes emerged from this activity: 'Recognition of the individuals' salty taste preference,' 'Identification of health risks due to dietary imbalances,' and 'Necessity to check the nutrition information for families' health.'

Those who participated in a health community activity on acculturation found instructions on Korean culture and the use of community resources such as parks as novel experiences. They said this information was necessary for foreigners to adapt. They expressed their acceptance of Korean life and culture. The theme derived from this activity was 'acceptance and assimilation with Korean culture.'

Those who participated in a health community activity on stress management said their knowledge of personality types identified through personality tests would help them seek jobs suitable for them. They discussed the need to understand other people's personalities to maintain good interpersonal relationships. The following themes emerged: 'Understanding of one's personality' and 'Realizing to respect others' personality.'

2) *The level of barriers to health behavior and acculturation*

Participants in the health community activities shared what they felt barriers to engagement for healthy behavior in their lives. Barriers to health behavior and acculturation were identified in the categories of intrapersonal, interpersonal, and environmental factors.

Those who participated in a health community activity on healthy diets said no previous awareness of the importance of nutritional information, and those who lived alone mostly avoided cooking by frequently eating out or ordering food. They also said that poor eating habits formed in their childhood interfered with healthy eating practices in adulthood. The themes that emerged from this activity were 'Lack of education and awareness of nutrition information,' 'Korean culture where people eat out and order in,' and 'Unhealthy eating habits.'

Those who participated in a health community activity on acculturation said the Han River Marathon was their first experience participating in festivals or community events in Korea. Participants showed interest in Korean cultural life and using various

community resources but said that access to these was difficult due to a lack of information. Participants used the internet to find information on Korean culture but expressed difficulty with search methods and using tools like the Internet homepage. Based on these, 'Lack of accessibility to community resource information' and 'Difficulty in acculturation due to lack of search ability' were identified as barriers to the cultural adaptation of migrants.

Those who participated in a health community activity on stress management expressed they experienced stress due to conflicts with differing personalities, especially when they would force others to follow their perspective. The theme of 'Lack of respect for other people's personality' was identified.

3) *Personal efforts and social support for healthy behavior and acculturation*

Participants in the health community activities shared what they shared ways to overcome barriers and engage in healthy behaviors in daily life.

Those who participated in a health community activity on healthy diets said it was important to prepare healthy foods to ensure the health of their families and children. Participants also discussed the importance of improving Korean language skills to read about and prepare healthy food and informing others of their preference for healthy meals. 'Willingness to cook healthy meals,' 'Improving literacy for healthy eating,' and 'Changing behavior for healthy eating' were identified as themes.

Participants in an acculturation activity agreed that Korean festivals and other cultural events with one another increased their acculturation. Access to Korean cultural life could be increased by using high-powered social networking services such as Facebook. 'Acculturation to enjoy with participants' and 'Using various resources on Korean cultural life' were identified as themes.

Those who participated in a health community activity on stress management showed a willingness to overcome personal shortcomings guided by their personality test results. They also expressed the need to think positively and have greater self-confidence to reduce individual stress in a new and unfamiliar environment. Other participants suggested that emotional support through dialogue and humor could help face difficult situations. 'Understanding of one's personality and willingness to change attitudes,' 'Having a positive mindset and confidence,' 'Having an attitude of understanding others,' and 'Providing social support to others' were identified as themes.

Discussion

1. Principal findings

This study aimed to examine the effects of a multi-components living lab on health engagement among migrant workers. In the intervention group, levels of self-care agency, health literacy, and acculturation at week 12 were significantly increased than in the control group, indicating that the health engagement intervention had been effective. Although migrant workers play a critical role in the labor market as human resources, a significant proportion of migrant workers in South Korea were negatively aware of their self-rated health [40]. Despite the health disparities between migrant and native workers, to our knowledge, no studies on interventions to increase self-care agency for health promotion have been published. Thus, it is worthwhile to show evidence from this study for enhancing health promotion lifestyles of migrant workers.

Various experimental studies were conducted on migrant workers, including interventions for improving hand-washing skills [41], an educational program on reproductive health [42], culturally tailored HIV risk reduction program [43], peer-facilitated health and safety awareness training [44] and walking exercises for mental health and acculturation [45]. Most of the experimental studies conducted on migrant workers in South Korea were exercise interventions targeting middle-aged Korean-Chinese female workers [46]. Similar to our study, a study providing a multi-component intervention to migrant workers from multi-ethnic backgrounds included language classes and job training courses and reported improved communication with superiors and social support as a result [47]. In South Korea, intervention studies targeting migrant workers were rare, but this study may have significance as an experimental study in that it attempted to improve the targets' self-care agency by applying multi-component intervention and living lab.

As a result of qualitative research, it was reported that factors that become barriers to self-care for health behavior include lack of education and awareness, low accessibility to resource information, and difficulties in acculturation due to lack of searching ability. These results were similar to the results of 'lack of knowledge and skills' and 'lack of support' confirmed in a study investigating barriers to exercise performance among migrant workers in South Korea [48]. This evidence based on the results of the participants' interviews provides the importance of strategies such as identifying the barriers perceived by migrant workers, improving health literacy, providing resources for diverse acculturation, and encouraging cultural activities with groups to im-

prove migrant workers' self-care agency in the future. Health interventions for migrant workers with limited access to health information and services at work must be designed in collaboration with workplaces and community resources to ensure a supportive environment for safe and healthy work.

The living lab is an open network of people, which can encourage rapid and dynamic community participation. Living lab principles were applied as intervention strategies in this study to encourage in-depth exploration and active participation of migrant workers in health behavior engagement. Hard-to-reach (HTR) populations such as migrants and disabled people reported to be alienated from regular communication channels for various reasons [14] are typically hesitant about participating in health programs [49]. This study designed interventions using a guide that includes strategies and advice to help migrant workers easily access and continue to participate in health issues as an HTR population. Thus, we could persuade migrant workers that participation in user-driven programs is beneficial. Ultimately, participation was intended to help increase self-care agency in migrant workers and acculturation in Korea. In another study centered on marginalized groups in the community, the living lab method helped increase health and media literacy and resolved health disparities through cooperation with various stakeholders [50].

Combining mixed methods with action research methods such as living lab and intervention assessment yielded credible and valid conclusions about the intervention results and maximized the study potential [51]. Using solely quantitative research methods would have limited the identification of the various experiences and attitudes of the health promotion activities among migrant workers. Focus group interviews were used to discuss health issues; these discussions also provided co-learning opportunities and enabled multi-dimensional dynamics such as behavior motivation and results. The results of our qualitative research could be used in future studies to help plan interventions for health-promoting behaviors.

Our study results showed that the multi-component living lab increased access to community information and resources, such as social and health services in the host country and increased cultural adaptation. From a socioecological viewpoint, creating a supportive social environment, with opportunities for cultural activities and recreation and a comfortable physical environment, would promote migrants' acculturation and health and ensure their better control over health [52]. Participating in the host country's cultural activities, such as sporting or social events [25,47], is also a positive predictor of well-being as migrants may feel a greater sense of assimilation with the host society.

Global migration has expanded widely around world but reducing the health and safety gap for migrants in the workplace remains a challenge. Existing studies have uncovered various risk factors such as poor working conditions and acculturative stress for migrant workers, but sustainable interventions to improve self-management skills have been limited. Importantly, this study adds to the current knowledge that the living lab methodology was useful for the program development stage to identify their needs and to co-create program contents with various stakeholders so that stimulate motivation for program participation and evaluation. The health intervention applying the living lab in this study is meaningful that it showed the results of attempting to integrate the cultural adaptation of migrant workers as well as health issues by linking the host country's participation in cultural activities. Migrants-centered health interventions that focus on the potential of migrants improve health understanding and cultural adaptation than native-centered interventions through problem-oriented approaches [53]. This suggests the need to build partnerships with community organizations in which migrants participate in implementing migrant health programs. Finally, it is suggested to identify the effectiveness of the program and how socially vulnerable migrant workers can be best supported through longitudinal studies.

This study has tried to comply with living lab principles such as user engagement, multi-methods and co-creation during the intervention process. However, the migrant participants lacked the dynamism to recognize health issues and find solutions about how they could improve everyday actions for a healthy lifestyle. This may be due to language barriers and lack of acculturation, although only participants with intermediate-level Korean were selected. However, the mixed methods helped identify significant results that reflect the participants' unique characteristics. After each intervention activity, the three-group discussion was insufficient for all participants to share their beliefs and health value and commit to the engagement in healthy lifestyle behaviors. Considering these limitations, occupational health professionals and researchers can develop interventions by the ethnic group who speak the same language for a sufficient time period in collaboration with community stakeholders with bilingual and bicultural competency.

Conclusions

This study examined the effects of a 12-week multi-component living lab for migrant workers to promote acculturation and healthy behavior engagement. The intervention group showed

statistically significant differences in self-care agency, health literacy, and acculturation than in the control group. Living lab approach combined with mixed-method research were useful for researchers to identify effective strategies for encouraging migrant workers to make self-health decisions and to engage in self-management.

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Supplementary materials

Supplementary materials can be found via <https://doi.org/10.12799/rcphn.2023.00199>.

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and publication of this article.

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Authors' contributions

Youlim Kim contributed to conceptualization, formal analysis, methodology, investigation, visualization, and writing-original draft, review & editing. Hyeonkyeong Lee contributed to conceptualization, funding acquisition, methodology, writing-original draft, review & editing, and supervision. Sookyung Kim contributed to formal analysis and writing-review & editing. Junghee Kim contributed to formal analysis and writing-review & editing.

Data availability

The data that support the findings cannot be made publicly available as data sharing is not covered by the informed consent.

Trial Registration

The study protocol was registered in the World Health Organization International Clinical Trials Portal (KCT0006584; <https://trialsearch.who.int/Trial2.aspx?TrialID=KCT0006584>, 2021-09-16).

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Relationships of Self-leadership, Working Environment, and Professionalism among School Health Teachers

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Purpose: This study was conducted to examine the relationships of self-leadership, working environment, and professionalism, and to identify the factors that influence professionalism among school health teachers.

Methods: This study was a descriptive research study to identify the relationships of self-leadership, work environment, and professionalism among school health teachers. Data were collected from 198 people via an online survey using a structured questionnaire. The data were collected from February 7 to 24, 2023. The relationships of self-leadership, working environment, and professionalism were analyzed using multiple regression analysis.

Results: The score of self-leadership of school health teachers was 3.97 points out of 5, working environment was 3.28 points out of 5, and professionalism was 4.12 points out of 5. Professional accountability and competency development were influenced by behavioral strategies of self-leadership, cognitive strategies of self-leadership, and working environment. These variables explained 35.0% and 29.5% of professional accountability, respectively. Autonomy was influenced by age, cognitive strategy of self-leadership, and working environment, and these variables explained 19.2% of the variance of autonomy. Social recognition was influenced by behavioral strategy of self-leadership, and working environment, and these variables explained 28.0% of social recognition.

Conclusion: To enhance the professionalism of school health teachers, it is necessary to cultivate self-leadership that can overcome difficulties in work and properly self-criticize. Improving the working environment would help enhance the professionalism of school health teachers.

Keywords: School nurse; Health teacher; Leadership; Working environment; Professionalism

Introduction

In Korea, school health teachers are nurses and health professionals at the same time, and they are professionals who have implemented health education and school health programs [1]. As a result of the spread of a novel influenza A (H1N1) virus in 2009 and a global pandemic of coronavirus disease 2019 (COVID-19), the professionalism and roles of health teachers for the prevention of the occurrence and spread of infectious diseases have been increasingly expanded [2]. Nevertheless, some health teachers still experience feelings of alienation and perceive their status as rela-

tively low due to the perception of their identity as non-curriculum-based teachers and as teachers whose main duties are not teaching unlike other teachers [3], so they may show a low level of self-confidence at work [4]. In addition, Seo [5] reported that health teacher showed a high level of job stress due to the sense of duty and burden resulting from the perception that they should possess professional competencies and qualities required of both healthcare professionals and teachers. In view of this situation, it is very important to investigate health teachers' perceptions about their occupation and professional roles.

Professionalism refers to 'what a person thinks of his or her job

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as a profession', and it is a systematic view about one's job as a profession [6]. Therefore, health teachers' professionalism is the concept that represents the sum of all the beliefs, ideas, and impressions that health teachers have about their occupation as a profession and their job duties [7]. Unlike general teachers, based on their educational attainment in the fields of medicine and education, health teachers are healthcare professionals as stipulated by the Medical Service Act and also hold a teacher certificate, and their professionalism is based on the characteristics of healthcare professionals and teachers [8]. Specifically, the sub-factors of professionalism of health teachers include professional accountability, autonomy, and competency development, and social recognition. Professional accountability is a comprehensive concept that includes health teachers' sense of calling, pride, and professional performance regarding their occupation. Autonomy refers to health teachers' independent judgements and autonomy in handling and performing their duties, and competency development refers to health teachers' developing job competency to maintain and develop of their profession. Lastly, social recognition is related to social perceptions about health teachers and the recognition of people around them [4].

There have been a number of studies on professional attitude, which is a similar concept to professionalism. The professional attitude of health teachers refers to their values and attitude that lead them to recognize the importance of professional consciousness based on fundamental values in health services as professionals, show professional aspects in individual behavior and thinking, and have a positive image [9]. This concept is closely related to the professionalism of health teachers, which includes the overall beliefs about the work of health teachers. In a study of professional attitude among health teachers, Yoo et al. [9] reported that there was a significant correlation between job competency and professional attitude among health teachers. According to a prior study on professionalism among nurses, who are related to health teachers, as the level of nursing professionalism increased, the level of job satisfaction showed a significant increase [10]. Also, a study of perioperative nurses reported that a high level of professionalism was associated with a higher level of organizational commitment among nurses [11]. In addition, nursing professionalism was shown to have a positive correlation with job satisfaction and turnover intention [12]. As demonstrated by previous studies, since a high level of professionalism leads to the increase of job competency and job satisfaction among health teachers, it can be seen as an important factor that may have a positive impact on the health promotion of students, so it is necessary to pay attention to and investigate professionalism among

health teachers [4,9,10,13].

Self-leadership is the process of setting the direction of one's life and influencing oneself [14], and it is a comprehensive concept that includes emotions, ways of thinking, and behavioral strategies to influence oneself. If individuals have a high-level of self-leadership, it will lead to the emphasis of autonomy that enables individuals to set goals to accomplish on their own, also determine the reward for the achievement of a goal for themselves, and conduct self-criticism when they fail to achieve goals [15]. Thus, a high-level of self-leadership will lead to the improvement of professionalism. In particular, since health teachers have many opportunities to exert leadership as well as the coping capacity for prompt response, and perform duties involving face-to-face contact with patients, they are required to have self-leadership as leaders of the organization [16]. In a literature review study of self-leadership, Won & Cho [16] reported that a higher level of self-leadership was linked to higher age, higher education level, higher job position, and longer clinical career, and self-leadership was found to influence organizational commitment among nurses. Recently, in the field of nursing science, research on self-leadership has started to be conducted with the increase of interest in self-leadership [16], so there is a need to conduct research on the relationships self-leadership and professionalism among health teachers.

A working environment refers to the overall working environment that allows health teachers to perform their roles efficiently [17], and this concept includes interactions with members as perceived by individuals and aspects of policies influencing job duties as well as objective work situations and the physical environment [18]. Above all, the working environment of teachers is an important factor that allows teachers to maintain their physical and mental health while performing their roles with self-esteem. It has been shown that when health teachers encounter difficulties or obstacles at work, they may perceive their level of professionalism as low, depending on the working environment of schools [19,20,21]. Similarly, a previous study of early childhood teachers [22] found that excessive workload and poor working conditions acted as obstacles to the improvement of teachers' qualifications and the development of their professionalism.

In Korea, there have been few studies on the professionalism of health teachers, and no research has been conducted to consider self-leadership and working environment as factors directly influencing professionalism and examine their relationship with professionalism. In particular, when serious situations, such as periodically occurring outbreaks of emerging infectious diseases, occur, as the only health professionals in schools, health teachers

need to exert a high-level of self-leadership in a series of processes that include identifying the current situation on their own, setting goals, and carrying out their duties [32]. Meanwhile, in relation to attempts to help health teachers to perform their duties efficiently even in difficult situations, working environment has emerged as a very important factor. The working environment for health teachers includes support from people in charge of the management of the school and the clear specification of the division of duties. Therefore, this study aimed to examine the level of professionalism of health teachers and investigate the relationships of professionalism with self-leadership and working environment among current health teachers. This research also intended to provide basic data for the cultivation of professionalism needed for health teachers to faithfully perform their duties independently as the only healthcare professionals in schools.

Methods

1. Study design

This study is a descriptive survey research to investigate the levels of self-leadership and working environment and examine their relationships with professionalism among health teachers.

2. Participants

The participants were health teachers who understood the purpose of this study and voluntarily gave informed consent to research participation. Since there are few previous studies on the professionalism of health teachers, the sample size was calculated considering the results of a related previous study on job identity and job stress among elementary school health teachers [23], which reported that job enthusiasm, job satisfaction, and school size explained 21.2% of job identity. The effect size is expected to be larger than the medium effect size ($f^2 = 0.15$) presented by Cohen [24]. The G-power 3.1 program was used to calculate the sample size. The sample size for multiple regression analysis was calculated with 12 independent variables, a significance level of .05, a power of .95, and an effect size larger than the medium effect size ($f^2 = 0.15$) to perform multiple regression analysis to analyze factors influencing professionalism. As a result, the minimum sample size was determined as 184 persons. In this study, considering a dropout rate of 10%, 198 persons participated in an online survey, and since there were no questionnaires with missing data such as non-responses or incomplete responses, all the data from a total of 198 respondents were included in the analysis.

3. Measures

1) *Self-leadership*

Self-leadership was assessed using a Korean modified version of the questionnaire developed by Manz [25]. The Korean version used in this study was created by Park [27] by remodifying a Korean modified version developed by Lee [26], who made it through the modification and complementation of the original questionnaire proposed by Manz [25]. The modified version proposed by Park [27] was used in this study after obtaining prior approval for the use of the tool. The tool used consists of a total of 16 questions about the two components of self-leadership such as behavioral strategies and cognitive strategies. The six subdomains of behavioral strategies are self-management, self-goal-setting, management by cues, rehearsal, self-reward, and self-criticism, and the two subdomains of cognitive strategies are natural reward and effective thinking. Each item is rated on a 5-point Likert scale, and higher scores indicate higher levels of self-leadership. Regarding the reliability of the tool, the value of Cronbach's α was reported as .880 in a previous study [27], and it was calculated as .836 in this study.

2) *Working environment*

Working environment was assessed using a modified version of the tool presented by Moon [30]. The assessment tool was used after obtaining approval for its use from the author and modifying and complementing it to suit the purpose of the study. Moon [30] created the tool by reconstructing the instrument used by Baek & Choi [28] and Park & Hwang [29]. The assessment tool used in this study is composed of a total of 16 questions about satisfaction with the school as the working environment, the relationship with the members of the school, duties and roles, and facilities and employee benefits. Regarding the reliability of the tool, the value of Cronbach's α was reported as .860 by the creator of the original tool, and it was calculated as .846 in this study.

3) *Professionalism*

The assessment tool for professionalism consists of a total of 20 questions. This tool was developed Kwon [4] through the verification of the reliability and validity of the tool, and this study used it after receiving approval from the developer. It is composed of 20 items on the following four subdomains of professionalism: professional accountability (11 questions), autonomy (3 questions), competency development (3 questions), and social recognition (3 questions). Although the original version of the tool was created as a 4-point scale, it was modified into a 5-point scale before using it in this study because most existing

assessment tools for professionals are developed in the form of 5-point scales [7,31], and some previous studies [32,33] pointed out the possibility that if there is no mid-point in a Likert-type scale, it will force respondents who cannot choose one side or those who have no attitude to express an attitude, and lead them to respond only positively or negatively about matters that they do not know well or lead them to think of socially desirable responses.

Each item on professionalism was rated on a 5-point Likert scale ranging from 1 point (= 'Not at all (Strongly Disagree)') to 5 points (= 'Very much (Strongly Agree)'), and higher scores indicate higher levels of professionalism. Regarding the reliability of the tool, the value of Cronbach's α was reported as .932 in a previous study [4], and it was calculated as .911 in this study.

4) General characteristics of participants

The general characteristics of participants were examined using a total of 9 questions about age, gender, education level, the length of career, form of school establishment, employment status, the number of students, and health class implementation.

4. IRB approval and data collection

This study was conducted after obtaining approval from the Institutional Review Board of Gachon University (IRB NO. 1044396-202211-HR-220-01). Data was collected from February 7 to 24, 2023 using a Naver online survey. The target population of this study were all the school health teachers in Korea. To induce the voluntary participation of health teachers, the researcher posted a recruitment notice including an online survey link on the websites of the Korean Teachers and Education Workers Union and the Korean Health Teachers Association after obtaining the consent and cooperation of the organizations. The questionnaire of this study included statements that specified the anonymity and confidentiality of the survey data, the possibility of withdrawal from participation in the survey at any time, and the use of research results for no other purposes than academic research, and the researcher collected the questionnaire data only from people who voluntarily gave consent to participate in the research. Respondents who participated in the survey were given a small gift as a token of appreciation. Since no questionnaires had incomplete responses, the questionnaires of a total of 198 respondents were all included in the analysis.

5. Data analysis

The collected data was analyzed using SPSS (version 26.0 for Windows; SPSS, Inc., Chicago, IL, USA). The general character-

istics of participants were analyzed by calculating percentages and frequencies, and the levels of self-leadership, working environment and professionalism were analyzed by calculating means and standard deviations. The t-test and ANOVA were used to analyze differences in professionalism according to the general characteristics of participants, and the Scheffé's test was used for post hoc analysis. In addition, the analysis of relationships between self-leadership, working environment, and professionalism was conducted using Pearson's correlation coefficient. Additionally, to identify influencing factors for professionalism, multiple regression analyses were performed for each of the four subfactors of professionalism (professional accountability, autonomy, competency development, and social recognition) by entering each subfactor as the dependent variable. General characteristics that were identified as significant variables in univariate analysis, self-leadership, and working environment were entered as independent variables in regression analyses.

Results

1. The level of professionalism according to the general characteristics of participants

The general characteristics and the levels of self-leadership, working environment and professionalism of participants are shown in Table 1. In terms of age, people aged less than 40 years (42.9%) accounted for the largest proportion of a total of 198 participants. The proportion of females was 98.5%. As to education level, four-year university graduates (67.7%) made up the largest proportion, and the mean length of career was 10.18 years.

Regarding school level, elementary schools (51.0%) accounted for the largest proportion, followed by middle schools (33.3%) and high schools (15.7%). In the case of form of school establishment, national or public schools (91.9%) made up the largest proportion. As for employment status, 76.8% of the participants were permanent teachers. In the number of students, the percentage of health teachers working in schools with 100 to 499 students was highest (40.4%). About 80% performed health classes.

The collected data was analyzed to identify the characteristics of participants that had a significant effect on the subfactors of professionalism: professional accountability, autonomy, competency development, and social recognition. As a result, it was found that there were significant differences in professional accountability according to age, gender, length of career, and school level. More specifically, the results of Scheffé's post hoc test showed that the ≥ 50 age group showed a higher level of profes-

Table 1. General Characteristics and Professionalism (N=198)

Variables	Category	n(%)	Professionalism													
			Professional accountability			Autonomy			Competency development			Social recognition			Total	
			M±SD	t/F (p)	M±SD	t/F (p)	M±SD	t/F (p)	M±SD	t/F (p)	M±SD	t/F (p)	M±SD	t/F (p)	M±SD	t/F (p)
Age (year)	< 40 ^a	85(42.9)	4.24±0.43	9.22 (<.001)	4.16±0.66	5.38 (.005)	3.99±0.72	1.86 (.158)	3.52±0.83	8.75 (<.001)	4.08±0.46	8.76 (<.001)	4.08±0.46	8.76 (<.001)	4.08±0.46	8.76 (<.001)
	40~49 ^b	62(31.3)	4.16±0.49	b < c	3.85±0.67	b < c	3.97±.065		3.51±0.53	b < c	3.99±0.46		3.99±0.46		3.99±0.46	b < c
	≥ 50 ^c	51(25.8)	4.50±0.38		4.19±0.57		4.20±0.66		3.98±0.51		4.33±0.37		4.33±0.37		4.33±0.37	
Sex	Male	3(1.5)	3.66±0.40	-2.37 (.018)	3.88±0.19	-0.49 (.620)	3.66±0.57	-0.95 (.340)	3.33±0.57	-0.75 (.452)	3.65±0.35	-1.78 (.076)	3.65±0.35	-1.78 (.076)	3.65±0.35	-1.78 (.076)
	Female	195(98.5)	4.29±0.45		4.08±0.66		4.04±0.68		3.64±0.70		4.12±0.46		4.12±0.46		4.12±0.46	
Education	Associate degree	13(6.6)	4.14±0.23	2.29 (.079)	4.00±0.49	0.16 (.924)	4.10±0.58	0.619 (.603)	3.74±0.70	0.576 (.632)	4.05±0.31	1.36 (.254)	4.05±0.31	1.36 (.254)	4.05±0.31	1.36 (.254)
	Bachelor	134(67.7)	4.28±0.47		4.08±0.65		4.03±0.71		3.61±.073		4.11±0.48		4.11±0.48		4.11±0.48	
	Master's degree	46(23.2)	4.37±0.47		4.10±0.74		4.09±.065		3.70±0.61		4.19±0.45		4.19±0.45		4.19±0.45	
	Doctor's degree	5(2.5)	3.89±0.14		3.93±0.14		3.66±0.62		3.33±0.52		3.78±0.13		3.78±0.13		3.78±0.13	
Career (year)	< 5 ^a	84(42.4)	4.20±0.41	3.12 (.027)	4.05±0.59	1.66 (.176)	3.93±0.67	1.79 (.149)	3.51±0.75	3.44 (.018)	4.03±0.41	3.44 (.018)	4.03±0.41	3.44 (.018)	4.03±0.41	3.44 (.018)
	5~9 ^b	37(18.7)	4.39±0.49	a < d	4.21±0.78		4.18±0.69		3.63±0.80	a < d	4.22±0.53		4.22±0.53		4.22±0.53	
	10~19 ^c	47(23.7)	4.23±0.52		3.93±0.69		4.02±0.74		3.63±0.56		4.06±0.50		4.06±0.50		4.06±0.50	
	≥ 20 ^d	30(15.2)	4.45±0.38		4.20±0.59		4.21±0.59		3.98±0.49		4.31±0.37		4.31±0.37		4.31±0.37	
School level	Elementary school ^a (including annex kindergarten)	101(51.0)	4.38±0.43	4.72 (.010)	4.09±0.61	1.56 (.213)	4.09±0.63	0.58 (.557)	3.72±0.64	1.62 (.199)	4.19±0.43	1.62 (.199)	4.19±0.43	1.62 (.199)	4.19±0.43	2.73 (.067)
	Middle school ^b	66(33.3)	4.16±0.51	a > b	4.14±0.68		3.97±0.74		3.54±0.73		4.04±0.52		4.04±0.52		4.04±0.52	
	High school ^c (including special school)	31(15.7)	4.23±0.34		3.89±0.71		4.03±0.75		3.55±0.79		4.05±0.40		4.05±0.40		4.05±0.40	
Form of school establishment	National/public	182(91.9)	4.28±0.46	-0.33 (.739)	4.09±0.66	1.01 (.311)	4.04±0.69	0.39 (.696)	3.62±0.70	-0.91 (.364)	4.12±0.46	-0.91 (.364)	4.12±0.46	-0.91 (.364)	4.12±0.46	-0.08 (.932)
	Private	16(8.1)	4.32±0.39		3.91±0.64		3.97±0.67		3.79±0.67		4.13±0.43		4.13±0.43		4.13±0.43	
Employment status	Permanent	152(76.8)	4.27±0.47	-0.65 (.512)	4.08±0.66	0.31 (.755)	4.06±0.71	0.73 (.462)	3.58±0.74	-1.83 (.067)	4.11±0.48	-1.83 (.067)	4.11±0.48	-1.83 (.067)	4.11±0.48	-0.54 (.587)
	Temporary	46(23.2)	4.32±0.39		4.05±0.65		3.97±0.61		3.80±0.50		4.15±0.37		4.15±0.37		4.15±0.37	
Number of students (person)	< 100	16(8.1)	4.39±0.56	0.96 (.412)	4.10±0.79	1.89 (.132)	4.08±0.74	0.19 (.900)	3.68±0.96	0.27 (.845)	4.20±0.63	0.27 (.845)	4.20±0.63	0.27 (.845)	4.20±0.63	0.88 (.448)
	100~499	80(40.4)	4.31±0.42		4.18±0.58		4.07±0.69		3.68±0.71		4.16±0.43		4.16±0.43		4.16±0.43	
	500~999	73(36.9)	4.27±0.48		4.03±0.71		3.99±0.74		3.60±0.68		4.09±0.49		4.09±0.49		4.09±0.49	
	≥ 1,000	29(14.6)	4.17±0.42		3.86±0.59		4.05±0.50		3.57±0.56		4.02±0.35		4.02±0.35		4.02±0.35	
Health class implementation	Conducted	159(80.3)	4.30±0.45	1.34 (.180)	4.10±0.67	1.08 (.278)	4.05±0.69	0.27 (.788)	3.65±0.70	0.81 (.416)	4.14±0.47	0.81 (.416)	4.14±0.47	0.81 (.416)	4.14±0.47	1.21 (.226)
	Not conducted	39(19.7)	4.19±0.46		3.97±0.61		4.04±0.66		3.55±0.68		4.04±0.43		4.04±0.43		4.04±0.43	
Total																4.12±0.46

sional accountability than the 40-49 age group ($F=9.22, p<.001$), and females showed a higher level of professional accountability than males ($t=-2.37, p=.018$). Also, the group with a career of 20 years or more showed a higher level of professional accountability than the group with a career of less than 5 years ($F=3.12, p=.027$). In terms of school level, elementary school health teachers showed a higher level of professional accountability than middle school health teachers ($F=4.72, p=.010$). Secondly, as for autonomy, age had a significant effect on autonomy. The ≥ 50 age group showed a higher level of autonomy than the 40-49 age group ($F=5.38, p=.005$). Finally, regarding social recognition, age and length of career had a significant influence on social recognition. The level of social recognition was significantly higher in the ≥ 50 age group than in the 40-49 age group ($F=8.75, p<.001$), and the group with a career of 20 years or more showed a higher level of social recognition than the group with a career of less than 5 years ($F=3.44, p=.018$) (Table 1).

2. The levels of self-leadership, working environment, and professionalism among participants

The level of self-leadership among the participants was 3.97 points out of 5. Regarding the subdomains of self-leadership, the scores for behavioral strategy and cognitive strategy were 4.05 points and 3.72 points, respectively. In addition, the score for working environment was 3.28 points out of 5, and the score for professionalism was 4.12 points out of 5. Among the subdomains of professionalism, professional accountability showed the highest score of 4.28 points. The score for autonomy was 4.07 points, and the score for competency development was 4.04 points. Social recognition showed the lowest score of 3.63 points among the subdomains of professionalism (Table 2).

3. Relationships between self-leadership, working environment, and professionalism among participants

With respect to the correlations of each subdomain of profes-

sionalism with other variables, professional accountability was significantly positively correlated with the behavioral strategy of self-leadership ($r=.46, p<.001$), the cognitive strategy of self-leadership ($r=.47, p<.001$), and working environment ($r=.31, p<.001$).

Autonomy was significantly correlated with the behavioral strategy of self-leadership ($r=.19, p<.001$), the cognitive strategy of self-leadership ($r=.35, p<.001$), and working environment ($r=.31, p<.001$).

Competency development had a significant positive correlation with the behavioral strategy of self-leadership ($r=.44, p<.001$), the cognitive strategy of self-leadership ($r=.43, p<.001$), and working environment ($r=.31, p<.001$).

Finally, social recognition was found to have a significant positive correlation with behavioral strategy as a subdomain of self-leadership ($r=.26, p<.001$), cognitive strategy as a subdomain of self-leadership ($r=.31, p<.001$), and working environment ($r=.48, p<.001$) (Table 3).

4. Factors affecting professionalism among participants

To identify factors influencing professionalism in health teachers, multiple regression analysis was performed for the influencing factors for each subdomain of professionalism. Regarding the assumptions of regression analysis for independent variables, the Durbin-Watson statistic was 2.09 for professional accountability, 1.80 for autonomy, 1.93 for competency development, and 2.08 for social recognition, and these values are close to 2, indicating that there was no autocorrelation. The tolerance values were 0.45~0.97, which are higher than 0.1, and the VIF values were 1.04~2.23, which are less than 10, indicating that there was no problem of multicollinearity.

First, to identify factors affecting professional accountability among the subdomains of professionalism, age, gender, length of career, school level, behavioral strategy, cognitive strategy, and working environment were entered as independent variables be-

Table 2. Self-leadership, Working Environment, and Professionalism (N=198)

Variables		Min.	Max.	M	SD
Professionalism	Total	2.40	5.00	4.12	0.46
	Professional accountability	2.82	5.00	4.28	0.46
	Autonomy	1.67	5.00	4.07	0.66
	Competency development	1.67	5.00	4.04	0.68
	Social recognition	1.00	5.00	3.63	0.70
Working environment		1.31	4.94	3.28	0.58
Self-leadership	Total	2.88	5.00	3.97	0.41
	Behavioral strategy	2.92	5.00	4.05	0.44
	Cognitive strategy	2.25	5.00	3.72	0.53

Table 3. Relationships Among Self-leadership, Working Environment, and Professionalism (N=198)

Variables	Self-leadership		Working environment	Professionalism				
	Behavioral strategy	Cognitive strategy		Professional accountability	Autonomy	Competency development	Social recognition	
				<i>r</i> (<i>p</i>)				
Self-leadership	Behavioral strategy	1	.53 (<.001)	.06 (.346)	.46 (<.001)	.19 (.007)	.44 (<.001)	.26 (<.001)
	Cognitive strategy		1	.28 (<.001)	.47 (<.001)	.35 (<.001)	.43 (<.001)	.31 (<.001)
Working environment			1	.31 (<.001)	.31 (<.001)	.31 (<.001)	.31 (<.001)	.48 (<.001)

cause age, gender, length of career, and school level were found to have a significant effect on professional accountability in testing for differences, and the other three variables showed a significant correlation with professional accountability in correlation analysis. The results of regression analysis showed that behavioral strategy as a subdomain of self-leadership ($\beta = .32, p < .001$), cognitive strategy as a subdomain of self-leadership ($\beta = .21, p = .003$), and working environment ($\beta = .22, p < .001$) had a significant effect on professional accountability, and they explained 35% of professional accountability ($F = 14.24, p < .001$).

In order to identify factors affecting autonomy among the subdomains of professionalism, age, behavioral strategy, cognitive strategy, and working environment, were entered as independent variables because age was found to have a significant effect on autonomy in testing for differences, and the other three variables showed a significant correlation with autonomy in correlation analysis. In the analysis of the regression model, significant influencing variables for autonomy among health teachers were identified as age ($\beta = -.17, p = .010$), cognitive strategy as a subdomain of self-leadership ($\beta = .30, p < .001$), and working environment ($\beta = .27, p < .001$), and these variables explained 19.2% of autonomy ($F = 12.72, p < .001$).

In order to identify factors influencing competency development among the subdomains of professionalism, behavioral strategy, cognitive strategy, and working environment, were entered as independent variables because the variables were shown to have a significant correlation with competency development in correlation analysis. Regression analysis revealed that behavioral strategy ($\beta = .32, p < .001$), cognitive strategy ($\beta = .19, p = .009$), and working environment ($\beta = .24, p < .001$) were variables significantly influencing competency development, and these variables explained 29.5% of competency development ($F = 28.51, p < .001$).

Lastly, in order to identify factors influencing social recognition among the subdomains of professionalism, behavioral strategy as a category of self-leadership, cognitive strategy as a category

of self-leadership, and working environment were entered as independent variables into the regression model, since the two subdomains of self-leadership and working environment were derived as significant variables in testing for differences. As a result of regression analysis, significant variables affecting social recognition in health teachers were identified as behavioral strategies as a subdomain of self-leadership strategies ($\beta = .19, p = .007$) and working environment ($\beta = .42, p < .001$), and their variables explained 28.0% of social recognition ($F = 16.81, p < .001$) (Table 4).

Discussion

This study aimed to investigate the relationships between self-leadership, working environment, and professionalism among health teachers.

First, in this study, the score of professionalism was 4.12 points out of 5 among health teachers, and this result indicates that participants showed a high level of professionalism through the responses 'Agree' or 'Strongly Agree'. In particular, among the subfactors of professionalism, professional accountability showed the highest mean score of 4.28 points, and social recognition had the lowest mean score of 3.63 points. In other words, study results indicate that although health teachers show strong professionalism in areas such as setting goals about overall school health services for themselves, handling their duties according to priorities, and responding to various emergency situations using their expertise as healthcare professionals, they perceive that they do not receive adequate social recognition as professionals, and that their parents and other teachers do not trust or respect them regarding their education, medical treatment, and judgements related to their work. Since it is an important factor for maintaining a job to have positive professionalism [34], there is a need for various interventions to ensure that health teachers will have pride in their job as professionals.

Second, in this study, the score for self-leadership was 3.97

Table 4. Factors Influencing Professionalism (N=198)

Dependent variable	Variables(reference)	B	SE	β	t	p	
Professional accountability	(Constant)	1.59	0.30		5.16	< .001	
	Age	0.00	0.00	.05	0.67	.914	
	Male(female)	-0.39	0.22	-.10	-1.77	.078	
	Career	-0.00	0.00	-.00	-0.22	.983	
	Elementary school (high school)	0.12	0.07	.13	1.06	.110	
	Middle school (high school)	-0.03	0.08	-.03	-0.44	.656	
	Self-leadership	Behavioral strategy	0.33	0.07	.32	4.71	< .001
		Cognitive strategy	0.18	0.06	.21	2.97	.003
Working environment		0.17	0.04	.22	3.59	< .001	
Adjusted R ² = .35, F = 14.24, p < .001							
Autonomy	(Constant)	2.02	0.45		4.44	< .001	
	Age	-0.01	0.00	-.17	-2.61	.010	
	Self-leadership	Behavioral strategy	0.03	0.11	.02	0.33	.738
		Cognitive strategy	0.37	0.09	.30	3.78	< .001
	Working environment		0.31	0.07	.27	4.04	< .001
Adjusted R ² = .19, F = 12.72, p < .001							
Competency development	(Constant)	0.14	0.43		0.33	.739	
	Self-leadership	Behavioral strategy	0.50	0.11	.32	4.58	< .001
		Cognitive strategy	0.25	0.09	.19	2.63	.009
	Working environment		0.28	0.07	.24	3.83	< .001
Adjusted R ² = .29, F = 28.51, p < .001							
Social recognition	(Constant)	0.09	0.48		0.19	.849	
	Age	0.00	0.00	.08	1.00	.317	
	Career	0.00	0.00	.01	0.13	.890	
	Self-leadership	Behavioral strategy	0.30	0.11	.19	2.72	.007
		Cognitive strategy	0.08	0.09	.06	0.87	.385
	Working environment		0.51	0.07	.42	6.64	< .001
Adjusted R ² = .28, F = 16.81, p < .001							

points out of 5. This is a similar level to the results of a previous study in Korea [35], which reported that the level of self-leadership among health teachers was 3.82 points out of 5. A study of self-leadership in middle-school teachers using the same scale [27] reported that the score of self-leadership in middle-school teachers was 3.78 points out of 5. Meanwhile, a study of long-term care hospital nurses [36] reported that the level of self-leadership in nurses was 3.66 points out of 5. These two prior studies revealed relatively lower levels of self-leadership in middle school teachers and long-term care hospital nurses, compared to the results about health teachers of this study. Compared to the self-leadership levels of general teachers and nurses, health teachers' higher level of self-leadership is thought to reflect the characteristics of the work of health teachers who are in charge of school health duties and various school health programs, take

overall responsibility for them, and need to set goals on their own and lead related activities when they perform their duties [35]. Among the subfactors of self-leadership, 'self-goal-setting', which is one of behavioral strategies, showed the highest score of 4.34 points, and 'natural reward', which is one of cognitive strategies, had the lowest score of 3.46 points. These results are similar to the results of a study of middle school teachers [27], which showed that the score for self-goal-setting was highest, and the score for natural reward was lowest. In other words, research results suggest that health teachers perceive a series of processes of setting and prioritizing goals in their work as very important, and thus carry out the processes, but they lack confidence in their ability to achieve high performance and think that they may not overcome obstacles when they encounter them. In this regard, a previous study [8] reported that a significant influencing factor

for health teachers' organizational commitment to the school is teacher efficacy, which refers to teachers' belief and confidence in their own ability to perform their job. This finding supports the results of this study that health teachers are required to have self-leadership for cultivating confidence in job competency as well as job competency as professional teachers in order to successfully perform duties required of health teachers. Therefore, it is first necessary to identify specific obstacles that arise in the process of operating health services and school health programs that health teachers carry out independently. Then, as the next step, there is a need to develop and operate self-leadership enhancement programs to enable health teachers to overcome the obstacles and create a democratic and open communication system. In addition, assistance and administrative support from school members including the principal are required for health teachers to improve their confidence as they continuously have success experiences at work.

Third, in this study, the score of working environment was 3.28 points out of 5, which is a score above the midpoint. In a previous study, Park [37] assessed the working environment of kindergarten teachers using a different assessment tool, and reported the score as 3.52 points out of 5, which is higher than the score of health teachers in this study. Meanwhile, a study of nurses [38] reported that the score for working environment of nurses was 2.43 points out of 4, which is relatively lower, compared to the score of health teachers in this study. Since different occupational groups have different working environments, it is difficult to make a direct comparison between different occupational groups, but the research findings described above suggest that health teachers working in schools have a better working environment than hospital nurses. However, since health teachers perform professional duties as the only healthcare professional in each school, it is difficult for health teachers to receive help or support from fellow teachers [20]. In addition, it has been reported that health teachers feel a sense of psychological pressure and a heavy burden of responsibility regarding handling all duties related to school health services by themselves. These factors are thought to explain the fact that health teachers showed a lower level of working environment than other teachers [39]. A prior study also showed that a good working environment is associated with high-quality nursing and high job satisfaction, and professional working environment is directly related to nurturing competence nurses, but a poor working environment acts as an obstacle to the performance of high-quality, professional, and excellent nursing [38]. Likewise, a poor working environment may negatively affect not only health teachers' job performance but also

students' health problems. Therefore, it is very important to establish a basis for securing excellent and professional nursing workforce by assessing and improving the working environment of health teachers [38]. The specific aspects of working environment about which health teachers have negative perceptions include a lack of clarity in the scope and content of their job duties, student health services that health teachers need to perform independently, the burden about their roles in health counseling and handling civil complaints, and their difficulty in going out, leaving work early, and taking sick leave or annual leave as well as going on a business trip because most of them work alone. Therefore, it is necessary to develop a manual that can improve the principal's and other managers' awareness of the roles of health teachers and ensure clarity in the division of work regarding the duties of health teachers. In addition, there is a need to develop and implement specific policies, such as guidelines for emergency situations in the absence of health teachers, the support of professional personnel such as nurses, and a flexible school health operation system, instead of temporarily replacing health teachers with not healthcare professionals but general teachers.

Fourth, there were positive correlations between self-leadership, working environment and professionalism. These results are supported by a previous study that showed a positive correlation between self-leadership and professionalism among nursing students [41]. Another prior study also showed a significant positive correlation between nursing working environment and nursing professionalism among long-term care hospital nurses [34]. As nurses with a high level of self-leadership were found to exert excellent abilities in communication, interpersonal relationships, and nursing services [41], the enhancement of self-leadership is thought to serve as the foundation of the development of the nursing profession [42].

Lastly, the analysis of factors influencing professionalism in health teachers showed that working environment had an effect on professional accountability, autonomy, and competency development among the subfactors of professionalism. These results suggest that the evaluation and improvement of working environment are very important factors in the enhancement of the professionalism of health teachers. Accordingly, there is a need to develop a manual to ensure the development of guidelines on emergency situations in the absence of health teachers, expansion of the support of professional workforce, a flexible school health operation system, the improvement of administrators' awareness of the roles of health teachers, and the clarification of the division of duties. In addition, the results of this study showed that cognitive strategies as subfactors of self-leadership

strategies influenced professional accountability, autonomy, and competency development among the subfactors of professionalism, and behavioral strategies as subfactors of self-leadership strategies had an effect on professional accountability, autonomy, and social recognition among the subfactors of professionalism. In this study, cognitive strategies were not related to social recognition, and behavioral strategies did not show a significant relationship with autonomy among health teachers. Regarding the working environment of health teachers, although they perform highly professional duties as healthcare professionals, it is often the case that they are not given recognition and reward when they exert their competency and resolve problems autonomously in the performance of their duties, and they experience a heavy burden of responsibility and psychological pressure regarding the results by themselves [39], so health teachers generally tend to perform their duties according to a given manual. These problems are thought to be related to the fact that the participants in this study mostly did not use cognitive strategies such as confidence about achieving high performance and overcoming obstacles, and many of them actually showed a low level of autonomy in the performance of job duties.

Since health teachers showed a high level of professional accountability and a low level of social recognition in this study, it is important to strengthen behavioral strategies among self-leadership strategies. Therefore, regarding the development of self-leadership enhancement programs for health teachers, to complement the 'self-criticism' factor that showed the lowest score among behavioral strategies comprising a subdomain of self-leadership strategies, it is necessary to strengthen self-leadership that is needed to objectively analyze oneself and achieve one's growth through proper self-criticism about successes and failures in performing one's duties. Above all, it is necessary to develop and implement policies for providing support and help to health teachers to ensure that health teachers themselves will recognize the importance of their duties, have self-esteem regarding their work, and gain a sense of accomplishment and satisfaction from their work. In addition, it is necessary to carry out various activities for forming a trust relationship between health teachers and school members including the principal, fellow teachers, and students' parents, and promoting cooperation among them.

In conclusion, the results of this study showed that self-leadership and working environment are closely related to professionalism among health teachers. The results of this study can be used as basic data for making suggestions on policies to recognize the importance of the enhancement of self-leadership for the establishment of the proper professionalism of health teachers and

create a desirable working environment for health teachers. The study findings can also serve as a basis for the development and application of a professionalism enhancement program for health teachers. However, since participants were selected by a random sampling method through an online survey in data collection, caution is needed in the generalization of research findings. In addition, the present study used an assessment tool for professionalism for health teachers originally developed as a 4-point scale [4] after modifying it into a 5-point scale, but this research did not consider differences in assessment results or bias that could arise due to the modification of the scale.

Conclusions

This study attempted to investigate relationships between self-leadership, working environment, and professionalism among health teachers. Regarding the significance of the present study, this research was conducted in a situation where there were few previous studies on professionalism of health teachers. In addition, this study conducted a detailed analysis of the professionalism of health teachers, and presented realistic methods and policy directions regarding factors that can contribute to the improvement of the professionalism of health teachers. In this study, behavioral strategies and cognitive strategies among self-leadership strategies and working environment were found to significantly influence professionalism. Based on the results of this study, the following suggestions are presented.

First, the results of this study showed that a higher level of self-leadership and a better working environment were associated with a higher level of professionalism. Therefore, to improve the professionalism of health teachers, it is necessary to establish a democratic and open communication system, identify specific obstacles that health teachers encounter in performing their duties independently, and develop and operate self-leadership enhancement programs to enhance health teachers' capability to overcome impediments to their work and promote their appropriate self-criticism. In addition, the assistance and administrative support of school members including the principal and managers to help health teachers to perceive the importance of their duties and work with self-esteem and self-confidence as the only healthcare professional in each school.

Second, especially the working environment of health teachers was found to be a factor influencing all the subfactors of professionalism. Therefore, it is necessary to develop policies for a desirable working environment, including creation of a manual for clarification of the division of work of health teachers, establish-

ment of guidelines for emergency situations in the absence of health teachers, support of professional healthcare personnel, and a flexible school health operation system in addition to enhancement of the awareness of health teachers' roles among people in charge of the management and operation of the school.

Third, influencing factors for the professionalism of teachers were identified as self-leadership and working environment. However, it is difficult to exclude the possibility of other external factors required for the establishment of the professionalism of health teachers, so further research including replication studies is required to identify various factors related to the cultivation of professionalism.

Lastly, although a number of research on professionalism among nurses has been conducted, there has not been sufficient domestic research on the professionalism of school health teachers who meet qualification requirements of nurses and are in charge of school health-related duties. Therefore, further research, including replication studies, should be conducted in the future.

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Conflict of interest

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Authors' contributions

Kim, Joohee contributed to conceptualization, data curation, formal analysis, funding acquisition, methodology, project administration, visualization, writing-original draft, investigation, resources, software, supervision, and validation. Ko, Young contributed to conceptualization, data curation, formal analysis, methodology, project administration, writing-review & editing, investigation, resources, software, supervision, and validation.

Data availability

Please contact the corresponding author for data availability.

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Factors Related to Smoking Relapse Within Six-Months of Smoking Cessation Among Inpatients

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Purpose: The purpose of this study is to identify factors associated with smoking relapse within 6 months after quit attempts among inpatients of a university hospital.

Methods: The subjects of this study were 572 inpatients of the National University Hospitals in Daejeon & Sejong who had enrolled in the smoking cessation service provided by the Daejeon-Sejong Tobacco Control Center and attempted to quit smoking. The data used in the study were extracted from the Smoking Cessation Service Integrated Information System. The Kaplan-Meier method and Cox Proportional hazards model were used to identify variables associated with smoking relapse within 6 months.

Results: The smoking relapse rate within 6 months was 76.7%, and variables associated with relapse included the absence of supporters for quitting smoking (hazard ratio [HR]=1.42, 95% confidence interval [CI]=1.00-2.02), nicotine dependence (HR=1.09, 95% CI=1.03-1.15), the use of prescription medications (including varenicline or bupropion) (HR=3.99, 95% CI=1.83-8.71), and the number of consultations (HR=0.67, 95% CI= 0.63-0.70).

Conclusion: As a result of the study, the number of consultations showed the strongest correlation with abstinence within 6 months. This implies that it is necessary to increase the counseling participation rate of the subjects so that smoking cessation counseling can be continued after discharge, and it is also required to provide support education to guardians during hospitalization for effective smoking relapse prevention.

Keywords: Smoking Cessation; Recurrence; Inpatients; Survival Analysis

Introduction

Changes in health status such as disease diagnosis are an important factor that gives rise to a motivation for smoking cessation in smokers [1,2]. In particular, hospitalization due to disease gets smokers to pay more attention to their health, thereby make them more motivated to stop smoking, and causes them to more actively attempt to quit smoking. In addition, the hospital environment for inpatients is a favorable condition for smokers to attempt to quit smoking and maintain smoking cessation because

inpatients have high accessibility to smoking cessation programs provided by the hospital, such as smoking cessation education, smoking cessation counseling, and pharmacotherapies, and all the spaces in a hospital are no smoking areas [3]. Actually, 51~60% of inpatients were reported to quit smoking voluntarily during hospitalization [4,5], and it was found that smoking cessation interventions provided for a short period of time led to the increased success rates of smoking cessation in patients [6,7]. Considering the effectiveness and efficiency of smoking cessation interventions, professional and systematic smoking cessa-

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tion interventions for inpatients are believed to be necessary and important.

Therefore, in an attempt to help inpatients to quit smoking, the Ministry of Health and Welfare implemented the inpatient smoking cessation support pilot program in 2016, and has implemented the inpatient smoking cessation program through 17 Regional Tobacco Control Centers since 2018 to ensure that inpatients can receive appropriate smoking cessation interventions. The 6-month smoking cessation success rate of the inpatient smoking cessation support pilot program was reported to be 55.8% [8], and this is about 3.7 times higher than the 6-month smoking cessation success rate of 15% after discharge in inpatients who quit smoking without receiving any interventions [9].

However, smoking is a behavior with a high relapse risk, and a previous study reported that 78% of the people who attempted to quit smoking resumed smoking within 1 week from the quit date and 42% experienced smoking relapse within 6 months from the quit date [10]. It has been reported that the likelihood of smoking relapse decreases after maintaining smoking cessation for 6 months, and in this respect, the 6-month smoking abstinence rate can be viewed as a measure of long-term smoking cessation [11,12]. The purpose of smoking cessation is not quitting smoking for a short period of time but life-long smoking cessation, and the smoking cessation of inpatients influences the prognosis of underlying diseases, including the recurrence, mortality, and complications of diseases [8]. For these reasons, interventions for the prevention of smoking relapse are essentially required, but there have been relatively fewer studies of the smoking relapse of inpatients, compared to research on smoking relapse among general adult smokers [13-21]. In addition, a number of previous studies in Korea have the following limitations. First, in the majority of previous studies, the participants of each study were patients with a single disease such as acute myocardial infarction, cerebral infarction, and angina pectoris, so it is difficult to generalize study findings to all inpatients. Also, since most previous studies in Korea investigated the success or failure of smoking cessation over a relatively short period of 4~12 weeks, it is difficult to examine continuous abstinence rates over a period of 6 months or more. In addition, prior studies mainly conducted logistic regression analysis to identify factors associated with smoking relapse or smoking cessation success among inpatients. However, considering the results of Hughes et al. [11] that the participants showed variable patterns of smoking relapse over time after quitting smoking, it is necessary to investigate smoking relapse patterns by conducting a survival analysis because there is a need to examine the patterns of smoking relapse over a period

from the starting point of smoking cessation to the time of smoking relapse and identify factors related to smoking relapse.

Therefore, this study aimed to identify the patterns of smoking relapse over a period of 6 months from the quit date among people who used the inpatient smoking cessation program implemented by Daejeon-Sejong Tobacco Control Center (DTCC). Through this research, this study sought to present scientific bases required for the efficient operation of the inpatient smoking cessation program, and contribute to providing services that can help the inpatients to maintain smoking cessation.

Methods

1. Study design

This study is a retrospective survey study to identify factors affecting smoking relapse within 6 months from the date of the decision to quit smoking among the inpatients of two national university hospitals located in Daejeon and Sejong regions who received the inpatient smoking cessation service.

The inpatient smoking cessation service is generally provided for 6 months from the date of enrollment in the inpatient smoking cessation program, and it is implemented by visiting the hospital room of the patient at least once a week during the hospital stay to deliver one-on-one personalized counseling services and additionally provide smoking cessation aids such as nicotine patches, gum, and lozenges if necessary. In addition, after providing education on pharmacotherapy for smoking cessation, it was checked whether the participant had intention to use prescription medicines for smoking cessation, and when the patient wanted to receive pharmacotherapy for smoking cessation, a request for collaborative treatment regarding pharmacotherapy was made to the department of family medicine in order to provide both pharmacotherapy and counseling for smoking cessation. When the patients who enrolled in the inpatient smoking cessation program were discharged from the hospital, face-to-face counseling was performed at 2, 4, 12, and 24 weeks from the date of the decision to quit smoking through the outpatient appointments of the hospital or through appointments for the visit to the DTCC, and telephone counseling was performed at 8, 16, and 20 weeks from the date of the decision to quit smoking. However, when a registrant was unable to participate in face-to-face counseling, it was replaced with telephone counseling.

2. Participants

This study was conducted using the data of the users of the smoking cessation service program obtained from the smoking

cessation integrated information system (nosmk.khealth.or.kr) of the Ministry of Health and Welfare and the Korea Health Promotion Institute. The participants were 732 persons who enrolled in the inpatient smoking cessation program provided by the DTCC from February, 2018 to July, 2021. The smoking cessation program started to be implemented in February, 2018, and the research data was obtained in July, 2021. Among the enrollees of the smoking cessation program, 572 persons who decided to quit smoking were finally selected as the participants of this study by excluding 160 persons who did not have intention to quit smoking.

Regarding the inclusion criteria, the participants were selected from people who had the intention to quit smoking among the inpatients admitted to all the wards of national university hospitals located in Daejeon and Sejong regions. To screen the inpatients for the intention to quit smoking, when patients were hospitalized, the ward nurses initially examined the current smoking status of patients when they filled out the nursing information form of the electronic medical record (EMR), and the nurses asked the patients identified as smokers to apply for smoking cessation counseling if they wanted to. Afterwards, when a request for smoking cessation counseling was submitted to the DTCC, a smoking cessation counselor from the center visited the patient's room in the hospital, and explained the smoking cessation support service to the patient. Then, after confirming the patient's intention to quit smoking, the screening process for registering the patient was carried out. During the screening process, patients who did not wish to receive the smoking cessation support service, patients who were not able to communicate due to reasons such as a comatose state, and patients who were using other public smoking cessation support services such as the smoking cessation clinics of public health centers were excluded from the selection of participants.

3. Measures

1) Sociodemographic characteristics

The sociodemographic characteristics examined in this study were as follows: gender, age, education level, social security regarding health coverage, alcohol intake in the past year, and regular exercise in the past year. Education level was classified into middle school or below, high school, and junior college/university or higher. Social security regarding health coverage was categorized into national health insurance and medical aid, and 'Do not know' or no response (including refusal to respond) was treated as a missing value. Drinking status or alcohol intake in the past year refers to whether the respondent consumed alcohol in

the past year regardless of the type of alcohol. The performance of regular exercise in the past year was assessed by examining whether the patient performed moderate-intensity physical activities (physical activities that cause a person to feel slightly out of breath more than normal or make the heart rate slightly higher than normal) for 10 minutes or more at least once a week in the past year.

2) Smoking-related characteristics

This study analyzed the following smoking-related characteristics: the presence of a supporter for quitting smoking, the presence of previous quit attempts, the age of smoking initiation, the period of smoking (pack-years) and nicotine dependence. The presence of supporters for quitting smoking refers to the presence or absence of people who helped the person to quit smoking, including family members, colleagues at work, and health-care professionals. Regarding the presence of previous quit attempts, it was examined whether the participant had ever attempted to quit smoking in the past year. For the age of smoking initiation, the participants were asked to write their age or the year when they smoked cigarettes for the first time. Regarding the period of smoking (pack years), one pack year was defined as smoking a pack of cigarettes a day for one year, and the total pack year was calculated by multiplying the average smoking amount per day (pack) by the total period of smoking (years). The level of nicotine dependence was measured using a Korean Version of the Fagerström Test for Nicotine Dependence (K-FTND). FTND was developed by Heatherton et al. [22], and it is the most commonly used method to measure nicotine dependence. It consists of a total of 6 items, and the total scores range from 0 to 10. A total score is calculated by summing the scores of all six questions, and higher total scores indicate higher levels of nicotine dependence, and a total score of 7 points or more is classified as a high level of dependence on nicotine. K-FTND was created by Ahn et al. [23] by translating the original version of FTND. This tool has been shown to have satisfactory levels of reliability and validity, so it has been used in many studies as a measure of nicotine dependence in Korean smokers [7,12]. The value of Cronbach's α was reported as .61 in Heatherton et al. [22] and as .69 in Ahn et al. [23]. It was calculated as .61 in this study.

3) Attitude toward smoking cessation

Attitude toward smoking cessation was assessed by measuring the following three subdomains of attitude as variables:

importance of quitting smoking, confidence in quitting smoking, and readiness in quitting smoking [12,24]. Each subdomain of attitude was measured with a single question on a 10-point

Likert scale. In other words, respondents were asked to select a response within the range of 0 to 10 points, and higher scores indicated higher levels of importance of quitting smoking, confidence in quitting smoking, and readiness in quitting smoking. The levels of importance of quitting smoking, confidence in quitting smoking, and readiness in quitting smoking were respectively measured using the following questions: (1) How important is quitting smoking to you?; (2) How confident are you that you will succeed in quitting smoking?; (3) How much are you ready to quit smoking?

4) Characteristics related to smoking cessation interventions

This study examined the following characteristics related to smoking cessation interventions: the number of counseling sessions, the use of pharmacotherapeutic smoking cessation aids (nicotine replacement therapies, NRTs) such as nicotine patches, gum, and lozenges, and the use of prescription medicines for smoking cessation (varenicline and bupropion). The frequency of counseling is the total number of counseling sessions including both face-to-face and telephone consultations provided from the date of enrollment in the inpatient smoking cessation program to the completion time of the consultations, and it was used as a continuous variable in the analysis. The use of pharmacotherapeutic smoking cessation aids (NRTs) or prescription medicines for smoking cessation (bupropion and varenicline) was dichotomously categorized into 'Use' and 'No use.' In other words, it was classified as 'Use' when the participant used NRTs or prescription medicines for smoking cessation at least once during the period of the smoking cessation service program, and it was classified as 'No use' when the participant had never used them during the period.

5) Smoking relapse status and the duration of smoking abstinence

In this study, the dependent variable was smoking relapse status. Smoking relapse means resuming smoking after a period of abstinence. In this study, it refers to resuming smoking within 6 months after deciding to quit smoking through enrollment in an inpatient smoking cessation program. Smoking relapse was assessed by examining whether the person maintained smoking cessation through self-reports. At this time, smoking relapse was defined as 'smoking 3 or more cigarettes within 6 months after starting an attempt to quit smoking' according to the criterion of the guidelines of the regional smoking cessation private subsidy program [25].

In this study, the duration of smoking abstinence was used as the time variable to analyze factors associated with smoking re-

lapse within 6 months after enrollment in the inpatient smoking cessation program. The duration of smoking abstinence was defined as the period from the date of the decision to quit smoking to the date of the final evaluation and confirmation of continued smoking abstinence, and it was calculated in days.

4. Data collection and analysis

This study received approval for the data use from the Ministry of Health and Welfare and the Korea Health Promotion Institute through the application procedure for the use of project results (Research Management No. 2021-023), and this research was conducted after obtaining approval from the Institutional Review Board of Chungnam National University (IRB No. 202106-SB-114-01).

Regarding the research data, the items of the registration form (registration card) and the counseling record form (counseling card) of the inpatient smoking cessation program were utilized as the major variables of this study, and these data were obtained from the integrated smoking cessation service information system (nosmk.khealth.or.kr). The information of the registration form was acquired through a face-to-face interview with each patient when the patient registered for the inpatient smoking cessation program, and the patients themselves were asked to complete the form based on their current status at the time of registration during the interview. The content of the counseling record form was written based on the counselor's consultations with individual participants in a face-to-face manner or over the phone during the service period.

The collected data was analyzed using SPSS 24.0 to examine differences in the characteristics of participants between people who resumed smoking within 6 months and those who continuously abstained from smoking for 6 months, examine the patterns of smoking relapse according to the duration of smoking abstinence, and identify factors associated with smoking relapse within 6 months. First, a univariate analysis was performed using the t-test and χ^2 -test to comparatively analyze the differences between the characteristics of participants between smoking relapsers and abstinent smokers, and a survival curve was generated using the Kaplan-Meier method to examine the patterns of smoking relapse according to the duration of smoking abstinence.

Next, a multivariate analysis was conducted using the Cox proportional hazard model to identify factors affecting smoking relapse within 6 months after enrollment in the inpatient smoking cessation program. The time variable was set as the duration of abstinence, and the event variable was set as smoking relapse

within 6 months after enrollment in the inpatient smoking cessation program. As a result of the assessment of the multicollinearity of the explanatory variables used in Cox regression analysis, the tolerance values of all variables were greater than 0.1 and the variance inflation factor (VIF) was 1.04-2.16, indicating that there was no problem of multicollinearity.

Results

1. Comparison of characteristics of smoking relapsers and abstinent smokers over a 6-month period

This study was conducted with a total of 572 participants, and their sociodemographic characteristics were as follows (Table 1). In gender, males accounted for 94.2% (539 people) and females took up 5.8% (33 people). The mean age was 54.47 years. For education level, high school (33.4%, 191 people) accounted for

the largest proportion, followed by college/ university or higher (32.2%, 184 people), and middle school or below (14.9%, 85 people). Regarding the type of social security regarding health-care coverage, 78.7% (450 people) were enrolled in national health insurance and 6.6% (38 people) were medical aid beneficiaries. With respect to smoking-related characteristics, 86.7% (496 people) had a supporter for smoking cessation, and 31.8% (182 people) reported having previously attempted to quit smoking. The average age of smoking initiation was 20.34 years, and the average period of smoking was 34.24 pack-years. The mean score for nicotine dependence was 4.39 points. In terms of characteristics related to smoking cessation interventions, 16.6% (95 people) used smoking cessation aids (NRTs), and 2.3% (13 people) used prescription medicines for smoking cessation (varenicline, bupropion). However, there was no significant difference in sociodemographic characteristics, smoking-related char-

Table 1. Comparison of Characteristics of Subjects between Relapsers and Abstainers (N=572)

Variables	Categories	Total(N = 572)	Relapsed (n = 439)	Abstinent (n = 133)	p
		n (%) or M ± SD	n (%) or M ± SD	n (%) or M ± SD	
Gender	Male	539 (94.2)	410 (76.1)	129 (23.9)	.119
	Female	33 (5.8)	29 (87.9)	4 (12.1)	
Age(year)		54.47 ± 12.89	53.94 ± 12.89	56.21 ± 12.81	.076
Education	Below middle school	85 (14.9)	64 (75.3)	21 (24.7)	.978
	High school	191 (33.4)	145 (75.9)	46 (24.1)	
	College or more	184 (32.2)	138 (75.0)	46 (25.0)	
Social security	Health insurance	450 (78.7)	340 (75.6)	110 (24.4)	.404
	Medical allowance	38 (6.6)	31 (81.6)	7 (18.4)	
Alcohol intake within 1 year	Yes	340 (59.4)	258 (75.9)	82 (24.1)	.622
	No	224 (39.2)	174 (77.7)	50 (22.3)	
Regular exercise	Yes	221 (38.6)	166 (75.1)	55 (24.9)	.516
	No	342 (59.8)	265 (77.5)	77 (22.5)	
Supporter for quitting smoking	Yes	496 (86.7)	375 (75.6)	121 (24.4)	.098
	No	76 (13.3)	64 (84.2)	12 (15.8)	
Attempted to quit	Yes	182 (31.8)	137 (75.3)	45 (24.7)	.569
	No	390 (68.2)	302 (77.4)	88 (22.6)	
Starting smoking age		20.34 ± 22.46	20.43 ± 4.91	20.02 ± 4.13	.385
Period of smoking (pack-years)		34.24 ± 20.65	33.68 ± 19.75	36.08 ± 23.38	.240
Dependence of nicotine(FTND)		4.39 ± 2.49	4.45 ± 2.46	4.20 ± 2.56	.299
Importance of quitting smoking		8.38 ± 2.17	8.29 ± 2.24	8.68 ± 1.90	.049
Confidence in quitting smoking		7.30 ± 2.36	7.09 ± 2.37	7.98 ± 2.22	< .001
Readiness in quitting smoking		7.70 ± 2.39	7.54 ± 2.39	8.21 ± 2.35	.005
Frequency of counseling		5.84 ± 3.06	4.80 ± 2.56	9.25 ± 1.86	< .001
Use of pharmacotherapies(NRT)	No use	477 (83.4)	366 (76.7)	111 (23.3)	.981
	Use	95 (16.6)	73 (76.8)	22 (23.2)	
Varenicline or bupropion	No use	559 (97.7)	431 (77.1)	128 (22.9)	.189
	Use	13 (2.3)	8 (61.5)	5 (38.5)	

acteristics, and the use of NRTs or prescription medications among characteristics related to smoking cessation interventions between the group who resumed smoking within 6 months (the relapser group) and the group who had been continuously abstinent from smoking throughout 6 months (the abstainer group).

As a result of the comparison of characteristics of participants between the relapser group who relapsed to smoking within 6 months and the abstainer group who continuously abstained from smoking for 6 months, there was a significant difference in the levels of importance of quitting smoking, confidence in quitting smoking, and readiness in quitting smoking, which are the subdomains of attitude toward smoking cessation. Also, there was a significant difference in the frequency of counseling among the characteristics related to smoking cessation interventions. More specifically, scores for importance of quitting smoking ($p = .049$), readiness in quitting smoking ($p = .005$), and confidence in quitting smoking ($p < .001$) were lower in the relapser group (8.29 points, 7.09 points, and 7.54 points) than in the abstainer group (8.68 points, 7.98 points, and 8.21 points). The frequency of counseling was lower in the relapser group (4.80 session) than the abstainer group (9.25 sessions) ($p < .001$).

2. The pattern of smoking relapse according to the duration of smoking abstinence

Among the 572 participants who registered for the inpatient

smoking cessation program and decided to quit smoking, the smoking relapse rate within 6 months was 76.7% (439 people), and the smoking cessation maintenance rate was 23.3% (133 people). The average survival period from the date of the decision to quit smoking to the time of smoking relapse was 109.68 days, and the survival period when 50% of the participants survived or continuously abstained from smoking was 43.00 days. Regarding the time of smoking relapse, among the participants who failed to continuously abstain from smoking, the group who resumed smoking within 4 weeks from the date when they decided to quit smoking constituted the largest proportion 41.8% (239 people), and the survival curve for the cumulative smoking relapse rate shows a sharp increase in the slope of the curve until 4 weeks after the decision to quit smoking (Figure 1). As shown in Figure 1, the cumulative smoking relapse rates over a period after 4 weeks showed the pattern of a relatively gradual increase. More specifically, 20.4% (117 people) resumed smoking within 4 weeks to 12 weeks, and 14.5% (83 people) resumed smoking over a period within 12 weeks to 6 months (Table 2).

3. Factors associated with smoking relapse within 6 months

The variables that showed a significant association with smoking relapse within 6 months among people who decided to quit smoking were identified as the presence of a supporter for smoking cessation, nicotine dependence, the frequency of coun-

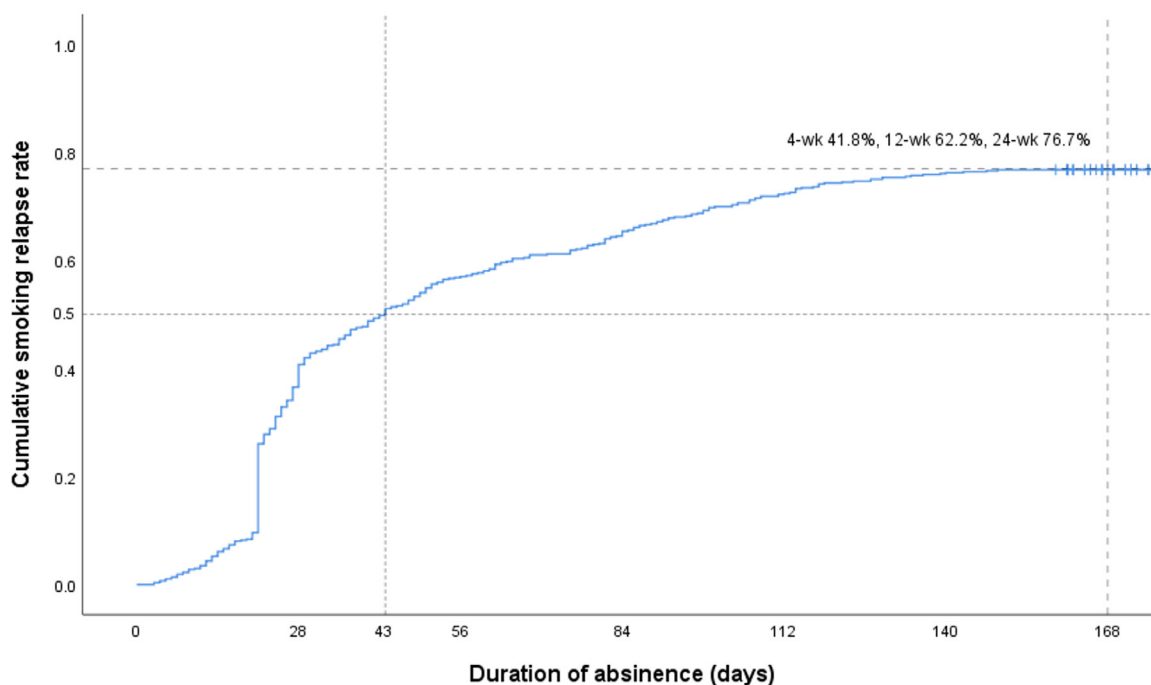


Figure 1. Pattern of Relapse over time.

seling, and the use of prescription medicines for smoking cessation ($p < .05$). The use of NRTs was also identified as a significant variable, but this variable was significant by a narrow margin ($p = .050$) (Table 3). Specifically, the risk for smoking relapse was 1.42 times higher in the group without a supporter for smoking cessation than the group with at least one supporter for smoking cessation (hazard ratio(HR) = 1.42, 95% confidential interval(CI) = 1.00~2.02, $p = .049$). Also, it was found that as the score for nicotine dependence was increased by one point, the risk for smoking relapse was increased by 1.09 times (HR = 1.09, 95% CI = 1.03~1.15, $p = .002$). In terms of smoking cessation intervention variables, as the frequency of counseling was increased by one session, the risk for smoking relapse was decreased by 33% (HR = 0.67, 95% CI = 0.63~0.70, $p < .001$). On the other hand, the risk for smoking relapse was 3.99 times higher in the group who used prescription medicines for smoking cessation than the group who did not use them (HR = 3.99,

95% CI = 1.83~8.71, $p = .001$).

Discussion

The majority of prior studies on the smoking cessation of inpatients in Korea provided participants with smoking cessation programs developed by hospitals themselves, and mainly analyzed factors related to the achievement of continued smoking abstinence within 4 to 12 weeks [13-21]. This study is differentiated from such previous studies in that it investigated the smoking relapse rate within 6 months from the date of the decision to quit smoking and factors related to smoking relapse among the patients who enrolled and participated in the inpatient smoking cessation program that is a government-supported community service program implemented by Regional Tobacco Control Centers.

The comparison of the characteristics of participants between

Table 2. Period of Smoking Relapse Rate

Variables	Categories	n (%)	Cumulative relapse rate (%)
Smoking status	Relapse	439 (76.7)	76.7
	Smoking cessation	133 (23.3)	100.0
Period of relapse(week)	≤ 4	239 (41.8)	41.8
	4 < ~ ≤ 12	117 (20.4)	62.2
	12 < ~ ≤ 24	83 (14.5)	76.7

Table 3. Hazard ratios for Factors Related to Relapse within 6 Months

Variables	Categories	B	SE	HR	p	95% CI
Gender (ref. Male)	Female	0.02	0.29	1.02	.951	0.58-1.78
Age (year)		-0.00	0.01	1.00	.875	0.99-1.01
Education (ref. Below middle school)	High school	-0.03	0.18	0.97	.872	0.69-1.37
	College or more	-0.15	0.20	0.86	.460	0.58-1.28
Social security (ref. Health insurance)	Medical allowance	0.20	0.23	1.22	.383	0.78-1.92
Alcohol intake within 1 year (ref. No)	Yes	-0.07	0.12	0.93	.571	0.73-1.19
Regular exercise (ref. No)	Yes	-0.10	0.12	0.90	.406	0.71-1.15
Supporter for quitting smoking (ref. Yes)	No	0.35	0.18	1.42	.049	1.00-2.02
Attempted to quit (ref. No)	Yes	-0.05	0.13	0.95	.712	0.74-1.23
Starting smoking age (year)		0.03	0.01	1.03	.061	1.00-1.05
Period of smoking (pack-years)		-0.01	0.00	0.99	.083	0.99-1.00
Dependence of nicotine (FTND)		0.09	0.03	1.09	.002	1.03-1.15
Importance of quitting smoking		-0.00	0.03	1.00	.914	0.94-1.06
Confidence in quitting smoking		-0.06	0.04	0.94	.101	0.88-1.01
Readiness in quitting smoking		0.01	0.04	1.01	.875	0.94-1.08
Frequency of counseling		-0.41	0.03	0.67	< .001	0.63-0.70
Use of pharmacotherapies (NRT) (ref. No use)	Use	0.30	0.16	1.36	.050	1.00-1.84
Varenicline or bupropion (ref. No use)	Use	1.38	0.40	3.99	.001	1.83-8.71

B = Regression Coefficient; SE = Standard Error; HR = Hazard ratio; CI = Confidence interval; ref. = Reference; FTND = Fagerström test for nicotine dependence.

the group who resumed smoking within 6 months (the relapse group) and the abstainer group who continuously abstained from smoking for 6 months (the abstainer group) revealed that there were significant differences in the attitude toward smoking cessation (importance of quitting smoking, confidence in quitting smoking, and readiness to quit smoking) and the frequency of counseling between the two groups. The levels of importance of quitting smoking, confidence in quitting smoking, and readiness to quit smoking, which indicate the assessments of attitudes toward quitting smoking, can be regarded as indicators that represent the motivation levels for smoking cessation among the participants. In this study, scores for importance of quitting smoking, confidence in quitting smoking, and readiness in quitting smoking were higher in the abstainer group than the relapse group, and these results indicated that the abstainer group was more motivated to quit smoking. Meanwhile, the mean score for attitudes toward smoking cessation was 7.09 points or higher in both groups. In particular, the mean score for importance of quitting smoking was 8.29 points or higher. In previous studies conducted with general adult populations and adolescents, the mean score for importance of quitting smoking was reported as 6.73–8.12 points, and the mean score for confidence in quitting smoking, as 5.64 to 7.06 points, and the mean score for readiness in quitting smoking as 5.41 to 7.51 points [26–28]. Compared to these results of previous studies, the mean scores for attitudes toward smoking cessation were relatively higher in this study. These results are thought to indicate that as inpatients recognized the need to quit smoking as a result of increased interest in health due to the occurrence of the disease, they showed a high level of motivation to quit smoking. Regarding the frequency of counseling, the average number of counseling sessions in the relapse group was 4.80 sessions, which was significantly lower than 9.25 sessions in the abstinence group. This finding is consistent with the results of a study by Shin et al. [19], which showed that the number of counseling sessions was lower in the group who failed to quit smoking than the group who succeeded in smoking cessation.

In the present study, among the patients using the inpatient smoking cessation program, the smoking relapse rate within 6 months was 76.7%, and this means that 23.3% of the participants continuously abstained from smoking for 6 months. The smoking relapse rate in this study was a little higher compared to the 6-month smoking relapse rate of 68% reported in a previous study of inpatients by Shin et al. [19]. However, in a study by Shin et al., the residents and nurses of the department of family medicine provided 6-month-long one-on-one smoking cessa-

tion counseling to patients referred to the smoking cessation clinic of the department of family medicine within the hospital, and 32.1% of the participants actively used prescription medicines for smoking cessation such as varenicline or bupropion. On the other hand, in this study, the smoking cessation counseling service were provided by counselors from the DTCC, who were not the medical staff of the hospital, and only 2.3% of the participants were prescribed medicines for smoking cessation. In this regard, it has been reported that provision of smoking cessation advice and education by professional medical staff had a significantly greater effect on smoking cessation [6,29]. In addition, the use of prescription medications such as varenicline in combination with counseling has been shown to be more effective for prolonged smoking abstinence [30–32]. Thus, it is thought that these differences in smoking cessation intervention methods contributed to the above-mentioned difference in the smoking relapse rate between this study and a previous study [19]. With respect to foreign studies conducted not with inpatients but with the general population, a previous study reported that when only smoking cessation counseling was provided, the 6-month continuous abstinence rates of smokers were about 10–12% [33], and other previous studies revealed that when both pharmacotherapy for smoking cessation and smoking cessation counseling were provided, the continuous abstinence rates of smokers were about 20–30% [12,34]. In this study, the 6-month continuous abstinence rate among inpatients was a similar level to the results of previous studies.

Factors related to smoking relapse within 6 months among inpatients were the presence of the supporter for quitting smoking, nicotine dependence, the frequency of counseling, and the use of prescription medicines for smoking cessation. In particular, smoking cessation intervention characteristics, such as the frequency of counseling and the use of prescription drugs for smoking cessation, were found to have a strong association with the risk for smoking relapse.

Although social support for smoking cessation is theoretically considered an important factor in maintaining smoking cessation [35], some previous clinical trial studies reported inconsistent and contradictory findings [20,36–38]. The results of this study indicated that the presence of supporters for quitting smoking positively influenced the prevention of smoking relapse among inpatients who decided to quit smoking. These results are consistent with a prior study of smoker patients who used the smoking cessation clinics of public hospitals [20]. The study reported that the continuous abstinence rate was higher in the group who lived with one or more family members than the group who did not

[20]. Similarly, a previous study of male workers from small and medium-sized enterprises also found that the likelihood of smoking cessation success for 6 months was 1.9 times higher in the group with a supporter for quitting smoking such as the spouse or other family members than in the group without any supporters for quitting smoking [38]. Meanwhile, it has been reported that the significant influence of supporters for quitting smoking on the maintenance of smoking cessation is also related to the support behavior of supporters for smoking cessation [36,39-40]. In particular, a previous study reported that the positive behaviors of supporters for smoking cessation positively influenced the maintenance of smoking cessation, but negative behaviors such as criticism about smoking may lead to smoking relapse [36]. These results suggest that in order to reduce the smoking relapse rate in inpatients, it is necessary to implement systematic education for supporters for smoking cessation so that guardians can perform their role as supporters for quitting smoking in a positive direction.

Nicotine dependence indicates the degree of addiction to the nicotine component contained in cigarettes. It is generally known that a higher level of nicotine dependence is associated with more severe withdrawal symptoms when an attempt to quit smoking are made, and thus it is linked to a greater likelihood of failure to quit smoking [41]. The results of this study also showed that a higher level of nicotine dependence was associated with a higher risk for smoking relapse, and these results are consistent with the findings of a previous study of the users of the smoking cessation clinic of public health centers, which reported that a lower level of nicotine dependence was linked to a higher smoking cessation success rate [42].

Regarding the characteristics related to smoking cessation interventions, the examination of the relationship between the frequency of counseling (the number of counseling sessions) and the risk for smoking relapse showed that a higher frequency of counseling was associated with a lower smoking relapse rate. As a general rule, the inpatient smoking cessation program normally provides at least one session of 30-minute individual counseling during hospitalization, and continuously offers one-on-one face-to-face counseling or phone counseling for six months after discharge, thereby delivering a total of 9 sessions of counseling after discharge. A number of previous studies have reported that the number of smoking cessation counseling sessions is closely related to the maintenance of smoking cessation [27-28,41,43-45]. Miller et al. [29] also reported that the 1-year continuous abstinence rate was higher in the group that received counseling for 3 months after discharge, compared to the general counseling

group that received the physician's recommendation to quit smoking during hospitalization. In a study of patients referred to the smoking cessation clinic of a general hospital, Shin et al. [19] also reported that a higher number of counseling sessions for smoking cessation after discharge was associated with a higher smoking cessation success rate. These study findings suggest that the provision of continuous smoking cessation counseling after discharge as well as smoking cessation counseling during hospitalization has a strong association with the prevention of smoking relapse and the maintenance of smoking cessation.

Regarding the use of prescription drugs for smoking cessation among the characteristics related to smoking cessation interventions, the risk for smoking relapse was four times higher in the group who used prescription medicines for smoking cessation than in the group who did not use them. This result is in contrast to the previous findings that both varenicline and bupropion, which are prescription drugs for smoking cessation, increased the rate of long-term smoking cessation attempts, and in particular, varenicline was more effective for smoking cessation than NRT products [30-32,46]. In this study, out of 572 participants, only 13 people used smoking cessation drugs, so caution is needed in interpreting the research results, and further research is required to accumulate more research results in the future.

This study has the following limitations. First, smoking relapse status, the dependent variable of this study, was examined through self-reports, which represent subjective assessments. Although it is necessary to assess smoking relapse through physiological indicators such as the measurement of exhaled carbon monoxide concentration and a urine cotinine test, the assessment method was limited to self-reports in this study. This is due to the fact that the self-report method was realistically more suitable and feasible because only 11.1 to 50.8% of the participants visited the hospital for outpatient treatment and participated in the physiological measurement when the assessment of the maintenance of abstinence from smoking was performed at 4 weeks, 12 weeks, and 24 weeks. In the future, follow-up research should be conducted on an objectively measured dependent variable by increasing the physiological measurement rate. Second, this study used the data from the integrated smoking cessation service information system of the Korea Health Promotion Institute. Since this study analyzed only the standardized data of the results of the national smoking cessation support service program presented by the institute, variables related to the characteristics related to hospitalization, such as the main diseases of participants, were not reflected in the study results. As a result, this study did not provide sufficient discussion on smoking relapse in

relation to variables related to hospitalization. Therefore, in the future studies, there is a need to analyze characteristics related to hospital admission by including them as variables and using a more sophisticated research design. Third, the value of Cronbach alpha of K-FTND used to measure nicotine dependence in this study was .61, and this is the same value as the value of Cronbach alpha reported by the creator of FTND [22]. It is thought that since the instrument contains only 6 items, the level of reliability was calculated as a relatively low value [22]. However, considering that FTND is the most commonly used instrument that provides a measure of the nicotine dependence of smokers in Korea as well as in other countries, there is a need to conduct an in-depth analysis of the reliability of the nicotine dependence assessment tool in the future.

Despite the above-mentioned limitations of this research, it is considered meaningful that this study examined smoking abstinence rates over a period of 6 months and analyzed factors related to smoking relapse among all the inpatients of two university hospitals who had intent to quit smoking.

Conclusions

This study applied the Cox proportional hazards model to identify factors associated with smoking relapse over time within 6 months from the date of the decision to quit smoking among the inpatients of university hospitals who used the inpatient smoking cessation program of the DTCC.

The results of this study revealed that a lower risk for smoking relapse was associated with the presence of supporters for smoking cessation, a lower level of nicotine dependence, and a higher number of counseling sessions. These results showed that personalized smoking cessation counseling considering the characteristics of the participants of the inpatient smoking cessation program had a positive effect on the prevention of smoking relapse and the maintenance of smoking cessation among the participants of the smoking cessation program. Since the number of counseling sessions is an important factor for continuous smoking abstinence, it is important to increase the rate of participation in counseling even after hospital discharge by paying attention to the formation of rapport between the patients receiving counseling and the counsellor during hospitalization. Additionally, there is a need to develop a system for smoking cessation counseling linked to the outpatient treatment schedule after discharge, and it is also necessary to secure a stable location for smoking cessation counseling. Further, in order to support the smoking abstinence behavior of hospitalized smokers, it is nec-

essary to provide support for the guardians of smoker patients by providing appropriate education materials as well as systematic education programs for supporters for smoking cessation to ensure that the guardians of patients can perform the role of positive supporters for smoking cessation not only during hospitalization but also after discharge.

Based on the study findings described above, it is suggested that further research should be conducted on factors related to smoking cessation success among inpatients according to characteristics related to hospitalization, based on the rates of smoking abstinence verified by biomarkers. In addition, it is necessary to conduct research on the development and effectiveness of education programs for supporters for quitting smoking among the guardians of inpatients.

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Conflict of interest

The authors declared no conflict of interest.

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Authors' contributions

Bae, Ji Eun contributed to conceptualization, data curation, formal analysis, methodology, project administration, visualization, and writing-original draft, review & editing. Kim, Chul-Woung contributed to conceptualization, funding acquisition, methodology, project administration, writing – original draft, review & editing, and supervision. Lee, Seung Eun contributed to conceptualization, methodology, project administration, and writing – original draft, review & editing. Jang, Myungwha contributed to conceptualization, methodology, and writing – review & editing.

Data availability

Please contact the corresponding author for data availability.

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Factors affecting cultural adaptation stress by gender among multicultural adolescents in Korea

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Purpose: This paper is a descriptive survey research to identify factors that affect acculturation stress in multicultural adolescents, and provide basic information that can be used to develop ways to improve their mental health.

Methods: This study used the data of the 2nd multicultural adolescents panel study provided on December 30, 2022 by the National Youth Policy Institute. The subjects of this study were 1,520 multicultural adolescents in the fourth grade of elementary school and the survey period was from July to November 2020. The dependent variable was acculturation stress, and the explanatory variables were as follows: mother's and father's country of origin, region size, home economic conditions, academic achievement, experience of discrimination, mother's level of education, father's level of education, and number of close friends. Data analysis involved calculation of descriptive statistics, analysis of differences in the level of acculturative stress and general characteristics between male and female adolescents, and multiple regression analysis.

Results: This study found that there are gender differences in significant influencing factors for acculturation stress among multicultural adolescents. For males, factors influencing acculturation stress were identified as regional size, mother's education level, parental support, and teacher support. For females, they were regional size, experience of discrimination, number of close friends, parental support, and self-esteem.

Conclusion: The results of this study suggest that psychiatric nurses should provide psychiatric nursing and counseling to multicultural adolescents in addition to clinical psychiatric nursing. Various mental health programs should be developed for multicultural adolescents, with a focus on counseling, education, and family therapy.

Keywords: Adolescent; Acculturation; Stress, Psychological; Self Esteem, Republic of Korea

Introduction

According to a recent analysis of education statistics published by the Ministry of Education in 2021, the number of students from multicultural families is 131,522 persons, and this figure represents a three-fold increase over the past nine years. In particular, the proportion of multicultural students is reported to be highest in elementary schools at 4.2% [1]. As the inflows of foreign students, foreign workers, and marriage migrant women

into Korea increased in the 2000s, this increase of foreign residents in Korea has led to the improvement of perceptions about multicultural families and increased respect for diversity, and national-level efforts for children and adolescents from multicultural families have been gradually expanded with increasing national attention to them [2].

Adolescence is the phase of life during which young people experience rapid and significant physical and psychological changes, and it is also a period when adolescents are greatly influenced

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by the environment, including parents' parenting style, peer relationships at school, and teachers' roles. Young adolescents, such as elementary school students, acquire socialization through school life. They develop problem-solving skills through peer relationships, and in this process, they form values and self-concept and develop the ability to adapt to the social environment [3]. In particular, although it is important for elementary school students to experience and observe various environments, it is crucially required to help them appropriately respond to crises and unfamiliar environments and effectively utilize support resources around them. In a previous study [4], compared to non-multicultural youth, multicultural adolescents were found to have a sense of inferiority in terms of Korean language proficiency and the financial status of the family, and prejudices, cultural conflicts, and confusion in values resulting from biculturalism were shown to naturally lead to negative emotional reactions such as depression, anxiety, psychological withdrawal, and aggression. Multicultural adolescents who undergo confusion due to bicultural situations may experience various types of stress, and the most common stress they experience is acculturation stress. Multicultural families experience a new cultural environment, and go through changes for adaptation in various areas such as values, cultural attitudes, cognition, and behavior. Acculturative stress refers to psychological difficulties arising from undergoing such adaptation [5].

Recently, research has been conducted on acculturation stress in various research fields as a result of increasing interest in the issue, and Berry proposed a model of acculturative stress [6]. According to Berry's model of acculturative stress, the cultural adaptation experienced by individuals is influenced by stress factors, and the acculturation process does not continuously remain a stressful situation, but individuals rather adapt to new environments and cope with acculturative stress through the moderating factors of stress. In the model of acculturative stress, the moderating factors of stress are largely categorized into group-level and individual-level variables. More specifically, among the moderators of stress, group-level factors include multicultural experiences as well as the political context, ethical attitudes, and ideologies of the society in which the individual was born, while individual-level factors are divided into moderators acting before acculturation and those acting during the acculturation process [6].

This study attempted to explore individual-level factors influencing acculturative stress in Korean multicultural adolescents, based on the moderating factors of stress presented in Berry's model of acculturative stress. This study did not analyze group-level factors affecting acculturative stress because multi-

cultural adolescents have not yet fully developed a firm sense of identity, appropriate values, and a stable self-concept, and the investigation of group-level factors such as ideology may cause further confusion in their values. In addition, according to a previous study [6], group-level variables are factors that predict the level of voluntary migration motivation of individuals through a combination of political, economic, and sociodemographic conditions encountered by the individuals in the society where they were born. Therefore, it was thought that since this study intended to examine factors affecting cultural adaptation stress in multicultural adolescents, there would be limitations in exploring group-level factors as influencing factors for acculturative stress.

First, based on the individual-level factors presented in Berry's model of acculturative stress [6], this study examined parental support and teacher support as influencing factors for acculturative stress in multicultural adolescents. In this regard, a previous study reported that the social support system is a very important factor for the mental health of adolescents, and that adaptation patterns vary depending on the social support system such as parental support and teacher support [7]. It was also previously found that a higher level of parental support was associated with decreased levels of depression and anxiety in adolescents, and that a higher level of teacher support was linked to a lower level of academic stress in adolescents [8]. In addition, it has been reported that the support system is a factor that acts as a moderator of acculturation stress and reduces social withdrawal, and thus it plays a very important role in adaptation to the social environment during adolescence [9]. These research findings confirmed that parental support and teacher support are important factors affecting acculturation stress because they act as psychological protective factors.

Self-esteem refers to perceiving oneself as a positive being and considering oneself important and valuable regarding one's abilities, attitudes, and thoughts [9]. Self-esteem is closely related to the acculturative stress of multicultural adolescents. According to a previous study, in a situation of self-identity confusion arising from the experience of bicultural situations, a lower level of self-esteem is linked to a higher level of acculturative stress, while a higher level of self-esteem is associated with a higher level of achievement motivation, and performs a positive role in psychological and social adaptation [10]. These previous findings suggest that it is important to appropriately develop and promote the self-esteem of multicultural youth because self-esteem is an important factor that affects acculturative stress in that it is an internal factor in psychological adaptation that enables individuals to protect themselves and cope with unfamiliar environments.

Lastly, this study intended to explore how gender affects the influencing factors for acculturation stress in multicultural adolescents.

According to Berry's model of acculturative stress [6], gender is a moderator of acculturative stress prior to acculturation. Regarding the stress that individuals experience during adolescence, it was previously found that female adolescents generally showed more distinct and sensitive responses to stress, while the level of school-related stress was relatively higher in male students [11]. These results suggest that there may be gender differences in the perceptions of stress according to situations. Another prior study [12] also found that multicultural children in upper elementary grades showed a lower level of adaptation to school life and greater gender differences in psychological and behavioral characteristics [13]. Therefore, identification of the factors affecting acculturative stress in multicultural adolescents through a differentiated approach according to gender is expected to contribute to providing an in-depth understanding of the potential predictors of acculturative stress by gender in relation to the implementation of counseling and the development of educational programs for multicultural adolescents in the future.

This research was conducted using the data from the 2020 Multicultural Adolescents Longitudinal Panel Study conducted by the National Youth Policy Institute. The present study aimed to identify factors influencing acculturative stress by gender in multicultural adolescents in Korea in order to present basic data for the development of health promotion programs for multicultural adolescents and the development of policies for multicultural youth in the future. The specific objectives of this study are as follows:

- 1) To investigate gender differences in the level of acculturative stress according to general characteristics in multicultural adolescents;
- 2) to examine the levels of parental support, teacher support, self-esteem, and acculturative stress in multicultural adolescents;
- 3) to identify factors affecting acculturative stress in multicultural adolescents by gender.

Methods

1. Study design

This study is a secondary analysis study using the data from the 2020 (Second-Year) Multicultural Adolescents Panel Study, and it is a descriptive survey research to identify factors affecting acculturation stress among multicultural adolescents.

2. Participants

This study was conducted with the data from the 2020 (Second-Year) Multicultural Adolescents Panel Study (MAPS) conducted by the National Youth Policy Institute. The data of the 2020 MAPS consists of the data of adolescents and the data of students' parents, and this study used only the data of adolescents. Based on the recent revision of the Ministry of Government Legislation [14] that legally defined youth as young people ages 9 to 24, this study used the data of multicultural adolescents who were fourth-grade students in elementary school as of 2019 as specified in the 2020 MAPS.

In this study, multicultural adolescents were defined as adolescents from multicultural families in which the country of origin of one or both of the parents is not Korea. This study used the data from the 2020 MAPS provided by the National Youth Policy Institute. In the 2020 MAPS, school samples were selected by the stratified random sampling method in the first stage, and the probability-proportional-to-size (PPS) sampling method was applied in the second stage. A total of 2,100 people participated in the sample survey of the 2020 MAPS. In this study, out of the 2,100 respondents, a total of 1,520 people was finally selected as the participants by excluding 580 people with missing data.

3. Measures

1) General characteristics

The general characteristics of the participants were examined using 9 questions on the following variables: mother's country of origin, the father's country of origin, regional scale, home economic conditions, academic achievement, discrimination experience, the mother's education level, the father's education level, and the number of close friends.

2) Acculturative stress

Acculturative stress was assessed using a modified version of the SAFE (Social, Attitudinal, Familial, and Environmental Acculturative Stress) scale developed by Hovey & King [15]. The modified version used in the 2020 MAPS was presented by Hong [17], and it was created by remodeling a modified version of the SAFE scale made by Noh [16]. This scale consists of 10 questions in the data from the First-Year MAPS, but it contains 9 questions in the data from the 2020 (Second-Year) MAPS because the following tenth item has been deleted: 'I will live better in Korean than in the countries where my parents were born.' Each item is rated on a 4-point Likert scale ranging from 1 point (= 'Not at all') to 4 points (= 'Very much'). Higher scores indicate higher levels of acculturative stress. Hovey & King [15], Noh

[16], and Hong [17] reported the value of Cronbach's α as .89, .76, and .85, respectively. The value of Cronbach's α was calculated as .88 in this study.

3) Parental support

Parental support was measured using a tool presented by the National Youth Policy Institute, and this instrument was a scale for parents' educational support and expectations developed by Kim [18]. This instrument consists of a total of 6 questions. Each item is assessed on a 4-point Likert scale ranging from 1 point (= 'Not at all') to 4 points (= 'Very much'). Higher scores indicate higher levels of parental support. The value of Cronbach's α was reported as .83 by Kim [18], and it was calculated as .88 in this study.

4) Teacher support

Teacher support was measured using the tool presented by the National Youth Policy Institute. This scale contains 3 questions, and it was created by reducing, modifying and supplementing the perceived social support scale developed by Han [19]. The original version proposed by Han [19] consists of 8 questions. Each item is rated on a 5-point Likert scale ranging from 1 point (= 'Not at all') to 5 points (= 'Very much'), and higher scores indicate higher levels of teacher support. The value of Cronbach's α was reported as .83 by Han [19], and it was calculated as .85 in this study.

5) Self-esteem

Self-esteem was assessed using a modified Korean version of the self-esteem scale developed by Rogenberg [20]. This modified version was presented and used by the Comprehensive Survey of Korean Youth [21]. This scale contains a total of 3 questions, and each item is rated on a 4-point Likert scale ranging from 1 point (= 'Not at all') and 4 points (= 'Very much'). Higher scores indicate higher levels of self-esteem. Regarding the reliability of the tool, the value of Cronbach's α was reported as .77 by Rogenberg [20], and it was calculated as .81 in this study.

6) Data collection

This study was conducted using the data from the 2020 (Second-Year) Multicultural Adolescents Panel Study (MAPS) presented on the website of the National Youth Policy Institute. The researcher submitted a permission request document regarding the data use, and directly downloaded and used the data sent via email by the National Youth Policy Institute. Regarding the data collection of the 2020 MAPS conducted by the National Youth Policy Institute, schools participating in the MAPS sent home

letters and informed consent forms regarding survey participation to the families of the target students, and collected the informed consent forms. Then, the recruitment of households and panel formation were carried out, and a survey was conducted anonymously by a self-administered survey method.

7) Data analysis

In this study, the analysis of complex sample survey data was performed using SPSS/WIN 23.0. Gender differences in the level of acculturation stress in the participants were analyzed by calculating the mean, standard deviation, frequency, and percentage. The influence of each variable on acculturation stress by gender was analyzed using the mean and standard deviation. The 2020 (Second-Year) Multicultural Adolescents Panel Study (MAPS) presented on the website of the National Youth Policy Institute is a complex sample design analysis. In this study, the analysis of the survey data was performed by calculating and applying longitudinal weights. Multiple regression analysis was conducted to identify factors influencing acculturation stress in Korean multicultural adolescents by gender. The level of significance was set at $p < .05$.

8) Ethical considerations

The data used in this study received approval (202009-HR-고유-011) from the IRB of the National Youth Policy Institute, and this study was conducted after receiving an exemption determination from the IRB of Kwangju Women's University (1041465-202305-HR-002-12).

Results

1. The level of acculturation stress according to sociodemographic characteristics

The results of examining the level of acculturation stress according to sociodemographic characteristics are presented below (Table 1).

Regarding the mother's country of origin, 'Southeast Asia' accounted for the largest proportion among both males (51.5%, 396 persons) and females (53.2%, 395 persons). For males, the level of acculturative stress was highest when the mother's country of origin was 'Southeast Asia' (1.25 ± 0.02 points). For females, the level of acculturative stress was highest when the mother's country of origin was China (Korean-Chinese) (1.26 ± 0.05 points) for females. However, there was no statistically significant difference according to the mother's country of origin in both males and females ($p = .119$, $p = .865$). As for the

father's country of origin, 'Korea' took up the largest proportion among both males (93.7%, 736 persons) and females (92.4 %, 661 persons). For both males and females, the level of acculturative stress was highest when the father's country of origin was China (Han-Chinese). In this case, the mean score was 1.41 ± 0.25 points for males and 1.43 ± 0.19 points for females. However, there was no statistically significant difference in acculturative stress according to the father's country of origin in both males and females ($p = .679$, $p = .664$). In terms of regional scale, students living in 'small and medium cities' accounted for the largest proportion among both males (56.7%, 407 persons) and females (54.0%, 368 persons). The mean score for acculturative stress was highest in the group living in 'big cities' for both males and females. The level of acculturative stress in the group living in 'big cities' was 1.30 ± 0.03 points for males and 1.25 ± 0.03 points for females, and there was a statistically significant difference according to regional scale ($p = .008$, $p < .001$). With respect to home economic conditions, students with 'moderate' home economic conditions took up the largest proportion among both males (61.2%, 491 persons) and females (66.1%, 464 persons). For males, the group with 'poor' home economic conditions showed the highest level of acculturative stress (1.28 ± 0.03 points). For females, the group with 'moderate' home economic conditions showed the highest level of acculturative stress (1.23 ± 0.02 points). There was no statistically significant difference in acculturative stress according to home economic conditions. In terms of academic achievement, students who reported their academic achievement as 'medium' took up the largest proportion with 53.7% (419 persons) among males and 53.2% (386 persons) among females. For males, the group with 'low academic achievement' showed the highest level of acculturative stress (1.36 ± 0.06 points). For females, the group with 'medium academic achievement' showed the highest level of acculturative stress (1.24 ± 0.02 points). There was a statistically significant difference in acculturative stress according to academic achievement only in males ($p = .003$). As for discrimination experience, people without discrimination experience accounted for 97.5% (774 persons) among males and 98.7% (719 persons) among females. The level of acculturative stress was higher in the group with discrimination experience for both males and females. The mean scores for acculturative stress in the group with discrimination experience were 1.42 ± 0.11 points for males and 1.44 ± 0.11 points for females. but the difference was significant only in females ($p = .037$). Regarding the mother's education level, 'high school or below' accounted for 75.8% (591 persons) in males and 79.3% (577 persons) in females, so 'high school or below' took up the

largest proportion in both males and females. When the mother's education level was 'high school or below,' the level of acculturative stress was highest, and the mean score was 1.25 ± 0.02 points for males and 1.22 ± 0.02 points for females. However, there was a significant difference according to the mother's education level only in male students ($p < .001$). With respect to the father's education level, 'high school or below' accounted for 73.6% (598 persons) among male students and 73.5% (545 persons) among female students, so 'high school or below' took up the largest proportion in both males and females. In the level of acculturative stress according to the father's education level, for both males and females, the level of acculturative stress was highest when the father's education level was 'high school or below.' In this case, the mean score was 1.24 ± 0.02 points for males and 1.23 ± 0.02 points for females. However, there was a significant difference according to the father's education level only in male students ($p < .041$). Lastly, regarding the number of close friends, the group with 5 or fewer (≤ 5) close friends accounted for the largest portion among both males (56.5%, 440 people) and females (66.2%, 481 people). For both male and female students, the level of acculturative stress was highest in the group with ≤ 5 close friends, and there was a significant difference in both groups. In the group with ≤ 5 close friends, the mean score of acculturative stress was 1.28 ± 0.02 points for males and 1.25 ± 0.02 points for females ($p = .002$, $p < .001$)(Table 1).

2. The levels of parental support, teacher support, self-esteem, and acculturative stress by gender

In this study, the mean score for parental support was 3.25 ± 0.02 points in male students and 3.27 ± 0.02 points in females, and there was no statistically significant difference between two groups. The mean score for teacher support was 3.68 ± 0.03 points in males and 3.80 ± 0.03 points in females, and there was a statistically significant difference between two groups. The mean score for self-esteem was 3.22 ± 0.02 points in males and 3.25 ± 0.02 points in females, and there was no statistically significant difference between two groups. The level of acculturative stress was 1.24 ± 0.01 points in males and 1.22 ± 0.01 points in females, and there was no statistically significant difference between two groups (Table 2).

3. Factors affecting acculturative stress in multicultural adolescents

In order to identify significant influencing factors for acculturation stress among the participants, multiple regression analysis was performed using independent variables, such as parental

Table 1. Acculturation Stress by Demographic Characteristics (N=1,520)

Variables	Categories	Male (n=791)			Female (n=729)		
		n (%)	M ± SE	p	n (%)	M ± SE	p
Mother's country of origin	Korea	13 (1.7)	1.24 ± 0.05	.119	17 (2.5)	1.22 ± 0.06	.865
	China (Han Chinese, other ethnic groups)	153 (21.0)	1.25 ± 0.04		111 (20.7)	1.23 ± 0.04	
	China (Korean-Chinese)	86 (8.5)	1.17 ± 0.03		90 (8.7)	1.26 ± 0.05	
	Southeast Asia	396 (51.5)	1.25 ± 0.02		395 (53.2)	1.20 ± 0.02	
	Japan	55 (4.3)	1.17 ± 0.04		41 (4.5)	1.20 ± 0.04	
	Others	88 (13.0)	1.22 ± 0.03		75 (10.5)	1.24 ± 0.05	
Father's country of origin	Korea	736 (93.7)	1.23 ± 0.01	.679	661 (92.4)	1.21 ± 0.01	.664
	China (Han Chinese, other ethnic groups)	5 (1.6)	1.41 ± 0.25		7 (2.8)	1.43 ± 0.19	
	China (Korean-Chinese)	25 (1.6)	1.25 ± 0.05		20 (1.4)	1.23 ± 0.07	
	Southeast Asia	23 (3.0)	1.19 ± 0.04		39 (3.3)	1.23 ± 0.05	
	Japan	2 (0.2)	1.14 ± 0.12		2 (0.1)	1.36 ± 0.15	
	Others	0 (0.0)	-		-	-	
Regional scale	Big cities	249 (29.4)	1.30 ± 0.03	.008	226 (27.4)	1.25 ± 0.03	< .001
	Small and Medium	407 (56.7)	1.22 ± 0.02		368 (54.0)	1.23 ± 0.02	
	Towns and Villages	135 (14.0)	1.17 ± 0.03		135 (18.6)	1.12 ± 0.02	
Home economic conditions	Poor	231 (28.5)	1.28 ± 0.03	.082	209 (25.7)	1.21 ± 0.02	.139
	Moderate	491 (61.2)	1.23 ± 0.02		464 (66.1)	1.23 ± 0.02	
	Wealthy	69 (10.3)	1.18 ± 0.03		56 (8.2)	1.16 ± 0.03	
Academic achievement	Low	75 (9.5)	1.36 ± 0.06	.003	68 (8.6)	1.22 ± 0.04	.078
	Medium	419 (53.7)	1.25 ± 0.02		386 (53.2)	1.24 ± 0.02	
	High	297 (36.8)	1.18 ± 0.02		275 (38.1)	1.18 ± 0.02	
Discrimination experience	Yes	17 (2.5)	1.42 ± 0.11	.103	10 (1.3)	1.44 ± 0.11	.037
	No	774 (97.5)	1.23 ± 0.01		719 (98.7)	1.21 ± 0.01	
Mother's education	≤ High school	591 (75.8)	1.25 ± 0.02	< .001	577 (79.3)	1.22 ± 0.02	.669
	University or college	190 (22.7)	1.20 ± 0.03		142 (19.2)	1.19 ± 0.03	
	Graduate school	10 (1.5)	1.08 ± 0.02		10 (1.5)	1.22 ± 0.08	
Father's education	≤ High school	598 (73.6)	1.24 ± 0.02	.041	545 (73.5)	1.23 ± 0.02	.496
	University or college	177 (24.5)	1.23 ± 0.03		170 (24.4)	1.19 ± 0.03	
	Graduate school	16 (1.9)	1.12 ± 0.04		14 (2.1)	1.20 ± 0.05	
Close friends (Num)	≤ 5	440 (56.5)	1.28 ± 0.02	.002	481 (66.2)	1.25 ± 0.02	< .001
	6-10	232 (29.3)	1.18 ± 0.02		189 (26.6)	1.17 ± 0.02	
	More than 11	119 (14.2)	1.18 ± 0.03		59 (7.3)	1.11 ± 0.02	

support, teacher support, and self-esteem, and the general characteristics that were found to be statistically significant variables. Among the general characteristics, regional size, academic achievement, the mother's education level, the father's education level, and the number of close friends (people) were entered into multiple regression analysis for male adolescents, while regional size, discrimination experience, and the number of close friends were entered for female adolescents.

As mentioned above, multiple regression analysis was conducted to identify influencing factors for acculturative stress. Ta-

bles 3 and 4 show the analysis results about factors influencing acculturative stress among the participants.

For male adolescents, residing in big cities in terms of regional scale ($\beta = .18, p = .001, 95\% \text{ CI}, 0.06 \text{ to } 0.22$), high school or below in the mother's education level ($\beta = .26, p < .001, 95\% \text{ CI}, 0.10 \text{ to } 0.31$), university or college in the mother's education level ($\beta = .24, p < .001, 95\% \text{ CI}, 0.09 \text{ to } 0.29$), parental support ($\beta = -.11, p = .016, 95\% \text{ CI}, -0.13 \text{ to } -0.01$), and teacher support ($\beta = -.10, p = .033, 95\% \text{ CI}, -0.09 \text{ to } -0.01$) were found to have a significant effect on acculturation stress (Table 3).

Table 2. Parental Support, Teacher Support, Self-esteem, and Acculturation Stress by Gender

Variable	Male (n = 791)	Female (n = 729)	p
	M ± SD	M ± SD	
Parental support	3.25 ± 0.02	3.27 ± 0.02	.567
Teacher support	3.68 ± 0.03	3.80 ± 0.03	.008
Self-esteem	3.22 ± 0.02	3.25 ± 0.02	.429
Acculturation stress	1.24 ± 0.01	1.22 ± 0.01	.359

For female adolescents, residing in big cities in terms of regional scale ($\beta = .22, p = .001, 95\% \text{ CI}, 0.07 \text{ to } 0.23$), residing in small or medium cities ($\beta = .22, p < .001, 95\% \text{ CI}, 0.08 \text{ to } 0.19$), the presence of discrimination experience ($\beta = .12, p < .001, 95\% \text{ CI}, 0.16 \text{ to } 0.45$), 5 or fewer close friends in the number of close friends ($\beta = .21, p < .001, 95\% \text{ CI}, 0.07 \text{ to } 0.20$), 6~10 close friends ($\beta = .10, p = .027, 95\% \text{ CI}, 0.01 \text{ to } 0.13$), parental support ($\beta = -.09, p = .020, 95\% \text{ CI}, -0.10 \text{ to } -0.01$), and self-esteem ($\beta = -.09, p = .034, 95\% \text{ CI}, -0.10 \text{ to } -0.01$) were identified as influencing factors for acculturation stress (Table 4).

Table 3. (Male) Influencing Factors on Acculturation Stress

Variable	Category	B	β	95% CI	p
(Constant)		1.37	-	1.05~1.65	<.001
Regional scale	Big cities	0.14	.18	0.06~0.22	.001
	Small and Medium-sized Towns and Villages	0.05	.08	-0.02~0.12	.146
	Ref	Ref			.
Academic achievement	Bad	0.09	.08	-0.02~0.20	.102
	Normal	0.02	.03	-0.03~0.08	.434
	Good	Ref			.
Mother's education	≤ High school	0.21	.26	0.10~0.31	<.001
	University or college	0.19	.24	0.09~0.29	<.001
	Graduate school	Ref			.
Father's education	≤ High school	0.07	.09	-0.04~0.19	.212
	University or college	0.10	.12	-0.02~0.21	.092
	Graduate school	Ref			.
Close friends (Num)	≤ 5	0.07	.10	-0.01~0.15	.064
	6-10	-0.01	-.01	-0.08~0.07	.841
	More than 11	Ref			.
Parental support		-0.07	-.11	-0.13~0.01	.016
Teacher support		-0.05	-.10	-0.09~0.01	.033
Self-esteem		-0.03	-.05	-0.09~0.03	.260

Table 4. (Female) Influencing Factors on Acculturation Stress

Variable	Category	B	β	95% CI	p
(Constant)		1.46	-	1.27~1.64	<.001
Regional scale	Big cities	0.15	.22	0.07~0.23	.001
	Small and Medium-sized Towns and Villages	0.13	.22	0.08~0.19	<.001
	Ref	Ref			.
Discrimination experience	Yes	0.31	.12	0.16~0.45	<.001
	No	Ref			.
Close friends (Num)	≤ 5	0.14	.21	0.07~0.20	<.001
	6-10	0.07	.10	0.01~0.13	.027
	More than 11	Ref			.
Parental support		-0.05	-.09	-0.10~0.01	.020
Teacher support		-0.03	-.08	-0.07~0.01	.076
Self-esteem		-0.05	-.09	-0.10~0.01	.034

Discussion

In adolescents, there may be gender differences in stress perceptions and the patterns of responses to perceived stress. This study attempted to explore factors affecting acculturative stress by gender in multicultural adolescents in order to identify the psychological and behavioral characteristics of multicultural adolescents and contribute to the development of differentiated intervention programs for acculturation stress.

As a result, for males, regional scale, the mother's education level, parental support, and teacher support were identified as factors affecting acculturative stress. For females, regional scale, discrimination experience, the number of close friends, parental support, and self-esteem were identified as influencing factors for acculturative stress.

The results of this study showed that acculturation stress was influenced by regional scale in both male and female multicultural adolescents. A prior study [22] also reported that the level of perception of negative emotions such as depression among multicultural adolescents was higher in the group residing in big cities and in female adolescents. These results seem to suggest that acculturation stress is influenced by various environmental factors related to regional size and gender differences in sociodemographic characteristics.

The above findings suggest that there is a need to analyze factors that may affect acculturation stress from a multidimensional perspective by taking into account the environments of various regional characteristics in the future.

In this study, another factor affecting acculturation stress in multicultural youth was the mother's education level, and it was a statistically significant variable only in male adolescents. According to Berry's model of acculturative stress [6], education level is closely related to problem analysis and problem solving when individuals are faced with a situation, and thus it can help individuals to achieve a higher level of adaptation in a stressful environment. In addition, a previous study [23] reported that the mother's education level was closely related to children's resilience and parenting behavior, and a higher education level of the mother was associated with warmer and receptive parenting attitudes toward children and greater resilience in children. These research results demonstrated that the mother's education level is an important factor influencing positive adaptation to stress as well as personality traits such as children's resilience. However, it is difficult to make a direct comparison of study findings because there are few prior studies showing that the education level of the mother who was a foreign national influences acculturation stress

only in male multicultural adolescents. Thus, further research should be conducted to investigate various variables that may be associated with gender differences regarding acculturation stress in multicultural adolescents according to parents' education level.

In this study, discrimination experience was found to be a factor significantly affecting acculturation stress in female multicultural adolescents, and these results suggest that there is a need to explore methods for reducing acculturative stress caused by discrimination. In this regard, a previous study [7] found that negative situations caused by social withdrawal was closely related to acculturation stress. In particular, it was found that discrimination experience due to appearance or cultural alienation may lead to the experience of social withdrawal [7]. These research results suggest that female multicultural adolescents are more sensitive to such discrimination than males. In other words, the above findings indicate that the level of perceived discrimination according to gender may affect acculturation stress. Furthermore, factors affecting cultural adaptation stress depending on gender may include various factors related to temporal, environmental, and situational aspects. Thus, it is necessary to further investigate various factors that may influence acculturative stress more sensitively or more prominently in female multicultural adolescents, and such investigations are expected to contribute to the development of nursing interventions that can reduce various negative emotions such as depression, anxiety, and alienation.

Meanwhile, the number of close friends was found to be a factor affecting acculturation stress only in female multicultural adolescents. In a previous study [13], the path from peer relationships to depression was found to be stronger in female students than male students, and the path from peer relationships to suicidal thoughts was also stronger in female students, suggesting that peer relationships have a greater impact on overall negative emotions in female students. In agreement with these findings, the results of this study also indicated that female students may more sensitively exhibit the effect of the number of close friends on acculturative stress than male students, and that the number of close friends is also a factor affecting negative emotions such as acculturation stress in female students. In follow-up studies, it is necessary to identify various factors related to peer relationships that may affect acculturative stress by gender, and provide basic data for the development of peer promotion programs that can be utilized in school counseling centers and multicultural family support centers.

In this study, parental support was found to be a factor positively affecting acculturative stress in both male and female multicultural adolescents. A previous study [23] found that a higher

level of positive involvement and support of parents is associated with adolescents' more successful cultural integration and more resilient behavior in unfamiliar environments through pioneering and exploring new environments by using their parents as a safe coping resource in unfamiliar environments. Another prior study [24] also reported that regardless of gender, a higher level of parental support is more likely to influence positive emotions such as self-efficacy and happiness in adolescents. These findings are thought to suggest that supportive parental involvement is important in emotional regulation during adolescence. Taken together, the above research results showed that factors arising from the support system of the home environment of adolescents, such as parental support, are factors that have a significant impact on acculturative stress regardless of gender. In the future, these findings are expected to contribute to the development of a family counseling therapy program using parent participation as an intervention for multicultural adolescents who need the nursing interventions of community nurses.

A noteworthy finding of this study is that although teacher support was identified as a factor affecting acculturative stress, it had a significant effect on acculturative stress only in male multicultural adolescents. In this regard, Berry's model of acculturative stress emphasized the establishment of support system as an important strategy for adaptation to a stressful situation. This claim is supported by the findings of a previous study that a higher level of teacher support was associated with better adaptation to school life, coping more smoothly with discrimination or language conflicts, and a lower level of acculturative stress in multicultural adolescents [25]. In particular, another previous study reported that compared to non-multicultural adolescents, multicultural adolescents are more likely to have a psychologically and mentally vulnerable school life in childhood, and teachers' positive and supportive attitudes are likely to contribute to the positive psychological and mental development of multicultural youth [26]. Therefore, teacher support can be seen as an important factor affecting acculturative stress among multicultural adolescents. In particular, in a previous research on factors influencing happiness by gender among adolescents [24], teacher support was found to have a statistically significant effect on happiness in male students, but it did not have a statistically significant impact in female students, and the peer relationship was rather found to have a statistically significant effect on happiness in females. These results suggest that male students are more influenced by teacher support in terms of psychological aspects. However, another prior study [27] reported that a higher level of teacher support is more likely to lead to the reduction of psycho-

logical maladjustment in female students than male students, and female students showed a higher level of psychological well-being. In view of this disagreement in research results, there is a need to more carefully examine gender differences regarding factors that may affect acculturation stress.

Lastly, self-esteem was identified as a factor affecting cultural adaptation stress in multicultural adolescents, and it was found to have no significant effect in male multicultural adolescents. According to Berry's model of acculturative stress, among individual-level factors presented as the moderators of stress in the acculturation process, personality aspects such as self-efficacy and self-esteem are important factors in the acculturation process. In other words, a prior study argued that people with higher self-esteem are likely to be more active and confident about the future and express positive emotions, whereas lower self-esteem is linked to higher self-dissatisfaction and expression of more negative emotions toward others, so people with lower self-esteem are likely to have more difficulties in coping with crisis situations [28]. In this connection, a previous study reported that the level of self-esteem was higher in male multicultural adolescents than females, and a higher level of self-esteem was linked to the decreased impact of acculturation stress on the level of depression [22]. However, in this study, female adolescents showed a lower level of acculturative stress, and these results are presumed to show that female multicultural adolescents responded more sensitively to negative emotional states such as acculturation stress than males. In future studies, it is necessary to develop positive psychological coping mechanisms, such as self-esteem, conduct a multidimensional analysis of the patterns of responses to negative emotional reactions by gender, and explore the methods to utilize the research results in the development of emotion regulation strategies.

This study has the following limitations.

First, this study was conducted using data from the Second Multicultural Adolescents Panel Study conducted in 2020, so there are limitations in generalizing the results of this study to all the multicultural adolescents. In future research, it is necessary to derive and verify statistically significant results by including more regions in the research and acquiring the data of more samples.

Second, although various negative emotional factors such as depression and anxiety are thought to affect cultural adaptation stress, there were limitations in conducting a multidimensional analysis of variables by using the data of the Second (2020) Multicultural Adolescents Panel Study. In follow-up studies, it is necessary to explore factors affecting cultural adaptation stress by including more diverse variables in the analysis.

Third, this study is a secondary analysis study using data from the Multicultural Adolescents Panel Study, and there is a possibility that an imbalance in the frequency of data by category occurred in the data selection process. In order to overcome these limitations of panel data, it is necessary to perform a data sampling process for optimizing the data of minor categories in future studies.

Lastly, because acculturation stress may be influenced by various cultural, situational, and environmental factors, it is thought that quantitative research would have limitations in exploring the acculturation stress of multicultural adolescents. In future research, there is a need to conduct a more realistic and in-depth investigation through qualitative research. In addition, this study did not investigate the relationship between peer support and acculturation stress. In this regard, there are some disagreements in previous research findings regarding social support. In particular, a previous study reported that a higher level of perceived peer support among the subdomains of social support was associated with lower levels of depression and psychosis among adolescents [8]. However, another previous study found that family support had the greatest influence on adaptation to school life among multicultural adolescents [12]. Based on the research findings of a previous study [12] showing that more active support and intervention from superiors, such as parental support and teacher support, was more effective in preventing maladjustment among elementary school students than older adolescent groups, this study analyzed the effects of family support and teacher support on acculturation stress. However, some inconsistency in research findings suggests that there is a need to examine the impact of peer support on acculturation stress in multicultural adolescents. Despite the limitations of the present study, it is meaningful that this study conducted research on multicultural adolescents in relation to community nursing by using the latest data presented by the National Youth Policy Institute on December 30, 2022. The results of this study can be utilized as basic data for counseling for multicultural youth at school as well as the development of family therapy programs of community multicultural welfare centers. In addition, as the numbers of foreign workers and multicultural families have recently been increasing, the roles of community multicultural welfare centers are expected to be expanded further. Community nurses should play a central role in not only the physical health but also the mental health of children from multicultural families. In this connection, the results of this study will hopefully contribute to the improvement of national awareness regarding the health promotion of multicultural adolescents in terms of community nursing. Lastly, in Berry's model of accul-

turative stress [6], gender was mentioned as an important moderating factor prior to acculturation in the acculturation stress process, and it was claimed that women may be at greater risk for acculturative stress during the acculturation process than men. In particular, considering the finding that female adolescents more sensitively perceive stress than male adolescents in the process of acquiring various types of socialization and forming self-concept through school life, it is thought that there would be significant gender differences in the acculturative process occurring in stressful situations [11].

The significance of this study can be found in that this study explored gender differences in factors affecting acculturation stress, and showed that there is a need to consider and pay attention to gender differences when counseling for multicultural adolescents or the development of programs for them is carried out in the future.

Conclusions

This study examined independent variables such as parental support, teacher support, and self-esteem as well as sociodemographic characteristics to identify factors affecting acculturative stress in multicultural adolescents. In terms of sociodemographic characteristics, for male adolescents, regional size, academic achievement, the mother's education level, the father's education level, and the number of close friends were identified as statistically significant variables. For female adolescents, regional size, discrimination experience, and the number of close friends were statistically significant variables. With respect to factors influencing acculturative stress in multicultural adolescents, for male adolescents, they were found to be regional size, mother's education level, parental support, and teacher support. For female adolescents, regional size, discrimination experience, the number of close friends, parental support, and self-esteem were identified as influencing factors of acculturative stress.

Currently, the number of multicultural families has been continuously increasing in Korea. In this situation, the role of community nurses should not be limited to clinical therapeutic interventions, and community nurses are also required to play a central role in the health promotion of the multicultural youth in the community, their adjustment to school life, and counseling for them at school. Based on the results of this study, it is suggested that community nurses should take an interest in counseling, education, and family therapy for the multicultural youth going through adolescence when rapid physical and psychological growth and changes occur, and develop and apply various health

promotion programs tailored to multicultural adolescents. In particular, it is necessary to appropriately develop and apply customized education programs that reflect the characteristics and environment of multicultural adolescents, such as human respect programs for multicultural youth and social adaptation programs for them, in addition to the implementation of existing self-esteem promotion programs.

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Conflict of interest

The authors declared no conflict of interest.

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Authors' contributions

Han, Seungwoo contributed to conceptualization, data curation, formal analysis, funding acquisition, methodology, project administration, visualization, writing – original draft, review & editing, investigation, resources, software, supervision, and validation.

Data availability

Please contact the corresponding author for data availability.

Acknowledgments

None.

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Aims and scope

1. The Research in Community and Public Health Nursing (RCPHN) is the official journal of the Korean Academy of Community Health Nursing. The RCPHN coverage includes theoretical, practical, and educational issues related to community and public health nursing. Articles include original research articles, reviews, and editorials. This journal aims to provide worldwide access to timely research and practice features of use to community and public health nurses, educators, school health teachers, occupational nurses, and administrators in the field of community and public health nursing.
2. The RCPHN is a peer-reviewed journal published quarterly at the end of the month (March, June, September, and December) by the Korean Academy of Community Health Nursing.
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rean Academy of Community Health Nursing website. Reviews shall be processed on a first-come-first-served basis.

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 - 1) All lines shall be single-lined and vertical lines shall not be used.
 - 2) The title of the table shall be placed on top of the table, and the first letters of the important words shall be capitalized (e.g., Table 1. Overall Responses to Question Types).
 - 3) Separate tables shall be numbered in the order of their first appearance.
 - 4) Footnotes can be used to convey additional information. Nonstandard abbreviations used in the tables must be explained in the footnotes (e.g., HR= heart rate; T = temperature).
 - 5) Footnotes in tables should use symbols in the following sequence: †, ‡, §, ||, ¶, #, ††, ‡‡. The explanations for these superior characters shall be placed on the bottom left of the tables (e.g. †Survival case; ‡Dead case).
 - 6) 0 shall be placed in front of the decimal point if the number is close to 1 and left blank if the number is not close to 1 (e.g., t = 0.26, F = 0.92, r = .14, R² = .61).
 - 7) When reporting p-values, which refer to the significance probability, footnotes shall not be used, but the actual p-val-

ues shall be provided. If the p-value is .000, it shall be indicated as $p < .001$, and if the p-value is 1.000, it shall be indicated as $p > .999$.

- 8) When reporting decimal numbers, the significance level shall be rounded to three decimal places. Standard deviations, other averages and means shall be rounded to two decimal places, and percentages rounded to one decimal place (e.g., $p = .002$, 23.98 ± 3.47 , 45.7%).
 - 9) When p-values have to be reported using footnotes, *, ** shall be used (e.g., * $p < .05$, ** $p < .01$).
- #### 4. Figure guidelines
- 1) The title of the figure shall be placed below the figure with the first letter capitalized. Separate figures shall be numbered in the order of their first appearance.
 - 2) When there are two or more figures for the same number, alphabets shall be placed after the Arabic number. (e.g., Figure 1-A and Figure 1-B).

5. Tables and figures shall be in sharp, black lines and adjusted to fit within the A4 size page (width 150 mm × height 200 mm) with the explanations written separately.
6. The resolution of the figures shall be more than 3 million pixels.

In-text citation

Citations of references within the text should follow Citing Medicine: The NLM (National Library of Medicine) Style Guide for Authors Editors, and Publishers 2nd edition (2007) (<https://www.ncbi.nlm.nih.gov/sites/books/NBK7256/>)

Use [1], [2,3], or [4-6] in the text, and they should be listed in the Reference section in numerical order of their citation.

References

1. All references cited in the text must appear in the Reference section, and all items in this section shall be cited in the text. References cited in the manuscripts such as meta-analyses and systematic reviews are presented in the appendix. Authors are responsible for the accuracy and completeness of their references and correct text citations.
2. State Journal's full name (e.g., Research in Community and Public Health Nursing). The sequence is authors, the title of the paper, journals name, year published, and volume, followed

by page numbers and the Digital Object Identifier (if it is available). For citation from other sources, refer to The NLM Style Guide for Authors, Editors, and Publishers 2nd ed. (2007) (<https://www.ncbi.nlm.nih.gov/books/NBK7256/>).

3. If the number exceeds six, list only the first six authors followed by et al. shall be given.

Journal article:

1. Cho OH, Yoo YS, Kim NC. Efficacy of comprehensive group rehabilitation for women with early breast cancer in South Korea. *Nursing & Health Sciences*. 2006; 8(3): 140-146. <https://doi.org/10.1111/j.1442-2018.2006.00271.x>
2. Bang KS, Kang JH, Jun MH, Kim HS, Son HM, Yu SJ, et al. Professional values in Korean undergraduate nursing students. *Nurse Education Today*. 2011;31(1):72-75. <https://doi.org/10.1016/j.nedt.2010.03.019>

Forthcoming journal articles (articles published electronically ahead of the print version):

3. Scerri J, Cassar R. Qualitative study on the placement of Huntington disease patients in a psychiatric hospital: Perceptions of Maltese nurses. *Nursing & Health Sciences*. 2013. Forthcoming.

Periodicals or magazines:

4. Rutan C. Creating healthy habits in children. *Parish Nurse Newsletter*. 2012 May 15:5-6.

Newspaper articles:

5. Cho C. Stem cell windpipe gives Korean toddlers new life. *The Korea Herald*. 2013 May 2; Sect. 01.
6. Lyderson K. Risk of disease rises with water temperatures. *Washington Post* [Internet]. 2008 Oct 20 [cited 2008 Dec 19]:A08. Available from: <http://www.washingtonpost.com/wp-dyn/content/article/2008/10/19/AR2008101901533.html> Article includes a correction.

Books:

7. Peate I. *The student's guide to becoming a nurse*. 2nd ed. Chichester WS: John Wiley & Sons; 2012. 660 p.

Parts of books (chapter):

8. Reed JG, Baxter PM. *Library use: handbook for psychology*. 3rd ed. Washington: American Psychological Association; c2003. Chapter 2, Selecting and defining the topic; p. 11-25.

Entire book on the Internet

9. Peterson K. *Guide to life science careers* [Internet]. Cambridge: NPG Education; c2014 [cited 2020 Jul 2]. Available from: <https://www.nature.com/scitable/ebooks/guide-to-life-science-careers-14053951/>.

Scientific and technical reports:

10. Perio MA, Brueck SE, Mueller CA. Evaluation of 2009 pandemic influenza A (H1N1) virus exposure among internal medicine house staff and fellows. *Health Hazard Evaluation Report*. Salt Lake City, Utah: University of Utah School of Medicine, 2010 October. Report No.: HETA 2009-0206-3117.

Dissertations and theses (This journal does not recommend citing dissertations or theses. If necessary, less than three should be cited.)

- Doctoral dissertation:

11. Jin HY. A study on the analysis of risk factors and characteristics for nosocomial infection in intensive care unit [dissertation]. [Seoul]: Yonsei University; 2005. 108 p.

- Master's thesis:

12. Kim JS. A study on fatigue, stress and burnout of pregnancy nurses [master's thesis]. [Gwangju]: Chonnam National University; 2012. 50 p.

Papers and poster sessions presented at meetings

- For a paper:

13. Bryar R. The primary health care workforce development roadmap. Paper presented at: The public health nursing contribution to primary health care 3rd International public health nursing conference; 2013 Aug 25-27; National University of Ireland Galway (NUIG). Galway.

- For a poster session:

14. Bigbee J. Promoting the health of the population: Public health nursing leading the way. Poster session presented at: The public health nursing contribution to primary health care 3rd International public health nursing conference; 2013 Aug 25-27; National University of Ireland Galway (NUIG). Galway.

Conference publications

15. Dostrovsky JO, Carr DB, Koltzenburg M, editors. *Proceedings of the 10th World Congress on Pain*; 2002 Aug 17-22; San Diego, CA. Seattle: IASP Press; c2003.

Citing material on the Internet

- Standard citation to an open serial database on the Internet:

16. TrialSearch [Internet]. New York: AIDS Community Research Initiative of America. c2003 - [cited 2007 Feb 1]. Available from: <http://www.acria.org/>.

- Standard citation to a retrieval system on the Internet:

17. WHOSIS: WHO Statistical Information System [Internet]. Geneva: World Health Organization. c2007 - [cited 2007 Feb 1]. Available from: <http://www.who.int/whosis/en/>.

- Standard citation to a homepage:

18. Statistics Korea. 2010 life tables for Korea [Internet]. Seoul: Statistics Korea; 2011 [cited 2012 January 16]. Available from: http://kostat.go.kr/portal/korea/kor_nw/3/index.board?bmode=read&aSeq=252533.

- Homepage with no authors or editors:

19. StatePublicHealth.org [Internet]. Washington: ASTHO; [cited 2007 Feb 23]. Available from: <http://statepublichealth.org/>.

Appendix

1. Authors should submit an appendix to show the developed final measurements in the instrument development study and a list of articles reviewed in the systematic review or meta-analysis research.

- 1) Supplementary material: Supplementary material can support and enhance your scientific research. Supplementary files offer the author additional possibilities to publish supporting applications, high-resolution images, background datasets, sound clips, and more. Please note that such items are published online exactly as they are submitted; there is no typesetting involved (supplementary data supplied as an Excel file or as a PowerPoint slide will appear as such online).
- 2) Please submit the material together with the article and supply a concise and descriptive caption for each file. If you wish to make any changes to the supplementary data during any stage of the process, please provide an updated file, and do not annotate any corrections on a previous version.
- 3) Please also make sure to switch off the "Track Changes" option in any Microsoft Office files, as these will appear in the published supplementary file(s).

Data sharing and transparency

1. This journal encourages and enables you to share data that sup-

ports your research publication, where appropriate, and enables you to interlink the data with your published articles. Research data refers to the results of observations or experimentation that validate the research findings. To facilitate reproducibility and data reuse, this journal also encourages you to share your software, code, models, algorithms, protocols, methods, and other useful materials related to the project.

2. Data generated through the participation of subjects and the public should be put to maximum use by the research community and, whenever possible, translated to deliver patient benefit. Data sharing benefits numerous research-related activities: reproducing analyses; testing secondary hypotheses; developing and evaluating novel statistical methods; teaching; aiding design of future trials; meta-analyses; helping to prevent error, fraud, and selective reporting.
3. To promote more transparent and reproducible research, we ask authors to submit a Data Availability Statement in the manuscript to help authors understand how they can access the data, code and other resources that support the research findings.
4. The following are examples of data-sharing statements:
Example 1. Data can be obtained from the corresponding author.
Example 2. Data can be obtained from the supplementary material link.
Example 3. (In the case of health care big data) Data can be obtained from (the name of the) __ repository source.

Registration of a Clinical Trial

1. A clinical trial is defined as "any research project that prospectively assigns human subjects to intervention and comparison groups to study the cause-and-effect relationship between a medical intervention and a health outcome." We encourage the prospective registration of studies. Where a study has been registered, please give the number on your title page and include the registration number within the body of the paper as appropriate.
2. The journal accepts the registration in any of the primary registries that participate in the World Health Organization International Clinical Trials Portal (<http://www.who.int/ictrp/en/>), the National Institutes of Health ClinicalTrials.gov (<https://clinicaltrials.gov/>), the International Standard Randomized Controlled Trial Number Registry (<https://www.isrctn.com/>), or the Clinical Research Information Service, Korea Disease

Control and Prevention Agency (KDCA) (<https://cris.nih.go.kr/cris/info/introduce.do>).

3. This journal follows the data sharing policy described in “Data Sharing Statements for Clinical Trials: A Requirement of the International Committee of Medical Journal Editors” (<https://doi.org/10.3346/jkms.2017.32.7.1051>). As of July 1, 2018, manuscripts submitted to ICMJE journals that report the results of interventional clinical trials must contain a data-sharing statement. Clinical trials that began enrolling participants on or after January 1, 2019, must include a data-sharing plan when registering the trial. The ICMJE’s policy regarding trial registration is explained at <http://www.icmje.org/recommendations/browse/publishing-and-editorial-issues/clinical-trial-registration.html>.
4. The journal follows the data-sharing policy described in “Data-sharing Statements for Clinical Trials: A Requirement of the International Committee of Medical Journal Editors (ICMJE)” (<https://doi.org/10.3346/jkms.2017.32.7.1051>) (<http://icmje.org/icmje-recommendations.pdf>).
5. If the data-sharing plan changes after registration, this should be reflected in the statement submitted and published with the manuscript and updated in the registry record. Based on the degree of the sharing plan, authors should deposit their data after de-identification and report the digital object identifier, or DOI, of the data and the registered site.

Reporting Guidance for Specific Study designs

For the specific study design, such as randomized control studies, studies of diagnostic accuracy, meta-analyses, observational studies, and non-randomized studies, it is recommended that the authors follow the reporting guidelines (<https://www.equator-network.org/>).

Editorial and peer-review process

1. Submitted manuscript

- 1) All contributions (including solicited articles) are critically reviewed by the Editorial Board members and reviewers. The decision to publish a paper is based on an editorial assessment and peer review.
- 2) Prereview: Initially, all papers are assessed by an editorial committee consisting of members of the editorial team. The primary purpose is to decide whether to send a paper for peer review and to give a rapid decision on those that are not put forward.

ward.

- 3) Review: Manuscripts going forward to the review process are reviewed by two or more reviewers and the editor. The Editorial Board reserves the right to refuse any material for publication. The Editor-in-Chief reserves the right to the final decision regarding acceptance. RCPHN uses a double-blinded review. The names of the reviewers will thus not be disclosed to the author submitting a paper, and the name(s) of the author(s) will not be disclosed to the reviewers.
- 4) The average time from manuscript submission to the author’s receipt of the editor’s decision about publication is approximately three months. Many excellent manuscripts are accepted, some pending minor revisions. Many other excellent manuscripts may receive a “revise and resubmit” decision.

2. Revised manuscript

- 1) When you prepare a revised version of your manuscript, you should carefully follow the instructions given in the Editor’s letter. Authors are encouraged to follow the suggestions made by the reviewers to make changes and then resubmit with a detailed letter to the editor outlining the changes made following the reviewers’ suggestions. Revised submission must also include a point-by-point response to reviewer comments and a traced-changed version of the revised manuscript.
- 2) Revised manuscripts must be uploaded within two weeks of authors being notified of conditional acceptance pending satisfactory revision.
- 3) Authors who are responsive to the reviewers’ suggestions are well placed to have their manuscripts accepted for publication.
- 4) The revised manuscript should have changes highlighted (either by using the “Track Changes” function in MS Word or by highlighting or underlining the text) with notes in the text referring to the editor or reviewer query.

After acceptance of a manuscript

1. Paper proof

- 1) RCPHN provides the corresponding author with paper proofs for their correction. The corresponding author will receive electronic page proofs to check the copyedited and typeset article before publication. Corrections should be kept to a minimum.
- 2) The Editor retains the prerogative to question minor stylistic alterations and major alterations that might affect the scientific content of the paper. Any fault found after the publication is the authors’ responsibility.

3) We urge our authors to proofread their accepted manuscripts carefully. The corresponding author may be contacted by the Editorial Office, depending on the nature of the correction in the proof.

2. Publication fee

- 1) Authors are asked to pay a fee to allow perpetual, unrestricted online access to their published articles for readers globally, immediately upon publication to cover some part of the costs associated with publication, depending on the number of pages of the published article.
- 2) The publication charges are 60,000 won (50 US dollars) per printed page.

3. Errata and Corrigenda

- 1) An erratum will be used if a significant error has been intro-

duced by us during the production of the journal article, including errors of omission such as failure to make factual proof corrections requested by authors within the deadline provided by the journal and within journal policy. A 'significant error' is one that affects the scholarly record, the scientific integrity of the article, the reputation of the authors, or of the journal.

- 2) A corrigendum is a notification of an important error made by the author(s) that affects the publication record or the scientific integrity of the paper, or the reputation of the authors or the journal.
- 3) We will publish a correction of your article if a significant or important error is discovered after publication.

Additional clauses

These regulations are effective from March 24, 2023.

Please check below items before submission of the manuscript.

Publication Ethics

- This manuscript is not duplicated, and it follows the ethical guidelines of the Research in Community and Public Health Nursing.
- Deliberation of the Institutional Ethics Committee (excludes review and editorial)

Title page

- Use the title page template.

Manuscript preparation

- Delete the personal information of the author from the file name or the contents of the manuscript.
- A4 MS word with 1- inch margin on all sides.
- The font shall be in size 12-point batang or 12 point Times New Romans font. The line spacing shall be double-spaced or 200%.
- Put page numbers at the bottom.

Abstract

- 250 words or less
- Use the sub-titles of Purpose, Methods, Results, and Conclusion.
- English keywords: Use 3 to 5 words registered in MeSH in principle.

Main text

- Title, English abstract, keywords, main text (introduction, methods, results, discussion, conclusion), reference, tables, and figures in order
- The total volume of the manuscript: 20 pages or fewer (excluding title, abstract, reference, appendix)

Reference

- Follow the instructions for authors (NLM style): including the DOI and the full name of the journal.

Tables and figures

- Follow the instructions for authors.
- They must be written in English.
- The numbers shall be the same as those in the body without typographical errors.

Statement of Copyright & Conflict of Interest

1. Transfer of copyright

If this manuscript is published in the Research in Community and Public Health Nursing, its copyright is transferred to the Korean Academy of Community Health Nursing, and the Korean Academy of Community Health Nursing will have the copyright for the concerned manuscript as well as the right to transmit the digital data. The author possesses all the rights except for the copyright, including the right to use all or a part of this manuscript for application for a patent or writing a future thesis. The author may use the material of this manuscript in another manuscript after obtaining written approval. All the authors of this manuscript made practical and intelligent contributions to this manuscript and share public responsibility for the contents of this manuscript. In addition, this manuscript has not been published by or submitted to another academic journal and is not being considered by any other academic journal.

2. Clear statement of interests

The author(s) of this manuscript clearly stated all the interests related to this manuscript, including financial interests (benefit of research funding, employment, possession of stocks, speaker's fees or consultancy fees, material support, etc.) and personal interests (concurrent position, conflict of interest, conflict in intellectual property rights, etc.).

Title of submitted manuscript: _____

Date _____

Author's Name _____ Author's Signature _____

Author's Name _____ Author's Signature _____

Author's Name _____ Author's Signature _____

Author's Name _____ Author's Signature _____

Author's Name _____ Author's Signature _____

Author's Name _____ Author's Signature _____

Author's Name _____ Author's Signature _____

Author's Name _____ Author's Signature _____

(USE A CONTINUATION SHEET IF NECESSARY FOR ADDITIONAL SIGNATURE.)

Article 1

The purpose of these guidelines is to regulate the operation of the Editorial Board (hereinafter referred to as 'the Board') organized according to Article 7 (Committee) of the Bylaws of the Korean Academy of Community Health Nursing.

Article 2

The Board has 7 to 15 members, including the Editor-in-Chief and the Executive Editor, and Associate Executive Editor.

The Editor-in-Chief organizes the Board by recommending the members and obtaining the approval of the Executive Board.

Article 3

1. (Qualifications) The Editor-in-Chief is recommended by the Directors of the Academy in the current and next terms according to the member selection criteria.
2. (Criteria for member selection) One who is experienced in publishing in journals (candidates) registered in the Korea Research Foundation; one who is experienced in publishing in international academic journals; one who is experienced in editing and reviewing for a journal registered in the Korea Research Foundation; and one who has never been subjected to disciplinary punishment related to research and publication ethics.
3. (Procedure) The Director of the Academy or the Editor-in-Chief recommends those satisfying the member selection criteria among the professors at nursing colleges (departments) throughout the country. The Editor-in-Chief then reviews and selects the member candidates of the Board. The Board of Directors approves the candidates, and the Director of the Academy appoints them as the Board members.
4. (Term) The term of the Editor-in-Chief and the members of the Board is two years, and they may be reappointed.

Article 4

The Board deliberates on and decides the following matters for publishing the Research in Community and Public Health Nursing and related academic materials and reporting the results to the Executive Board.

1. Publishing the journal
 - (1) Matters on editing

Instructions for editors

- (2) Review of received manuscripts and decision on whether to publish
- (3) Decision on the article processing charge
2. Issuing academic materials
 - (1) Matters on editing and publishing
3. Managing the quality of the Research in Community and Public Health Nursing
 - (1) Preparation for the evaluation of journal registered in the Korea Research Foundation
 - (2) Preparation for evaluation by KoreaMed
 - (3) Maintenance and management of CINAHL registration
 - (4) Maintenance and management of SCOPUS registration
4. Regulations related to publishing
5. Matters referred to by the Board of Directors

Article 5

The Board selects and manages the reviewers.

1. (Qualifications) The reviewers are selected according to the following criteria.

A reviewer should be experienced in reviewing for a journal (candidate) registered in the Korea Research Foundation, have a doctoral degree, is a university professor or in an equivalent position, and is familiar with recent advances in each research area.
2. (Number) The number of reviewers shall be around 150, including English proofreaders.
3. (Procedure) The members of the Board recommend candidates among professors at nursing colleges (departments) throughout the country who satisfy the reviewer qualifications, and the Editorial Board reviews and selects among them. The Board of Directors approves them, and the Director of the Academy appoints them as reviewers.
4. (Term) The term of a reviewer is two years, and they may be reappointed.
5. (Special reviewer) If external reviewers are required for a special review of a dissertation, the Editor-in-Chief may appoint special reviewers and entrust them with the review of the dissertation.
6. The review of the manuscript follows separate regulations on review.

Additional Clauses

These guidelines were effective from March 24, 2023.

Title: _____

Rate this manuscript on the following criteria using the scale of 1 (lowest) to 5 (highest), then enter your comments in the text boxes below.

Items	Score					
	1	2	3	4	5	N/A
Originality of the contribution						
Well written: organized, correct grammar and punctuation						
Significance to population health, nursing practice, and nursing science						
Research Question(s) and Purpose of Study: clearly explicated?						
Methodology: appropriate research design used and described in depth; setting(s) and selection criteria of the participants adequately described; valid and reliable instruments used; ethical issues considered; IRB approval acknowledged						
Findings: comprehensive and clearly described; linked with research questions; tables used appropriately and constructively						
Discussion/Conclusions: based on the data presented; linked with the current literature						
Reference: Does the research mostly use recently published references?						

Date : _____

Reviewer : _____

We believe that peer review is the foundation for safeguarding the quality and integrity of scientific and scholarly research. This is a guideline for reviewers who voluntarily participate in the peer review process of Research in Community and Public Health Nursing (RCPHN). All of the journal's contents including commissioned manuscripts are subject to peer-review.

1. According to the Bylaws of the Korean Academy of Community Health Nursing and the Regulations on the Editorial Board of KACHN, these guidelines are provided for the review of manuscript submitted to RCPHN.
2. Manuscripts are reviewed and accepted according to these guidelines
3. Manuscripts to be reviewed should be research papers related to community nursing, and dissertations for a master's or doctoral degree goes through the same review procedure. However, the reviewing process may be different in the case of special papers that are contributed to the development of community and public health nursing.
4. Manuscripts not complying with the qualifications and regulations related to the contribution will be rejected.
5. Role of the reviewers: The peer-reviewer's role is to advise editors on individual manuscript to revise, accept, or reject. Judgments should be objective, and comments should be described lucidly. Scientific soundness is the most important value of the journal. Therefore, logic and statistical analysis should be considered meticulously. The use of reporting guidelines is recommended for review. Reviewers should have no conflicts of interest. Reviewers should point out relevant published work that is not yet cited. Reviewed articles are managed confidentially. The editorial board is responsible for the final decision to accept or reject a manuscript based on the reviewers' comments..
6. How to become a reviewer: Reviewers are usually invited by the editorial board or recommended by authors. Anyone who wishes to work voluntarily as a reviewer can contact the editorial office.
7. Two or more reviewers are assigned to each manuscript and the reviewers are appointed by the Editorial Board.
8. Accepting an invitation to review: The Editors will invite you to review because they believe that you are an expert in a certain area. They would have judged this from your previous publication record or conference/posters sessions. Before you

Instructions for reviewers

accept an invitation to review a paper, you should consider The following:

· Are you qualified?

You should decline to review the manuscript if it is too far outside your area.

· Do you have time?

If review comments cannot be submitted within the three weeks review period, please decline to review the manuscript or ask for an extension.

· Are there any potential conflicts of interest?

In case of any conflicts of interest, the reviewer should decline to review. The conflicts of interest should be disclosed if the reviewer still wishes to review.

9. Double Blind Peer Review: RCPHN adopts double blind review which means that the reviewer cannot identify author information and authors cannot identify reviewers, too.
10. Manuscript are reviewed according to the 'criteria for review'. The reviewer writes their review comments
 - 1) Criteria for review: Review table with 8 items (Originality, Well written, Significance, Research Question(s) and Purpose of Study, Methodology, Findings, Discussion/Conclusions, and References) using the scale of 1 (lowest) to 5 (highest) (if it is not applicable, check N/A) is provided for the reviewer's convenience.
 - 2) Comment to authors: Summarize the whole content of the manuscript in one sentence. Mention the strengths of the manuscript, and any problems that make you believe it should not be published, or that would need to be corrected to make it publishable.
 - 3) Comment to editor: Both the strength and weaknesses of the manuscript should be added. The reviewer's recommendation on acceptance may be added here, including any other opinions to the editor.
11. Ethical Guidelines for Reviewers
 - 1) Any information acquired during the review process is confidential.
 - 2) Please inform the editor of any conflicts of interest, such as
 - Reviewer is a competitor.
 - Reviewer may have some antipathy with the author(s).
 - Reviewer may profit financially from the work.In case of any of the above conflicts of interest, the reviewer should decline to review. The conflicts of interest

should be disclosed if the reviewer still wishes to review. A history of collaboration with the authors or any intimate relationship with the authors does not preclude the review.

- 3) Reviewer should not use any material or data originating from the manuscript in review; however, it is possible to use the open data of the manuscript after publication.
12. The review procedures are as follows:
- 1) The Editor-in-Chief chooses two or more reviewers and one editor online based on their research specialty.
 - 2) The reviewers examine the manuscript online and input the evaluation results, what to revise, and what needs to be supplemented in three weeks.
 - 3) The reviewers should keep confidential the fact that they have reviewed the manuscript.
 - 4) The results of the review by the two or more reviewers are deliberated by the editorial board, and the editorial Board makes the final decision.
13. Based on the review, the reviewers make general opinions and detailed reports, and decide one of the following: 'Accept,' 'Minor Revision,' 'Major Revision,' and 'Reject.'
14. Based on the two or more reviewers' review results, the Editorial Board decides whether to accept the manuscript.
- 1) Accept: Accept without revision.
 - 2) Minor Revision: The authors should revise as commented by the reviewers, and the reviewers confirm the revisions.

- 3) Major Revision: The authors should revise as commented by the reviewers, and the reviewers review the manuscript and decide whether to accept it.
- 4) Reject: Only if the contents of the manuscript fall into any of the cases listed below:
 - ① The research theme is not original or lacks the significance of nursing.
 - ② The contents are plagiarized from previous studies.
 - ③ The reliability or validity of the research results is questioned.
 - ④ In the evaluation criteria, more than 30% of the items were graded 'Lowest.'
 - ⑤ It is considered impossible to revise.
15. The contents of the review shall not be disclosed to anybody other than the author.
16. The editorial board finally decides whether to publish the manuscript by combining the review results of the two or more reviewers and the review results of the editors.
17. If the authors fail to submit a revised manuscript within two weeks from the date of revision request by the Board, it is regarded as being withdrawn (If the author requests an extension, the due date may be extended for another month).

Additional Clauses

These regulations are effective from March 24, 2023.

2006년 12월 12일 전면 개정

2011년 12월 10일 개정

2017년 01월 16일 개정

2017년 12월 14일 개정

2018년 12월 20일 개정

2022년 02월 21일 개정

제1장 총칙

제1조 (명칭) 본회는 한국지역사회간호학회라 칭한다.

제2조 (목적) 본회는 지역사회 간호학의 학문적 발전을 위해 교육과 연구에 관한 학술과 정책 활동을 도모하고 회원간 학술적 교류를 목적으로 한다.

제3조 (사무소 소재지) 본회 사무소는 본회 학회장 소속 기관에 둔다.

제4조 (사업) 제1장 제2조의 목적을 달성하기 위하여 다음의 사업을 행한다.

1. 연구 활동
2. 국내외 학술활동 및 교류
3. 학술 및 홍보활동
4. 학회지 발간 및 출판사업
5. 간호교육 발전을 위한 활동
6. 기타사업

제2장 회원

제5조 (회원자격)

- ① 본회회의 회원은 본 법인에 등록을 마친 자로 한다.
- ② 본회회의 회원은 다음과 같이 구분한다.
 1. 정회원은 간호학을 전공한 자로서 학사학위 이상의 소지자로 한다.
 2. 준회원은 본회회의 목적에 동의하는 자로 한다.
 3. 명예회원은 간호학 발전에 공헌이 있는 개인 혹은 기관으로서 실행이사회에서 추대된 자로 한다.

제6조 (회원의 권리와 의무)

- ① 본회회의 회원은 정관을 준수하고 다음과 같이 소정의 회비 납부와 본회회의 사업에 적극 참여할 의무를 갖는다.
 1. 정회원과 준회원은 입회비 및 회비를 본회회에 납부하여야 한다.
 2. 정회원은 선거권과 피선거권을 갖는다. 단, 선거예정일로부터 1년 이상 정회원 자격을 유지한 자로 한다.
 3. 회원은 본회회가 제공하는 학회지, 학술정보 등 각종혜택을 받을 권리를 갖는다.

- ② 본회회의 회원은 1개 이상의 회원 학회에 가입할 수 있으며 회원이 회원 학회에 복수가입을 원할 경우에는 온라인 가입 후 복수회비를 본 법인에 납부하여야 한다.

제7조 (회원의 탈퇴)

- ① 회원은 회장에게 탈퇴의사를 서면으로 통고함으로써 본 법인을 임의로 탈퇴할 수 있다.
- ② 회원이 탈퇴해도 이미 납부한 회비는 반환되지 않는다.

제8조 (회원의 제명)

본회회의 회원으로서 본 법인의 목적에 배치되는 행위 또는 명예·위신 등의 손상을 가져오는 행위를 하였을 때에는 이사회의 의결로써 회장이 제명할 수 있다.

제3장 조직 및 임원

제9조 (임원) 본회에는 다음과 같은 임원을 둔다.

1. 회장 1명
2. 부회장 1명
3. 총무이사 1명
4. 서기이사 1명
5. 재정이사 1명
6. 학술이사 1명
7. 교육이사 1명
8. 편집이사 1명
9. 출판이사 2명
10. 홍보이사 1명
11. 국제교류이사 2명
12. 정책이사 1명
13. 감사 2명
14. 당연직 이사

제10조 (임원의 직무)

1. 회장은 본회를 대표하고 회무를 정리하며, 본회회의 의장이 된다.
2. 부회장은 회장과 협력하여 본회회의 제반 사업 활동을 처리한다.

3. 총무이사는 본회의 일반 제질 활동을 총괄한다.
4. 서기이사는 본회의 회의록을 기록하고, 보고하며, 제반 서류를 보관한다.
5. 재정이사는 본회의 재정을 담당한다.
6. 학술이사는 본회의 학술활동을 총괄한다.
7. 교육이사는 본회의 교육활동을 총괄한다.
8. 편집이사는 본회의 학술활동을 위한 출판을 총괄한다.
9. 출판이사는 본회의 문예은행 관리, 출판활동을 총괄한다.
10. 홍보이사는 본회의 홍보활동을 담당한다.
11. 국제교류이사는 본회의 국제교류활동을 담당한다.
12. 정책이사는 본회 관련된 정책 활동을 담당한다.
13. 감사는 본회 회무 및 재정을 담당한다.
14. 당연직이사는 분야별 학회장과 단체의 장, 지역 지부장으로 한다.

제11조(위원회, 지부, 분야별 학회와 분야별 단체)

1. 본회의 조직과 활동을 위해 별도의 위원회를 둘 수 있다. 위원회의 운영에 관해서는 별도의 규정을 둔다.
2. 본회는 지부, 분야별 학회, 분야별 단체를 둘 수 있다.
3. 지부, 분야별 학회 및 분야별 단체의 운영을 위하여 별도의 규정을 둔다.

제12조(임원의 선임)

1. 회장은 총회에서 출석인원 과반수의 득표로 선출한다.
2. 부회장은 차기 회장 지역의 지역사회 간호학 교수 중 추대된 자로 한다.
3. 감사는 총회에서 선출하되 다수득표자로 정한다.
4. 임원(총무, 학술, 정책, 교육, 편집, 출판, 서기, 재정, 홍보, 국제교류)은 회장이 정하고 재적 총투표자의 다수결에 의한다.

제13조 (임원의 임기)

1. 임원의 임기는 2년이다.
2. 임원의 동일한 직에 1회에 한하여 중임할 수 있다. 임원 중 결원이 있을 때에 회장을 제외하고는 임원회에 서 이를 보선하며 임기는 잔여기간으로 한다.

제4장 회의

제17조 (구성) 본회는 정기총회, 임시총회, 이사회를 둔다.

제18조 (총회의 소집)

정기총회는 매년 12월, 임시총회는 회장이 필요하다고 인정하였을 때 또는 회원 3분의 1이상의 요구가 있을 때 회장이 이를 소집한다.

제19조(총회의 기능)

정기총회는 다음사항을 관장한다.

1. 회칙개정
2. 예산, 결산
3. 임원선거
4. 사업계획
5. 기타 안전 토의

제5장 재정

제21조(재정) 본회의 재정은 다음과 같이 충당 한다.

한국간호과학회로부터 본회에 등록된 회원의 연회비 증일정액을 지급받는다. 지급받은 회비와 찬조금, 기타 사업조성금으로 재정을 충당한다.

제22조(회계연도) 본회의 회계연도는 12월 1일부터 11월 30일로 한다.

부칙

제1조 본회 회칙은 총회 재적 3분의 2이상의 결의로서 수정할 수 있다.

제2조 본회 회칙은 정기총회에서 개정통과일로부터 시행한다.

제3조 기타 본 회칙에 규정되지 아니한 사항은 일반 관례에 따른다.

제4조 한국간호과학회의 인준을 받은 후 2018년 1월 1일부터 시행한다.

부칙 <2018.12.20.>

제1조 (시행일)

본 회칙은 한국간호과학회의 인준을 받은 날로부터 시행한다.