Development and Assessment of an ICT-Based Non-Face-to-Face Lifestyle Program to Improve the Mental Health of Older Adults: A Pilot Study

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Abstract

Objective : This study aimed to develop an information and communication technology (ICT)-based, non-face-to-face lifestyle program for older adults and assess its applicability.

Methods : The program was developed on the basis of the ADDIE model which comprises 5 stages: analysis, design, development, implementation, and evaluation. In this study, a step-by-step identification was performed in 8 stages.

Results : The results of the program analysis showed a significant decrease in depressive symptoms and loneliness scores, and an increased quality of life scores.

Conclusion : The findings suggest that the ICT-based non-face-to-face lifestyle program developed in this study can motivate older adults to better understand their lifestyles for successful aging, while helping senior citizen centers resume stagnant projects.

Keywords : ADDIE model, Information and communication technology, Lifestyle, Older adults, Quality of life

Ⅰ. Introduction

In 1974, Canadian Health Minister Lalonde presented human ecology, lifestyle, environment, and healthcare systems as health determinants in a Canadian health report, which shifted the direction of health policies from a treatment-oriented approach to that focused on the prevention of disease and early death (Lee, 2020). Then, in 1978, the World Health Organization issued the Alma-Ata Declaration, stressing the need for a lifestyle- and healthcare-based approach to improving the health of the entire human population (Kim, 2019). As lifestyle is a major factor of health outcomes, it has been used as a basis to establish several health policies globally, and research into lifestyle and its related factors is continuously being conducted. In addition, lifestyle as a factor in the field of occupational therapy was newly added to the fourth edition of the Occupational Therapy Practice Framework 4th to emphasize its importance (American Occupational Therapy Association, 2020).

Consequently, most countries have been focusing on lifestyle and healthy habits to prevent diseases and improve health, particularly in older adults (Ministry of Health and Welfare, 2020). From this preventive point of view, a healthy lifestyle is considered important for a healthy life. A healthy lifestyle is closely related to the prevention of health problems and reflects an individual's overall health status.

Lifestyle-based interventions are the most appropriate approach to address older adults' mental and physical health problems, and it is important to continue implementing lifestyle-related approaches, rather than one-time welfare services for older adults. Since lifestyle and physical, mental, and social health are closely related to each other, they also affect the overall health status of older adults (Menichetti et al., 2016). Older adults' lifestyle consists of lifestyle habits and characteristic behaviors of old age, which establish the values for older adults. Furthermore, lifestyle is reported to be a major factor in approximately 80% of older adults' health problems along with health promotion activities, and 50% of the 10 major factors (ex., ischemic heart disease, stroke, chronic obstructive pulmonary disease, lower respiratory infections, neonatal conditions) associated with higher mortality rates are closely related to lifestyle (Lee, 2019).

For older adults, a healthy lifestyle is imperative to not only maintain their health status but to also ensure that their activities of daily living are carried out without the help of others; these in turn have positive effects on their quality of life (Lee, 2015). Studies have shown that a healthy lifestyle is associated with a higher quality of life, suggesting that unhealthy lifestyle habits, such as poor physical activity, unbalanced diet, smoking, and alcohol consumption, can result in physical and mental health problems such as depression and loneliness (Yang, 2021). According to a study by Ohrnberger et al. (2017), it is important to increase physical activity levels in older adults; moreover, they emphasize the positive influence of lifestyle on depression, anxiety, stress, and psychological loneliness in older adults. In addition, Park et al. (2019) reported on the necessity of lifestyle and its management through physical activity, participation in activities of daily living, and dietary habits to improve older adults' health and quality of life.

Based on the findings from studies on the

coronavirus disease 2019 (COVID-19) pandemic, lifestyle-based specialized quality welfare services are needed to prevent older adults' problems. In particular, given how non-face-to-face activities have taken precedence over face-to-face activities due to COVID-19, interventions for older adults using information and communication technology (ICT) have become a topic of recent studies, particularly in the healthcare field, along with the development of modern industries. In the field of healthcare, ICT can be applied to promote older adults' health without any problems, and participation in activities involving direct interaction with people and indirect involvement in tasks can improve the quality of life of older adults (Cotten et al., 2013; Ihm & Hsieh, 2015). In addition, ICT has fewer time constraints than do existing health services; thus, health care workers can easily monitor the condition of older adults and provide appropriate interventions, thereby increasing the opportunity for older adults to receive quality services (Kim & Shin, 2015; Shin et al., 2020). In addition, Guner and Acarturk (2020) reported increased life satisfaction in older adults using familiar ICT-based devices in their daily lives. Moreover, previous studies related to older adults have reported a wide range of positive outcomes, including the development of ICT-based programs to enhance health care in old age, reduction of depressive symptoms and improvement of psychological stability, and improvement of familial and social relationships (Cotten et al., 2014; Vassli & Farshchian, 2018). Consequently, ICT-based may be deemed appropriate for elderly individuals who face significant temporal and spatial limitations preventing them from accessing welfare resources. This research posits that ICT-based initiatives are poised to facilitate the realization of more efficient lifestyles, particularly by offering proactive health prevention strategies tailored to the needs of senior individuals (Eom, 2005). Thus, it is meaningful to develop programs tailored to older adults, based on ICT, particularly during the ongoing pandemic.

To successfully promote the health of older adults with poor physical and mental health management, especially at a time when the health of older adults is at a higher risk owing to their susceptibility to the COVID-19, this study aimed to develop an ICT-based non-face-to-face program focusing on the lifestyle aspect, which directly affects older adults' mental health.

II. Methods

1. Procedure

The ICT-based non-face-to-face lifestyle program for improving the mental health of older adults was based on the ADDIE model, which is the most common teaching system with maximum known efficiency. While the program developed in this study is not educational, it is predicated upon the dissemination of knowledge. Consequently, the ADDIE model was employed on the premise that a program designed upon an educational framework is likely to be more efficacious for the intended participants. The ADDIE model consists of five stages: analysis, design, development, implementation, and evaluation (Allen, 2017). The following steps were carried out in this study: 1) analysis of the supply system and status of senior centers' programs through a literature review and field demand

analysis, 2) obtaining expert advice based on the results of the literature review and field demand analysis, 3) design of the direction of the program, 4) development of the ICT-based non-face-to-face lifestyle program, and 5) assessment of the effectiveness of the program (Figure 1). This study was conducted after approval from Yonsei University's Mirae Campus Institutional Review Board (approval number: 1041849-202108-BM-134-01).

This program comprises 12 sessions across four sub-themes: physical activity, diet, mental health management, and healthy aging. The ICT-based non-face-to-face lifestyle program conducted in this study was delivered using a video conference program rather than traditional in-person interactions between the researcher and participants. Furthermore, comprehensive session-specific materials were compiled into kits and distributed to participants prior to the commencement of the program and during the preliminary assessment phase. Upon the
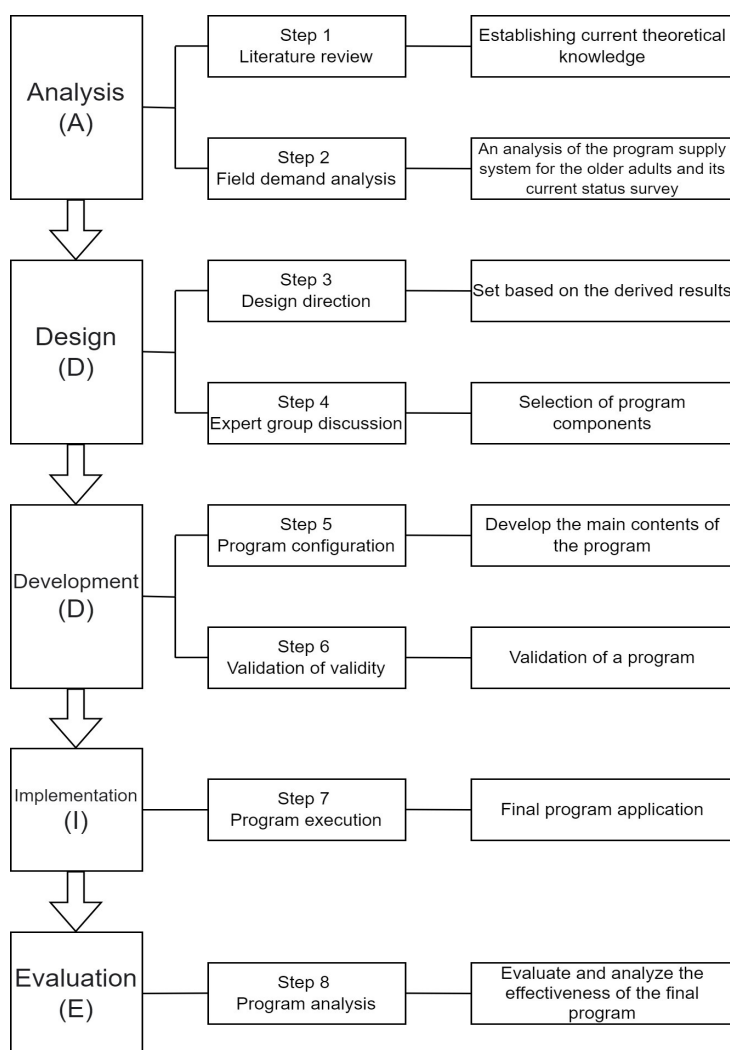

Figure 1. Information and Communication Technology-Based Non-Face-to-Face Lifestyle Program Development Process

scheduled initiation of the program, the researcher established a connection with the participants through the video conferencing platform to facilitate the remote program delivery. Based on the lifestyle redesign program, after completing each activity, we sought to improve the understanding of the activity through a general discussion among the participants and a presentation of their personal experiences. Before the program onset, a booklet was produced and distributed to record each participant's occupational performance. Since the activities performed in each hour of the day were recorded, it was possible to objectively analyze duration, as opposed to a lifestyle assessment scale, which is a subjective evaluation (Appendix 1).

2. Participants

The participants of this study were five older adults recruited from senior citizen centers and institutions located in Wonju-si, Gangwon-do. The inclusion criteria were: 1) Those aged 65 years or older, 2) those who did not have difficulties in activities of daily living, and 3) those who understood the study and agreed to participate.

3. Assessment tool

1) Korean version of the Center for Epidemiologic Studies Depression Scale (Korean version of the CES-D)

The Korean version of the CES-D was used to determine the severity of depressive symptoms in the participants. Based on a study by Ham (2017), the following sub-factors of the CES-D were assessed: depressed affect (7 items), positive affect (4 items),

somatic complaints (7 items), and interpersonal problems (2 items) (Ham, 2017). Responses are made using a 4-point Likert scale, with the total score ranging from 0~60. Higher scores indicate more severe depressive symptoms. Scores ranging from 0~15 indicate mild depressive symptoms, whereas those ranging from 24~60 indicate severe depressive symptoms. In this study, items on positive affect were reverse scored. In a study by Chon and Rhee (1992), the internal consistency of the Korean version of the CES-D was 0.89, and the reliability coefficient (Cronbach's α) for all items was .931.

2) Korean version of the World Health Organization Quality of Life-Brief (Korean version of the WHOQOL-BREF)

The Korean version of the WHOQOL-BREF was used to assess the participants' quality of life. Based on a study by Sim (2008), the Korean version of the WHOQOL-BREF consists of 5 sub-factors: overall quality of life and satisfaction (2 items), physical health (7 items), psychological health (6 items), social relationship (3 items), and environment (8 items) (Sim, 2008). The total score ranges from 26~130 points, and higher scores indicate better quality of life. Each item is rated on a 5-point Likert scale with the following anchors: 5 = "Always," 4 = "Sometimes," 3 = "Neutral," 2 = "Rarely," and 1 = "Never." Negative items were scored minus 6 points. The reliability coefficient (Cronbach's α) of the Korean version of the WHOQOL-BREF is .898.

3) Korean version of the Revised University of California, Los Angeles (UCLA) Loneliness Scale

The Korean version of the Revised UCLA Loneliness Scale was used to measure the loneliness

level of the participants. Based on a study by Lee (2017), the Korean version of the UCLA Loneliness Scale consists of 20 items across three sub-factors: a lack of intimacy (11 items), a lack of social neighbors (5 items), and a lack of belonging (4 items) (Lee, 2017). Each item is rated on a 4-point Likert scale with the following anchors: 4 = "Always," 3 = "Sometimes," 2 = "Rarely," and 1 = "Never." The total score ranges from 20~80, with higher scores indicating a greater sense of loneliness. The scale consists of 10 positively and 10 negatively worded items; the positively worded items are summed after inverse scoring them. The reliability coefficient of the Korean version of the UCLA Loneliness Scale (Cronbach's α) is .907.

4. Statistical analysis

Data were analyzed using the IBM SPSS Statistics 26 program (Statistical Package for the Social Sciences; 2019; IBM Corp.). The Wilcoxon signed-rank test method was used to analyze any significant differences in depressive symptoms, quality of life, and the degree of loneliness before and after delivering the developed program. For all statistical analyses, $p < .05$ indicated significance.

III. Results

1. Participants

Of the five participants, four were women (80.0%), and the ages of the participants ranged from 66~83 years. Most participants' educational level was elementary school, and only one graduated from middle school. Most participants lived alone, and only one participant was living with her husband. Although the participants had old-age-related diseases, such as blood cancer, renal failure, osteoporosis, high blood pressure, and stomach ulcer, none of the participants had difficulties participating in daily life activities or the experiments (Table 1).

2. Changes in the severity of depressive symptoms

Participants reported a significant decrease in the scores on most of the CES-D items. This suggests that the developed program could effectively reduce depressive symptoms in older adults. In addition, a high negative ranking indicates severe depressive symptoms before the program, and a high positive ranking indicates severe depressive symptoms after the program. In this study, a negative ranking value

Table 1. Demographic Characteristics of Participants

No.	Gender	Year of birth	Education	Spouse	Cohabiting family	Holding disease
1	Woman	1944	Elementary school graduation	Yes	Husband	No
2	Woman	1940	Drop out of elementary school	No	Living alone	Blood cancer, renal failure, osteoporosis
3	Woman	1946	Elementary school graduation	No	Living alone	No
4	Woman	1947	Middle school graduation	No	Living alone	High blood pressure, stomach ulcer
5	Man	1957	Drop out of elementary school	No	Living alone	Osteoporosis

of 5 and a positive ranking value of 0 indicate severe depressive symptoms before the program but a significant reduction in depressive symptoms after the program. The specific differences in the four sub-factors of the CES-D are described ahead (Table 2).

First, there was a significant difference in the severity of depressed affect (z = -2.121, p = .034). That is, there was a significant decrease in the depressed affect scores after participation in the lifestyle program than before participation. This suggests that the program effectively reduced depressed affect in the older adults. Second, there was a significant improvement in the positive affect scores after participation than before participation (z = -2.023, p = .043). This suggests that the lifestyle program effectively improved the positive affect of the older adults. Third, there was a significant difference in somatic complaints (z =-2.032, p = .042); that is, participants showed a significant decrease in somatic complaints scores after participation than before participation. Thus, the program effectively decreased somatic complaints in the older adults.

3. Changes in the level of Quality of Life

The total WHOQOL-BREF scores indicated a significant increase in the quality of life following the program, indicating the program's effectiveness. In addition, a high negative ranking indicates a high quality of life before the program, and a high positive ranking indicates a low quality of life after the program. In this study, the negative rank value of the quality of life level was 0, and the value of the positive rank was 5, indicating that while the quality of life before the program was low, it

significantly increased after the program. The specific differences in the five sub-factors of the WHOQOL-BREF are described ahead (Table 3).

First, there was a significant difference in the overall quality of life and life satisfaction (z = -2.060, p = .039). In particular, there was a significant increase in participants' quality of life and life satisfaction scores after participating in the lifestyle program compared with before participating. Second, there was a significant difference in physical health (z = -2.023, p = .043); that is, participants reported a significant increase in physical health after participation in the lifestyle program than before participation. Third, participants reported a significant increase in psychological health after participation in the lifestyle program than before participation (z = -2.041, p = .041). Fourth, there was a significant difference in social relationship (z = -2.032, p = .042); participants showed a significant increase in social relationship scores after participating in the lifestyle program than before participating. Fifth, the lifestyle program increased older adults' environment scores significantly compared with before participation (z = -2.032, p = .042).

4. Changes in loneliness levels

The ICT-based non-face-to-face lifestyle program significantly decreased participants' loneliness scores on most items of the Korean UCLA Loneliness Scale. In addition, a high negative ranking value indicates severe loneliness before the program, whereas a high positive ranking indicates severe loneliness after the program. In this study, the negative and positive rank values for loneliness were 5 and 0, respectively, indicating that while the degree

Table 2. Comparison of Program Pre- and Post-CES-D Results

Participants	Pre-CES-D					Post-CES-D				
	Depressed affect	Positive affect	Somatic complaints	Interpersonal problems	Total	Depressed affect	Positive affect	Somatic complaints	Interpersonal problems	Total
1	10	6	1	3	30	5	1	4	3	13
2	12	4	6	4	36	5	0	7	0	12
3	11	9	8	1	29	4	0	5	1	10
4	12	3	5	2	32	5	1	4	1	11
5	13	6	4	5	38	6	0	7	1	14
Mean ± SD	11.60 ± 1.14	5.60 ± 2.30	12.80 ± 3.27	3.00 ± 1.58	31.80 ± 6.57	5.00 ± 0.71	0.40 ± 0.55	5.40 ± 1.52	1.20 ± 1.10	12.00 ± 1.58
z						-2.121	-2.023	-2.032	-1.633	-2.032
p						.034*	.043*	.042*	.102	.042*

CES-D = Center for Epidemiologic Studies Depression Scale; SD = standard deviation.
* $p < .05$.

Table 3. Comparison of Program Pre- and Post-WHOQOL-BREF Results

Participants	Pre-WHOQOL-BREF						Post-WHOQOL-BREF					
	Overall quality of life and satisfaction	Physical health	Psychological	Social relationship	Environmental	Total	Overall quality of life and satisfaction	Physical health	Psychological	Social relationship	Environmental	Total
1	6	21	17	17	25	77	8	31	21	9	31	100
2	5	19	16	16	18	64	7	24	20	9	25	85
3	5	20	14	14	15	60	8	29	20	7	23	87
4	4	10	13	13	19	53	8	21	19	8	24	80
5	5	17	13	13	17	58	7	23	21	10	25	86
Mean ± SD	5.00 ± 0.71	17.40 ± 4.40	14.60 ± 1.82	14.60 ± 1.82	18.80 ± 3.77	62.40 ± 9.07	7.60 ± 0.55	25.60 ± 4.22	20.20 ± 0.84	8.60 ± 1.14	25.60 ± 3.13	87.60 ± 7.44
z							-2.060	-2.023	-2.041	-2.032	-2.032	-2.032
p							.039*	.043*	.041*	.042*	.042*	.042*

SD = standard deviation; WHOQOL-BREF = World Health Organization Quality of Life-Brief.
* $p < .05$.

Table 4. Comparison of Program Pre- and Post-UCLA Loneliness Scale Results

Participants	Pre-UCLA Loneliness Scale				Post-UCLA Loneliness Scale			
	Lack of intimacy	Lack of social neighbors	Lack of belonging	Total	Lack of intimacy	Lack of social neighbors	Lack of belonging	Total
1	28	13	12	53	20	10	7	37
2	30	12	15	57	19	10	7	36
3	27	14	9	50	16	9	9	34
4	32	15	13	60	18	12	5	35
5	31	18	13	62	20	8	9	37
Mean ± SD	29.60 ± 2.07	14.40 ± 2.30	12.40 ± 2.19	56.40 ± 4.93	18.60 ± 1.67	9.80 ± 1.48	7.40 ± 1.67	35.80 ± 1.30
z					-2.060	-2.032	-1.841	-2.041
p					.039*	.042*	.066	.041*

SD = standard deviation; UCLA = University of California, Los Angeles.
*$p < .05$.

of loneliness before the program was severe, it decreased after the program and improved significantly. The specific differences in the 3 sub-factors of the Korean UCLA Loneliness Scale are described ahead (Table 4).

First, there was a significant difference in the lack of intimacy scores ($z = -2.060$, $p = .039$). That is, the lack of intimacy was significantly reduced after participating in the lifestyle program than before participating. Second, there was a significant difference in the lack of social neighbors scores ($z = -2.032$, $p = .042$); that is, participants reported a significant decrease in the lack of social neighbors score after participating than before participating.

IV. Discussion

This study developed an ICT-based non-face-to-face lifestyle program for older adults, focusing on physical activity, diet, mental health management, and healthy aging, and investigated the applicability of the program for older adults. In addition, through expert advice, the design direction of the program, the development of the subject area of the program, and the program's strategic goals were selected.

In this study, to improve the mental health of older adults, older adults were educated about the definitions of lifestyle, daily living activities, and mental health disorders, such as loneliness and depression. Compared with existing studies on lifestyle interventions that focus on one-way education of the intervention provider and lifestyle change, it is important to link the overall discussion and personal experiences of the intervention provider and recipient. This approach is considered more effective in cultivating a healthy lifestyle.

Physical activities for older adults, such as gymnastics to prevent dementia, can help decrease rigidity in everyday activities and improve mental health. This is consistent with Kim (2014)'s report that physically active people show a 20%~30% reduction in depression levels compared with inactive people and that physical activity significantly improves depression in those aged 60 years or higher, among three levels of physical activity based on the International Physical Activity Questionnaire (Kim, 2014). In addition, Kim (2018) confirmed that

the dietary risks caused by improper nutritional intake in older adults are related to psychological symptoms and low quality of life. Appropriate nutrition is important for older adults' mental and physical health status. Dietary-related activities were added based on what was considered necessary.

The effectiveness of this program was investigated by assessing participants' degree of loneliness, depressive symptoms, and quality of life as dependent variables. This program is different from existing occupational therapy programs in that it assessed not only the known correlations between lifestyle, depression, and quality of life but also measured the degree of loneliness using a tool not typically used in the existing occupational therapy program interventions. It is possible to analyze the impact of the lifestyle program by analyzing the level of loneliness in older adults, who have limited opportunities for social participation, particularly during voluntary isolation periods due to the COVID-19 pandemic.

Further, in this study, the Korean version of the CES-D was used to measure older adults' depressive symptoms. In addition, among the sub-factors of this scale, there were significant decreases in depressed affect, positive affect, and somatic complaints. This result is an important indicator of the effectiveness of the developed program, and it can be applied to improve positive affect in those with depressive symptoms. However, there was no significant difference in interpersonal problems among the sub-factors. This means that the program developed in this study is a non-face-to-face program, and although the program activities may have had a positive effect on depressive symptoms and somatic complaints, it cannot provide a sufficient experience of direct meetings. Although the participants of this

study did not have a disease that made it impossible for them to perform daily activities, the average CES-D score in this study was 33, which is higher than the CES-D cutoff score of 24 for severe depressive symptoms. This is consistent with a previous study showing that depressed patients have poor interpersonal relationships (Joiner et al., 1999). Further, the findings from a study by Lee (2011) suggest that difficulties in interpersonal relationships can contribute to the recurrence of depression and new-onset depression (Lee, 2011). The follow-up direction for this study is to focus on non-face-to-face programs. Positive interpersonal relationships should be encouraged while participating in this program.

Further, the WHOQOL-BREF evaluation tool was used to measure the quality of life of older adults. The program had positive effects, based on significant improvements in the scores on all sub-factors. This is also consistent with the results of previous studies (Cho, 2008; Jeon, 2016; Kim & Park, 2015). In a study by Park and Yu (2016), stress was found to be one of the main factors affecting the overall quality of life, as well as the physical, psychological, social, and environmental health (Park & Yu, 2016). This suggests that the program developed in this study had a positive effect on stress reduction.

In addition, the three factor Korean UCLA Loneliness Scale was used to measure the level of loneliness in the study participants. Among the sub-factors of this scale, there was a significant decrease in the lack of intimacy and social neighbors. Accordingly, this program can be used as a basis for future programs aimed at reducing loneliness in older adults. However, there was no significant difference in the lack of belonging scores. This finding

is similar to the result regarding interpersonal relationships. Considering the characteristics of the lifestyle program, this might have been due to a lack of belonging as there was no way or reason to contact the participants or researcher until the next session, after a program session was completed. These results are consistent with those of Yang's study (2016), and who also suggested that it might be the researcher's problem if a significant decrease is confirmed for all sub-factors except for the lack of belonging (Yang, 2016). Participants' psychological anxiety owing to a lack of participant-research rapport should be addressed before starting the study. In future studies, the direction should be set so that participants feel like belonging to one group.

This study has certain limitations, and future research should address these. Here, we only included modules for physical activity, diet, mental health, and healthy aging to create the program. Future work should develop detailed plans for different lifestyle areas and programs that better consider the specific environments and characteristics of the participants. Second, we tested the usability and effectiveness of the program with five older adults aged 65 or above who did not have cognitive impairments. This small sample size was due to the challenges of recruiting participants during the COVID-19 pandemic. Nevertheless, as the primary aim of this study was to create a program and to see if it could be used in real-world clinical settings, this limitation did not greatly impact the study's objectives. Nevertheless, to enhance the external validity of the program's outcomes, future research should assess the effects of the program across a diverse age range and various health statuses.

This study attempted to improve older adults'

loneliness, depressive symptoms, and quality of life by developing and applying an ICT-based non-face-to-face lifestyle program, considering older adults' characteristics. This study can serve as a basis for developing intervention programs at leisure welfare facilities for older adults.

V. Conclusion

The summary of the study results is as follows. First, the program was developed based on the ADDIE model through a literature analysis and field demand analysis at stage A, expert group advice at stage D (Development), program draft development at stage D (Design), final program development at stage I, and effectiveness verification at stage E. The developed program had significant positive effects on depressive symptoms, quality of life, and loneliness. The findings suggest that it may be possible to enhance and maintain the mental health of older adults as well as lay the groundwork for resuming stalled projects for older adults.

Conflicts of interest

No potential conflict of interest relevant to this article was reported.

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국문초록

고령자의 정신건강을 위한 ICT 기반 비대면 라이프스타일 프로그램:
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목적 : 본 연구에서는 정보통신기술(information and communication technology, ICT) 기반의 고령자를 위한 비대면 라이프스타일 프로그램을 개발하고 그 적용 가능성을 평가하였다.

연구방법 : 본 프로그램은 분석, 설계, 개발, 구현 및 평가 5단계로 구성된 ADDIE 모델을 기반으로 개발되었다. 5단계의 연구과정 동안 8단계를 거쳐 최종적으로 지역사회 고령자들을 대상으로 비대면 라이프스타일 프로그램이 수행되었다.

결과 : 프로그램 분석 결과, 대상자들의 우울 증상과 외로움이 유의하게 감소한 것으로 나타났고 삶의 질 점수가 증가함을 확인할 수 있었다.

결론 : 본 연구를 통해 개발된 ICT 기반의 비대면 라이프스타일 프로그램은 고령자들이 성공적인 노화를 위한 생활 방식을 더 잘 이해하도록 동기부여하는 데 도움이 되었다.

주제어 : 노인, 라이프스타일, 삶의 질, 정보통신기술, ADDIE 모델

Appendix 1. ICT-Based Non-Face-to-Face Lifestyle Program

Session (min)	Sub-theme	Activity	Time (min)	Goal teaching strategy
Preliminary evaluation	-	1) CES-D 2) WHOQOL-BREF 3) UCLA Loneliness Scale	60	-
1 (60)	Healthy aging	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Creating a life planner Present and discuss a completed planner	30	Identify and correct unnecessary and excessive behavior through time management
		Closing and next schedule guidance	5	
2 (60)	Physical activity	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Stretching with Sera Band	30	Remember and apply aerobic or stretching and flexibility exercises that can be easily performed at home If moderate aerobic exercise is difficult, perform stretching and flexibility exercises
		Closing and next schedule guidance	5	
3 (60)	Diet	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Understanding Your Eating habits Talk about your diet	30	Reflect on your eating habits and identify deficiencies or excess nutrients
		Closing and next schedule guidance	5	
4 (60)	Mental health care	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Meditating	30	At least 50 minutes a week, soothing meditation Identify exactly what causes stress Trying to find your own way of relieving stress
		Closing and next schedule guidance	5	
5 (60)	Healthy aging	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Education on chronic diseases	30	Learn and apply habits and information to prevent chronic diseases for healthy aging
		Closing and next schedule guidance	5	
6 (60)	Physical activity	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Small Sports Day 1	30	Remember and apply aerobic or stretching and flexibility exercises that can be easily performed at home
		Closing and next schedule guidance	5	

Session (min)	Sub-theme	Activity	Time (min)	Goal teaching strategy
7 (60)	Diet	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		5 major nutrients education	30	Identify and apply balanced intake of the five major nutrients (carbohydrates, proteins, fats, vitamins and minerals)
		Closing and next schedule guidance	5	
8 (60)	Mental health care	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Handicraft activity	30	Trying to find your own way of relieving stress
		Closing and next schedule guidance	5	
9 (60)	Healthy aging	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Sharing the life planner experience	30	Identify and correct unnecessary and excessive behavior through time management Understand occupations and improve unnecessary occupations and habits during activities daily living
		Closing and next schedule guidance	5	
10 (60)	Physical activity	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Small Sports Day 2	30	Remember and apply aerobic or stretching and flexibility exercises that can be easily performed at home
		Closing and next schedule guidance	5	
11 (60)	Diet	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		A healthy dish	30	Reflect on your eating habits and identify deficiencies or excess nutrients
		Closing and next schedule guidance	5	
12 (60)	Mental health care	Greeting, calendar introduction, ventilation	10	
		Exercise to prevent dementia	15	Perform at least 150 minutes of moderate aerobic exercise a week
		Writing calligraphy	30	Trying to find your own way of relieving stress
		Closing and next schedule guidance	5	
Post evaluation	-	1) CES-D	60	-
		2) WHOQOL-BREF		
		3) UCLA Loneliness Scale		

CES-D = Center for Epidemiologic Studies Depression Scale; UCLA Loneliness Scale = University of California, Los Angeles Loneliness Scale; WHOQOL-BREF = World Health Organization Quality of Life-Brief.