

# A Health Recreation Program for u-Healthcare Clients: Effects on Mental Health

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## Abstract

**Introduction:** In this study, a health recreation program was implemented with elderly patients (60 years of age or older) who were receiving ubiquitous healthcare (u-healthcare) services. Furthermore, we examined the effects of health recreation on perceived stress, anxiety, and depression, by comparing survey results before and after the recreation program was conducted. Thus, the aim of this study was to develop an offline service with the ability to promote the impact of the u-healthcare service on mental healthcare. **Materials and Methods:** A health recreation program, consisting of a variety of weekly games, songs, and minilectures about mental health over a 10-week period, was offered at a senior citizens center in K-Gu, Seoul, Korea. This program targeted 18 elderly people currently receiving u-healthcare services. Data on the impact of the program on the mental health of the elderly were collected through surveys administered before and after the recreation program, and the results were compared with those of a control group. The control group consisted of 18 elderly people who were receiving u-healthcare services from the same district. **Results:** The perceived stress and anxiety of the experimental group decreased significantly compared with those of the control group. However, the program did not result in a significant reduction in depression. **Conclusions:** This offline health recreation program offered to elderly u-healthcare service clients contributed to the promotion of their mental health. Further studies will be required to better incorporate the offline mental healthcare program into their daily lives within the u-healthcare service.

**Key words:** u-healthcare service, mental health, health recreation, telemedicine, u-health

## Introduction

According to a 2010 report of the U.S. Centers for Disease Control and Prevention, the average lifespan of an American is 78.7 years. However, according to the World Health Organization, a healthy lifespan is 71 years, and the difference between the two is about 7 years. The term “health” refers

to not only physical health but also mental health. The World Health Organization defines mental health as “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community.” It is related to the promotion of well-being, the prevention of mental disorders, and the treatment and rehabilitation of people affected by mental disorders. The economic burden of mental illness in the United States is substantial, amounting to about \$300 billion/year in 2002. Furthermore, mental illness is an important public health problem in itself not only because about 25% of U.S. adults have a mental illness, but also as it is associated with chronic medical diseases such as cardiovascular disease, diabetes, and obesity.

In recent years, ubiquitous healthcare (u-healthcare) has been in the spotlight as a form of medical care. It is referred to as telemedicine or e-health in some countries, but in South Korea, a unique word, “u-health,” has been in use. U-health is a healthcare service based on ubiquitous and remote medical technologies. In its early stages, use of u-health services was predominantly restricted to vulnerable areas with lower accessibility to medicine, such as prisons, or in medical emergencies. However, with improvements in disease prevention and increases in the demand for healthcare services, the u-health service has been utilized for disease management in disabled senior citizens and those with chronic conditions. Currently, u-healthcare mainly consists of online services such as remote medical services focusing on disease management or online consultations.<sup>1</sup>

The subjective quality of life of senior citizens is strongly influenced by their mental health. Therefore, in order to improve senior citizens' quality of life, education in relation to stress management and the development and use of appropriate mental health programs is necessary.<sup>2</sup> Recently, the activities of senior citizens have become more active and dynamic, and their participation in physical activity is increasing. Accordingly, social support is regarded as a very important factor in terms of mental health.<sup>3</sup> In general, recreation is described with phrases such as leisure or fun-based activity, feeling of satisfaction, and well-being.<sup>4,5</sup> Specifically, therapeutic recreation is defined as an intentional intervention that helps with the growth of a participant through recreation and leisure activities and aids in the prevention and treatment of medical problems.<sup>6</sup> In the case of senior citizens, therapeutic recreation is carried out in conjunction with the treatment of behavior and psychology to maximize their capacity for rehabilitation.<sup>7</sup> Therapeutic recreation targeting senior citizens reduces depression and anxiety and offers both the opportunity for fun and a sense of accomplishment in interacting with others.<sup>8</sup> It also positively changes the cognitive functioning of the senior citizens by improving their self-esteem. Although many studies have been conducted on recreational therapy, investigating the improvement of

physical and psychological functions of the elderly, research on clients of u-healthcare services is rare.<sup>9,10</sup> When u-healthcare services are combined with an offline program like health consultations and exercise programs, the service has been found to be highly efficient.<sup>11</sup> Therefore, an offline mental healthcare service for senior citizens who use u-healthcare services is vital.

Generally, there are no limitation to the subject of therapeutic recreation, but the primary subjects are people who are functionally disabled because of aging or disease. Furthermore, recreation was termed “health recreation” in this study because it utilized offline services designed to complement the mental healthcare of u-healthcare clients. With reference to mental health programs, “telepsychiatry” has developed as a subfield of telemedicine. When practiced with senior citizens, it is termed “telepsychogeriatrics,” and it is a newly emerging field. Most u-healthcare services have been developed to target individuals who cannot or do not need to visit a hospital. As such, these services solely focus on providing online services.<sup>12</sup> However, in the case of mental health programs, addressing the problems face to face has been shown to be highly effective.<sup>13</sup> Furthermore, programs of this type help in observing the nature of patient interactions in face-to-face situations. In addition, the participants in such programs have been reported to prefer face-to-face consultations.<sup>14</sup> As a result, in this study, we devised an offline health recreation program. Our primary aim was to measure and evaluate the effect of this health recreation program on the mental health of the u-healthcare clients.

## RESEARCH HYPOTHESES

The specific research hypotheses were as follows:

1. *First hypothesis:* There will be a significant difference in the level of perceived stress between the participants in the experimental group and those in the control group.
2. *Second hypothesis:* There will be a significant difference in the level of anxiety between the participants in the experimental group and those in the control group.
3. *Third hypothesis:* There will be a significant difference in the level of depression between the participants in the experimental group and those in the control group.

## Materials and Methods

### STUDY DESIGN

All the participants had been receiving the “Healthcare Smart Home” service for managing their chronic diseases. They had been provided with blood pressure monitors and blood glucose meters, which transmitted the patients’ data by gateway and Bluetooth® (Bluetooth SIG, Kirkland, WA). This enabled u-health nurses to monitor the participants’ status and to manage their health through videotelephony services. According to the type and severity of the disease, appropriate online and offline services such as offline group education and health sports programs were provided to the participants. In this study, a nonequivalent control group, quasiexperimental design was applied to evaluate the effectiveness of the health

recreation program. For this purpose, questionnaires were used to measure the perceived stress, anxiety, and depression of participants before and after intervention in the experimental and control groups.

### MEASURES

*Mini-Mental Status Examination—Korea.* The Mini-Mental State Examination (MMSE) evaluates the degree of cognitive disability and observes changes in cognitive function using repeatable measurements. It has demonstrated adequate reliability and validity in detecting moderate to severe degrees of dementia.<sup>15</sup> The total score is out of 30, with 10 points for orientation, 3 points for memory register, 3 points for memory recall, 5 points for attention and calculation, 7 points for language function, and 2 points for understanding and judgment. Bonus points can be given to illiterate participants. This tool was used in the present study to exclude participants with cognitive functional impairment.

*Perceived stress.* To measure the perceived level of stress, we used a specific scale originally developed by Cohen et al.<sup>16</sup> in 1983. In 1988, Cohen and Williamson<sup>17</sup> modified it by using factor analysis. Finally, Lee and Lee<sup>18</sup> translated this scale into Korean in 2005. The Perceived Stress Scale provides a life-event impact score and has been shown to be a good predictor of mental health.<sup>16</sup> A particular event could elicit varying degrees of perceived stress in individuals, which can vary according to personal values and cognitive views. It measures the degree of perceived stress in the participant’s life, rather than the actual number of stressful events.<sup>18</sup> This tool is composed of 10 questions, each rated on a 5-point Likert scale. The higher the total score, the higher is the level of perceived stress. When the tool was developed, the Cronbach’s alpha coefficient was 0.83, and in the present study, it was 0.76.

*Anxiety.* In this study, to measure anxiety we chose the State Anxiety Inventory standardized for the Korean population by Kim and Shin<sup>19</sup> in 1978. It is one of the components of the State-Trait Anxiety Inventory first devised by Spielberger et al.<sup>20</sup> in 1970. When the tool was initially developed, its Cronbach’s alpha coefficient was 0.87. In this study, the coefficient was 0.94.

*Depression.* To measure the degree of depression, we used the Korean version of the Geriatric Depression Scale. This is a shortened version of the original Geriatric Depression Scale (which consisted of 30 items),<sup>21</sup> developed and standardized by Kee and Lee<sup>22</sup> in Korea. The scale consists of 15 dichotomous (“yes or no”) questions. The total score ranges from 0 to 15 points, where a score of 10–15 indicates the possible presence of moderate or severe depression that requires medical diagnosis to confirm, 5–9 points indicates mild depression, and 4 points or less represents a normal state. When the tool was initially developed, its Cronbach’s alpha coefficient was 0.88. It was found to be 0.72 in the present study.

### PARTICIPANTS

This study included senior citizens above 60 years of age who lived in permanent housing and received u-healthcare services in K-estate,

K-Gu, Seoul. Those with dementia, as assessed by the MMSE Korean version, or those who were disabled in terms of mobility were excluded. The size of the sample, using the G\* power version 3.1.5 (power=0.8, significance level [ $\alpha$ ]=0.05, effect size [ $d$ ]=0.8) was calculated, resulting in 21 people each in the experimental and control groups. After considering the elimination rate, 30 people were the desired sample size each groups. However, it was only possible to recruit 24 participants for the experimental group and 20 for the control group. In the experimental group, six participants were excluded: four decided not to participate, one cited religious reasons, and another cited maladjustment. In the control group, two participants were excluded from the sample: one underwent hospitalization, and another was disabled in terms of mobility. As a result, both groups consisted of 18 participants.

## PROGRAM

In this study, a health recreation program was conducted for the 18 participants of the experimental group over 10 weeks by a professional of therapeutic recreation. Each program consisted of game activities, singing, and a 50-min-long miniture on mental health. The impact of the program was evaluated by questionnaires.

## PROCEDURE

This study was preapproved by the institutional review board of Seoul National University, prior to our soliciting the written consent of the participants and data collection. Most of the participants could not read the text; therefore, the survey researchers explained the details orally. To facilitate oral explanation of the questions and to obtain answers verbally, the survey was conducted in a quiet room of the senior citizens center or in the participants' home. Minimal personal information was sought in the study, which was used strictly for research purposes. The collected data were stored separately in a secure place and disposed of immediately after the study was terminated. The data were analyzed by using IBM (Armonk, NY) SPSS Statistics version 21 for Windows software.

## Results

### PARTICIPANT CHARACTERISTICS

In both groups, senior citizens in their 70s made up more than half of the total number of participants (66.7% and 55.6% in the experimental and control groups, respectively); these proportions

**Table 1. Sample Characteristics and Homogeneity Tests of All the Variables**

	EXPERIMENTAL GROUP (N= 18)		CONTROL GROUP (N= 18)		$\chi^2$	P
	N	%	N	%		
Age (years)					2.782	0.249
60–69	3	16.7%	7	38.9%		
70–79	12	66.7%	10	55.6%		
80–89	3	16.7%	1	5.6%		
Gender					5.90	0.035 <sup>a</sup>
Male	3	16.7%	10	55.6%		
Female	15	83.3%	8	44.4%		
Education					5.893	0.207
Illiterate	3	16.7%	5	27.8%		
Elementary school	11	61.1%	5	27.8%		
Middle school	3	16.7%	4	22.2%		
High school	0		3	16.7%		
College graduate	1	5.6%	1	5.6%		
Residential types					–	
Live together	7	38.9%	7	38.9%		
Live alone	11	61.1%	11	61.1%		
Residence period (years)					1.333	0.513
>5	1	5.6%	0			
5–10	1	5.6%	2	11.1%		
10–20	16	88.9%	16	88.9%		
Monthly income (×1,000 wons)					4.1	0.25
<30	13	72.2%	16	88.9%		
30–50	4	22.2%	1	5.6%		
50–100	1	5.6%	0			
100–200	0		1	5.6%		
Employment					–	
Yes	0	0.0%	0	0.0%		
No	20	100.0%	18	100.0%		
Disease					0.253	0.881
Diabetes	10	55.6%	9	50.0%		
Hypertension	6	33.3%	6	33.3%		
Other	2	11.1%	3	16.7%		

<sup>a</sup> $p < 0.05$ , significant difference.

**Table 2. Homogeneity of the Dependent Variables Before Intervention**

	EXPERIMENTAL GROUP (N= 18)		CONTROL GROUP (N= 18)		T	P
	MEAN	SD	MEAN	SD		
Perceived Stress	19.78	6.83	18.67	7.35	0.470	0.642
Anxiety	50.50	14.18	47.00	15.43	0.709	0.483
Depression	7.39	3.24	7.67	3.61	-0.243	0.810

SD, standard deviation.

did not significantly differ. The educational level of the participants broke down to “uneducated” (16.7% and 27.8%), “elementary school” (61.1% and 27.8%), “middle school” (16.7% and 22.2%), “high school” (0% and 16.7%), and “college graduates” (5.6% and 5.6%) for the experimental and control groups, respectively. Note that most participants had a middle school degrees or less. The distribution of residential type and occupation were the same across the groups. About half of participants lived alone without a partner (61.1% and 61.1%, respectively), and all 36 participants declared that they were not presently engaged in any occupation. In addition, most participants had been living in permanent housing for more than 10 years and for less than 20 years (88.9% and 88.9%, respectively). All participants were recipients of u-healthcare services, and they had more than one kind of chronic disease (e.g., hypertension and diabetes). The medical conditions were not significant different between the two groups.

With reference to gender, 15 experimental group participants (83.3%) and 8 control group participants (44.4%) were female. There was a significant difference between groups in terms of their gender

distribution ( $\chi^2 = 5.90, p = 0.035$ ) (Table 1). Therefore, when validating the intervention effects, we included gender as a covariate. Furthermore, before the intervention, the chi-squared test was performed to determine the homogeneity of the dependent variables (perceived stress, anxiety, and depression) in the two groups. Table 2 shows similar patterns of the two groups with measures of the dependent variables before intervention.

**IMPACT OF THE PROGRAM**

In both groups, the effects of the general characteristics on the dependent variables were analyzed by a one-way analysis of variance. We found that the socioeconomic factors such as education level and residence period had a significant impact on perceived stress (Table 3). Table 4 shows data of the dependent variables after intervention and the intervention effects. Before the analysis of variance was conducted, the presurvey value for each dependent variable, gender (which lacked homogeneity), and education level and residence period (which had intervention effects) were regarded as covariates. As a result, the perceived stress and anxiety levels of participants had decreased significantly in the experimental group, compared with the control group. These findings supported Hypotheses 1 and 2. In the case of depression, there were no significant findings. As a result, we rejected Hypothesis 3 (Table 4). Furthermore, to understand the relationship among the dependent variables, a correlation analysis was performed. The perceived stress, anxiety, and depression levels had very high correlations (Table 5).

**Discussion and Conclusions**

According to the World Health Organization’s 2010 report, mental health is determined by socioeconomic, biological, and environmental factors. Persistent socioeconomic pressures are recognized as risks to

**Table 3. Effects of General Characteristics on Dependent Variables**

	EXPERIMENTAL GROUP (N= 18)						CONTROL GROUP (N= 18)					
	PERCEIVED STRESS		ANXIETY		DEPRESSION		PERCEIVED STRESS		ANXIETY		DEPRESSION	
	F	P	F	P	F	P	F	P	F	P	F	P
Physiological factor												
Age	2.199	0.145	1.163	0.339	1.211	0.325	0.212	0.811	0.423	0.663	2.543	0.112
Gender	4.155	0.058 <sup>a</sup>	1.918	0.185	2.021	0.174	0.357	0.558	2.138	0.163	0.225	0.642
Socioeconomic factor												
Education	5.193	0.013 <sup>b</sup>	1.197	0.347	1.095	0.384	0.377	0.821	0.621	0.661	0.143	0.963
Residential types	1.086	0.313	0.001	0.997	0.880	0.670	0.861	0.367	0.075	0.788	0.070	0.795
Residence period (years)	7.360	0.006 <sup>c</sup>	1.780	0.202	1.664	0.223	3.060	0.099 <sup>a</sup>	0.182	0.676	0.058	0.813
Monthly income (×1,000 wons)	0.082	0.992	0.352	0.709	0.199	0.821	1.926	0.180	0.101	0.904	0.096	0.909
Employment	—	—	—	—	—	—	—	—	—	—	—	—
Pathologic factor												
Disease	0.994	0.441	0.229	0.798	1.261	0.312	1.017	0.415	0.501	0.668	1.708	0.211

<sup>a</sup>p<0.1, <sup>b</sup>p<0.05, <sup>c</sup>p<0.01.

**Table 4. Descriptive Data of the Dependent Variables After Intervention and the Intervention Effects**

	EXPERIMENTAL GROUP (N= 18)		CONTROL GROUP (N= 18)		F	P
	MEAN	SD	MEAN	SD		
Perceived stress	13.67	8.1	19.17	7.81	7.656	0.01 <sup>a</sup>
Anxiety	42.11	12.44	49.33	19.03	8.781	<0.001 <sup>a</sup>
Depression	6.78	3.64	8.22	4.01	0.659	0.423

<sup>a</sup> $p < 0.05$ .

mental health. These factors are associated with indicators of poverty, including low levels of education. In this study, education level and period of living in rental housing significantly affected perceived stress. In fact, it is difficult to negate the impact of these stress factors through u-healthcare services alone. However, when u-healthcare services were combined with an offline health recreation program, we observed a significant reduction in participants' perceived stress. More than 350 million people worldwide suffer from depression. This is causing a substantial economic burden. According to a Korea Ministry of Health and Welfare report,<sup>23</sup> the prevalence of depression in older South Koreans is 29.2%. In the groups with the lowest 20% of household income, this occurrence increases to 47.1%. Furthermore, it was reported that 11.2% of senior citizens had attempted suicide. In the case of anxiety disorders, a recent survey has shown that as many as 18% of Americans may meet the psychiatric diagnostic criteria for an anxiety disorder.<sup>24</sup>

Anxiety and other mental disorders are affected by gender (specifically being female), low education levels, family structure, unemployment, and low income. With anxiety and depression, stressful life events lead to a characteristic stress response. In the present study, the correlations among perceived stress, anxiety, and depression were high. However, health recreation had a significant impact on perceived stress and anxiety. Indeed, some interventions and programs reduced depressive symptoms.<sup>25</sup> However, in the present study, a significant decrease was not observed in depression.

Three potential factors may have affected the results. The first was that depression is deep-rooted. According to one study, certain environmental features strongly influence symptoms of anxiety while

having little impact on symptoms of depression.<sup>26</sup> In other words, health recreation was likely not strong enough to influence depression. The second potential factor was the participants' characteristics. All were socially isolated older adults with chronic diseases. Thus, they were more likely to be depressed compared with other older adults without these characteristics.<sup>25</sup> Doubtlessly, these characteristics did not change over the intervention period. As a result, there was no significant decrease in depression score. Finally, social anxiety is affected by mental faculties, self-criticism, and interpersonal skills.

On the other hand, depression is affected by self-regulation ability, self-contentment, and mental faculties.<sup>27</sup> The most common stress is caused by difficulties in interpersonal relationships. Therefore, to facilitate promotion of mental health in the elderly, social support such as befriending initiatives and community and day centers for the elderly should be included in the service.<sup>28</sup> Accordingly, we targeted participants who lived in the same apartment and received the same healthcare services. Furthermore, the program was implemented in a senior citizens center, where they felt comfortable. During the beginning stage of data collection, participants did not know each other's names; however, each time, they introduced themselves with their merits and played team games. At the end of each session, they gave massages to each other. Following this, the leader of the senior citizens center and the u-healthcare nurse who operated the videotelephony service also took a part in the program. As time passed, participants called each other by name and told the partner about his or her merits. Consequently, it seemed likely that their interpersonal skills had improved and their negative self-criticism had decreased. However, health recreation could not influence self-regulation ability and mental faculties. This may have led to nonsignificant results with regard to depression.

The present study also has three limitations. First, this study had a small sample size. We suggest that the health recreation program be examined by including all u-healthcare service clients. Second, the present program operated just once a week at the senior citizens center. Therefore, the participants returned to their regular daily lives after each session. Further studies should devise ways of incorporating the offline mental healthcare program into their daily lives within the u-healthcare service. Third, when we surveyed the participants, they wanted to tell us about their personal affairs. Unfortunately, time did not permit us to listen to their stories. Further program development is needed to add a consultation program within the offline mental healthcare program.

**Table 5. Correlation Coefficients Between the Dependent Variables**

	TEST	PERCEIVED STRESS	ANXIETY	DEPRESSION
Perceived stress		1		
Anxiety	Pearson	0.556 <sup>b</sup>	1	
Depression	Pearson	0.414 <sup>a</sup>	0.616 <sup>b</sup>	1

<sup>a</sup> $p < 0.05$ , <sup>b</sup> $p < 0.01$ .

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## Disclosure Statement

No competing financial interests exist.

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