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Efficacy of Chronic Disease Self-management Program in Older Korean Adults with Low and High Health Literacy

Su Hyun Kim, PhD, RN, [1,*] Chang Ho Youn, MD, PhD [2]

[1] College of Nursing, Research Institute of Nursing Science, Kyungpook National University, Daegu, South Korea
[2] School of Medicine, Kyungpook National University, Daegu, South Korea

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SUMMARY

Purpose: We evaluated the efficacy of the Chronic Disease Self-management Program (CDSMP) among older Korean adults and investigated the question of whether the effects differed according to their levels of health literacy.
Methods: Measures of self efficacy, physical activity, physical health, and mental health were assessed at baseline, and at 6-week, and 18-week follow up for the CDSMP intervention group ($n = 23$) and control group ($n = 31$) according to their health literacy status.
Results: The older adults in the CDSMP intervention group showed significantly higher levels of self efficacy and physical activity at follow up. Participants with low health literacy had greater benefits from the intervention than had those with high health literacy.
Conclusions: The CDSMP is a beneficial intervention for older Korean adults with chronic disease. Healthcare professionals should encourage older Korean adults with chronic illness to participate in the CDSMP, in particular for those with low health literacy.

Introduction

A high prevalence rate of chronic illness in older adults, associated with a poor quality of life and escalating healthcare costs has led to an increased interest in the role of self-care activities in long-term illness [1]. To prevent complications and the risk of dependency or nursing home placement of older adults, the literature has supported the importance of self care, which necessitates sufficient knowledge and the ability to manage one's own chronic illness [2]. For older adults who have difficulty changing their perceptions and lifestyles built over a lifetime, programs for management of chronic illness should improve their motivation to manage their disease by themselves and reinforce specific plans for daily life rather than simply provide information about disease [3].

The Chronic Disease Self-management Program (CDSMP) [4] has been reported to have a positive impact on the enhancement of self efficacy, healthy behavior, and health status in chronically ill patients [5,6]. In previous studies, patients with chronic diseases showed improvements in physical exercise, symptom management, self efficacy, self reports of health, and health distress after their participation in the CDSMP [7–10]. The CDSMP, a group-based intervention for use with any long-term condition, focuses on improving self efficacy, and incorporates information on the management of common daily problems associated with chronic illness [11]. However, the significant effects of the program have been reported to vary with the cultural characteristics of the participants [12,13].

For individuals with a chronic illness, having an adequate level of health literacy is essential to obtaining and understanding the health information and services needed to engage in managing and making decisions about their own health [14,15]. Previous studies have reported an association of a low level of health literacy with poor health outcomes and poorer utilization of healthcare services [14], in which the mechanism involved certain psychological variables, such as self efficacy [16,17]. Thus, self efficacy should be incorporated as a key component of the self-management of chronic disease in older adults [16–18]. Interventions focusing on self efficacy, such as the CDSMP, may help mitigate literacy-related barriers [19]. However, empirical studies testing the differential effects of the CDSMP in relation to health literacy have not been reported.

* Correspondence to: Su Hyun Kim, PhD, RN, College of Nursing, Kyungpook National University, 101 Dongin 2 Ga, Junggu, Daegu, 700-842, South Korea.
E-mail address: suhyun_kim@knu.ac.kr

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Therefore, it was hypothesized that the CDSMP would have a positive influence on health behavior and health status in older adults by improving their self efficacy, in particular, for those with low levels of health literacy. The aim of our study was to evaluate the effects of the CDSMP on self efficacy, physical activity, and physical and mental health status among older Korean adults, and to determine whether the efficacy differed according to health literacy.

Methods

Study design

A nonequivalent control group pretest-posttest design was used to evaluate the effectiveness of the CDSMP among older Korean adults, and to determine whether the efficacy varied according to their levels of health literacy.

Setting and sample

Participants were recruited from two senior centers in the same local district located in low-income urban areas. In order to avoid contamination of the intervention within a senior center, participants in one senior center were assigned to the intervention group, and participants in the other center were assigned to the control group. The inclusion criteria were (a) age 65 years or older and (b) diagnosis of one or more chronic diseases. Based on analysis of covariance with alpha at .05, effect size of 0.45 for the CDSMP [20], and five potential covariates, a sample size of at least 21 persons per group was calculated to get a statistical power 0.80 [21]. In total, 25 participants in the intervention group completed the baseline assessment. Participants who attended more than four sessions were included in the analysis. Over the course of the study, two participants in the intervention group withdrew because of health issues ($n = 1$) or were lost to follow up ($n = 1$). A total of 31 participants were recruited for the control group and none of them withdrew from the study. Thus, 23 participants in the intervention group and 31 participants in the control group were included in the current analysis.

Data collection and procedure

The CDSMP workshop was conducted for six weekly sessions; each of which was conducted for 2.5 hours by the primary investigator and a lay leader from May 26 to June 30, 2012 (Table 1). Each session was conducted in groups of 10–12 participants. The content of the course included symptom management, problem-solving, managing the emotions associated with having a chronic illness, exercise, nutrition, medications, and communication skills [4]. The program, based on self efficacy theory, utilized the strategies of weekly action planning and feedback, participant modeling of behaviors and problem-solving, reinterpretation of symptoms and symptom management techniques, group problem-solving, and individual decision-making [10].

To implement the major strategies of the CDSMP, each session involved action planning and feedback. Action plans are concrete and specific activities that participants agree to do to help them reach their goals before the next weekly session, such as walking around the block twice daily or increasing water intake from three to five glasses per day [22]. To enhance the likelihood of success, each participant was asked to make an action plan with a confidence rating of at least 7 on a 10-point scale of the likelihood of its accomplishment. The feedback included problem-solving sessions in small groups that related to the barriers to their success in implementing their action plans [22].

Participants in the intervention group received a Korean version of the Living a Healthy Life with Chronic Conditions [23]. The average workshop attendance was 4.7. Participants in the control group received treatment as usual from the senior center. The primary investigator completed training as a CDSMP master trainer before implementing the study's intervention. To maintain fidelity to the intervention, the primary investigator provided the program with a standardized leader's manual to follow [4]. Data were collected through self-administered questionnaires before the start of the workshop (baseline), immediately after the end of the program (6 weeks), and at 18 weeks follow up.

Ethical consideration

This study was reviewed and approved by the ethics committee of Kyungpook National University Hospital (IRB file no. 2012-02-016). The principal investigator explained the purpose and the procedures of the study to the potential participants, and that they could withdraw from the study. Written informed consent was provided by all of the participants.

Measures and instruments

The Korean Test of Functional Health Literacy was used to assess health literacy [24]. The test consists of numeracy and reading

Table 1 *Overview of the Chronic Disease Self-management Program.*

Session	Content outline	
1	• Introduction - Identifying common problems • Workshop overview • Differences between acute and chronic conditions	• Using your mind to manage symptoms and distraction • Introduction to action plans
2	• Feedback/problem-solving • Dealing with difficult emotions	• Introduction to physical activity and exercise • Making an action plan
3	• Feedback/problem-solving • Better breathing • Muscle relaxation	• Pain and fatigue management • Endurance activities • Making an action plan
4	• Feedback/problem-solving • Future plans for healthcare • Healthy eating	• Communication skills • Problem-solving • Making an action plan
5	• Feedback/problem-solving • Medication usage • Making informed treatment decisions	• Depression management • Positive thinking • Guided imagery • Making an action plan
6	• Feedback/problem-solving • Working with your healthcare professional and the healthcare system	• Looking back and planning for the future • Closing

comprehension sections. Its possible range is 0–15, with higher scores indicating higher levels of health literacy. The participants were classified as having a high level of literacy if their health literacy score was at or above the median (≥5), and were classified as having a low level of literacy if their literacy scores were below the median (<5) [25]. The validity and reliability of the test was demonstrated in a sample of community-dwelling older Korean adults [24]. The Cronbach's alpha coefficient was .87 in the current study.

Self efficacy was measured using the instrument developed by Lorig et al. [6]. It consists of six items that assess the degree of confidence in the management of chronic disease, including symptom control, role function, emotional functioning, and communicating with physicians. The possible scores of the scale range from 1 to 10, with a higher score indicating higher self efficacy. The internal consistency measure of reliability was .91 in the original study [6] and .94 in this study. Physical activity was assessed using an instrument developed by Lorig et al. [26]. It consists of five items to measure the total amount of time (in minutes) spent performing aerobic exercise per week. In a previous study of participants with chronic disease, the test-retest reliability was .72 [26].

Physical and mental health statuses were measured using the Medical Outcomes Study 12-item Short-Form Health Survey (SF-12) subscales. The Physical Component Summary (PCS) and Mental Component Summary (MCS) were computed using standardized measures based on a mean of 50 and a standard deviation of 10, for the general population within the United States, whereby higher scores indicate better health status [27]. The validity and reliability of the scale were demonstrated in a previous study [27]. The Cronbach's alpha coefficient was .76 for the PCS and .82 for the MCS in the current study.

Data analysis

The baseline characteristics between the intervention and control groups were compared using t tests or χ^2 tests. The intervention's effect on the outcome variables was assessed using a linear mixed model. Linear mixed models provide a general framework for the analysis of repeated measures to take into account the correlations that occur from taking multiple measurements on the same individual [28]. The potential baseline covariates that might influence the outcomes were adjusted [29] if there were differences between the groups ($p < .20$). When selecting the covariates, the p value cut-off point of .20 was used because more traditional significance levels such as .05 were more likely to fail to identify the variables known to be important [30,31]. The linear mixed model included age, sex, the number of comorbid diseases, education, and the baseline scores on each outcome variable. Compound symmetry was specified as the covariance structure for the linear mixed model in order to adjust for the correlations among the repeated measures.

For the analysis of differential effects of the CDSMP in relation to health literacy, t tests were used to compare mean change in scores between those with health literacy and low literacy after the intervention. An alpha level of .05 was selected to assess statistical significance. SPSS version 19.0 (IBM SPSS Statistics for Windows, Armonk, NY, USA) was used for statistical analysis.

Results

Demographic characteristics of participants

The baseline characteristics of the participants are presented in Table 2. The majority of the participants had low levels of income and education. The participants in the intervention group were significantly older ($t = 4.16$, $p < .001$) and had a higher morbidity rate from hypertension and cardiac disease than those in the control group ($\chi^2 = 5.77$, $p = .027$; $\chi^2 = 7.43$, $p = .006$, respectively). However, no significant differences were observed between the groups in terms of education, monthly income, the number of comorbid diseases, health literacy levels, and baseline scores on the outcome variables. Based on the median split (health literacy score at 5) in scores on the Korean Test of Functional Health Literacy, 63.6% of participants in the intervention group and 54.8% in the control group were classified as having a low level of health literacy (health literacy score < 5).

Table 2 *Baseline Characteristics of Participants in Intervention (n = 23) and Control Groups (n = 31).*

Characteristics	Intervention	Control
Age, *M* (*SD*, year)*	80.32 (5.94)	74.06 (5.23)
Education, *M* (*SD*, year)	2.28 (3.52)	4.06 (3.86)
Female, *n* (%)	21 (95.5)	24 (77.4)
Monthly income (US dollars), *n* (%)		
<455	19 (86.4)	29 (93.6)
455–900	3 (13.6)	2 (6.5)
No. of active comorbid diseases		
≤2, *n* (%)	16 (69.6)	28 (90.3)
>3, *n* (%)	7 (30.4)	3 (9.7)
Comorbid disease, *n* (%)		
Hypertension*	15 (65.2)	10 (32.3)
Arthritis	10 (43.5)	19 (61.3)
Diabetes mellitus	4 (17.4)	3 (9.7)
Asthma	2 (8.6)	4 (12.9)
Cardiac disease*	5 (21.7)	0 (0)
Depression	1 (4.3)	1 (3.2)
Others	7 (30.4)	8 (25.8)
Low health literacy, *n* (%)[a]	14 (63.6)	17 (54.8)
Self efficacy at baseline, *M* (*SD*)	5.78 (2.29)	5.77 (2.45)
Physical activities at baseline *M* (*SD*, min/week)	116.40 (77.20)	101.50 (71.66)
PCS at baseline, *M* (*SD*)	36.17 (11.12)	40.32 (7.63)
MCS at baseline, *M* (*SD*)	47.00 (15.07)	48.82 (14.63)

Note. PCS = Physical Component Score of Health Survey; MCS = Mental Component Score of Health Survey.
* $p < .05$.
[a] Defined as < 5 (median).

Change in outcome measures

Compared to the control group, the participants in the CDSMP intervention group scored significantly higher on measures of self efficacy and physical activity at follow up, after controlling for age, sex, number of comorbid diseases, education, and baseline scores (estimated difference = 1.33, $SE = 0.64$, $p = .045$; estimated difference = 29.71, $SE = 14.23$, $p = .047$, respectively) (Table 3). However, the intervention effects were not significant for the PCS and MCS scores at follow up (estimated difference = 1.17, $SE = 3.11$, $p = .708$; estimated difference = −0.57, $SE = 3.08$, $p = .855$, respectively).

Differences by health literacy

When analyzing by literacy levels in the intervention group only (Table 4), the participants with low literacy spent significantly more time on physical activities after the intervention than did those with high literacy: 40.39 ± 90.24 versus −8.97 ± 75.38 from baseline to 6 weeks ($t = 2.19$, $p = .033$); and 61.30 ± 103.00 versus −1.97 ± 98.15 from baseline to 18 weeks ($t = 2.29$, $p = .026$). Participants with low health literacy showed a significantly greater improvement in MCS score than did those with high literacy: 10.17 ± 19.54 versus 0.75 ± 15.03 from baseline to 6 weeks ($t = 2.00$,

Table 3 *Effects of CDSMP on Self Efficacy, Aerobic Exercise, Physical Component Score, and Mental Component Score (N = 54).*

Fixed effect	6 weeks	18 weeks	Estimated difference (*SE*)	*p*
	M (95% CI)[a]			
Self efficacy				
Intervention group	7.12 (6.29–7.95)	6.77 (64.68–7.62)	1.33 (0.64)	.045
Control group	5.79 (4.94–6.64)	5.44 (4.62–6.25)	Reference	
Physical activities (min/week)				
Intervention group	140.01 (115.61–164.41)	143.77 (118.11–169.53)	29.71 (14.23)	.047
Control group	111.29 (88.62–133.97)	115.06 (89.60–140.51)	Reference	
PCS				
Intervention group	41.40 (37.37–45.44)	39.20 (35.03–43.37)	1.17(3.11)	.708
Control group	40.23 (36.03–44.43)	38.03 (33.99–42.06)	Reference	
MCS				
Intervention group	53.17 (45.65–60.68)	48.74 (41.08–56.40)	−0.57(3.08)	.855
Control group	54.24 (46.16–62.32)	49.81 (41.60–58.02)	Reference	

Note. CDSMP = Chronic Disease Self-management Program; CI = confidence interval; PCS = Physical Component Score of Health Survey; MCS = Mental Component Score of Health Survey.

[a] Differences were adjusted for baseline score on each outcome variable and for age, sex, number of comorbid diseases, and education.

$p = .050$); and 5.19 ± 16.18 versus −3.36 ± 12.35 from baseline to 18 weeks ($t = 2.20$, $p = .032$). Although participants with low literacy showed a trend of more improvement in self efficacy and the PCS scores from baseline to 6 weeks than did those with high literacy, no significant differences were observed in self efficacy (0.89 ± 1.85 vs. 0.57 ± 2.34, $p = .586$) and the PCS scores (3.37 ± 12.47 vs. 0.30 ± 9.65, $p = .311$).

Discussion

The current study demonstrated that the utilization of the CDSMP for older Korean adults led to significant improvements in self efficacy and physical activity, and the beneficial effects were greater for participants having low literacy. In the current study, the positive effects of the CDSMP on self efficacy and physical activity were consistent with those of previous studies conducted in the United States, Hong Kong, and China [7,9,20] but not with a study from the Netherlands [12]. The underlying mechanism of the positive effect of the CDSMP may be explained by current problems in the healthcare system, in which healthcare professionals do not assist patients in acquiring the practical skills and competencies needed to manage their chronic diseases.

Unlike the Netherlands, where a specialized nurse provides a substantial amount of information about various aspects of self-management to chronically ill patients [12], the Korean health care system has weak primary care, which focuses on specialized hospital-based treatment rather than preventive coordinated care for patients with complex health care needs [32]. Older Korean older adults who had insufficient information on how to deal with chronic illness in the existing health care system could learn to acquire knowledge, behavior, and confidence on self-management throughout the CDSMP classes. Unlike the traditional assumptions that older Korean adults, particularly those with low income and less education, are passive, and that eliciting changes in health behaviors is difficult [33], our finding indicates that strategies to facilitate older adults' roles as the primary agent in the management of their own diseases may be highly applicable to the Korean culture.

Regarding the beneficial effects of the CDSMP, more gains in outcome measures were observed in participants with low health literacy. These findings were consistent with those of a previous study [34] in which literacy-sensitive educational interventions resulted in greater improvements in the techniques of using a metered dose inhaler by patients with chronic obstructive pulmonary disease who had low literacy levels compared to their high literacy counterparts. In addition, the findings are similar to those of a diabetes self-management study, which demonstrated that health literacy was the modifier for reaching the effectiveness of the intervention outcomes [35]. This study found that the CDSMP's focus on enhancing self efficacy and behavioral change is a beneficial strategy for older adults, in particular for those with low health literacy [14].

In the current study, the nonsignificant effects of the CDSMP on the participants' physical and mental health were inconsistent with those of the studies that reported improvements in self-ratings of health, physical discomfort, and health distress at follow up [8,13]. However, they were similar to the studies reporting no improvements in physical symptoms and health status [12,36]. These conflicting results on participants' health status may have been affected by participant characteristics. The average age of the

Table 4 *Effects of CDSMP According to Health Literacy Level (N = 23).*

Variables	Baseline	6 weeks	18 weeks	*t* (*p*) for difference in mean change	
				Baseline to 6 weeks	Baseline to 18 weeks
Self efficacy					
High literacy	5.94 (2.55)	6.51 (1.53)	5.71 (2.41)	0.55 (.586)	1.58 (.121)
Low literacy	5.61 (2.08)	6.50 (1.57)	6.59 (1.95)		
Physical activities (min/week)					
High literacy	131.58 (66.73)	122.62 (52.05)	129.61 (71.08)	2.19 (.033)	2.29 (.026)
Low literacy	80.77 (73.92)	121.16 (82.04)	142.06 (71.82)		
PCS					
High literacy	38.50 (10.19)	38.80 (11.51)	37.86 (10.29)	1.02 (.311)	0.76 (.450)
Low literacy	38.94 (8.18)	42.31 (9.84)	40.52 (11.06)		
MCS					
High literacy	51.18 (11.67)	51.93 (13.09)	47.83 (12.99)	2.00 (.050)	2.20 (.032)
Low literacy	44.04 (17.16)	54.21 (11.99)	49.23 (13.45)		

Note. CDSMP = Chronic Disease Self-management Program; PCS = Physical Component Score of Health Survey; MCS = Mental Component Score of Health Survey.

participants in the current study was 77 years old, somewhat higher than that of previous studies [5]. Thus, the undeteriorated health during the follow up period might indicate the potential efficacy of the intervention. Another possible explanation for the conflicting results on health status is the instrument used in the study. Compared to the scales developed from the Stanford Patient Education Research Center, commonly used for testing the outcomes of the CDSMP, the attainment of comprehensive functional improvements on the SF-12 physical and mental component summary scale might be difficult for older adults, as demonstrated in another study that found no positive evidence for the CDSMP in a sample of older adults [12].

The limitations of the study are as follows: Due to possible contamination of the intervention within the senior center, we could not randomize the participants into intervention and control groups. The next step should be an evaluation of the CDSMP using a double-blind randomized controlled trial. In addition, this study evaluated the relatively short-term effects of the CDSMP. It is possible that a period of 18 weeks was too short to detect an improvement in the physical and mental health among the members of the older population. In order to maintain the intervention's effects, it might be necessary to provide a booster session for older adults. Future research is needed to determine the long-term effects of the CDSMP.

Conclusion

Older Korean adults participating in the CDSMP showed significantly higher levels of self efficacy and physical activity at follow up in comparison to those who did not participate. In a health care system deficient in preventive comprehensive services for the chronically ill, the CDSMP may help them in the successful management of their own illnesses in daily life lives. The beneficial effects of the CDSMP were greater for those with low health literacy. Based on this study's findings, healthcare professionals should encourage the participation of older adults with chronic illnesses in the CDSMP, particularly for those with low health literacy.

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