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Evaluation of the chronic disease self-management program in a Chinese population

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Abstract

Objective: This study evaluated the 6-week Chronic Disease Self-Management Program (CDSMP) in Hong Kong.

Methods: A total of 148 subjects with chronic illness were recruited. Subjects were matched on duration of illness and gender, and then randomly allocated to experimental and comparison groups. The experimental group participated in the CDSMP, while the comparison group joined a Tai-Chi interest class in a mass-activity format. Subjects completed evaluation questionnaires before beginning their program and 1 week following the program.

Results: Analysis of covariance showed that the CDSMP participants demonstrated significantly higher self-efficacy in managing their illness, used more cognitive methods to manage pain and symptoms, and felt more energetic than the subjects in the comparison group. The CDSMP participants also demonstrated changes in their profile of coping strategies, having a tendency to adopt the cognitive methods of diverting attention, reinterpreting pain, ignoring sensations, and making positive self-statements.

Conclusion: The short-term evaluation results showed that the CDSMP primarily increased the self-efficacy, exercise behavior, and application of cognitive coping strategies of the participants.

Practice Implication: The effect of the CDSMP in a Chinese population is similar to that found in studies in Western cultures, and the CDSMP could be applied effectively in a Chinese population.

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1. Introduction

The advance of medical technology has substantially increased the life expectancy of people in modern societies. With increased life expectancy, a higher proportion of the population is likely to suffer chronic diseases as they age. Hypertension, diabetes mellitus, heart disease, arthritis, stroke, asthma, and depression are the most common chronic diseases among patients consulting primary care in Hong

Kong. Chronic diseases are estimated to account for about 70% of health-care expenditures in modern societies [1], while threatening patients' quality of life [2].

In addition to regular follow-up at medical specialist clinics, persons with chronic diseases are often encouraged to join health-education programs provided by the patient resource centers of hospitals or social service agencies in Hong Kong. In 2000, the Hong Kong Society for Rehabilitation introduced a new community-based service called Health-In-Action, based on the blueprint of the Chronic Disease Self-Management Program (CDSMP) developed at Stanford University [3]. Different from health education and promotion services for chronic diseases, the CDSMP assists participants in developing self-efficacy and

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self-management behaviors to manage their illnesses. It does not seek to cure chronic diseases, but rather to enable participants to “live” with their diseases.

The standardized CDSMP program is a 6-week program (one session per week) led by professionals and/or lay persons (with chronic disease). The content of the program covers areas such as diet, exercise, medications, fitness, emotion management, problem-solving skills, and communication with health professionals, which are the keys to a better quality of life in persons with chronic illness. During group sessions, participants are guided to experience and master self-management behavior (enactive mastery experiences) [4,5]. Participants learn to set realistic self-management goals with a “just-right challenge”; that is, goals that participants feel 70% confident they will complete. The leaders act as role models in self-management, providing a source of vicarious experience. The progress of participants toward the goals is monitored by peers through weekly reviews, sharing, and group problem-solving. Through self-paced practice with different self-management behaviors, participants gradually acquire self-management skills and improve efficacy in managing their illness. In the long run, persistent application of self-management behaviors is expected to help them achieve better mental and physical health and decrease health-care utilization.

A wealth of literature shows that the patient self-management program of the CDSMP is effective in increasing self-efficacy in managing illness, knowledge and behavior in self-management, and energy [2,6]. These positive changes are typically maintained at the end of 6 months after completion of the CDSMP, and participants also report a significant decrease in the frequency of medical consultations, improvement in perceived health, and a decrease in health-care costs [7,8].

This study examined the efficacy of the CDSMP conducted in a Chinese population. Unlike previous studies, we used a 7-week time frame to study the short-term effects of the CDSMP, and we included a measure of coping strategies as a short-term outcome of the program. We wanted to capture the short-term effects of the CDSMP in this manner for several reasons. First, it was important to identify how far the effects of the CDSMP could be consolidated and maintained over a 6-month period [6,9], although their validity could be threatened by using an extended time window of 6 months because of the effects of history and maturation [10]. It is difficult to attribute 6-month outcomes to participation in a 6-week CDSMP program, since participants in community-based programs may be subjected to various intervening influences within a 6-month time frame.

Second, we observed that although Lorig and associates have translated and modified the CDSMP for use with Hispanic populations in the USA [11–13], most studies of the CDSMP had been conducted among English-speaking populations (such as in UK or Australia) [7]. Hong Kong, on the other hand, is a place where “East meets West,” having been a British colony for 99 years (up to 1997) but having a

population mostly made up of Chinese (95%). Public health services mainly deliver Western medicine, although Chinese medicine and alternative medicine (including Tai-Chi) are widely accepted and practiced. It would be of interest to examine how well the CDSMP, an intervention developed in Western cultures, is received by people in Hong Kong. The empirical results of this study could provide valuable information on the application of the program to Chinese populations. However, in doing this, we made no changes to the content of the original program. We instead merely translated the program content into Cantonese (the language spoken in Hong Kong). Our intention was to explore to what extent the CDSMP was culturally relevant when applied to a Chinese population. Third, we know from the literature on rehabilitation counseling that changes in coping strategies (such as cognitive reappraisal) are an important mechanism underlying adjustment to illness and disability [14]. We hypothesized that changes in coping strategies were possible precursors to changes in longer-term outcomes of the CDSMP, and we added this measure to strengthen the design of the study.

2. Methods

This evaluation study used a quasi-experimental design. Participants were recruited through referrals from health-care and social-work professionals working in hospitals, specialist clinics, and social services. Participants were matched and screened according to selection criteria before being randomized to the CDSMP group (experimental) or the Tai-Chi group (comparison). A comparison group was used for two reasons. First, it was not ethical to delay intervention for those assigned to the control group. Second, we experienced substantial difficulty in recruiting research participants when we explained to them that they may be allocated to a control group without active intervention. We used the Tai-Chi interest class as a comparison group as Tai-Chi is widely accepted in Chinese culture; as a result, the recruitment of participants was improved. However, as we mainly aimed to examine CDSMP in this clinical trial, we tended to use several strategies to limit the potential benefits of Tai-Chi so that it could be used as a comparative intervention. Tai-Chi was taught using an interest group and mass activity format, and the participants were not involved in group discussion or the learning of self-management skills, nor were they encouraged to practice Tai-Chi outside of class. All participants in the comparison group were offered the opportunity to enroll in the CDSMP after completing the clinical trial. Ethics approval of the study was obtained from both The Hong Kong Polytechnic University and the Hong Kong Society for Rehabilitation.

2.1. Participants

All participants were adults (aged 18 or above) diagnosed as suffering from chronic diseases ($N = 160$), and were

referred to the HIA from different medical institutions. The purpose of the trial was explained and their voluntary consent obtained. The inclusion criteria consisted of (1) diagnosis of a chronic disease; (2) age 18 years or older; (3) voluntary enrollment in the Health-In-Action project; and (4) no previous enrollment in patient education or self-help programs in the past 2 years. All participants were screened by staff of the HIA before being randomized. Randomization was conducted by pooling the participants into groups of 20–30 people. They were then put into sequence according to gender (male and female), age (from young to old), and duration of illness (from recent to chronic). The participants were allocated to best-match pairs with respect to their gender and age, and then to the history of their disease (number of years from onset). By tossing a coin, we assigned the first participant in the best-matched pair to the CDSMP or Tai-Chi groups. The second participant in the same pair was then assigned to the opposite group. The HIA staff involved in the randomization process was not involved in leading the cohorts in the CDSMP or Tai-Chi groups. Each CDSMP cohort had 12–15 participants (total $n = 80$), while a Tai-Chi cohort had 25–30 participants (i.e., two cohorts to every one of the CDSMP) (total $n = 80$).

2.2. Procedures

Both the CDSMP and Tai-Chi groups were conducted over a period of 6 weeks. Each CDSMP program was conducted by one professional leader and one lay leader. The professional leaders were registered physiotherapists, occupational therapists, or social workers, while the lay leaders were individuals who had suffered from chronic diseases and had attended the CDSMP before becoming leaders. Both the professional and lay leaders received credential training organized by trainers from Stanford University, USA. Six CDSMP cohorts (each with 12–15 participants) and three Tai-Chi cohorts (each with 25–30 participants) were conducted over 6 weeks. Each Tai-Chi cohort was conducted by a Tai-Chi master. There was no cross-over between the CDSMP and Tai-Chi leaders. Both the CDSMP and Tai-Chi programs lasted for 2 h each week. The programs were conducted in the community centers of the Hong Kong Society for Rehabilitation, located in different districts of Hong Kong.

All participants were assessed twice on their self-management behavior, self-efficacy, and health outcomes. The first assessment was conducted before the first session began, and the second assessment 1 week after completion of the 6-week program. All assessments were conducted by two research assistants not involved in the randomization or delivery of the two programs. In addition, a daily logbook was distributed to each participant in the CDSMP program. The participants were required to record their self-management plans and goals and experience in implementation of goals, and to self-monitor their own progress of implementation. The content collected became the source for

qualitative analyses of the behavioral and self-efficacy changes in the CDSMP participants.

2.3. Instrumentation (outcome measures)

The 86-item outcome-measurement questionnaire had four sections. The first section consisted of nine questions that collected socio-demographic data, including gender, age, marital status, level of education, monthly family income, history of illness, membership in self-help groups, and the need for medical follow-up.

The other three sections of the questionnaire measured the expected outcomes of the program in the three domains of self-management behavior, self-efficacy, and health outcomes. We adopted the outcome-measurement instrument of the self-management course devised by Lorig and associates [15], which has been extensively used in the evaluation of health education and related health-care interventions. We translated the English instrument into Chinese, and evaluated its content validity and cultural relevance using an expert panel review. During data collection, most participants took 25–35 min to complete the questionnaire. Resting periods were allowed for clients with lower physical tolerance.

2.3.1. Self-management behavior

This section of the questionnaire had 26 items covering four domains of self-management behavior: (1) exercise, (2) cognitive-symptom management, (3) use of community services, and (4) communication with physicians. The questions in this section used a 4- or 5-point scale, on which participants were requested to indicate the frequency of performing specific self-management behaviors like walking, swimming, relaxation, or use of positive thinking. In our pilot study, the four subscales demonstrated acceptable to high internal consistency ($\alpha = .72-.91$) and acceptable to good test-retest reliability ($r = .65-.80$).

2.3.2. Self-efficacy in illness management

This section consisted of 33 items that assessed the perceived competence of participants in carrying out self-management behaviors, managing disease in general, and achieving health outcomes. Participants were requested to indicate their confidence in completing specific self-management tasks on a 10-point Likert scale, ranging from 1 (not at all confident) to 10 (totally confident). In our pilot test of this instrument, the internal consistency of the three subscales was excellent ($\alpha = .94-.98$), and the test-retest reliability was good to excellent ($r = .73-.94$).

2.3.3. Health outcomes

These 18 items of the questionnaire assessed the perceived health outcomes of (1) pain and physical discomfort, (2) fatigue, and (3) energy. For the questions on pain and physical discomfort or on fatigue, participants were requested to indicate the frequency of these symptoms

on a 6-point Likert scale. For the questions on energy, participants used a 10-point Likert scale to indicate how far their energy levels affected their function in daily activities like self-care, shopping, leisure, or going to work. The internal consistency of these four health-outcome subscales ranged from satisfactory to very good ($\alpha = .85-.91$), and the test-retest reliability was good to very good ($r = .74-.80$).

2.3.4. Coping strategies

Coping strategies were measured using the 42-item Coping Strategies Questionnaire (CSQ) [16,17], which was one of the instruments suggested by Lorig [15] for the evaluation of self-management programs. Respondents are requested to use a 7-point scale to indicate how often they use different strategies to cope with pain and discomfort. The CSQ has six subscales that measure six dimensions of cognitive coping strategies (diverting attention, reinterpreting pain sensations, catastrophizing, ignoring sensations, praying or hoping, and making coping self-statements) and one dimension of behavioral coping strategy. The CSQ was reported to have good internal consistency ($\alpha = .72-.91$) among different ethnic groups [17].

2.4. Qualitative evaluation

In addition to participants' responses in the outcome measures, qualitative data were obtained from the CDSMP participants in terms of their entries made in a logbook distributed to them in the first session. The logbook was designed in a diary format in which the participants were to enter a log of their self-management goals for the week, their action plans, and a record of their self-management behavior for each day, as well as an adjunct for examining the process of change in self-management by the researcher.

2.5. Data analysis

The demographic characteristics of the participants in the CDSMP and Tai-Chi groups were compared using a *t*-test (for interval data) or χ^2 test (for categorical data) to examine the degree to which the baselines for both groups were equivalent or not. Using a one-way repeated measure ANOVA, we analyzed the changes in outcomes in the experimental group and the comparison group respectively. We then conducted repeated measures ANOVA (2 groups \times 2 occasions) to compare the outcomes of the CDSMP both pre-test and post-test. The treatment effects were further tested by conducting ANCOVA on the scores of the outcome measures obtained at the post-test assessment, using the pre-test scores as the covariate. Qualitative analyses were carried out on the data obtained from the logbooks of the CDSMP group. These included frequency count, theme collation, and content analyses.

3. Results

Of the 160 participants who were randomized and assigned to the CDSMP or Tai-Chi groups, 12 (7.5%) dropped out of the study. Of these, four did not complete the CDSMP program, resulting in a 5% drop-out rate. Eight participants dropped out of the Tai-Chi group, resulting in a 10% drop-out rate. An analysis of their gender, age, and medical history did not reveal obvious differences between those who completed the interventions and those who did not. Thus, the biases in the results attributable to the drop-out rates were deemed insignificant.

Of those who completed the programs and all assessments ($N = 148$), 111 (75%) were female and 37 (25%) were male. More than half (58%) of the participants were between 45 and 55 years old. About half (54.1%) had received a secondary education (equivalent to grade 6 or above) or higher. A majority of participants (72%) were married. About half (48.8%) had a family income lower than the median family income in Hong Kong. Most participants (90.7%) were not members of self-help or mutual-help organizations. No significant differences were found in age ($t = 1.77, P = .77$), education level ($t = .37, P = .71$), gender ($\chi^2 = .25, P = .87$), and history of disease ($t = 1.53, P = .05$) between participants in the CDSMP group and those in the Tai-Chi group.

3.1. Self-management behavior

The experimental group showed significant increases in both exercise ($F = 29.14, P < .001$) and cognitive-symptom management ($F = 14.69, P < .001$), while showing no significant changes in the use of community resources or communication with physicians (Table 1). The comparison group, on the other hand, demonstrated significant increases in exercise ($F = 14.03, P = .001$), but not in the other three types of self-management behavior ($P = .265, .688, .450$) (Table 2).

In addition, the results of the ANCOVA revealed that the participants in the CDSMP group had significantly higher scores when compared with their Tai-Chi counterparts in cognitive-symptom management ($F = 4.72, P = .032$) (Table 3). Since both groups showed significant increases in exercise after the treatment period, no significant difference in exercise behavior was found between the groups by the end of the treatment period.

3.2. Self-efficacy

The experimental group showed significant increases on all three subscales of self-efficacy ($F = 7.27, 6.92, 8.96; P = .010, .012, .004$) (Table 1), while the comparison group showed no change in self-efficacy outcomes (Table 2). The experimental group also demonstrated significantly higher self-efficacy on all three subscales compared with the comparison group ($F = 4.47, 8.67, 4.56; P = .036, .004, .028$) (Table 3). While both groups displayed increases in

Table 1
Changes in outcomes in the experimental group (CDSMP) over pre- and post-intervention measurements

Outcome measure	Range of measures	Pre-test		Post-test		<i>F</i>	<i>P</i>	Power ^a
		<i>M</i>	S.D.	<i>M</i>	S.D.			
Self-management behavior								
Exercise	0–18 ^b	3.48	2.82	6.23	3.21	29.14	.000	.99
Cognitive symptom management	0–5	1.80	.85	2.32	.91	14.69	.000	.96
Use of community services	0–20	14.17	3.49	14.72	2.01	1.20	.280	.19
Communication with physician	0–5	1.79	1.11	1.99	1.11	1.41	.242	.21
Self-efficacy								
Perform self-management behavior	1–10	6.17	1.83	6.76	1.59	7.27	.010	.75
Manage disease in general	1–10	6.40	1.67	6.92	1.71	6.92	.012	.73
Achieve health outcomes	1–10	6.23	1.90	6.85	1.76	8.96	.004	.83
Coping strategies								
Diverting attention	0–36	21.57	7.16	23.91	6.14	7.90	.007	.79
Reinterpreting pain	0–36	17.21	6.49	19.70	6.50	7.86	.007	.78
Catastrophizing	0–36	16.89	5.37	16.30	5.28	.62	.435	.12
Ignoring sensation	0–36	20.15	6.30	23.09	5.86	13.76	.001	.95
Praying or hoping	0–36	21.49	6.24	22.34	5.82	1.08	.303	.18
Making self-statements	0–36	23.83	5.82	25.77	5.62	9.42	.004	.85
Behavioral coping	0–36	22.26	6.16	23.17	5.27	1.16	.287	.18
Health outcomes								
Pain and physical discomfort	0–100	54.82	23.58	48.30	20.73	6.16	.013	.71
Energy	0–5	2.11	.81	2.39	.95	7.81	.008	.78
Fatigue	4–44	26.69	9.73	23.90	9.76	4.41	.041	.54

^a Power refers to the observed power calculated based on an α value of .05, the actual sample size, and the effect size for each outcome variable.

^b This is the observed range, since there is no upper limit for the scale.

self-efficacy in performing self-management behavior and achieving health outcomes, the comparison results showed that the experimental group achieved significantly greater increases in self-efficacy than did the comparison group.

3.3. Coping strategies

The experimental group showed significant increases in using four out of the eight coping strategies, including

Table 2
Changes in outcomes in the comparison group (Tai-Chi interest class) over pre- and post-intervention measurements

Outcome measure	Range of measures	Pre-test		Post-test		<i>F</i>	<i>P</i>	Power ^a
		<i>M</i>	S.D.	<i>M</i>	S.D.			
Self-management behavior								
Exercise	0–18 ^b	4.17	2.73	6.11	2.61	14.03	.001	.95
Cognitive symptom management	0–5	1.99	1.04	2.21	.87	1.30	.265	.20
Use of community services	0–20	14.31	2.09	14.46	1.96	.17	.688	.07
Communication with physician	0–5	2.19	1.22	2.03	.90	.59	.450	.11
Self-efficacy								
Perform self-management behavior	1–10	6.60	1.67	6.66	1.45	.04	.846	.05
Manage disease in general	1–10	6.99	1.64	6.94	1.87	.12	.878	.05
Achieve health outcomes	1–10	6.70	1.71	6.72	1.68	.02	.964	.05
Coping strategies								
Diverting attention	0–36	21.92	7.05	23.15	5.37	1.27	.271	.19
Reinterpreting pain	0–36	16.85	7.19	18.65	7.10	2.52	.124	.33
Catastrophizing	0–36	16.84	7.19	17.15	5.63	.76	.392	.13
Ignoring sensation	0–36	21.00	6.77	21.00	6.09	.00	.999	.05
Praying or hoping	0–36	21.81	6.78	24.04	5.94	4.73	.039	.55
Making self-statements	0–36	24.69	5.61	25.81	5.22	.82	.375	.14
Behavioral coping	0–36	20.81	4.80	23.19	4.73	4.16	.052	.50
Health outcomes								
Pain and physical discomfort	0–100	50.69	24.52	44.53	24.52	2.97	.097	.38
Energy	0–5	2.48	1.07	2.43	.85	.08	.776	.06
Fatigue	4–44	25.23	10.29	23.89	11.60	.85	.365	.14

^a Power refers to the observed power calculated based on an α value of .05, the actual sample size, and the effect size for each outcome variable.

^b This is the observed range, since there is no upper limit for the scale.

Table 3
Comparison of outcomes between the experimental (CDSMP) and comparison (Tai-Chi interest class) groups using ANCOVA

Outcome measure	Group	Range of measures	Estimated marginal means			P	Power ^a
			M	S.E.	95% CI		
Self-management behavior							
Exercise	Comparison	0–18 ^b	5.99	.33	5.34–6.65	.131	.33
	Treatment		6.69	.32	6.06–7.33		
Cognitive symptom management	Comparison	0–5	2.11	.09	1.92–2.29	.032	.58
	Treatment		2.39	.09	2.21–2.57		
Use of community services	Comparison	0–20	14.61	.21	14.20–15.03	.226	.23
	Treatment		14.95	.20	14.56–15.34		
Communication with physician	Comparison	0–5	2.04	.11	1.83–2.25	.62	.07
	Treatment		2.11	.10	1.90–2.31		
Self-efficacy							
Perform self-management behaviors	Comparison	1–10	6.52	.18	6.17–6.88	.036	.56
	Treatment		7.05	.17	6.71–7.39		
Manage disease in general	Comparison	1–10	6.62	.17	6.28–6.96	.004	.83
	Treatment		7.32	.17	6.99–7.65		
Achieve health outcomes	Comparison	1–10	6.57	.16	6.26–6.88	.028	.60
	Treatment		7.06	.15	6.76–7.36		
Coping strategies							
Diverting attention	Comparison	0–36	22.61	.65	21.33–23.88	.011	.72
	Treatment		24.98	.66	23.67–26.28		
Reinterpreting pain	Comparison	0–36	18.25	.68	16.91–19.59	.076	.43
	Treatment		19.99	.69	18.61–21.36		
Catastrophizing	Comparison	0–36	16.84	.71	15.44–18.24	.319	.17
	Treatment		15.83	.72	14.40–17.26		
Ignoring sensation	Comparison	0–36	21.12	.64	19.86–22.38	.005	.81
	Treatment		23.72	.65	22.43–25.00		
Praying or hoping	Comparison	0–36	21.96	.61	20.76–23.15	.171	.28
	Treatment		23.15	.62	21.92–24.37		
Making self-statements	Comparison	0–36	24.89	.65	23.61–26.17	.127	.33
	Treatment		26.31	.66	25.01–27.62		
Behavioral coping	Comparison	0–36	22.25	.64	20.98–23.51	.137	.32
	Treatment		23.61	.65	22.32–24.91		
Health outcomes							
Pain and physical discomfort	Comparison	0–100	45.21	1.93	41.40–49.02	.809	.06
	Treatment		44.54	1.97	40.65–48.44		
Energy	Comparison	0–5	2.35	.09	2.17–2.52	.023	.62
	Treatment		2.63	.09	2.46–2.81		
Fatigue	Comparison	4–44	25.12	1.50	22.13–28.11	.397	.14
	Treatment		23.47	1.18	21.12–25.82		

^a Power refers to the observed power calculated based on an α value of .05, the actual sample size, and the effect size for each outcome variable.

^b This is the observed range, since there is no upper limit for the scale.

diverting attention ($F = 7.90$, $P = .007$), reinterpreting pain ($F = 7.86$, $P = .007$), ignoring sensation ($F = 13.76$, $P = .001$), and using positive self-statements ($F = 9.42$, $P = .004$) (Table 1). The comparison group demonstrated significant increases only in praying and hoping ($F = 4.73$, $P = .039$) (Table 2). The increase in the use of behavioral coping methods was also close to statistical significance ($F = 4.16$, $P = .052$). When the outcomes of both groups

were compared using ANCOVA (Table 3), the experimental group showed a significantly greater increase in the use of diverting attention ($F = 6.60$, $P = .011$) and ignoring sensation ($F = 8.09$, $P = .005$) than did the comparison group. The use of reinterpreting pain was also higher in the experimental group than in the comparison group, and was close to statistical significance ($F = 3.19$, $P = .076$).

3.4. Health outcomes

The experimental group showed significant decreases in pain and physical discomfort ($F = 6.16$, $P = .013$) and fatigue ($F = 4.41$, $P = .041$), and a significant increase in energy ($F = 7.81$, $P = .008$) over the treatment period (Table 1). The comparison group, on the other hand, demonstrated no significant change in health outcomes (Table 2). When the health outcomes of both groups were compared, the experimental group was found to have experienced significantly higher energy levels than the comparison group on completion of the program ($F = 5.23$, $P = .023$) (Table 3).

4. Discussion and conclusion

4.1. Discussion

The single-group analysis showed that the CDSMP group achieved significant increases in self-management behavior (exercise and cognitive symptom management), in self-efficacy of managing illness (all three aspects), in the use of some coping strategies (i.e., diverting attention, reinterpreting pain, ignoring sensation, and making self-statements), and in energy levels. The comparison group, which practiced Tai-Chi in a mass-activity format, showed increases only in exercise and in the use of praying and hoping as coping strategies.

The comparison of the CDSMP group with the Tai-Chi group showed that the effects of the CDSMP were more significant than the effects of Tai-Chi in several areas. In self-efficacy, the CDSMP group significantly outperformed the comparison group on all three subscales, with an observed power between .56 and .83. Among all outcome domains, it is in the self-efficacy domain that the CDSMP group outperformed the comparison group on all subscales. This result is consistent with the theoretical postulation of self-efficacy theory that self-management programs like that of the CDSMP has a major impact on the self-efficacy of participants in managing their disease [5,18]. An increase in self-efficacy may have a major influence on self-management behavior, coping skills, and other health-related improvements.

In the outcome domain of self-management behavior, three points are worth noting. First, the significant increases in exercising in both groups masked the effects of the CDSMP. From the single-group analysis, because both groups showed significant increases in exercising, it appeared that no significant changes occurred in exercise levels between the two groups. Second, the CDSMP group used significantly more types of cognitive methods (e.g., relaxation, guided imagery, positive thinking) than did the comparison group to manage disease symptoms like pain and discomfort. On the whole, the results suggest that the CDSMP was effective in helping participants acquire self-

management behaviors with respect to cognitive-symptom management and exercise by the end of the 6-week program. In fact, these two types of self-management behavior were the ones most commonly seen in the participants' action plans, as reported in their daily logs. Third, we noticed some measurement issues with the two self-management subscales of "use of community services" and "communication with physician." Participants' report on the "use of community services" subscale could depend on individual needs as well as awareness and availability of neighborhood resources. For the "communication with physician" subscale, participants reported in their logs much dissatisfaction in communicating with health professionals. Many said they could do little on their part, and some even said that physicians needed to improve their communication skills. In short, the "use of community resources" subscale may be dropped as its reliability is in question. There is also a need to further explore the difficulties in communication with health-care professionals and to use the information to re-design the questions in this subscale, as well as addressing this issue in the program content.

In the area of health outcomes, the participants experienced significant increases in energy but no decrease in pain and discomfort or fatigue in the short run. These results are consistent with those of previous evaluation studies that have shown that self-management interventions for people with chronic illness may not result in short-term changes in perceived health conditions in short-term evaluations [19,20]. Many chronic diseases, like rheumatoid arthritis or diabetes, are characterized by a recurring pattern of exacerbation and remission of symptoms. It is possible that clients may not perceive significant decreases in pain and physical comfort as a whole. The more immediate benefit of the self-management interventions probably lies in helping clients to perceive more control over their illness and lives, and to apply more effective self-management strategies [14].

The present study results with a Chinese population were consistent with outcome studies conducted in English-speaking countries and among Hispanic populations. There were significant increases in self-efficacy and aspects of self-management behavior and coping skills. However, from observation of group processes and the qualitative data collected from participants, several aspects of the program may need further review. First, participants were rather ambivalent about topics related to death and dying. Many were reluctant to discuss the topic of advanced directives and dismissed it as unnecessary. On the other hand, quite a number of participants requested more coverage of suicide and dying. They said that many persons with chronic illness think of ending their own lives some time in the course of their illness. Second, many participants expressed great dissatisfaction in their communication with health-care professionals, especially physicians. Participants were interested in learning ways of getting their opinions across

to their doctors. Thus, there is a need to review the contents of the CDSMP regarding these two aspects—death and dying, and communication with health professionals.

This study's use of a quasi-experimental research design may have resulted in several limitations. First, we used a comparison group instead of a control group. We have found that it is rather difficult to attract research participants if they are informed they may be allocated to a control group without active intervention. The best alternative we could implement was to set up a Tai-Chi interest class as a comparison group, and a matched-pairs procedure was conducted before randomization to either the CDSMP group or the Tai-Chi group. As reflected in the results, we found that Tai-Chi in a mass-activity format primarily resulted in an increase in exercising and in the use of coping strategies of hope and prayer, but not in the other outcome domains we measured. Using the Tai-Chi comparison group was a good alternative to using a control group, as it can still provide adequate protection against threats to validity like maturation or history effects as well as selection biases.

Second, the target population of the CDSMP is a diverse group with different diseases, different levels of pain, and functional levels. This is evident from the large standard deviations in the baselines, such as for pain and discomfort, exercising, or coping strategies. To control for inter-subject differences in the evaluation design, we used the matched-pairs approach before subject randomization. We also used the baseline measurement as a covariate in the analysis, so that the comparison of outcomes between groups could be more powerful.

Third, this study only evaluated the short-term (post-program) effects of the CDSMP. In the original plan of the study, we planned to conduct a third measurement at a 3-month follow-up. However, this follow-up measurement was dropped because of the outbreak of Severe Acute Respiratory Syndrome (SARS) in Hong Kong during the follow-up period. During this period, people were very afraid to leave home, and many tried to avoid social contact as much as possible. People with chronic illness were advised by the Health Department that they were more vulnerable to SARS than the general public, which decreased the feasibility of conducting the follow-up assessment. Thus, the nature of this study was reframed as a short-term evaluation of the CDSMP. In a further evaluation study of CDSMP, we have included a 6-month follow-up to evaluate the longer-term effects of the program.

Fourth, we estimated that a sample size of 160 participants – 80 in the experimental group and 80 in the comparison group – was adequate for this clinical trial. This was based on conservative estimates of effect sizes (low effect sizes of .35 for within-subject and between-group effects) obtained from a pilot study. While our final sample size of 148 was close to the required sample size of 160, a few factors may have affected the power of the statistical analysis. This includes the use of a comparison group instead of a control group and the lack of a second

follow-up measure at 6 months after completion of the CDSMP.

Lastly, we were aware of the potential effects of prior exposure to other types of self-help intervention (other than the CDSMP) or Tai-Chi on the results of the experiment. We attempted to control exposure to self-help interventions by recruiting participants who had not received patient education programs in the past 2 years (one of the selection criteria). However, it was more difficult to control the exposure to Tai-Chi, as Tai-Chi is commonly practiced by the elderly in Hong Kong. Prior exposure to Tai-Chi could have raised the outcomes of the comparison group in the study, and have reduced the power of the between-group analyses.

4.2. Conclusion

When compared with the comparison group, the CDSMP participants demonstrated significantly higher self-efficacy in managing their illness, used more cognitive methods to manage pain and symptoms, and felt more energetic. The CDSMP participants also demonstrated changes in their profile of coping strategies, with a tendency to adopt the cognitive methods of diverting attention, reinterpreting pain, ignoring sensations, and making positive self-statements. On the whole, the short-term evaluation results showed that the CDSMP primarily increased participants' self-efficacy in managing illness, self-management behavior (symptom management and exercising), energy level, and the application of cognitive strategies in coping with pain and discomfort.

4.3. Practice implications

To sum up the above discussion, there are a number of implications for practice with regard to the use of chronic disease self-management programs with Chinese populations. First, among all the outcome domains, the CDSMP was most effective in increasing the self-efficacy of illness management upon completion of the 6-week program. This result suggests that the self-efficacy theory may be a useful framework for studying the change mechanisms underlying the CDSMP. Group strategies used in the CDSMP, like role-modeling, goal-setting, group evaluations and persuasion, and cognitive reappraisals, could be very powerful tools in health-promotion programs delivered in a small-group format.

Second, the CDSMP participants achieved significant increases in self-management behaviors like exercise and cognitive symptom management (e.g., relaxation, diversion, imagery), as well as in the use of coping strategies, including diverting attention, reinterpreting pain, ignoring sensation, and using self-statements. In addition, we also noticed that many participants set self-management goals in practicing cognitive methods. These results support the notion that the practice and application of cognitive methods by participants played an important part in the change processes of the CDSMP. While many Chinese

patients may begin their self-management plans by exercising, health-care practitioners should note the importance of teaching cognitive methods as a major coping strategy.

Third, the study results with a Chinese population were consistent with outcome studies conducted in English-speaking countries and among Hispanic populations. The results suggested that the effects of the CDSMP for Chinese populations were largely similar to those for other ethnic groups. There were, however, two aspects of the program that may need further review. Participants were ambivalent toward the topics of death, dying, and suicide, and interested in learning more about communicating with health professionals. Health-care practitioners should note the taboo associated with discussions of death and dying in Chinese populations, and assist patients to learn communication and assertive skills when talking with their doctors.

Fourth, we noticed that there were issues regarding the measurement of the use of community resources. The responses to questions on the use of community resources may have been greatly confounded by the availability of such resources in neighborhoods; thus, it is suggested that the measurement subscales in these areas be revised or removed if reliability and validity cannot be maintained.

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References

- [1] Lorig KR, Sobel DS, Stewart AL, Brown Jr BW, Ritter PL, González VM, et al. Evidence suggesting that a chronic disease self-management program can improve health status while reducing utilization and costs: a randomized trial. *Med Care* 1999;37:5–14.
- [2] Lam CLK, Lauder IJ. The impact of chronic disease on the health-related quality of life (HRQOL) of Chinese patients in primary care. *Fam Pract* 2000;17:159–66.
- [3] Lorig K, Gonzalez V, Laurent D. The chronic disease self-management workshop: leaders manual Palo Alto, CA: Stanford Patient Education Research Center; 1999.
- [4] Bandura A. *Self-efficacy: the exercise of control* New York: Freeman; 1997.
- [5] DeVellis BM, DeVellis RF. Self-efficacy and health. In: Baum A, Revenson TA, Singer JE, editors. *Handbook of health psychology*. Mahwah, NJ: Lawrence Erlbaum; 2001. p. 235–47.
- [6] Lorig KR, Sobel DS, Ritter PL, Laurent D, Hobbs M. Effect of a self-management program on patients with chronic disease. *Effective Clin Pract* 2001;4:256–62.
- [7] Barlow J, Wright C, Sheasby J, Turner A, Hainsworth J. Self-management approaches for people with chronic conditions: a review. *Patient Educ Couns* 2002;48:177–87.
- [8] Lorig K, Ritter PL, Stewart AL, Sobel DS, Brown BW, Bandura A, et al. Chronic disease self-management program: 2-year health status and health care utilization outcomes. *Med Care* 2001;39:1217–23.
- [9] Fu DB, Fu H, McGowan P, Shen YE, Zhu LZ, Yang HQ, et al. Implementation and quantitative evaluation of chronic disease self-management programme in Shanghai, China: randomized controlled trial. *B World Health Organ* 2003;81:174–82.
- [10] Reichardt CS, Mark MM. Quasi-experimentation. In: Bickman L, Rog DJ, editors. *Handbook of applied social research methods*. Thousand Oaks, CA: Sage; 1998. p. 193–288.
- [11] Lorig KR, Ritter PL, González VM. Hispanic chronic disease self-management: a randomized community-based outcome trial. *Nurs Res* 2003;52:361–9.
- [12] Lorig K, González VM, Ritter P. Community-based Spanish language arthritis education program: a randomized trial. *Med Care* 1999;37:957–63.
- [13] Wong AL, Harker JO, Lau VP, Shatzel S, Port LH. Spanish arthritis empowerment program: a dissemination and effectiveness study. *Arthritis Rheum* 2004;51:332–6.
- [14] Stanton AL, Collins CA, Sworowski LA. Adjustment to chronic illness: theory and research. In: Baum A, Revenson TA, Singer JE, editors. *Handbook of health psychology*. Mahwah, NJ: Lawrence Erlbaum; 2001. p. 387–404.
- [15] Lorig K, Stewart A, Ritter P, Gonzalez V, Laurent D, Lynch J. *Outcome measures for health education and other health care interventions* Thousand Oaks, CA: Sage; 1996.
- [16] Rosentiel AK, Keefe FJ. The use of coping strategies in chronic low back pain patients: Relationship to patient characteristics and current adjustment. *Pain* 1983;17:33–44.
- [17] Hastie BA, Riley III JL, Fillingim RB. Ethnic differences in pain coping: factor structure of the Coping Strategies Questionnaire and Coping Strategies Questionnaire—Revised. *J Pain* 2004;5:304–16.
- [18] Schwarzer R. Self-efficacy in the adoption and maintenance of health behaviors: theoretical approaches and a new model. In: Schwarzer R, editor. *Self-efficacy: thought control and action*. Washington, DC: Hemisphere; 1992. p. 217–43.
- [19] Chan SCC, Siu AMH, Poon PKK, Chan CCH. Chronic disease self-management program for Chinese patients: a preliminary multi-base-line study. *Int J Rehab Res* 2005;28:351–4.
- [20] Siu AMH, Chui DYY. Evaluation of a community rehabilitation service for people with rheumatoid arthritis. *Patient Educ Couns* 2004;55:62–9.