Self-management for chronically ill older people

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Methods

3.1 Introduction

This chapter describes the methods used in the studies reported in this thesis. First of all, the sample size, the recruitment strategy, the enrollment process, and the characteristics of the participants are described. This is followed by an overview of the measurements and the questionnaires that were used. Subsequently, information is given about the intervention and the leaders, and the analyses are discussed.

3.2 Patients

3.2.1 Sample size

We originally aimed to include 200 participants, 100 of whom could be randomized to the intervention group, and 100 to the control group. We allowed for 20-30% drop-out, so that 150 of the 200 would complete the study, with 75 patients in the intervention group and 75 in the control group. This group size of 75 was based on the following power analysis for completed cases. The aim was to have a standardized effect of approximately 0.5, a power of 80%, and an $\alpha = 0.05$ (one-tailed). These were reasonable parameters for this kind of research, and they jointly yielded a group size of 75 patients in each group.

3.2.2 Recruitment

In the period between May 2003 and May 2004 patients were recruited on four wards of the Internal Medicine outpatient clinic at the University Medical Center Groningen, through announcements in the media, and various patient association magazines. The eligibility criteria were: age 59 or older; angina pectoris or heart failure, COPD or asthma, or arthritis, or diabetes; ability to communicate adequately in the Dutch language; experiencing problems in coping with the disease; ability to attend a six-week course. Patients with a life-expectancy of less than one year, or currently attending a disease-specific self-management program, or participating in another study, or who were permanent residents of a nursing home were excluded from the study. Patients with other diseases, in addition to the above-mentioned ones, for example hypertension, were also eligible for participation.

On the day before the consultations with a physician were planned, all medical files of patients with an appointment were screened to identify patients who met the above-mentioned criteria. If a patient was eligible, a green leaflet

was placed in the file, so that during the consultation the physician would see the leaflet indicating that the patient was eligible for the study. After the consultation, the physician asked the patient if (s)he had enough time to answer a few questions concerning a study investigating the influence of a chronic disease on daily life. If a patient agreed, the physician informed the medical secretary, who informed the primary researcher (i.e., Henrike Elzen). Subsequently the patient was invited to have a short conversation with the primary researcher, during which the researcher used the Groningen Frailty Indicator (GFI) to collect data on several domains of functioning [1;2]. The GFI is a short, easy-to-administer 15-item screening instrument to assess level of frailty, which will be described in more detail the Measurement section. At the end of this conversation the patients who were, indeed, eligible at this stage were invited to participate in a study investigating the effects of Lorig et al.'s Chronic Disease Self-Management Program (CDSMP) on older people with one or more chronic diseases in the Netherlands. Patients who agreed to participate were told that they should keep in mind that they would be randomly assigned to an intervention group or a control group.

Of the 616 patients who were eligible for participation based on their medical file, 124 (20.1%) were not further assessed, because the physician did not consider the patient to be eligible for the study, or the patient had no time, or the patient did not keep the appointment (Figure 3.1). Of the 492 patients who were screened, 217 were recruited through the Rheumatology ward (44.1%), 147 through the Endocrinology ward (29.9%), 121 through the Lung Disease ward (24.6%), and 7 through the General Internal Medicine ward (1.4%). Of these patients, 131 (26.6%) had not been invited to participate during the initial conversation, mainly because the patient's (n=100) physical condition seemed to be either too bad or too good. This assessment was based on the patient's self-rated score for their health status, the answers they gave to other questions on the GFI (indicating that they did not experience any problems in daily life), or the fact that the patient appeared to be very weak. Other reasons were: cognitive impairment (n=8); impaired vision or hearing (n=5); personality characteristics, such as being too talkative, because of which the patient was not considered to be suitable for participation in a group (n=5); living in a nursing home (n=3); inability to communicate adequately in Dutch (n=2); admission to a hospital or rehabilitation center (n=5); participating in another study (n=2); or recently discharged from a psychiatric hospital (n=1).

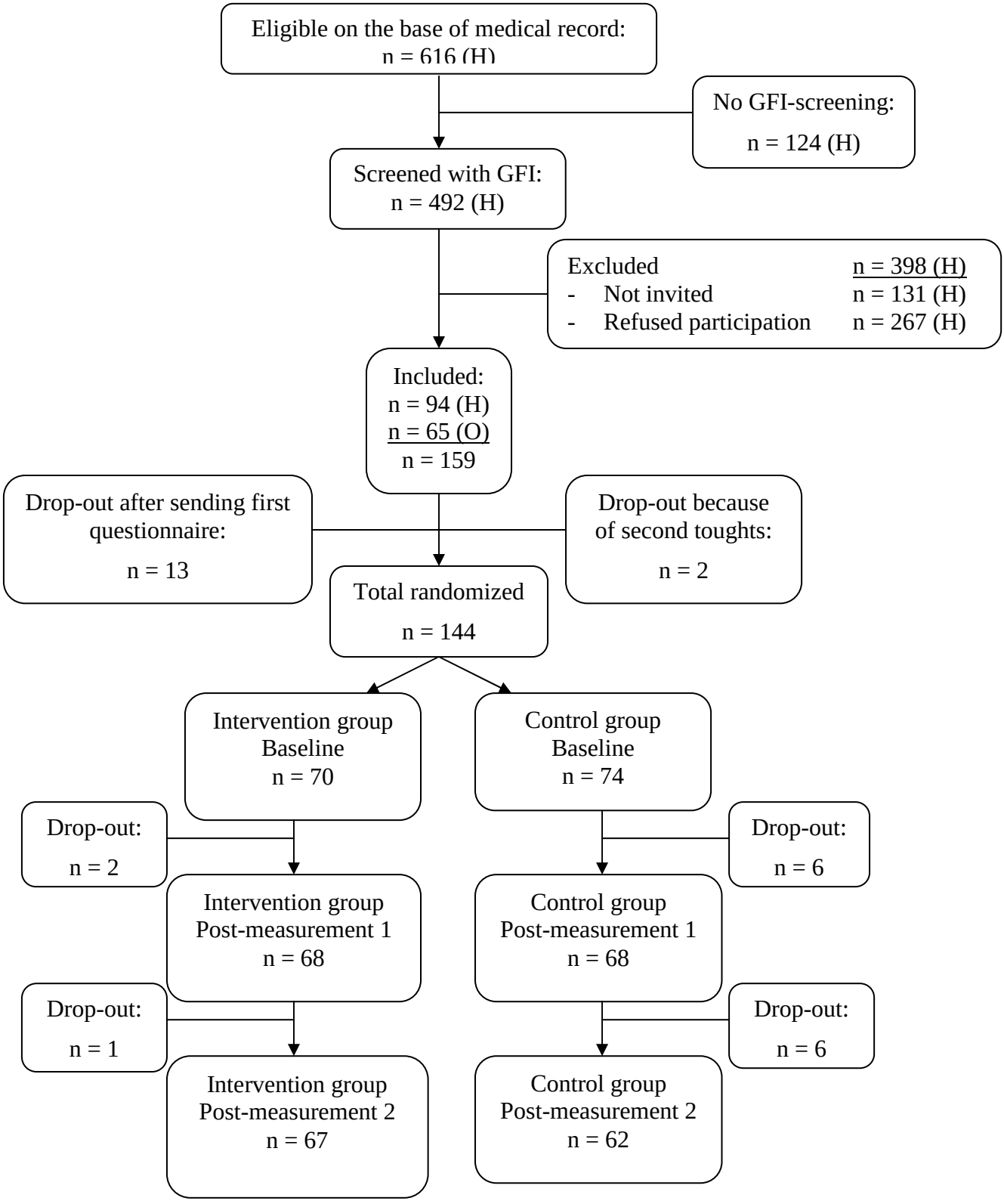

Figure 3.1 Enrolment procedure (H = hospital and O = other ways of recruitment)

Of the 361 patients who were invited, 267 refused participation (74.0%), and 80% gave their reasons for non-participation (n=218). The main reasons were: no time to attend a six-week course (19.3%), long travel distance to course location (19.3%), transportation problems (12.4%), no need to attend a course (10.1%), participation in a course would be too strenuous (7.8%; see also Chapter 7 for characteristics of the refusers).

Patients who agreed to participate, were given an information brochure and an informed consent form to take home. The primary investigator then contacted them by telephone two days later, allowing them some time for consideration. If they were still willing to participate, they were asked to sign the informed consent form and send it back. In this way, a total of 94 patients were recruited for the study.

Due to the low response rate in the wards of the outpatient clinic, other methods were used to recruit additional patients, namely announcements in local and national newspapers, announcements via local and national radio stations, an announcement in a Dutch health insurance company magazine, leaflets distributed to all residential care homes in the city of Groningen, announcements in patient association magazines and meetings (Dutch Diabetes Association, and the regional branches of the Arthritis Association and the Asthma Association). In this way, another 65 patients were recruited (see Table 3.1).

Each time about twenty-five patients returned their informed consent forms, a baseline questionnaire was sent to these patients. After they had returned this questionnaire, these twenty-five participants were randomized: within each diagnostic group participants were assigned either to the intervention or the control group. After three randomization moments, it appeared that the control group was bigger than the intervention group, so in order to eliminate this difference it was decided to randomize people with a probability of 2/3 to the fourth and fifth intervention group. The sixth group was randomized in the order in which the questionnaires were returned, i.e. the first eight were assigned to the intervention group. The sixth group also contained four people from the first control group but these four people were excluded from the analyses of the sixth group. In this way, six consecutive blocks of approximately twenty-five people with various diseases were formed during the inclusion period, half of whom where in the intervention group and half in the control group. The intervention group participated in the CDSMP and the control group received care-as-usual. After the last measurement, the control group was also offered the patient information book that was used in the intervention.

Table 3.1 Other methods of recruitment, and the number of people recruited per method

Time period	Method of recruitment	N
November '03	Distribution of flyers during a regional Asthma-manifestation in Groningen	1
January '04	Interview for a column in "Het Parool" (Dutch national newspaper)	0
	Interview in "Dagblad van het Noorden" (Dutch regional newspaper)	0
	Interview in "De Ochtenden" (program on the national radio)	0
	Interview in "Friesch Dagblad" (Dutch regional newspaper)	0
	Telephone interview on radio Delfzicht (local radio station)	0
	Announcement in a regional magazine of the Dutch Arthritis Association	8
March '04	Telephone interview on radio Veendam (local radio station)	0
	Presentation at a regional meeting of the Dutch Arthritis Association	0
	Interview in "Trouw" (Dutch national newspaper)	5
	Announcement in the national magazine of a Dutch health insurance company ("Health")	0
April '04	Interview on radio "Noord" (regional radio station)	12
	Presentation at a regional meeting of the Dutch Asthma Association	4
May '04	Announcement in the national magazine of the Dutch Diabetes Association	16
	Distribution of flyers in local residential care homes	5
September '04	Poster at a local rehabilitation sports center	3
	Presentation at a regional meeting of the Dutch Diabetes Association	4
October '04	Presentation at a regional meeting of the Dutch Asthma Patients Association	5
	Announcement in the national magazine of the Dutch Heart Disease Association	2
	Letters to regional contact persons for the Dutch Heart Foundation	0
Total		**65**

A total of 159 patients were included in the study. After giving informed consent two patients dropped out because they had second thoughts, and another 13 dropped out after receiving the baseline questionnaire (without completing it), mainly for physical reasons.

Eight patients did not complete the first post-intervention questionnaire. Two patients withdrew from the study after randomization: a couple that had been assigned to the intervention group, but the husband had subsequently suffered a heart attack. Six patients in the control group did not return the first post-intervention questionnaire: one patient had died, one wrote to say that the study did not meet her expectations, and four gave no specific reason. Five of the drop-outs had diabetes, two had arthritis, and one had a lung disease. The

eight drop-outs did not differ significantly from the other participants at baseline.

Seven patients (six in the control group and one in the intervention group) did not complete the second post-intervention questionnaire (T2). Of the six drop-outs in the control group, one had developed a brain tumor and was unable to complete the questionnaire, one had died, and four patients gave no specific reason. One patient in the intervention group did not complete the questionnaire because she no longer thought it was of any use. Of these seven drop-outs, four had diabetes, two had a lung disease, and one had a heart disease. Compared to the patients who completed the second post-intervention questionnaire, the drop-outs returned their questionnaire significantly later at T1 (Z=-3.269, p=.001) and had a significantly lower score for the physical functioning component of the RAND-36 (Z=-2.546, p=.011). The drop-outs also had a significantly lower score for exercise (Z=-2.695, p=.007), but a significantly higher score for cognitive symptom-management (Z=-2.138, p=.033) at the first post-intervention measurement.

Table 3.2 presents the characteristics of the participants. Of the 144 patients who were randomized, 48.6% (n=70) were assigned to the intervention group and 51.4% (n =74) to the control group. No differences between the groups were found at baseline with regard to any patient characteristics or measurement scales, confirming the random allocation to the intervention.

3.3 Measurements

Data were collected through self-administered questionnaires that were mailed to the patients three weeks before the program started (T0), immediately after the program had finished (T1, six weeks after baseline), and six months after the end of a course (T2). The patients had one to three weeks to complete and return the questionnaire. A research assistant, who was unaware of the patient's randomization status, checked the returned questionnaires for completeness. If questions or pages were missing, either a copy was sent to the patient with a request for completion of the questionnaire, or the patient was interviewed by telephone. Although they returned the questionnaire, it appeared that two patients had not been able to complete the questionnaire by themselves, probably due to a low education level, so they were helped by a research assistant who visited them at home.

The baseline questionnaire was returned within, on average, 11.4 days (range 2-60). Patients in the intervention group returned their questionnaire

significantly faster at baseline than patients in the control group (average 8.8 days and 14.0 days, respectively; t=-2.967, p=.004). The first post-intervention questionnaire was also returned within, on average, 11.4 days (range 2-48), and again the patients in the intervention group returned their questionnaire significantly faster than the patients in the control group (average 9.3 days and 13.4 days, respectively; t=-2.531, p=.013). The last questionnaire (T2) was returned later than the first two questionnaires, namely after, on average, 14.9 days (range 2-162). No significant difference was found between the intervention group and the control group.

Table 3.2 Patient characteristics

Characteristics	**Intervention group**	**Control group**	***P*-value**
N	70	74	
Mean age (SD)	68.5	68.5	.978
Range	59-84	59-87	
Gender			.935
Male (%)	37.1	36.5	
Partner (%)	67.1	56.8	.498
Disease			.496
Diabetes (%)	35.7	32.4	
Lung disease (%)	31.4	23.0	
Arthritis (%)	28.6	37.8	
Heart disease (%)	4.3	6.8	
Recruitment			.071
Hospital (%)	48.6	63.5	
Other (%)	51.4	36.5	

3.3.1 Measures

Demographic variables. The demographic data included date of birth, gender, marital status and primary chronic condition.

Self-efficacy. When we started collecting the data, it was uncertain which of the Lorig et al. self-efficacy scales for the CDSMP would be the most appropriate, because different scales had been used in studies of the CDSMP. In the first studies behavior-specific self-efficacy questionnaires were used, as described in Lorig et al.'s "Outcome measures for health education and other health care

interventions" [3]. An example of an item on these questionnaires is "How confident are you that you can do an aerobic exercise such as walking, swimming, or cycling three or four times each week?" In Lorig et al.'s "Sample questionnaire for the chronic disease self-management program", however, the questions concerning self-efficacy are less behavior-specific. For example "How confident are you that you can do things other than just taking medication to reduce the effects of your illness on your everyday life?" In personal correspondence, Kate Lorig explained why this other self-efficacy scale was introduced: "the SE scale was revised to reflect the belief that one could do some behavior to lessen the major symptom groups—this is the frame of the new scale—since it is not clear that any specific behavior is related to any specific outcome, we decided that in the spirit of self-management we would not specify behavior but let people self-tailor. What we are really asking is can you do something." Moreover, at the start of our study there was no available psychometric data on the more general questionnaire. Therefore, we decided to use a more general self-efficacy questionnaire that has also been validated in the Netherlands, namely the General Self-Efficacy Scale (GSES-16; [4]). The GSES-16 measures general expectations of self-efficacy. An example of an item is "When I make plans, I will execute them successfully". This instrument consists of 16 questions ($\alpha = .81$), scored on a 5-point Likert scale on the dimension agree/disagree, a higher score indicating a higher level of self-efficacy.

Self-management abilities (SMA). Self-management abilities were measured with the Self-Management Ability Scale (SMAS-30, [5]). This is a self-report questionnaire for measuring SMA in older people. It measures SMA as an overall concept of abilities systematically linked to dimensions of well-being, as described in the theory of self-management of well-being (SMW) and Lindenberg's Social Production Function (SPF) theory [6;7]. The SMAS-30 consists of six sub-scales (the six self-management abilities), with five items for every sub-scale ($\alpha = .89$). Some sub-scales are scored on a 5-point Likert scale, and some on a 6-point Likert scale. An example of an item in the sub-scale "taking initiative", that is related to affection is: "How often do you take the initiative to get in touch with people who are dear to you?" An item in the sub-scale "variety", which is related to stimulation, is: "How many hobbies or activities do you have on a regular basis?" However, "having a positive frame of mind" is an ability that is not directly related to specific dimensions of well-being, because it is considered to be a more general cognitive frame.

All sub-scale scores are transformed to a 100-point scale, with the sum of the items of the sub-scales as the sub-scale score and the average of the six sub-scales as the total SMA score. The higher the score, the higher the SMA. Cronbach's alpha of the overall scale was .89, and between .65 and .83 for the sub-scales.

Self-management behavior. Since there were no official Dutch equivalents of the Lorig et al. measures with regard to self-management behavior, i.e., frequency of exercise, cognitive symptom-management, and communication with a physician, we decided to use the Lorig et al. scales, slightly adapted for cultural differences [3]. The frequency of four different types of exercise was measured (walking, swimming, cycling and other types of exercise), with a translated and adapted version of the Lorig et al. "physical activities" [3]. We did not include the questions about frequency of 'stretching and strengthening exercises', 'aerobic exercise with equipment (such as a stair master, a health rider, etc.)', and 'other aerobic exercise' because we assumed that our older respondents would not be familiar with these exercises. The frequency of exercise refers to the number of minutes spent on exercise each week.

Cognitive symptom-management was measured with a translated and adapted version of the Lorig et al. "Coping with symptoms" [3]. The adaptation concerns two statements: 'try to feel distant from the discomfort and pretend that it is not part of your body' and 'don't think of it as discomfort but as some other sensation, such as a warm, numb feeling'. These two questions were left out, because it was assumed that our respondents would not have been familiar with these techniques. The adapted scale consists of five items ($\alpha = .71$), asking whether participants, when feeling depressed or experiencing pain or other symptoms, used techniques such as distraction, breathing exercises, guided imagery, progressive muscle relaxation, or positive thinking. This is scored on a 6-point Likert scale on the dimension never/always, a higher score indicating more use of cognitive symptom-management techniques. Cognitive symptom-management was only measured at the post-intervention measurement moments, because it was assumed that these questions would only be understood after the patients had heard about this subject during the course.

Communication with a physician was measured with a Dutch translation of the Lorig et al. "Communication with a physician"[3]. The scale contains three items, asking whether participants, when visiting a physician, prepare a list with questions to ask their doctor, ask questions about things they want to know and things they do not understand about the treatment, and discuss any personal

problems that may be related to the illness. This is scored on a 6-point Likert scale on the dimension never/always. The score is the mean of the three items. Cronbach's alpha was .65, a higher score indicating better communication with a physician.

Well-being. In this study, overall well-being was measured by means of both positive and negative indicators. The 15-item version of the SPF-Index Level Scale (SPF-IL) was used to measure overall well-being [8]. The SPF-IL is a multidimensional instrument that measures five dimensions of well-being (affection, behavioral confirmation, status, comfort, and stimulation). The short version consists of 15 items, with three positive items per goal. An example of a question about affection is: "Do people pay attention to you?" Scoring is on a 4-point Likert scale on the dimension always/never, with the sum of the items of the sub-scales as the sub-scale score and the sum score of all sub-scales as the total score. A higher score implies greater well-being. Cronbach's alpha of the overall scale was .80, and between .68 and .81 for the sub-scales.

Depression was measured with the 10-Item Geriatric Depression Scale (GDS-10; [9]). The GDS-10 consists of ten items, which are scored either yes or no. For seven of the questions the answer "yes" gives a positive score indicating depression; in the remaining three the answer "no" scores positively. An example of a question is: "Do you have the feeling that your life is empty?" The scores are summed to give a total of 0-10, the higher the score, the greater the depression. Cronbach's alpha of the scale was .76.

Positive and negative affect were measured with a short version of the Positive and Negative Affect Schedule (PANAS; [10;11]). This version consists of 5 positive and 5 negative adjectives, scored on a 5-point Likert scale on the dimension not at all/very much. An example of a question with regard to positive affect is "How often do you feel inspired?"; an example of negative affect is "How often do you feel nervous?" The higher the score of the sub-scale, the higher the positive or negative affect. A reliability analysis showed that the internal consistency of the positive affect scale was rather low (α=.63). Leaving out the item "feeling excited", because it has an ambiguous meaning in Dutch, increased the reliability (α=.70). Therefore, we used the four-item version of the positive affect scale. Cronbach's alpha for the negative affect scale was .88.

Health status. Health status was measured with the RAND 36-item Health Survey [12]. This scale consists of 36 questions and covers eight domains

(physical functioning; social functioning; role function (physical problems); role function (emotional problems); mental health; vitality; pain; and general health perception). In order to reduce the number of statistical comparisons, and therefore the inflation of the probability of type I error due to multiple testing, we used only the physical and mental component summary scales of the Dutch version of the RAND 36-item Health Survey [12;13]. The physical component is a composite of the sub-scales for physical functioning, role limitations (physical problems), bodily pain, and general health. The internal consistency of this overall scale was α=.77. The mental component is a composite of the sub-scales for vitality, social functioning, role limitations (emotional problems), and mental health. Cronbach's alpha of the overall mental scale is .72. The higher the score for both scales, the better the physical and mental health condition. Health status was measured at all three measurement moments.

Frailty. The Groningen Frailty Indicator (GFI) was used to measure frailty on both physical and psychosocial domains [1;2]. The GFI is a short, easy-to-administer 15-item screening instrument to assess level of frailty (*KR-20* = .62). The GFI relates to four domains of functioning: physical (mobility, physical fitness, vision, hearing, nourishment, and morbidity), cognitive (memory), social (emotional isolation), and psychosocial (depressed mood and feelings of anxiety). Every item is scored either 0 (no problems) or 1 (problems), and the scores are then summed. The sum scores range from 0 (not frail) to 15 (very frail).

Health care utilization. To measure health care utilization we used the Lorig et al. "Medical Care" [3], supplemented with questions from Bos et al. [14]. The Lorig et al. questionnaire asks how many times in the previous six months a person has visited one or more physicians, and the emergency department of a hospital. It also asks about hospital admission, and duration of hospitalization. Based on Bos et al., the patients were asked how many times in the previous six months they had visited a general practitioner (GP), a medical specialist, a physical therapist, or a social worker, and how many times in the previous six months they had made use of home care or unpaid volunteers. They were also asked if they had been admitted to any other institution, apart from a hospital (i.e., a nursing home, a rehabilitation center, a psychiatric hospital, or other institution), and how many days they had stayed there.

3.4 Intervention

The Chronic Disease Self-Management Program (CDSMP), developed by Lorig et al., consists of six weekly sessions, each with a duration of 2½ hours. Appendix 1 gives an overview of the content of each session. The program is led by two leaders who adhere to a detailed manual [15]. During the first session the participants receive "Living a Healthy Life with Chronic Conditions", a patient book that is used during the course and can also be used by the patients as a reference book [16]. The program includes: adoption of exercise programs; use of cognitive symptom-management techniques, such as guided relaxation and distraction; nutritional change; fatigue and sleep management; use of medication and community resources; managing the emotions of fear, anger and depression; training in communication with health professionals and others; health-related problem-solving; and decision-making. The program incorporates strategies that are known to enhance a sense of personal efficacy. These include guided mastery of skills through weekly action-planning and feedback of progress, modeling of self-management behavior and problem-solving strategies by participants for one another, social persuasion through group support and guidance for individual self-management efforts, re-interpretation of symptoms by giving many possible causes for each symptom as well as several different management techniques, group problem-solving, and individual decision-making [17].

In the study reported in this thesis, there were 10-15 participants aged 59 years and older with mixed diagnoses in each course group. The participants received a Dutch translation of "Living a Healthy Life with Chronic Conditions" (second edition). Some minor adjustments had been made in this book, mainly based on cultural considerations. Chapter 12 (Making your wishes known: advance directives for health care) was adapted, by use was made of information from the website of "Right to Die-NL" (NVVE in Dutch). In Chapter 13 (Healthy eating) the food guides were left out, because the units used in the guides differ from Dutch units. In Chapter 14 (Medication) the information about buying medication without a prescription was left out, because in the Netherlands this is very unusual. In consultation with a rheumatologist, Chapter 17 (Understanding Arthritis) was adapted, except for the part on "management of chronic arthritis". A distinction was made between arthritis and rheumatoid arthritis, and the detailed information about medication was left out. Finally, Chapter 19 (Planning for the future: fears and reality) was adapted to the Dutch

situation, especially the parts about finding care in the home and outside the home. The part “will I have enough money to pay for my care” was left out.

In the course manual only a few adjustments were made. From the second group onwards, during the introduction to session one, we also asked the participants to tell something funny or special about themselves. We did this because we noticed in the first group that when the participants only talked about their disease and disease-related problems, the atmosphere became charged with emotion. Also in the first group we noticed that the participants did not make a copy of the action plan for themselves, i.e., they did not write it down and so they forgot to stick to it. Therefore, copied the action plan every week for every participant. In the third session, five more minutes were spent on the topic ‘advance directives’ and five minutes less on healthy eating. From the fourth session onwards the action plan was dealt with at the end and not, as the manual prescribes, at the beginning of the session, because in the first three sessions the action plans were also formulated at the end of the session.

The CDSMP was given the Dutch name “GRIP op lijf en leven”, which can be translated as “Grip on your body and your life”. GRIP is an acronym for Groningen Intervention Program, a program that compromises several interventions and studies, in all different formats. All interventions are either called “Grip op het leven” or have a similar title containing the word GRIP.

3.5 Leaders

For practical reasons, and because a study performed by Lorig et al. showed that there are hardly any differences between lay-taught and professional-taught courses, all courses were had at least one professional leader [18]. Each course had two leaders who followed a detailed CDSMP manual [17]. In our study, all courses were led by the primary investigator (HE), who is an MA psychologist and trained as a CDSMP Master Trainer at Stanford University (27 hours), and a peer leader or other Master Trainer (psychologist, PhD).

The first course group had two Master Trainers. Three groups were led with peer leader A, and two with peer leader B (who was also a psychologist in training). All the leaders were women, three of whom had one or more chronic diseases themselves, and one had a significant other with chronic diseases. Three of the leaders were younger than the participants, ranging in age from 30-50 years. Peer leader B, however, was 62 at the time of the study. In accordance with the study, both peer leaders A and B had received individual training for at least 20 hours based on the Master Trainer manual. Although peer leader A had

amply experience in teaching groups, she did not have experience in adhering to a detailed manual. Peer leader B was inexperienced with regard to both aspects. During the study it became clear that it was important that the peer leaders had already accepted their own disease(s). Otherwise there is a chance that a leader takes on a participant role instead of teaching, as happened to leader B during the first session. For example, she participated in a discussion instead of leading it, and she added her own experiences to the information contained in the lectures.

In most other published studies of the CDSMP, very little information is given about the leaders. Often, it is only stated that there were two lay leaders in the program, one or both of whom were suffering from a chronic condition themselves [19-21]. Some studies reported that the leaders received 20 hours of training, or stated how many of the leaders were health professionals [19;22-24]. No other characteristics of these leaders are mentioned, such as gender or age. However, in their study, Lorig et al. reported that their 87 leaders ranged in age from 21-80 years, and that 82% of them were 40 years of age and over.

3.6 Analyses

Specific analyses are described in each chapter separately. In general, *t*-tests, Chi-square tests, and Mann-Whitney tests were performed to compare the demographic characteristics and the baseline scores in the intervention group and the control group. Between-group analyses of covariance (ANCOVA) were performed to compare the intervention group with the control group. Treatment group (intervention/control) was used as the independent variable. Baseline score and gender were used as covariates, and block (1-6) was used as a factor. Correlations of the baseline scores and both post-intervention measurement scores for the various outcome variables ranged from .31 to .83. Because we also wanted to control for the severity of the disease, baseline physical functioning and type of disease were both used as control variables. Since only a few people had a heart disease (n=8), and a heart disease in this older population is often due to diabetes, heart condition was combined with diabetes. Thus, type of disease was represented by two dummy variables, one for arthritis and one for lung disease. Preliminary checks were made to ensure that there was no violation of the assumptions of normality, linearity, homogeneity of variances, homogeneity of regression slopes, or reliable measurement of the covariates. In view of the directionality of the research hypotheses, i.e.,. the results for the experimental group were expected to be better than for the control group, one-

tailed tests were performed. The level of significance was $\alpha=0.05$. The analyses were performed in SPSS 12.0.2 [25].

3.7 References

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