Health decline and well-being in old age: the need of coping

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2010
Health decline and well-being in old age: the need of coping

Welbevinden in de vierde levensfase: nut en noodzaak van coping

Proefschrift

Ter verkrijging van de graad van doctor
aan de Vrije Universiteit van Amsterdam
op gezag van de rector magnificus
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Chapter 1 General Introduction

Introduction

Notions on the association between ageing and functioning vary widely and have shifted during the past decades from the deficit-approach towards an orientation on successful ageing. The deficit-approach focused on inevitable increase of deterioration and dependency during the ageing years (Lehr, 1986; Birren, 1996; Schroots, 1999). The current successful ageing orientation stresses a highly positive side of ageing (Baltes, 1996; Gatz & Zarit, 1999; Von Faber, 2002). Successful ageing is described as the process of successful adaptation and mastery of goals in the face of declining health and finding a new balance between gains and losses that remains positive despite deterioration.

Decline in the biological sense, leading to decline in physical and cognitive functioning, is inevitable with aging (Rowe & Kahn, 1987; Laslett, 1991; Crimmins et al., 1996) and is considered to be the most important feature of the transition into a Fourth Age (Laslett, 1991; Baltes & Smith, 1999). This phase can be characterised by ‘failure of repair and maintenance’ (Schroots & Yates, 1999). The moment of transition to this phase in which persistent decline takes place differs from person to person, but generally takes place between the ages of 70 and 85 (Baltes, 1996; Gatz & Zarit, 1999; Crimmins et al., 1996; Diener et al., 1999). The definition of a fourth age is theoretically supported by various studies on ‘successful aging’ (Baltes, 1996; Faber, 2001; Jorm et al., 1998). Newman et al. (2003), conceptualized successful aging as remaining free of major, life-threatening chronic diseases and having normal physical and cognitive functioning.

The concept of successful aging and the definition of the Fourth Age reflect two extremes on a continuum. In addition to these approaches it is argued that, despite the eventually inevitable and irreversible deterioration, successful and positive ageing must not be omitted from our conceptions of old age to do justice to the multifaceted nature and heterogeneity of the ageing population (Rowe & Kahn, 1987).

Because of the increase in life expectancy, a greater percentage of older people will have age related diseases and may suffer from the difficulties due to persistent health decline.

From all older persons in the Netherlands, 15% of the males and 22% of the females has a frail physical and/or cognitive health status (Deeg, 2007). Although the Dutch disability level is among the lowest in developed countries (Minicuci et al., 2003; Melzer et al., 2004) a considerable proportion of the population still will have to face the challenge of coping with health decline.
According to Westerhof et al. (2003), the objective quality of life of older persons is gradually negatively affected by age-related losses of roles and relationships, declines in psychophysical functioning and approaching finitude of life. However, often well-being does not decrease proportionally to this deterioration of functioning. Many studies with overall well-being as an outcome of the cognitive evaluation of one’s own life in general, show that older persons do not see themselves as less well off than younger or middle-aged persons (Diener & Suh, 1998). There appears to be a remarkable stability in the experienced quality of life, in spite of losses and irreversible deterioration associated with old age. The repeatedly confirmed findings in the literature that physical and cognitive deterioration does not have to lead to a proportional negative effect on well-being (Diener, 1984; Brim, 1992; Baltes, 1996; Lawton, 2001), also supports the counterintuitive proposition of ‘The Ageing paradox’. Van der Plaats (1994) states that in humans, the experience of having control over ones own actions and being able to take advantage of ones own possibilities are important factors of influence on well-being. These positive options might even compensate physical disorders and/or disabilities. When human beings experience such a control they look upon themselves as being “healthy”, despite deteriorative functioning and experience valuation of being old (Baltes & Carstensen, 1996).

Studies on health decline and
Previous studies have often investigated the association between age and outcomes such as life satisfaction (Mroczek, 2005), quality of life (Albrecht & Devlieger, 1999; Faber, 2001), positive affect (Isaacowitz, 2003; Kunzmann et al., 2000) and valuation of life (Lawton et al., 2001; Rott et al., 2006). However, these association studies did not differentiate between older persons in (relatively) good health and older persons facing (persistent) decline as in fourth age. Moreover, many studies of were cross-sectional (e.g. Mroczek & Kolarz, 1998; Jorm et al., 1998), whereas deterioration with aging is a dynamic intra-individual process that takes place over time. Two longitudinal studies focused primarily on the association between age and (Mroczek, 2005; Kunzmann et al., 2000). Kunzmann et al. (2000) concluded that those people who were older during the first wave were more likely to experience a decline in positive affect over the following four years. It was also found that life satisfaction increased until approximately age 65-70, and then declined (Mroczek, 2005). In both these studies, the effects of age on the two aspects of emotional were not influenced by poor functional health. Qualitative research (Albrecht & Devlieger, 1999; Faber, 2001) revealed surprising results such as stable and sometimes even higher in old age.
Although previous studies on aging and took health status into account, they did not investigate whether the (persistent) process of physical and cognitive decline is associated with longitudinal change in and the role of coping resources in this process.

The role of coping resources
Having to deal with persistent health decline is generally considered a stressful situation with various challenges. As a consequence, in persons with declining health the ability to keep control over one's life may come under pressure. Faced with deteriorating health, many older persons find it difficult to maintain a certain feeling of self-worth and . The availability of coping resources may influence the appraisal of one's situation and enables patients to deal adequately with the demands of their diseases (Folkman et al., 1986). It has been frequently reported that psychological coping resources, such as mastery (Smits et al, 1995), self-esteem (Schieman & Campbell, 2001) and self-efficacy (Bandura, 1977) favourably affect a person’s way of coping with deteriorating health (Penninx et al., 1998). It has also been found that greater availability of coping resources is associated with better in chronically diseased persons (Carpenter, 1997; Dirksen, 1989; Robinson-Smith et al., 2000; Schuurmans et al., 2004). These studies showed that having several chronic conditions goes together with loss of psychosocial resources, such as mastery, self-efficacy and self-esteem. These losses are strongly associated with decreasing (Ormel, 1997; Jang, 2002; Krokavcova, 2008). Bisschop and colleagues (2004a) reported comparable results in a longitudinal design. So, the association between deteriorating health, coping resources and is even more complex, because persistent health decline also leads to a decline in coping resources (Bisschop, 2004b; Schuurmans et al., 2004). This suggests that persistent health decline may lead to decreases both, in as well as in coping resources (Figure 1). As coping resources are important for the of older persons, one may expect that the maintenance or increase of coping resources has positive effects on the association between persistent health decline and , whereas the decrease of coping resources does not. Thus far, the role of change in coping resources in the association between health decline and change in have received little attention in research. Insight into these mechanisms may help to develop specific interventions for older persons with declining health which makes it important to investigate this issue.
**What about Chronic Disease Self-Management Program**

One could speak of a downward spiral of deteriorating health, and a decrease in coping resources and (Artistico et al., 2000) which constantly have a negative influence on each other. In order to optimize the of the growing population of vulnerable older people, one approach to break through the vicious circle may be to enhance their coping resources in order to empower those people. Self-management is proposed as one of the ways in which older people can more actively manage their own ageing process by increasing the availability of coping resources. As a consequence, their may be increased or at least maintained as long as possible (Steverink et al., 2005).

The Chronic Disease Self-Management Program (CDSMP) is a structured intervention developed by Kate Lorig, that emphasizes the strengthening of self-management in older people with multiple chronic conditions in order to empower them to stay in control of their own body and life (Lorig, 1996; Lorig et al., 1999, 2001a and 2001b). The CDSMP is the only intervention that focuses on older people with chronic diseases, regardless of the specific disease, and that aims to stimulate them to become more actively involved in the management of their own health and to enable them to take care of themselves (Elzen et al., 2006). The advantage of this general management program is that it focuses not so much on the problems related to one specific disease, but on the problems encountered during the course of the disease, such as fatigue, pain and anxiety, that are the same for patients with different chronic diseases.

Many studies have published reports on this intervention, but the sample characteristics, study design, measurements and outcome variables vary widely between these studies.
Because of the disparate presentation of various results and the small number of high quality studies available, there is a need for a review of randomized controlled trials (RCTs). No research has yet focused on people of 80 years of age and over, with heterogeneous chronic diseases participating the CDSMP while one may expect that vulnerable older persons could benefit most from such an intervention.

**Study cohorts**
First, the objectives of this thesis were studied within the context of the Longitudinal Aging Study Amsterdam, and second, we performed a RCT with a self-management program in frail older people with heterogeneous chronic diseases and who are dependent on old age care from Woonzorggroep Wilgaerden, participating in their day-care facility.

**LASA**
The first two articles presented in this thesis are part of the Longitudinal Aging Study Amsterdam (LASA), a prospective interdisciplinary population-based study on predictors and consequences of changes in and autonomy in the aging population (Deeg, et al., 1993 and 1998). The study was designed and funded with both scientific and policy aims in mind. Initiated, and largely funded by the Ministry of Health, Welfare and Sports, LASA contains a large representative sample of older adults (55-85 years of age), stratified for age and sex, was drawn from the population registries of 11 municipalities in the three regions of the Netherlands. During home visits, face-to-face interviews were conducted consisting of a broad range of physical, cognitive, emotional and social questions. The studies (chapter 2 and 3) described in this thesis will use three measurements cycles conducted at 3-year intervals, namely LASA baseline (1992/1993), second cycle (1995/1996) and third cycle (1998/1999).
Randomised controlled trial
For the trial we recruited older people who participated one or more days a week in a elderly day-care facility. Our study sample consisted of 132 persons of which 63 participated in the CDSMP and 69 were in the waiting list control group. We carried out interviews and measurements before participation, directly after the intervention (6 weeks) and on longer term (6 months). The results of the trial are described in chapter 5 and 6.

This thesis
The objectives of the present thesis were to investigate whether the association between persistent health decline and well-being is influenced by change in coping resources and whether the CDSMP may attribute to enhanced coping and well-being outcomes.

The main aims were:
1. To address the question: ‘Does in older persons change due to persistent deterioration of functioning (PDF)?’
2. To report on the role of three psychological coping resources, self-esteem, self-efficacy and mastery, in a longitudinal design. We hypothesize that the maintenance and/or increase of available coping resources are of high importance to the maintenance of well-being of people confronted with persistent health decline.
3. To review intervention studies (RCTs) focusing on the CDSMP and to draw conclusions on the benefits of the Program.
4. To conduct an intervention study on CDSMP in frail older people (80+) with heterogeneous chronic diseases and who are depending on old age care. It is hypothesized that participating in the CDSMP leads to improved coping resources and .
5. To report on several characteristics as possible moderators for the effectiveness from participating in CDSMP. We hypothesize that age, sex, education, frailty and cognition may be such characteristics. This study is expected to result in a specific profile of people potentially benefitting from the program, so that a target group can be more precisely identified.
Outline of the thesis

In Chapter 2 we investigated the association between persistent deterioration of functioning and well-being, and Chapter 3 reports on mediating and moderating effects from available coping resources on this association. Chapter 4 describes a narrative review on an intervention that may promote coping resources. In Chapter 5 we then report on the performance of a RCT with the Chronic Disease Self-Management Program and Chapter 6 reports on predictors for benefitting from participating in the Program. Chapters 2 to 6 were written as separate articles, which have either been published or submitted for publication in scientific journals. Therefore, there is some overlap, especially in the description of the methods. However, all chapters can be read independently.
Chapter 2
Persistent Deterioration of Functioning (PDF) and change in in older persons

Published as:
ABSTRACT

Objectives
It is often assumed that ageing is accompanied by diverse and constant functional and cognitive decline and it is therefore surprising that the health of older persons does not appear to decline in the same way. This study investigates longitudinally whether health in older persons changes due to Persistent Deterioration of Functioning (PDF).

Methods
The data were collected in the context of the Longitudinal Aging Study Amsterdam (LASA). Conditions of PDF are persistent decline in cognitive functioning, physical functioning and increase of chronic diseases. Measurements included life satisfaction, positive affect and valuation of life.

T-tests were used to analyse mean difference scores for health and univariate and multivariate regression analyses were performed to examine changes in three health outcomes in relation to PDF.

Results
Cross-sectional analyses showed significant differences and associations between two PDF subgroups and non-PDF for health at T3. In longitudinal analyses we found significant decrease in and associations with health over time in respondents fulfilling one PDF condition (mild PDF). For respondents fulfilling two or more PDF conditions (severe PDF) longitudinally no significant associations were found.

Conclusion
Cognitive aspects of health (life satisfaction and valuation of life) and the affective element (positive affect) of health appear to be influenced negatively by mild PDF, whereas in persons with more severe PDF health does not seem to be diminished. This may be due to the ability to finally accept to the inevitable situation of severe PDF.
Introduction

It is often assumed that ageing is accompanied by diverse and constant functional and cognitive decline and it is therefore surprising that the mental health of older persons does not appear to decline the same way. A considerable amount of evidence shows a remarkable stability in the reported quality of life, in spite of the losses and deficiencies associated with old age (e.g. Baltes, 1996; Lawton et al., 2001; Faber, 2001). These counter-intuitive findings are referred to as the ‘Ageing paradox’ (Westerhof et al., 2003), the ‘Disability paradox’ (Albrecht & Devlieger, 1999) and the ‘Paradox of ’ (Isaacowitz, 2003). These paradoxes contradict expectations that the experienced mental health of older persons will be negatively affected by age-related losses, decline in psycho-physical functioning and the approaching end of life. Successful coping, adequate adaptation processes and a positive balance between gains and losses, despite deterioration appears to lead to a successful ageing process which does not necessarily lower the level of mental health (Baltes, 1996; Gatz & Zarit, 1999; Faber, 2001).

Decline in the biological sense, leading to decline in physical and cognitive functioning, is inevitable with ageing (Rowe & Kahn, 1987; Laslett, 1991; Crimmins, et al., 1996) and is considered to be the most important feature of the transition between Third and Fourth Age, (Laslett, 1991; Baltes & Smith, 1999) which can be characterised by ‘failure of repair and maintenance’ (Schroots & Yates, 1999). The moment of transition to the phase in which decline takes place differs from person to person but generally takes place between the ages of 70 and 85 (Baltes, 1996; Gatz & Zarit, 1999; Crimmins et al., 1996; Diener, 1999).

Little research has focussed on the association between decline and mental health outcomes such as life satisfaction (Mroczek, 2005), quality of life (Albrecht & Devlieger, 1999; Faber, 2001), positive affect (Isaacowitz, 2003; Kunzmann, 2000) and valuation of life (Lawton, 2001; Rott et al., 2006). However, they did not differentiate between older persons in (relatively) good health and the older persons facing decline.

Moreover, many studies of mental health were cross-sectional (e.g. Mroczek & Kolarz, 1998; Jorm et al., 1998), whereas deterioration with ageing is a dynamic intra-individual process that takes
place over time. Two longitudinal studies focussed primarily on the association between age and (Mroczek, 2005; Kunzmann et al., 2000). Kunzmann et al (2000) concluded that those people who were older during the first wave were more likely to experience a decline in positive affect over the following four years. It was also found that life satisfaction increased until approximately age 65-70, and then declined (Mroczek, 2005). In both of these studies, the effects of age on the two aspects of emotional were not influenced by poor functional health. Qualitative research (Albrecht & Devlieger, 1999; Faber, 2001) revealed surprising results such as stable, and sometimes even higher at old age. Although previous studies on ageing and took health status into account, they did not investigate whether the (persistent) process of physical and cognitive decline is associated with change in . Therefore, in the present study we focused specifically on the situation in life in which physical and cognitive deterioration of functioning occurs, and investigated this aspect in a longitudinal design. We assumed that the definition of deteriorative ageing, as suggested in the definition of the ‘Fourth age’ (Laslett, 1991; Baltes % Smith, 1999), should be defined by substantial, objective and measurable aspects of persistent physical decline, such as cognitive decline, functional capacities, daily activities and chronic illnesses instead of merely being based on age. This definition is theoretically supported by various studies on ‘successful ageing’ (Baltes, 1996; Faber, 2001; Jorm et al., 1998) and is methodologically based on Newman et al. (2003) who conceptualized successful ageing as remaining free of major, life threatening chronic diseases and having normal physical and cognitive functioning. Maintenance of this state was defined as remaining free of incident chronic diseases or new and persistent physical disability or cognitive decline. The specific research question that we addressed is ‘Does in older persons change due to persistent deterioration of functioning (PDF)?’.

**Methods**

**Sample**
Data were collected in the context of the Longitudinal Aging Study Amsterdam (LASA). LASA is an ongoing multidisciplinary study on predictors and consequences of changes in physical, cognitive, emotional and social functioning in older persons in the Netherlands. A random sample, stratified by age and gender according to expected mortality after 5 years, was drawn from the population registers of eleven municipalities in three geographical areas in the Netherlands. In each cycle, data were collected by specially trained interviewers, in a face-to-face main interview which took place in the respondents private or institutional home, followed by a medical interview 2 to 6 weeks later (Deeg et al., 2002). In 1991, interviews were conducted with 4494 respondents within the NESTOR-LSN study (Knipscheer et al., 1995). After 10 months, the participants were approached to participate in the first LASA cycle. This baseline LASA interview (T0), took place in 1992 and 1993, 3107 respondents (response rate 69%), aged 55-85, were enrolled in the study. After approximately three years all surviving respondents who participated in the baseline LASA interview were approached for the first follow-up, T1 (1995/1996; n= 2545, 82% of 3107). A second follow-up, T2 (1998/1999; n=2076, 67% of 3107) and a third follow-up, T3 (2001/2002; n=1691, 55% of 3107) took place after three and six years. To establish a longitudinal effect (determination of persistent deterioration or stability over time) we took into account a time-span of six years between T1 and T3. This enabled us to include a sufficient number of the oldest old in our sample. Thus, the first LASA follow-up (T1) will be the baseline in the present study, and T2 and T3 will be the three-year and six-year follow-up measurement points. Between T1 and T3, 632 (24.8% of 2545) respondents had died. 16 (0.6%) could not be contacted (unsuccessful after >10 times, moved abroad, etc.), 132 (5.2%) were no longer willing to participate, and 74 (2.9%) respondents were unable to participate due to severe cognitive or physical impairments.
Measurements

We took as point of departure three elements in the definition of well-being, as introduced by Diener (1984), and which are accepted in the existing literature: (1) is subjective in nature, residing within the experience of the individual, (2) refers to a positive state of mind, and is more than just the absence of negative factors, and (3) involves an integrated judgement of the person’s life, i.e. a global assessment of all aspects of life (Hoff, 1995). This concept of well-being in the present study was considered to be covered by assessing three separate outcomes: positive affect, life satisfaction and valuation of life. The first indicates the affective aspect, the other two indicate the cognitive aspect of well-being.

Positive affect was measured with the Centre for Epidemiological Studies-Depression scale (CES-D) (Radloff, 1977), which assesses depressive symptomatology. The CES-D is a 20-item scale that asks participants to indicate how frequently they experienced certain symptoms or feelings during the previous week. Radloff described four separate dimensions of the CES-D. One of the dimensions is positive affect, including four of the CES-D items which refer to positive feelings: ‘enjoying life’, ‘feeling happy’, ‘being hopeful about the future’ and ‘feeling of as good as other people’. This sub-scale ranges from 0 (low) to 12 (high), with response categories of ‘rarely or never’, ‘some of the time’, ‘occasionally’ and ‘mostly or always’. The use of this subscale as an independent concept is supported by others (Ranzijn & Luszcz, 2000).

To assess life satisfaction, two individual questions (Deeg, 2007) ‘Have you been satisfied with your life lately?’ and ‘Are you satisfied with your life, up until now?’ were asked. The response categories ranged from 1 (very dissatisfied) to 5 (very satisfied), and the sum score ranged from 2 (very dissatisfied) to 10 (very satisfied).

Valuation of Life, as described in detail and operationally defined by Lawton et al., (Lawton et al., 1999 and 2001), represents an attempt to capture the result of balancing negative and
positive reasons for living. Valuation of life is ‘a cognitive scheme’. The scale for Valuation of life consists of nineteen statements, 13 positively formulated and 6 negatively formulated, about the value of life, such as: ‘It is difficult for me to find meaning in my daily routine’ or ‘At this moment I have a strong will to live’. The response categories range from 1 (strongly agree) to 5 (strongly disagree). Positively formulated questions are recoded and the outcome is transformed into a score on a Valuation of Life (VoL) scale ranging from 0-95 (a higher score indicating higher VoL). The VoL was measured only once, at the six-year follow-up (T3).

Change in was based on the difference in the scores for positive affect and life satisfaction between the baseline and the six-year follow-up measurements.

Persistent Deterioration of Functioning

The critical conditions of PDF include on persistent deterioration of cognitive and/or physical functioning to a dysfunctional level, and/or an increase in the presence of chronic diseases to a multimorbid level.

Cognitive functioning was measured by means of the Mini Mental State Examination (MMSE) (Folstein et al., 1975), a frequently used screening instrument for global cognitive dysfunctioning. The scores could vary between 0 (all answers incorrect) to 30 (all answers correct). Cognitive impairment was defined as a score \(< 25\) on the MMSE. This cut-off score is derived from normative data concerning the Dutch population (Kempen et al., 1995). Cognitive decline at T3 was defined as a decrease of \(\geq 3\) points over six years.

Physical functioning was assessed by asking the respondents about their degree of difficulty in performing the following six activities of daily living: climbing up and down a staircase of 15 steps without stopping, walking for five minutes outdoors without resting, getting up from and sitting down in a chair, dressing and undressing, cutting their own toenails, and using public transportation (Sonsbeek, 1988). The response categories range from 1 (yes, without difficulty) to 5 (No, I cannot). Scores on six functional limitation items were summed to a scale with an overall score ranging from ‘no
difficulties performing any activity’ to ‘difficulties performing six activities’. Decline in functional limitations was defined as the increase of difficulty with more than one additional limitation over a six-year period.
The presence of chronic diseases was determined by asking the respondents whether they had any of the following diseases: cardiac disease; peripheral arteriosclerosis of the abdominal aorta or the arteries of the lower limb; stroke; diabetes mellitus; lung disease (asthma or chronic obstructive pulmonary disease); arthritis or any other major chronic diseases (CBS, 1989). The number of chronic diseases was calculated by summing all diseases reported. In a validation study, the respondents’ self-reports were compared with information obtained from their general practitioners, and were found proved to be sufficiently reliable (Kriegsman et al., 1996). An increase of chronic illness was defined as the presence of more than one additional chronic disease over a six-year period.

Persons were considered as having PDF when they met one or more of the following conditions:
1. Good cognitive functioning at baseline (MMSE=> 26) and cognitive decline during the subsequent six years. Cognitive decline was defined as a decrease of at least 3 points at MMSE score and a MMSE score <= 25.
2. An increase with more than one functional limitations and having at least two functional limitations after six years.
3. An increase with more than one chronic diseases and having at least two chronic diseases after six years.
In addition, the criterion of persistent (i.e. impossible to stop or reverse) deterioration of functioning (PDF) was determined by checking if the deterioration was monotonic during both of the three year intervals (between 1995 and 1998 and between 1998 and 2001). This was checked by verifying that the level of functioning at the three year follow-up (1998) was not higher than the functioning at baseline (1995), and that the level of functioning at the six year follow up (2001) was not higher than at the three-year follow-up.
Differentiation within the PDF group was made by categorizing respondents fulfilling one of the PDF conditions as ‘One PDF condition’ (mild PDF) and respondents fulfilling two or more of the PDF conditions as ‘Two of more PDF conditions’ (severe PDF).

The absence of PDF (non-PDF) was defined as good cognitive functioning (MMSE > 26), a maximum of one functional limitation, and a maximum of one chronic disease, both at baseline and after six years.

Potential confounding factors

Potential confounding factors with regard to an association between PDF and were taken into account if they were found to be significant. We included age and gender because Ryff (1991) reported a clear and significant age-related decrease in and significant gender differences (Ryff,1989). In addition, the potentially confounding influence of the variables income, education and partner status were examined because earlier research has suggested that a higher social economic status leads to greater (Borg et al., 2006), a lower level of educational level has a negative effect on (Lawton, 2001), and partner status is associated with , particularly widowhood (Kempen & Ormel, 1996).

Statistical analyses

T-tests were used to analyse significant mean differences in scores on , and multivariate regression analyses to examine changes in in relation to the incidence of PDF. The regression models were adjusted for significant confounders and the baseline score for . Confounding variables were examined separately in multiple regression analyses with PDF and outcomes, corrected for baseline.

Significance was determined in linear regression analyses with as the dependent variable by comparing the standardized Beta-scores for PDF with and without the influence of single confounders at >=10% difference and a P-value <0.05. Three series of univariate and multivariate regression analyses were performed to examine the changes in each aspect of
in relation to the incidence of PDF, differentiated into ‘One PDF-condition’ and ‘Two or more PDF-conditions’, referred to as mild and severe PDF.

**Results**

631 respondents (37% of 1691) met the criteria for PDF or Non-PDF. Respondents who did not meet the criteria due to (temporary) improvement in functioning over time or already existing (stable) severe impairment at baseline or had missing values for one or more of the necessary variables or criteria during any of the three cycles were excluded. The 631 who met the criteria consisted of respondents with one of seven patterns of PDF or one pattern concerning Non-PDF (Table 1). There were 31 (17% of 186) respondents who met the criterion for cognitive decline, but maintained good functioning with regard to functional limitations and chronic diseases. 86 (46% of 186) respondents met the criterion of functional decline but kept good functioning on the other two conditions, whereas 28 (15% of 186) respondents showed incidence of chronic diseases, but maintained good functioning with regard to the other two conditions. There were 10 (5% of 186) respondents who met the conditions for cognitive and functional decline, but maintained good functioning with regard to chronic diseases, and 23 (12% of 186) respondents showed functional decline and an increase in functional limitations and chronic diseases, but maintained good functioning with regard to cognitive impairment. Only 3 (1.5% of 186) respondents met the conditions for cognitive impairment and decline and the incidence of chronic diseases, but maintained good physical functioning. 5 (3% of 186) respondents met all the conditions for PDF.

Further differentiation of the PDF group resulted in a total of 145 (78% of 186) respondents fulfilling ‘One PDF condition’ and 41 (22% of 186) respondents fulfilling ‘Two or more PDF conditions’. 445 (71% of 631) respondents met the conditions for Non-PDF. The average age at T3 was 76.2 years for PDF respondents and 72.2 years for Non-PDF respondents. The selected respondents were respectively 49% male (PDF) and 45% male (Non-PDF).
Because of missing values for outcomes at one of the measurement points, the number of respondents available for analyses was somewhat lower (Table 2).

**Association between the incidence of PDF and**

Table 2 shows the mean scores for the outcomes of life satisfaction and positive affect at baseline, and for life satisfaction, positive affect and valuation of life at the six-year follow-up. At baseline there was no significant difference in the mean scores for life satisfaction between the PDF subgroups. For positive affect at baseline there was a significant difference in the mean scores, for 'One PDF condition'. At the six-year follow-up (T3), when the phase of Persistent Deterioration of Functioning for the PDF groups was entered, there was a significant difference between respondents with mild PDF with regard to life satisfaction, positive affect and valuation of life. Severe PDF showed significance on mean scores of positive affect and valuation of life. The mean difference in scores of life satisfaction were significant only for mild PDF.

In order to investigate the association between PDF and more closely, we conducted regression analyses. Multivariate analyses showed that, in addition to the baseline scores, the variables age, income and partner status had a significant effect only on the association between PDF and positive affect. Therefore, multivariate regression analyses of positive affect were adjusted for these confounders (Tables 3 and 4). The results at T3 show a significant association between mild PDF and life satisfaction, positive affect and valuation of life. Severe PDF was significant in association only with valuation of life.

Table 4 shows the association between mild PDF, severe PDF and changes in (corrected for baseline scores and significant confounders). The associations between mild PDF and the difference score for life satisfaction and positive affect showed significance. Severe PDF showed no significant association with the difference score of.
Discussion

The aim of this study was to investigate whether in older persons changes due to Persistent Deterioration of Functioning (PDF). We defined PDF and Non-PDF based on substantial, objective, measurable aspects of persistent physical and cognitive decline and increased chronic illnesses. We selected groups of respondents who met one (mild PDF) or two and more conditions for PDF (severe PDF) and Non-PDF, and examined three aspects of, namely positive affect, life satisfaction and valuation of life.

Almost all of the examined differences in scores between mild PDF and Non-PDF and associations between mild PDF and (change in) were significant. In contrast, severe PDF only showed significant difference scores in cross-sectional analyses on Positive affect and Valuation of life. In other words, in our sample, PDF leads to decreasing . Specifically older persons with mild PDF are faced with a significant decrease of their over time.

Our findings concerning life satisfaction are in line with those of Landau & Litwin (2001), who provides evidence for an association between physical and mental decline and life satisfaction in the old-old. On the other hand, Mroczek (2005) suggests that life satisfaction increases until approximately the age of 65-70, and from then on it declines.

Concerning positive affect our findings are in line with those of others, for example Kunzmann et al.(2000), who reported a decrease in positive affect when health constraints emerge with ageing because age per se is not a cause of decline in subjective but health constraints are. However Mroczek et al.(1998) found that older adults were happier than younger adults when was defined as positive affect, and the analyses were controlled for physical health.

On valuation of life, Rott et al.(2006) found a high valuation of life in centenarians, almost comparable to that of people aged 70 and above, even though centenarians are confronted with an enormous amount of especially physical limitations and losses. According to his findings, physical functioning and cognitive status made no independent contribution to valuation of life. This is not in line with the cross-sectional significant difference scores and
association found in our study for valuation of life, for both groups of ‘One PDF condition’ and ‘Two or more PDF conditions’.

With respect to the paradoxes mentioned by Westerhof et al. (2003), Isaacowitz (2003) and Albrecht & Devlieger (1999), our findings suggest that when ageing is accompanied by mild PDF, overall indeed decreases. However our group of respondents showed stable life satisfaction and positive affect over time, despite severe PDF.

Albrecht & Devlieger (1999) also specifically reported that in their sample of younger persons, those with severe disabilities also still reported having excellent or good quality of life.

Concerning our findings support the line of thinking that more enduring life satisfaction and short-term positive and negative affect should be considered as distinct dimensions of psychological (Hoff, 1995). Happiness should be associated more with the present state of mind, while life satisfaction is thought to be more reflective and mainly takes the past into account. In his review, Diener (1984) stated that people experience in their lives both cognitive aspects and affective reactions. It is our opinion that in the light of Persistent Deterioration of Functioning one has to consider life satisfaction and positive affect as representative of separate aspects of with different time referents. Apparently, persistent deteriorating health as in mild PDF, influences the present mood, and also the appreciation of more enduring life satisfaction in the past. But in particular, respondents facing severe PDF showed significantly lower scores on both longitudinal and cross-sectional associations with the cognitive and affective aspects of in contrast to the cross-sectional and longitudinal mean scores on the cognitive aspect.

A possible explanation why PDF affects may be the importance of health. Deeg (2007) found that ‘good physical health’ was given uncontested priority in the importance of various domains of a person’s life. As it is one of the closest and most immediate concerns in older people’s personal lives, and therefore one that has the greatest influence on subjective (Campbell et al., 1976). One might therefore expect to find a more severe decrease of with the amount of PDF. But when facing the challenges of ageing with PDF, based on our
findings, it is useful to differentiate between mild deterioration (fulfilling one PDF condition) and more severe deterioration (two or more PDF conditions), because of their diverse impact on both aspects of . Apparently, general concern about satisfaction with life as a whole and valuation of life, on the one hand, and positive affect, on the other hand, are all influenced when facing mild PDF. Respondents with severe PDF did not show significantly decreasing over time. Maybe for older persons with more severe deterioration the paradox indeed does exist. One possible explanation of this finding is thought to be found in acceptance (Ranzijn & Luszcz, 1999) as one of the ways in which older persons adapt to some of the unavoidable and irreversible changes that accompany ageing. Ranzijn et al. (1999) found that both acceptance and self-rated health were good predictors of cognitive and affective aspects of .

In accordance Butler & Ciarrochi (2007) recently found that older persons reporting higher acceptance also reported higher quality of Life, even with declining health. However, Smith et al (2002) on the other hand, suggests that the capacity of the individual to adapt to declining health may reach a critical limit. Especially at the point of the cumulative chronic strain of dealing with the effects of multiple physical illnesses, functional impairment and losses that characterize the Fourth age test the limits of adaptive processes.

The strengths of our study are the longitudinal design and the cognitive and affective aspects of subjective self reported that were measured. In addition, as we selected respondents we were able to include strictly defined groups. The study has also some limitations. First, very weak older persons or ones in ill health are under-represented in our sample. This may have led to an under-estimation of the strength of the associations that were found. Second, the valuation of life data was not available at baseline, so we were not able to study change in this aspect. Third, because of the small amount of respondents with severe PDF we may have lacked some power and as a consequence we may have missed finding some associations with overall .

Further research is required in order to increase the reliability and validity of the PDF concept. Especially the use of relevant differentiation of the heterogeneity of persistent decline might be the focus of further exploratory research. A next step in research is then to
identify factors that strengthened adaptive capacity in older persons which could be maintained when facing persistent deterioration of functioning.

**Conclusion**

Our findings suggest that persistent deterioration of functioning is associated with decreasing overall. However, this outcome depends on the degree of deterioration. Somehow for older persons with severe deterioration the ageing paradox indeed may exist. Maybe one is finally able to accept the unavoidable constraints of severe PDF....
Table 1 Scores for presence of any one and a combination of (Non-)PDF conditions (N=631) and study group differentiation

<table>
<thead>
<tr>
<th>Cognitive impairment and decline</th>
<th>Functional limitations and decline</th>
<th>Chronic diseases and decline</th>
<th>Selected number of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>+</td>
<td>-</td>
<td>-</td>
<td>31</td>
</tr>
<tr>
<td>-</td>
<td>+</td>
<td>-</td>
<td>86</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>+</td>
<td>28</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>-</td>
<td>+</td>
<td>+</td>
<td>23</td>
</tr>
<tr>
<td>+</td>
<td>-</td>
<td>+</td>
<td>3</td>
</tr>
<tr>
<td>+</td>
<td>+</td>
<td>+</td>
<td>5</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>445</td>
</tr>
</tbody>
</table>

+ fulfilling PDF condition
- fulfilling Non-PDF condition
Table 2 Differences between PDF and Non-PDF in (change in)

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>P-value</td>
<td>Mean</td>
<td>P-value</td>
</tr>
<tr>
<td>Life satisfaction</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td>8.0</td>
<td>.61</td>
<td>7.7</td>
<td>.00</td>
</tr>
<tr>
<td>Two or more PDF conditions</td>
<td>7.8</td>
<td>.20</td>
<td>7.7</td>
<td>.07</td>
</tr>
<tr>
<td>Non-PDF (reference group)</td>
<td>8.0</td>
<td>8.0</td>
<td></td>
<td>.00</td>
</tr>
<tr>
<td>Positive affect</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td>9.1</td>
<td>.00</td>
<td>8.0</td>
<td>.00</td>
</tr>
<tr>
<td>Two or more PDF conditions</td>
<td>9.7</td>
<td>.75</td>
<td>7.9</td>
<td>.00</td>
</tr>
<tr>
<td>Non-PDF (reference group)</td>
<td>9.9</td>
<td>9.2</td>
<td></td>
<td>.7</td>
</tr>
<tr>
<td>Valuation of Life</td>
<td>n.a.</td>
<td></td>
<td>n.a.</td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td>46.0</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Two or more PDF conditions</td>
<td>45.4</td>
<td>.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-PDF (reference group)</td>
<td>51.0</td>
<td></td>
<td></td>
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</tbody>
</table>
Table 3 Cross-sectional association (Standardized Coefficients Beta) between PDF and
(2001/2002)

<table>
<thead>
<tr>
<th></th>
<th>Life Satisfaction</th>
<th>Positive affect</th>
<th>Valuation of Life</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Univariate model</strong></td>
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<td></td>
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<tr>
<td>One PDF condition</td>
<td>-.12*</td>
<td>-.20*</td>
<td>-.24*</td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td>-.08</td>
<td>-.12**</td>
<td>-.16*</td>
</tr>
<tr>
<td><strong>Multivariate model</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td></td>
<td>-.15*</td>
<td></td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td>-.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Confounders</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.09**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>.10**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner status</td>
<td>.16*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.14**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income</td>
<td>.12**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner status</td>
<td>.14**</td>
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<td></td>
</tr>
<tr>
<td><strong>R² Univariate</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td>.02</td>
<td>.04</td>
<td>.06</td>
</tr>
<tr>
<td><strong>R² Multivariate</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td>.00</td>
<td>.02</td>
<td>.03</td>
</tr>
</tbody>
</table>

P* <.005
P**<.05

1 Adjusted for baseline
2 Adjusted for age, partnerstatus and income
Table 4 Longitudinal association (Standardized Coefficients Beta) between PDF and change in (1995/1996-2001/2002)

<table>
<thead>
<tr>
<th></th>
<th>Life Satisfaction</th>
<th>Positive affect</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bivariate model</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td>-.12*</td>
<td>-.13*</td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td>-.06</td>
<td>-.13*</td>
</tr>
<tr>
<td><strong>Multivariate model</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td></td>
<td>-.10**</td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td></td>
<td>-.03</td>
</tr>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One PDF condition</td>
<td>.35*</td>
<td>.41*</td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td>.37*</td>
<td>.36*</td>
</tr>
<tr>
<td><strong>Confounders</strong></td>
<td></td>
<td></td>
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<tr>
<td>One PDF condition</td>
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<td>-.07</td>
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<td>Age</td>
<td></td>
<td>.11**</td>
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<td>Income</td>
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<tr>
<td>Partner status</td>
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<td>.06</td>
</tr>
<tr>
<td>&gt;=2 PDF conditions</td>
<td></td>
<td>-.10**</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>.10**</td>
</tr>
<tr>
<td>Income</td>
<td></td>
<td>.06</td>
</tr>
<tr>
<td>Partner status</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[
R^2 \text{ Bivariate} \\
\text{One PDF condition} \quad .14 \quad .22 \\
\text{>=2 PDF conditions} \quad .14 \quad .16 \\

R^2 \text{ Multivariate} \\
\text{One PDF condition} \quad .25 \\
\text{>=2 PDF conditions} \quad .20
\]

P* < .005  
P** < .05
Chapter 3

The role of coping resources on change in during persistent health decline.

Published as:

The role of coping resources on change in health at persistent health decline

Abstract

Objectives
Research in older persons with health decline shows a decrease in health. The aim of this study was to examine the role of psychological coping resources in the association between health decline and health, in a longitudinal design.

Methods
Data were used from the Longitudinal Aging Study Amsterdam (LASA). Health decline was defined as Persistent Deterioration of Functioning (PDF); persistent decline in cognitive functioning and/or physical functioning and/or increase of chronic diseases. Measurements of included life satisfaction and positive affect. Measurements of coping resources included self-esteem, mastery and self-efficacy.

Results
Multivariate linear regression analyses showed that self-efficacy, mastery and self-esteem mediated the association between PDF and change in health. Mastery also was a moderator of the association between PDF and life satisfaction. In older persons with a decreasing mastery, PDF was associated with a significant decrease on life satisfaction; this effect was not observed in older persons with stable or increasing mastery.

Discussion
The study suggests that coping resources are of importance in explaining associations between persistent health decline and decreasing health. Stable or improving mastery even proves to protect older persons with PDF from decreasing health. Therefore, it may be of importance to develop interventions for older persons aimed at maintaining or improving psychological coping resources when health declines.
Introduction

Research in older persons confronted with health decline shows that various aspects of decrease (e.g. Kunzmann et al., 2000; Landau and Litwin, 2001 and Smith et al, 2002). In an earlier study, we found that this health decline, as it takes place persistently over time, influences the present mood, and also the satisfaction with past life (Jonker et al., in press). This is in line with evidence that good physical health has uncontested priority in the importance of various domains of a person's life and therefore may have significant influence on (Campbell et al, 1976; Deeg, 2007)

Having to deal with persistent health decline is generally considered a stressful situation with various challenges. As a consequence, in persons with declining health the ability to keep control over one's life may come under pressure. Faced with deteriorating health, many older persons find it difficult to maintain a certain feeling of self-worth (self-esteem). To maintain a good feeling of self-worth, coping resource appear to play an important role. The availability of coping resources may influence the appraisal of one’s situation and enable patients to deal adequately with the demands of their diseases (Folkman et al., 1986). It has been reported that specific psychological coping resources, such as mastery (Smits et al, 1995; Schuurmans, 2004), self-esteem (Schieman and Campbell, 2001) and self-efficacy (Bandura, 1977) favourably affect a person’s way of coping with deteriorating health (Penninx et al., 1998). It has also been found that greater availability of coping resources is associated with better in chronically diseased persons (Carpenter, 1997; Dirksen, 1989 and Robinson-Smith et al, 2000). In addition, Borg et al., (2008) found that overall health as well as self-esteem explained lower among older people with reduced physical functioning, whereas low coping resources predict greater disease stress and lower levels of in persons with chronic diseases (Juth, et al., 2008). However, the association between deteriorating health, coping resources, and is complex because persistent health decline itself leads to a decline in coping resources (Bisschop, 2004b; Schuurmans et al., 2004). In recent years, various cross-sectional studies among older community-dwelling adults with chronic conditions or disability suggested a general consensus regarding the positive role of coping resources in the way people react to these chronic conditions. These studies showed that chronic conditions lead to loss of psychosocial resources, such as mastery and self-efficacy and self-esteem. These losses are strongly associated with decreasing (Jang, et al.'2002: Krokavcova et al., 2008; Ormel et al., 1997). Bisschop et al., (2004) reported comparable results in a longitudinal design.
As coping resources are important for the health of older persons, one then may expect that the maintenance or increase of coping resources have positive effects on the association between persistent health decline and death, whereas the decrease of coping resources does not. Thus far, the role of change in coping resources in the association between health decline and change in death have received little attention in research. Insights into these mechanisms may help to develop specific interventions for older persons with declining health, which makes it important to investigate this issue.

The main aim of this study is to report on the role of three psychological coping resources, self-esteem, self-efficacy and mastery, in a longitudinal design. We hypothesize that the maintenance and increase of available coping resources are of high importance to the maintenance of death of people confronted with persistent health decline. It will be investigated whether the association between persistent health decline and death is explained by change in availability of coping resources. In addition, it will be investigated whether the association between persistent health decline and death is different for people with increasing and decreasing availability of coping resources.

Methods

Sample

Data were collected in the context of the Longitudinal Aging Study Amsterdam (LASA). LASA is an ongoing multidisciplinary study on predictors and consequences of changes in physical, cognitive, emotional and social functioning in older persons in the Netherlands. A random sample, stratified by age and gender according to expected mortality after 5 years, was drawn from the population registers of eleven municipalities in three geographical areas in the Netherlands. In each cycle, data were collected by specially trained interviewers, in a face-to-face main interview which took place in the respondents private or institutional home, followed by a medical interview 2 to 6 weeks later (Deeg et al, 2002). In the baseline LASA interview (T0), which took place in 1992 and 1993, 3107 respondents, aged 55-85, were enrolled in the study. After approximately three years all surviving respondents who participated in the baseline LASA interview were approached for the first follow-up, T1 (1995/1996; n= 2545, 82%). A second follow-up, T2 (1998/1999; n=2076, 67%) and a third follow-up, T3 (2001/2002; n=1691, 55%) took place after three and six years. The first LASA follow-up (T1) will be the baseline in the present study, and T2 and T3 will be the three-year and six-year follow-up measurement points. This enabled us to include a sufficient number of the oldest old in our sample.
Between T1 and T3, 632 (24.8% of 2545) respondents had died. 16 (0.6%) could not be contacted (unsuccessful after >10 times, moved abroad, etc.), 132 (5.2%) were no longer willing to participate, and 74 (2.9%) respondents were unable to participate due to severe cognitive or physical impairments.

**Measurements**

*Cognitive functioning* was measured by means of the Mini Mental State Examination (MMSE) (Folstein et al, 1975), a frequently used screening instrument for global cognitive dysfunctioning. For 23 questions and tasks the respondents scored 1 or more points if they gave the correct answer or performed the task correctly. The scores could vary between 0 (all answers incorrect) to 30 (all answers correct). Cognitive impairment was defined as a score <=25 on the MMSE. This cut-off score is derived from normative data concerning the Dutch population (Kempen et al, 1995). Cognitive decline at T3 was defined as a decrease of >3 points over six years.

*Physical functioning* was assessed by asking the respondents about their degree of difficulty in performing the following six activities of daily living: climbing up and down a staircase of 15 steps without stopping, walking for five minutes outdoors without resting, getting up from and sitting down in a chair, dressing and undressing, cutting one’s own toenails, and using public transportation (Sonsbeek, 1988). The response categories range from 1 (yes, without difficulty) to 5 (No, I cannot). Decline in functional limitations was defined as the presence of increase with having difficulty with more than one physical function over a six-year period. The presence of *chronic diseases* was determined by asking the respondents whether they had any of the following diseases: cardiac disease; peripheral artherosclerosis; stroke; diabetes mellitus; lung disease (asthma or chronic obstructive pulmonary disease); arthritis; cancer; or any other major chronic diseases (Statistics Netherlands, 1989). The number of chronic diseases was calculated by adding up all the specific diseases reported. In a validation study, the respondents’ self-reports were compared with information obtained from their general practitioners, and were found to be sufficiently reliable (Kriegsman et al., 1996). An increase of chronic illness was defined as the incidence of more than one additional chronic disease over a six-year period.

**Persistent Deterioration of Functioning**

As suggested in the definition of the ‘Fourth age’ (Laslett, 1999 and Baltes, 1999), the definition of deteriorative ageing, should be defined by substantial, objective and measurable aspects of persistent health decline, such as cognitive and physical decline.
The concept of persistent decline of functioning is supported by various studies on 'successful ageing' (Baltes, 1996, Faber, 2001, Jorm, 1998) and is methodologically based on Newman et al (2003) who conceptualized successful ageing as remaining free of major, life threatening chronic diseases and having normal physical and cognitive functioning. Maintenance of this successful aging was defined as remaining free of incident chronic diseases or new and persistent physical disability or cognitive decline.

Persistent Deterioration of Functioning (Jonker et al, 2008) was considered present when persons met one or more of the three criterion of persistency of deterioration of functioning (PDF) after good functioning according to Non-PDF criteria at baseline (as defined below):

1. Cognitive decline during the subsequent six years. Cognitive decline was defined as a decrease of at least 3 points at MMSE score and a MMSE score <= 25.
2. Increase with more than one functional limitations and having at least two functional limitations after six years.
3. An increase with more than one chronic diseases and having at least two chronic diseases after six years.

In addition, the criterion of persistent (i.e. impossible to stop or reverse) deterioration of functioning (PDF) was determined by checking if the deterioration was monotonic during both of the three year intervals (between 1995 and 1998 and between 1998 and 2001). This was checked by verifying that the level of functioning at the three year follow-up (1998) was not higher than the functioning at baseline (1995), and that the level of functioning at the six year follow up (2001) was not higher than at the three-year follow-up.

The absence of PDF (non-PDF) was defined as good cognitive functioning (MMSE > 26), a maximum of one functional limitation, and a maximum of one chronic disease, both at baseline and after six years.

PDF therefore is a dichotomous variable consisting of 0 (non-PDF) and 1 (PDF).

We took as point of departure three elements in the definition of , as introduced by Diener (1984), and which are accepted in the existing literature: (1) is subjective in nature, residing within the experience of the individual, (2) refers to a positive state of mind, and is more than just the absence of negative factors, and (3) involves an integrated judgement of the person's life, a global assessment of all aspects of life (Hoff, 1995).

In the present study this concept of was considered to be covered by assessing two separate outcomes: positive affect and life satisfaction. The first indicates the affective aspect, the second indicate the cognitive aspect of .

Positive affect was measured with the Centre for Epidemiological Studies-Depression scale (CES-D) (Radloff, 1977), which assesses depressive symptomatology. The CES-D is a 20-
item scale that asks participants to indicate how frequently they experienced certain symptoms or feelings during the previous week. Radloff described four separate dimensions of the CES-D. One of the dimensions is positive affect, including four of the CES-D items which refer to positive feelings: ‘enjoying life’, ‘feeling happy’, ‘being hopeful about the future’ and ‘feeling of as good as other people’ with response categories of ‘rarely or never’, ‘some of the time’, ‘occasionally’ and ‘mostly or always’. This sub-scale ranges from 0 (low) to 12 (high). The use of this subscale as an independent concept is supported by others (Ranzijn and Luszcz, 2000).

To assess life satisfaction we summed the scores for two individual questions ‘Have you been satisfied with your life lately?’ and ‘Are you satisfied with your life, up until now?’ (Deeg, 2007). The response categories ranged from 1 (very dissatisfied) to 5 (very satisfied), and the sum score ranged from 2 (very dissatisfied) to 10 (very satisfied).

Change in was based on the difference in the scores between the baseline and the six year follow-up measurements.

Coping resources

*Psychological coping resources* in this study refers to three characteristics indicating feelings of control, self-esteem and self-efficacy.

*Mastery* is conceptualised as the extent to which a person perceives himself of herself to be in control of events and ongoing situations and reflects the perception of the ability to manage them. This was measured by a 5-item abbreviated version of the Pearlin Mastery scale (Pearlin and Schooler, 1978), which included questions like ‘I have little control over things that happen to me’ and ‘If I put my mind to it, I can accomplish almost anything’. For each item, the categories ranged from 1= strongly agree to 5= strongly disagree. The score is the sum of the ratings, with range 5-25, such that a higher rating indicates more feelings of mastery. Cronbach’s alpha at baseline is .784.

*Self-esteem* is measured by a scale that consists of four questions like, “feeling self-assured”, “positive attitude towards one’s self” and “feeling useless” that are scored on a five-point scale (Rosenberg, 1965). The score is the sum of the ratings, with range 1-20. People with higher self-esteem (i.e., higher scores) are supposed to have a more positive view of their identity. Cronbach’s alpha at baseline is .640.
Self-efficacy refers to personal judgements of how well behaviour can be implemented in situations that contain novel, unpredictable or stressful elements as well as ordinary situations, and was measured by a twelve-item version of the Perceived Self Efficacy Scale (Sherer et al., 1982 and Bosscher and Smit, 1998). The scale included questions like ‘When I have decided to do something, I go through performing it.’ and ‘I find it difficult to resolve the problems that I am facing in my life’. Response categories range from 1 = totally disagree to 5 = totally agree. The score is the sum of the ratings, with range 20-60, with a higher score indicating a higher level of self-efficacy. Cronbach’s alpha at baseline is .814.

Change in coping resources was based on the difference between scores on our baseline and six year follow-up measurement. We used the continuous variables in most of our analyses with coping resources. Only when stratification was necessary, we dichotomized the continuous variables into 0 (decrease of coping resource) and 1 (stable or increase of coping resource).

Confounding variables
Potential confounding factors with regard to an association between PDF and were taken into account if they were found to be significant. Age, sex and change in income were considered potential confounders. These analyses are not presented.

Statistical analyses
We performed analyses in order to determine the significance of the potential confounders; age, sex and change in income. Significance was determined in linear regression analyses with as the dependent variable by comparing the standardized Beta-scores for PDF with and without the influence of single confounders at >10% difference and a P-value <0.05. All of the analyses including change variables were corrected for baseline scores. The change score was defined as the difference between sex year follow-up and baseline scores. The difference score was chosen because it is a natural estimate of the amount of true change. Moreover, the difference score is reliable when individual differences is true change exist (Rogosa, 1988). Because we have selected our study sample such that it consists of a group with no decline in functioning and a group with persistent, severe decline in functioning, the expectation seems warranted that indeed individual differences in true change in measures exist.

To investigate associations between PDF, change in coping resources and change in we conducted linear regression analyses for each of the resources and each of the outcomes separately.
First, we performed analyses in univariate models on the association between PDF and change in outcomes (step 1 in figure 1). Only when these main effects were significant we proceeded further analyses focused on the aim of this study. Coping resources may influence through a mediating or a moderating effect. A mediating effect is present when PDF is associated with the change in coping resource which in turn is associated with change in (Holmbeck, 1997). This effect was tested by means of a two step procedure. First, we performed multivariate linear regression analyses to examine main effects of:

a.) PDF on well-being (step 1 in figure 1);
b.) PDF on change in coping resources (step 2 in figure 1);
c.) Change in coping resources on change in (step 3 in figure 1).

When these main effects were significant at p<.05, PDF was entered in a multivariate regression model including change in a coping resource, with change in as the outcome. When in this model the beta for PDF differed by 10% or more from the beta in the univariate model, it is concluded that a (partly) mediating effect is present. Mediation is further tested using the Sobel test (Baron & Kenny, 1986). Regression models are tested for each measure and change in each coping resource (6 models) at p<.05.

A potentially modifying (or interaction) effect (step 4 at figure 2) is one that affects the relationship between two variables, so that the impact of PDF on change in on each level of the modifier is different (Baron and Kenny, 1986). To examine whether coping resources also modify the association between PDF and, a new series of analyses was performed. For these analyses product terms of PDF and each of the change in coping resources were computed. Separate regression models examined the influence of PDF, one coping resource and the product term (PDF X change in coping). When the product term showed statistical significance at p<.05, interaction between PDF and coping resource was considered to be present. This implies that the longitudinal association between PDF and is modified by the psychosocial resource. In these cases, the coefficients for the influence of the coping resource on were calculated and presented separately for strata of coping resources.

**Results**

From 1691 respondents at T3 we excluded 1083 respondents when they did not meet the baseline criteria of good functioning at baseline (in accordance to the Non-PDF criteria) or when they showed temporarily improvement of functioning or when they had missing values for one or more of the necessary variables or criteria during any of the three cycles. This resulted in a study sample of 608 respondents (36% of 1691) who met the criteria for PDF or Non-PDF; 163 (27% of 608 ) respondents with PDF, and 445 (73% of 608) respondents with Non-PDF. Because of missing values for outcomes or scores on coping
resources at one of the measurement points, the number of respondents available for analyses was somewhat lower. The average age at T3 was 76 years for PDF respondents and 72 years for Non-PDF respondents. The selected respondents were women for 53% (PDF) and 51% (Non-PDF) respectively. Change in individual income between T1 and T3 showed a significant mean decreases of €100 for PDF respondents and €218 for Non-PDF respondents over six years (Table 1). Changes of the coping resources self-efficacy, mastery, self-esteem proved to be significant for older persons with PDF and Non-PDF. The outcome positive affect changed between T1 and T3 significantly for all respondents but life satisfaction only showed significant change for PDF.

To test on the potential confounders we performed multivariate regression analyses, which showed that sex and change in income were no confounders of the association between PDF and . Age proved to be a confounder but only in the association between PDF and positive affect. Therefore further on age was included in all of the analyses with positive affect as an outcome measure.

**Main effect (steps 1 and 2 of tables 2 and 3).**

As a first step to examine mediation, a main effects (Step 1 and 2 of Tables 2 and 3) of all variables on had to be present (Baron and Kenny, 1986 and Holmbeck, 1997). Multivariate regression analyses showed that PDF was significantly associated with change in each of the coping resources (P<.005) as well as with change in life satisfaction and positive affect (P<.005). This means that the incidence of PDF was associated with a decrease in as well as with a decrease in coping resources. Decrease in coping resource was also associated with decrease in (P<.005). Because of all main effects were significant, we proceeded to examine the mediating effect of change in coping recourses on the association between PDF and .

**Mediating effect**

Step 4 of Tables 2 and 3 shows the significance (P<.05) from multivariate linear regression analyses including PDF, change in coping resources mediating in the association with change in . Comparing step 1 with 4 of Tables 2 and 3 shows that changes in the coping resources self-efficacy, mastery and self-esteem significantly mediated the association between PDF and . Mediation is further tested using the Sobel test, which yielded significant mediation a p<=.02. By calculating the difference percentage decrease between betas, we specify the extent to which mediation is realized. When changes of 10% are commonly regarded as prove for significant mediation. In particular the beta (Standardized Beta) for the association between PDF and life satisfaction decreased significantly due to the inclusion of change in self-efficacy, mastery and self-
Estee with 26.9%, 18.5% en 30.6%, respectively. The beta for the association between PDF and positive affect decreased significantly due to the inclusion of change in self-efficacy, mastery and self-esteem with respectively coping resources with 38.9%, 37.3% en 33.3%, respectively. However, the main effect of PDF on change in still remained significant (P<.05). This means that the association between PDF and was partly explained by the decrease in individual level of all three coping resources over time.

**Moderator effect**

In investigating a moderator effect, the product term of PDF x Change in mastery was entered into the model. The product term proved to be significant in the multivariate regression analyses with life-satisfaction as the outcome (Table 4). Further stratification into respondents with decrease of their mastery score and respondents with stable or increase of their mastery score was performed. Multiple regression analyses showed a significant negative association of PDF with life satisfaction for respondents with decreasing mastery scores. This was in contrast to the results for respondents with a stable or positive change in mastery scores (Table 4), which didn’t show significance. This means that within the subgroup for respondents with a decrease in mastery, PDF is associated with a significant decrease in life-satisfaction.

The product terms of PDF x Change in self-esteem and PDF x Change in self-efficacy proved to be non-significant. Also no significant interactions were found with positive affect as the outcome.

**Discussion**

Some older persons appear to be remarkably effective in coping with the constraints of deteriorative functioning (Diener, 1999; Baltes, 1996; Gatz and Zarit, 1999; von Faber, 2001; Baltes and Carstensen, 1996) in order to maintain an acceptable level of, which indeed might only be somewhat lower than that of their healthier peers. In reaction to diseases and their consequences, these individuals make ongoing coping efforts to deal with the effects of the stress caused by diseases (Pellegrino and Thomasma, 1998). Several earlier findings show that it might be possible for some older persons to cope effectively with their decline in health in such a way that they maintain a higher level of than one would expect based on objective criteria.

The aim of this study was to examine the role of psychological coping resources in the association between persistent health decline (PDF) and, in a longitudinal design. We found that decreases in self-efficacy, mastery and self-esteem mediate the association between PDF and change in (life satisfaction and positive affect). Therefore, a substantial part of the
association between PDF and was explained by the decrease of these coping resources. However, PDF also kept an independent negative effect on after adjusting for change in coping resources. Specifically for older persons confronted with a decreasing mastery, PDF led to a significant decrease in life-satisfaction, in contrast to older persons confronted with a stable or an increase in mastery. This significant modifying effect was not found for self-efficacy and self-esteem.

Below we will discuss the results for each of the examined coping resources subsequently. Concerning the mediating role of the coping resource self-efficacy, our longitudinal findings are in line with former (mostly cross-sectional) research. Our findings support Bandura’s (1994) claim that a strong sense of efficacy enhances also when physical capacities decrease as people age. Furthermore, Artistico (2000) stated that older people with physical impairments and with a low sense of efficacy do not try to manage their health and have a low quality of life.

With respect to self-esteem as a sense of self pride that people derive from the way they manage relevant aspects of their life, including health, Larson, Boyle and Boaz (1984) suggested that in older persons, physical and health problems are associated with the level of self-esteem, which indeed is similar to our findings. They also support the evidence that more self-esteem beliefs relate to in chronically diseased persons (Bisschop, 2004b; Carpenter, 1997; Dirksen, 1989 and Robinson-Smith et al, 2000). Diener (1984) reported that high self-esteem is even one of the strongest predictors of and associated with better subjective . Our study also confirmed these findings. In addition, Artistico (2000) showed that increasing severity of disease was associated with progressively lower self-esteem and decreasing levels of self-esteem were associated with increased perceptions of illness.

Our findings as well as recent studies by others have shown that health problems lead to a lower sense of mastery, which in turn leads to lower (Schuurmans, 2004). In accordance to this mediating effect, mastery was found to provide psychological resilience and to facilitate adaptation under stressful life situations, including medical events and functional decline (Jang et al, 2002), leading to higher (Pearlin and Schooler, 1978).

In line with the modifying effect of mastery as our results showed, studies by Jang et al. (2002) and Bisschop et al. (2004b) showed a protective role of mastery modifying the association on feelings of depression due to disability and a specific chronic disease. Furthermore Chipperfield et al. (2004) suggested that health and among very old individuals may be compromised by fluctuating levels of perceived control, or vice versa, that stability in perceived control enhances health. In our sample of persons with stable or increasing coping resources, we did not find a significant association between PDF and well-being. Whereas we indeed did find evidence for this moderator effect of decreasing mastery, specifically on the cognitive aspect of well-being, life satisfaction. This may be explained by the fact that the
availability of the coping resource mastery is determined by questions referring to a more
cognitive, contemplative approach of the personal situation over a longer period of time,
whereas positive affect refers to a more affective consideration of the present state of mind.
The latter might therefore be less depending on overall reflection as life satisfaction is, for the
influence of longitudinally decreasing availability of mastery.

Strengths of our study are the longitudinal design, which made it possible to include
persistent health decline and change in coping resources into the analyses. Moreover, the
study included both the cognitive and affective aspects of that are measured. Furthermore,
as we selected respondents with scores for all variables and at least one of the outcomes at
all three follow-up measurement moments, we were able to include strictly defined groups.
However, the longitudinal design may also have caused selection bias because respondents
who had died in-between measurements were excluded from our sample and might have
represented the weakest.

**Conclusion**

Associations between persistent health decline and decreasing are explained by decreasing
availability of psychological coping resources. We therefore propose that it would be of great
importance for the older population, especially those (in future) confronted with persistent
health decline, that specific interventions need to be developed to improve coping resources.
Furthermore, within the working field of professional care for older persons, the improvement
of coping skills should be adapted into schooling of professionals. Empowerment should
become part of their attitudes in daily routine.
Table 1 Characteristics of the sample, mean (SD)

<table>
<thead>
<tr>
<th>Variable</th>
<th>PDF (N= 163)</th>
<th></th>
<th>NON-PDF (N=445)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
<td>T2</td>
<td>Change</td>
<td>T1</td>
</tr>
<tr>
<td>Sexe, % female</td>
<td>53</td>
<td>51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (64-92)</td>
<td>76 (6.8)</td>
<td>72 (5.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual income(^3)</td>
<td>1260 (539)</td>
<td>1180 (479)</td>
<td>100(^*) (349)</td>
<td>1600 (688)</td>
</tr>
<tr>
<td>Self-efficacy (24-60)</td>
<td>42.1 (5.6)</td>
<td>40.5 (5.5)</td>
<td>1.6(^*) (4.2)</td>
<td>43.9 (5.1)</td>
</tr>
<tr>
<td>Mastery (6-25)</td>
<td>17.8 (2.9)</td>
<td>17.0 (3.1)</td>
<td>.97(^*) (2.9)</td>
<td>18.6 (2.9)</td>
</tr>
<tr>
<td>Self-esteem (5-20)</td>
<td>15.2 (2.3)</td>
<td>14.8 (2.2)</td>
<td>.48(^*) (2.2)</td>
<td>15.8 (2.0)</td>
</tr>
<tr>
<td>Positive affect (0-12)</td>
<td>9.1 (2.8)</td>
<td>7.9 (2.9)</td>
<td>1.26(^*) (3.1)</td>
<td>9.9 (2.4)</td>
</tr>
<tr>
<td>Life satisfaction (2-10)</td>
<td>7.9 (1.1)</td>
<td>7.7 (1.1)</td>
<td>.25(^*) (1.4)</td>
<td>8.0 (1.1)</td>
</tr>
</tbody>
</table>

1 indexed to correct for inflation
*p=<.05
Table 2
Mediating effect of change in Coping resources on the association between change in Life-satisfaction (LS)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stand. Beta</th>
<th>Sign.</th>
<th>R2 model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PDF→LS</td>
<td>.108</td>
<td>.002</td>
<td>.319</td>
</tr>
<tr>
<td>2. PDF→Change in Self-efficacy</td>
<td>.151</td>
<td>.000</td>
<td>.136</td>
</tr>
<tr>
<td>3. Change in Self-efficacy→LS</td>
<td>.120</td>
<td>.001</td>
<td>.328</td>
</tr>
<tr>
<td>4. PDF→LS</td>
<td>.079</td>
<td>.026</td>
<td>.335</td>
</tr>
<tr>
<td>Change in Self-efficacy→LS</td>
<td>.108</td>
<td>.005</td>
<td></td>
</tr>
<tr>
<td>1. PDF→LS</td>
<td>.108</td>
<td>.002</td>
<td>.319</td>
</tr>
<tr>
<td>2. PDF→Change in Mastery</td>
<td>.119</td>
<td>.001</td>
<td>.219</td>
</tr>
<tr>
<td>3. Change in Mastery→LS</td>
<td>.176</td>
<td>.000</td>
<td>.342</td>
</tr>
<tr>
<td>4. PDF→LS</td>
<td>.088</td>
<td>.012</td>
<td>.349</td>
</tr>
<tr>
<td>Change in Mastery→LS</td>
<td>.164</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>1. PDF→LS</td>
<td>.104</td>
<td>.005</td>
<td>.228</td>
</tr>
<tr>
<td>2. PDF→Change in Self-esteem</td>
<td>.108</td>
<td>.002</td>
<td>.319</td>
</tr>
<tr>
<td>3. Change in Self-esteem→LS</td>
<td>.200</td>
<td>.000</td>
<td>.352</td>
</tr>
<tr>
<td>4. PDF→LS</td>
<td>.075</td>
<td>.032</td>
<td>.357</td>
</tr>
<tr>
<td>Change in Self-esteem→LS</td>
<td>.190</td>
<td>.000</td>
<td></td>
</tr>
</tbody>
</table>
Table 3
Mediating effect of change in Coping resources on the association between PDF and change in Positive affect (PA), adjusted for age.

<table>
<thead>
<tr>
<th>Variable</th>
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<th>Sign.</th>
<th>R2 model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. PDF→PA</td>
<td>.126</td>
<td>.001</td>
<td>.282</td>
</tr>
<tr>
<td>2. PDF→Change in Self-efficacy</td>
<td>.110</td>
<td>.005</td>
<td>.171</td>
</tr>
<tr>
<td>3. Change in Self-efficacy→PA</td>
<td>.188</td>
<td>.000</td>
<td>.320</td>
</tr>
<tr>
<td>4. PDF</td>
<td>.077</td>
<td>.034</td>
<td>.325</td>
</tr>
<tr>
<td>Change in Self-efficacy→PA</td>
<td>.179</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>1. PDF→PA</td>
<td>.126</td>
<td>.001</td>
<td>.282</td>
</tr>
<tr>
<td>2. PDF→Change in Mastery</td>
<td>.098</td>
<td>.010</td>
<td>.321</td>
</tr>
<tr>
<td>3. Change in Mastery→PA</td>
<td>.209</td>
<td>.000</td>
<td>.326</td>
</tr>
<tr>
<td>4. PDF→PA</td>
<td>.079</td>
<td>.030</td>
<td>.326</td>
</tr>
<tr>
<td>Change in Mastery→PA</td>
<td>.200</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>1. PDF→PA</td>
<td>.126</td>
<td>.001</td>
<td>.282</td>
</tr>
<tr>
<td>2. PDF→Change in Self-esteem</td>
<td>.096</td>
<td>.011</td>
<td>.229</td>
</tr>
<tr>
<td>3. Change in Self-esteem→PA</td>
<td>.223</td>
<td>.000</td>
<td>.319</td>
</tr>
<tr>
<td>4. PDF→PA</td>
<td>.084</td>
<td>.020</td>
<td>.326</td>
</tr>
<tr>
<td>Change in Self-esteem→PA</td>
<td>.215</td>
<td>.000</td>
<td></td>
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Table 4 Interaction and stratified analysis of the effect of PDF on change in life-satisfaction

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stand. Beta</th>
<th>Sign.</th>
<th>R2 model</th>
</tr>
</thead>
<tbody>
<tr>
<td>PDF X change Self-esteem</td>
<td>.058</td>
<td>.178</td>
<td>.332</td>
</tr>
<tr>
<td>PDF X change Mastery</td>
<td>.093</td>
<td>.028</td>
<td>.342</td>
</tr>
<tr>
<td>PDF X change Self-efficacy</td>
<td>.067</td>
<td>.122</td>
<td>.327</td>
</tr>
<tr>
<td>Mastery stable or increase</td>
<td>.036</td>
<td>.478</td>
<td>.297</td>
</tr>
<tr>
<td>Mastery decrease</td>
<td>.125</td>
<td>.003</td>
<td>.377</td>
</tr>
</tbody>
</table>
**Legend:**

1. association between PDF and change in 
2. association between PDF and change in coping resource 
3. association between change in coping resource and change in 
4. mediating effect of change in coping resource on association between PDF and change in well-being in a model including coping resources 
5. modifying effect of change in coping resource on association between PDF and change in well-being in a model including coping resources
Chapter 4
Promotion of self-management in vulnerable older people: a narrative literature review of outcomes of the Chronic Disease Self-Management Program (CDSMP)

Published as:
Promotion of self-management in vulnerable older people: a narrative literature review on the outcomes of the Chronic Disease Self-Management Program (CDSMP)

Abstract
Objectives
With ageing, older people can become frail, and this has been shown to be associated with a decrease in . Observational studies provide evidence of a positive effect of coping resources on . The question is: can coping resources can be improved in vulnerable older people? The Chronic Disease Self-Management Program (CDSMP) is a target group-specific intervention which aims to promote the self-management of older people who are confronted with deteriorating health. The aim of this study was to review intervention studies focusing on the CDSMP and to draw conclusions on the benefits of the Program.

Methods
A systematic search was conducted in PubMed and PsychINFO to identify RCTs focusing on the CDSMP. Nine RCTs focusing on relatively young older adults, 75% of whom with an average age between 49-65 years, were included.

Results
We found that the CDSMP was consistently beneficial for Health behaviour, especially with regard to the variables of exercise and self-care. For Health status, the majority of studies only showed improvement in the domain of health distress. Most of the studies that investigated Self-efficacy showed convincing improvement in self-efficacy, cognitive symptom-management and mental stress-management. In Health care utilization there was no significant decrease.

Conclusion
On the whole, the studies showed that CDSMP led to an increase in physical exercise, a decrease in health distress, an improvement in self-care, and it had a beneficial effect on self-efficacy.
Introduction
The majority of older people especially those with nursing needs have a compromised health status, accompanied by functional and cognitive decline (Crimmins et al., 1996; Crimmins 2004, Robine and Mitchel, 2004 and Schram et al., 2008), because they have more than one, often interacting, diseases (i.e. multimorbidity). Approximately 60% of the general older population (55 years and over) are confronted with multimorbidity. The prevalence increases to 95% of older persons from 85 years and over. Older persons with high nursing needs, such as those in care facilities, the prevalence of multimorbidity is 80% and does not differ by age and sex (Schram et al. 2008).

Because of the worldwide increase in life-expectancy, an increase in the number of older people with health decline can be expected. Older people who are confronted with deteriorating health often experience lower levels of (Kunzman et al., 2000; Landau and Litwin, 2001; Jonker et al., 2008), and as a consequence, many older people find it difficult to maintain control over their lives and to retain a certain feeling of self-worth. To retain a good feeling of self-worth, coping resources appear to play an important role. The availability of coping resources may influence patients self-appraisal of their situation and enable them to deal adequately with the demands of their disease(s) (Folkman et al., 1986). In addition, the availability of coping resources such as mastery, self-esteem and self-efficacy may buffer the negative influence of deteriorating health on , as has been demonstrated in several studies (Bandura,1977; Folkman et al., 1988; Jang et al., 2002; Bisschop et al., 2004a and Jonker et al., 2009a). However, these coping resources are under pressure, due to deteriorating health (Larson et al., 1984 and Bisschop et al., 2004b). One could speak of a downward spiral of deteriorating health, and a decrease in coping resources and (Artistico et al., 2000) which constantly have a negative influence on each other.

In order to optimize the of the growing population of vulnerable older people, one approach to break through the vicious circle may be to enhance their coping resources in order to empower those people.
Self-management is proposed as one of the ways in which older people can more actively manage their own ageing process by increasing the availability of coping resources and, as a consequence, their quality of life is increased and maintained as long as possible (Steverink et al., 2005). The Chronic Disease Self-Management Program (CDSMP) is a structured intervention developed by Kate Lorig, which emphasizes the strengthening of self-management in older people with multiple chronic conditions in order to empower them to stay in control of their own body and life (Lorig, 1996; Lorig et al. 1999, 2001a and 2001b). The National Health Service in the United Kingdom has adopted an amended version of the American CDSMP as its main self-management educational program, and is licensed to implement the CDSMP (Lorig, 1996). The CDSMP is the only intervention that focuses on older people with one or more chronic diseases, regardless of the specific disease, and that aims to stimulate them to become more actively involved in the management of their own health and to enable them to take care of themselves (Elzen et al., 2006). The advantage of this general management program is that it focuses not so much on the problems related to one specific disease, but on the problems encountered during the course of the disease, such as fatigue, pain and anxiety, which are the same for patients with different chronic diseases.

Many studies have published reports on this intervention, but the sample characteristics, study design, measurements and outcome variables vary widely between these studies. Because of the disparate presentation of various results and the small amount of available high quality studies, we chose to perform a narrative review of randomized controlled trials (RCTs) instead of a meta analysis of the many of uncontrolled studies with incomparably presented results. The aim of our narrative review was to examine the effectiveness of the CDSMP and to investigate whether this intervention does indeed, deserve to be further implemented in populations of vulnerable older people.

The Chronic Disease Self-Management Program (CDSMP)
The main aim of the CDSMP is to assist people to cope with multiple chronic diseases. It is based on prior experience with an arthritis self-management program, a literature review, various needs assessments, and the theoretical framework of self-efficacy (Bandura, 1977 and 1997; Lorig et al., 1999). Three principal assumptions underlie the CDSMP:

1. People with different chronic diseases have similar self-management problems and disease-related tasks.

2. People can learn to take responsibility for the day-to-day management of their diseases.

3. Confident, knowledgeable patients practicing self-management will experience improved health status and will utilize fewer health care resources.

Two additional requirements are:

1. Self-management education should be inexpensive and widely available.

2. Trained lay-persons with chronic conditions can effectively deliver a structured patient education program.

The CDSMP focuses on several topics, including physical exercise, nutrition, breathing, emotions, communication and medication, which are discussed during 6-weekly sessions of 2½ hours in groups of 10-15 participants. The groups are supervised by two trained leaders. The underlying mechanism that explains the positive effects on health behaviour, health status, self-management behaviour and health care utilization, is assumed to be self-efficacy. This is defined as 'believing in one's own capability to organize and execute the courses of action required to produce given attainments' (Bandura, 1997). The concept of self-efficacy refers to personal judgements of how well one's own behaviour can be implemented in situations that contain novel, unpredictable or stressful elements as well as ordinary situations. If people think that a certain behaviour will lead to a certain outcome, they will adopt that behaviour, but only if they consider themselves able to do so (Bandura, 1977).

The CDSMP incorporates strategies to enhance self-efficacy, and thereby to enhance self-management behaviour and health related outcomes: weekly action-planning and feedback,
participants modelling behaviour and problem-solving for each other, re-interpretation of symptoms, group problem-solving and individual decision-making (Lorig et al., 2000).

**Material and Methods**

Search strategy

To identify CDSMP intervention studies, a systematic search was conducted through the published article resources of PubMed (end date 18th April 2008) and PsychINFO (end date 18th April 2008). When applicable, thesaurus and MESH terms were used. The search terms: coping resources, intervention, health/aged/frailty, lead to the keywords: CDSMP, chronic disease self-management program, self-efficacy, self-esteem, mastery, adaptation psychological, coping, internal-external control, decision-making, problem solving, quality of life, life satisfaction, valuation of life, positive affect, patient education, self-help groups, intervention, aged, health status indicators, geriatric assessment, and Kate Lorig (who developed the CDSMP). The literature search identified a total of 700 possibly relevant articles; PubMed 603 and PsychINFO 97.4

Inclusion procedure

All articles matching one or combinations of the search terms were evaluated on the basis of title, key words, abstract and also full text. The inclusion criteria were: 1) CDSMP or EPP (English Patient Program which is an adaptation of the CDSMP), 2) physical group sessions, 3) RCTs and 4) having been published in peer-reviewed journals. As it was our aim to review the effectiveness of the program, we included only RCTs with a waiting list and/or care as usual control group. The exclusion criteria were: 1) Assessment-/process evaluations, 2) internet or bibliographic appliance 3) qualitative studies 4) cost as the sole outcome.

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4 The search strategy is available on request from the corresponding author.
Results

From a total of 700 potentially relevant articles, a total of 66 appeared to be relevant for analyses. Based on the title and keywords, 634 articles were irrelevant, mainly due to other (younger) age-groups or specific disease categories. Pre-post-test designs were also already mentioned in the title, as well as specific control groups. After reading the abstracts, another 32 articles were excluded. The full text of the remaining 34 articles was then read in extensor, after which an additional 25 were excluded on the basis of the criteria for inclusion and exclusion. Eight of these articles did not concern a RCT. The other most frequent reasons for exclusion were either the fact that the study focused on other educational programs were used, or on CDSMP, process evaluations, internet participation and cost outcomes only. Three studies were excluded because the control group attended an alternative course, such as Tai-Chi, instead of receiving care as usual while on a waiting list. A total of nine studies, which fulfilled all the inclusion criteria, were included in the review. In one of these studies, two separate research questions were addressed in the same sample (Richardson et al., 2008 and Kennedy et al., 2007) resulting in separate publications about the same intervention. Table 1 presents the sample characteristics, study design and results of the nine studies.

The designs of the studies varied widely. For instance, the follow-up ranged from 6 weeks (one study), to 4-6 months (nine studies) and one study included a 1-year follow-up. Some studies had both short and also on longer term follow-ups. The respondents had a variety of cultural and ethnic backgrounds; African American, Asian, Latino and White ethnicity. Five studies focused on majority ethnic groups (Elzen et al., 2006, Lorig et al., 1999, Kennedy et al., 2007, Richardson et al., 2008 and Haas et al., 2005), and four studies focused on minority ethnic groups (Griffiths et al., 2005, Fu Dongbo et al., 2003, Lorig et al., 2003 and Swerissen et al., 2006). 90% of the studies included groups of patients with heterogeneous chronic diseases, including those with comorbid conditions.
Only Haas et al. (2005) included a homogeneous group of respondents with low back pain. The vast majority of the participants were female (>75%). Among the nine studies the youngest sample had a mean age of 49 years (Griffiths et al., 2005) whereas the oldest sample had a mean age of 77 years (Haas et al., 2005). In many of the studies the participants were relatively young older adults, with average ages between 49-65 years (75%). The sample sizes varied from 109 (Haas et al., 2005) to 954 (Fu and Dongbo et al., 2003). With regard to other characteristics, such as types of teachers, lessons and group sizes (table 1, other characteristics), there were very few differences between the studies. However, the number of sessions attended did differ between the studies, and varied from 0 to 7 sessions. Some studies reported a high mean attendance of 5.6 (Elzen et al., 2006) and 5.3 (Swerissen et al., 2006) from 6 sessions. In the study of Kennedy et al. (2007) participants were included who attended at least 4 sessions. Some studies included all patients of the intervention group, irrespective of the number of sessions that was attended (Griffiths et al., 2005). The diseases that the patients suffered from were (combinations of) diabetes, asthma, arthritis, cardiovascular diseases, lung diseases and cancer. Only one study included participants specifically suffering from low back pain (Haas et al., 2005). All of the studies adhered to the written CDSMP manual that details both the content of the course and the process (Lorig et al., 2000). In some studies the original program was adapted to the culture and translated: Shanghai CDSMP (Fu Dongbo et al., 2003), Tomando (Lorig, et al., 2003) and Expert Patients Program (Kennedy et al., 2007; Richardson et al. 2008). Swerissen et al. (2006) also translated the CDSMP and made minor amendments. Almost all of the studies made use of the Chronic Disease Self-management questionnaire (Lorig et al., 1996), but Richardson et al. (2008) and Haas et al. (2005) used other measurement instruments. Only three studies - Fu Dongbo et al. (2003) and Lorig et al. (1999 and 2003) - reported effect sizes, varying between -0.10 and 0.38, whereas 0.20 is assumed to be a small effect.
Classification of the results

In describing the results we followed the original CDSMP classification model of coping resources (Lorig, 1996): Self-efficacy, Health behaviour, Health status and Health care utilization (see figure 1). The causal mechanisms of the current intervention is potentially multifaceted. Previous work suggests a theoretical model (figure 1) where the primary causal mechanism is change in self-efficacy, with changes in self-care behaviour secondary. Changes in self-efficacy are hypothesised to lead directly to changes in health status, which in turn influences healthcare utilisation (Kennedy et al. 2007).

If an outcome measure deviated from the chosen classification, we categorized the outcome according to its specific characteristics, e.g. smoking was added to the category Health behaviour.

Interpretation of the results was sometimes difficult because of the unequivocal presentation of the results in the various studies i.e. the variation in outcome measures within the main categories that were presented.

Health behaviour

Health behaviour can largely be defined as behavioural aspects contributing to healthy living. All the studies appeared to focus on five components of Health behaviour: self-care, communication with physicians, healthy diet, smoking and exercise, the significance reported on which was very diverse. We therefore present the results for each of these components (see Table 2).

*Self-care* was studied in three RCTs, all of which had a 4-6 month follow-up. Two of these studies found an improvement in self-care in relatively large sample sizes of 476-629 persons. The participants had heterogeneous chronic diseases and were relatively young, with a mean age-range of 49-55 years. The study of 109 patients with low back pain and an average age of approximately 77 years, did not show improvement in self-care.
Six studies reported on Exercise, including all types of physical exercises, such as strength training, stretching, walking and aerobics.

Five of these studies, which reported improvement, had large sample sizes (474-952 respondents) with a mean age-range of 55-65.5 years. Improvement was also reported at the 1-year follow-up (Lorig et al., 1999). Only one study found improvement in Exercise: a Dutch RCT with 139 participants with a somewhat older average age of 68 years.

The effect of the CDSMP on Communication with physicians was more diffuse. The three studies that reported and improvement had large sample sizes, varying from 551-952 participants, with a mean age-range of 55-65.4 years. The three studies that found no improvement varied in sample sizes from 139-954 participants who had mean ages ranging from 49 to 68 years, which did not differ from the studies in which no improvement was found. Follow-ups differed from six weeks to six months after the start of the CDSMP, but this did not lead to significant results.

The two studies that focused on a healthy diet (Kennedy at al. 2007) and to quit smoking (Lorig et al., 2003) found no improvement in either health behaviour at the 4-6 month follow-up. However, after one year, more participants in the CDSMP had stopped smoking.

Health status

Health status can be defined as mental and physical health conditions. The studies included in the review measured health distress, fatigue/energy, self rated health, disability/mobility, social roles, pain, discomfort, shortness of breath and anxiety (see Table 3). Outcomes were measured as a part of Health status. The effects of CDSMP on the components of Health status appeared to be very diverse.
All of the studies (N=5) that included Health distress as an outcome reported a significant improvement. Fatigue/Energy measured in six RCTs and reported an improvement in four studies. In the participants with a mean age of 58 years fatigue/energy was found to be improved at 6-month follow-up. The studies with the youngest (49 years) and the oldest (77.2 years) participants reported no improvement. With respect to General (self rated) health, four studies found an improvement, whereas three studies with smaller sample sizes did not.

The results vary considerably with regard to Disability/mobility and Social roles. Two studies found a beneficial effect of CDSMP, whereas three other studies did not. There were no clear differences between the study samples. For Pain, Discomfort, Shortness of breath and Anxiety, studies reported hardly any improvement. The eight studies that measured Pain, five found no significant effect of CDSMP, whereas three studies focusing on specific minority ethnic groups reported a decrease in Pain. On the other hand, an improvement in Shortness of breath was only found in one study of a minority ethnic group (Fu Dongbo et al., 2003); three other studies reported no improvement. There was also no improvement in Discomfort and Anxiety.

Although not predominantly described in the articles we reviewed, the main aim of promoting self-efficacy, in addition to improving of health behaviour and health status and decreasing health care utilization, should be to increase . Only five of the reviewed studies reported on outcomes (see Table 4). However, none of these studies found that CDSMP was beneficial for  in either the short or the longer term follow-up.

Health care utilization

With respect to health care utilization, participants were commonly asked whether they had visited a physician (including visits to an Accident and Emergency Department (AED) or had been hospitalized during a specific period of time.
Except for the larger-scale Lorig study (1999) which reported fewer hospitalizations at the 4-month follow-up and fewer visits to a physician/AED visits at the 1-year follow-up, none of the studies found any significant changes with respect to hospitalization and physician visits.

Self-efficacy

According to Bandura (1997), who developed the self-efficacy theory, cognitive processes play an important role in the acquisition and retention of new behaviour. If people think that a certain behaviour will lead to a certain outcome, they will adopt that behaviour, but only if they consider themselves able to do so. Applied to situations of multi-morbidity, belief in the ability to manage disease symptoms is expected to lead to this new behaviour.

The vast majority (N=5) of all studies that investigated self-efficacy (N=7) reported an improvement (see Table 5), and the effect remained until one year after the end of the intervention (Lorig et al., 2003). The beneficial effect of the CDMSP on Cognitive symptom management as a way of coping with disease-related symptoms, also seems to be convincing. Four of the nine studies we reviewed reported an improvement in Cognitive symptom management. No improvement was found only in Van Elzen’s (2006) RCT of in a group of participants with a somewhat older average age of 68 years. In one study, Mental stress management (as a way of coping with mental pressure from the difficulties caused by chronic diseases) according to certain cognitive self-management theories was also found to be improved by the CDMSP.

Other characteristics

We could draw no conclusions with regard to the specific influence of ‘other characteristics’ on the results. Diseases, translations, adaptations and attendance do not seem to lead to any systematic differences.
**Discussion**

The aim of our review was to evaluate the effects of the CDSMP, a program that claims to promote self-management in vulnerable older people. We identified nine studies describing eight RCTs and have presented the results in accordance with the four main domains of outcomes that are expected to improve after participation in the CDSMP: Self-efficacy, Health behaviour, Health status and Health care utilization. In order to investigate the effects of CDSMP on these four main domains, a variety of separate outcomes were studied. Overall, the results of the studies showed that the CDMSP led to an increase in physical exercise, a decrease in health distress, an improvement in self-care, and a beneficial effect on self-efficacy measures. Although there is an expected relationship between self-efficacy and , there was no improvement in the latter after participation in the CDSMP. There was also no change in Health care utilization after participation.

There were many differences with respect to the effectivity of the program between the studies, which could not be explained by differences in the sample sizes, the mean ages of the participants nor the follow-up period. All of the studies included patients with heterogeneous chronic diseases, but the samples were rather homogeneous with regard to sex and age. Most of the participants were somewhat younger older people with an average age of 58 years, except for the study of Haas et al. (2005) that included participants with low back pain and a higher mean age. Most participants were female. The inclusion of minority or majority ethnic groups did not appear to have any clear influence on the results. Also the type of disease and other characteristics, such as translation, adaptation and attendance showed no significant differences in effectivity of the program.

We only found 8 RCTs that investigated the effectiveness of CDSMP, whereas a considerable amount of literature reporting positive results of CDSMP in studies with pre/post-test design has been published. We only included RCTs because we think that this is the only design suitable for testing the effects of interventions and obtaining reliable results.
Well-designed RCTs can help us to understand what type of intervention promotes a specific change in behaviour, because evidence inspired descriptions of interventions are often not specific or detailed enough to exactly replicate the study (Michie, S. & Abraham, C., 2004). The effectiveness of the specific components of the CDSMP, has not yet been described so far, but may be inferred from the results we reviewed.

For instance, certain topics, such as exercise, which were explicitly and repeatedly addressed in the program, can be expected to have been effective. The standardized structure of formulating targets and action plans may also have influenced the outcomes. Specifically, the action plans that are formulated after each of the sessions and evaluated at the start of the next session, may have led to better self-efficacy scores, because this is commonly measured with questions that focus on ‘conviction in setting and realizing one’s own goals’. However, whether self-efficacy beliefs really did improve is still unclear in view of the conviction that improved self-efficacy leads to greater, one may indeed expect an increase in with an increase in self-efficacy beliefs. However no improvement was found in overall in the reviewed studies.

As life-expectancy increases, a greater percentage of older people will have age-related diseases and may suffer from the problems that accompanies persistent health decline. Since previous research has showed that coping resources such as self-efficacy mediate the association between persistent health decline and, the CDSMP could be considered a worthwhile intervention. Indeed, based on the current review the CDSMP seems a promising intervention that helps older persons to face the challenge they are confronted with, in order to increase their physical activity and self-care, decrease their health distress, to maintain self-management and thus hopefully their.

Strengths of our review consist in the systematic qualitative overview we created despite the of the disparate presentation of the results in the various studies and the inclusion of only 8 RCTs. As a shortcoming may be considered this small number of studies included.
Unfortunately, we were not able to perform a meta-analyses because the outcome measures varied widely between the studies. As a consequence, it was not possible to quantify the effects of the intervention.

Thus far, no research on the effectivity of the CDSMP has focused on people of 80 years of age and over, whereas this is the group with the most chronic diseases and functional limitations that may profit the most from the intervention.

Therefore we recommend the inclusion of such a sample in an CDSMP intervention study with the aim to improve health behaviour, self-efficacy and . We then strongly recommend a high quality design as a Randomized Controlled Trial, rather than a (pre-)post-test design, in order to provide evidence-based input for the development of feasible interventions. Also expanding outcomes with for instance the fields of quality of life and depression (), mastery and self esteem to broaden the current narrow standard focus of the studies. Furthermore, a significant improvement is needed in the possibility to compare separate study results.
<table>
<thead>
<tr>
<th>Author, year</th>
<th>Sample characteristics</th>
<th>Study design</th>
<th>Results (significance p&lt;=0.05), main effects, effect sizes (when available) and measurements</th>
<th>Other characteristics:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Griffiths, C. et al. 2005</td>
<td>N=476; 49 yrs (9.7); 43% Bangladeshi adults</td>
<td>RCT: intervention and waiting list control group. Pre-test and 4-month post-test study</td>
<td>Improvement: Self-efficacy, Self care behaviour No improvement: Communication, Anxiety, Pain, Fatigue, Shortness of breath, visits to a physician, Depression and Quality of Life. Measurements: self-administered version of the Chronic Disease Self-management questionnaire (Lorig et al., 1996), HADS (anxiety and depression) and EQ5D (health status).</td>
<td>T: pairs of trained and accredited Bangladeshi lay tutors with chronic diseases. D: Diabetes (68%), Asthma (16%), Arthritis (9%) and Cardiovascular diseases (6%). Also comorbidity. L: 6 times for 3 hours, according to detailed CDSMP manual A: 0 sessions N=50, 1-2 sessions N=118, 3-6 sessions N=122 S: Adapted CDSMP into the Sylheti dialect and Islamic culture.</td>
</tr>
<tr>
<td>Elzen, H. et al. 2006</td>
<td>N=139; 68yrs (6.3); 36.8% Mainly patients attending hospital outpatient clinic</td>
<td>RCT: intervention and control group, 6 weeks and 6 months post-test.</td>
<td>No improvement: 6-week and 6-month outcome Self-efficacy, Exercise, Cognitive symptom management, Communication, Role limitations,</td>
<td>T: pairs of trainers Psychology PhD and peer leaders D: Diabetes (32%), Lung disease (27%), Arthritis (33%) and heart disease (6%). Also comorbidity.</td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Design</td>
<td>Measurements</td>
<td>Intervention Details</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>Fu, Dongbo et al. 2003</td>
<td>N=954; 64 yrs (10); 28% Urban communities Shanghai, China</td>
<td>RCT: intervention and waiting list control group Pre-test and 6-month post-test</td>
<td>Social functioning, General health and Vitality. Measurements: self-administered version of the Chronic Disease Self-management questionnaire (Lorig et al., 1996) and GSES-16 (self efficacy scale).</td>
<td>L: 6 times for 2.5 hours, according to detailed CDSMP manual. A: 5.6 sessions G: 10-13 participants</td>
</tr>
</tbody>
</table>
| Lorig, K.R. et al. 2003 | N=551; 56 (14)yrs; 21% Hispanics in North-Carolina area | RCT: intervention group and waiting list control group. Pre-test and 4 months and 1 year post-test | Improvement:  
*Four-month outcome*  
Self-reported health (-.48), Health distress (-.47), Fatigue (-.27), Pain/Discomfort (-.23), Role function (-.26), Exercise (.28), Communication with physician (.34), Mental stress-management (.71), Self-efficacy (.16) and ER visits (-.29)  
*One-year outcome*  
Same aspects and Tobacco use, Self-efficacy and ER visits  
No improvement:  
*Four month outcome*  
Physician visits, Tobacco use and Hospital days  
*One-year outcome*  
Physician visits and Hospital days  
Measurements: self-administered version of the Chronic Disease Self-management questionnaire (Lorig et al., 1996) | T: pair of trained peer leaders  
D: Heart disease (19%), Hypertension (52%), Diabetes (45%), Lung disease (19%), Hypolipidemias (28%), Arthritis (15%). Also comorbidity.  
L: 6 times for 2.5 hours, according to detailed CDSMP manual  
A: Mean = 4.3 sessions  
G: 10-15 participants (patients, significant others)  
S: important cultural adaptation and translation to the version Tomando |
<table>
<thead>
<tr>
<th>Study</th>
<th>N=952; 65.4yrs (range 40-90 yrs); 35% English community</th>
<th>RCT: intervention group and control group. Pre-test and 6-month post-test</th>
<th>Improvement: Physical exercise, Cognitive symptom-management, Communication with medical doctor, Social roles, Self rated health, Disability and Health distress, Hospitalizations and Nights in hospital</th>
<th>No improvement: Pain, Physical discomfort, Shortness of breath, Visits to physicians and ER and Psychological Measurements: self-administered version of the Chronic Disease Self-management questionnaire (Lorig et al., 1996)</th>
<th>T: Pairs of trained volunteer lay teachers. Most with chronic disease. D: Heart disease (33%), Lung disease (44%), Arthritis (54%), Stroke (11%). Also comorbidity. L: 7 times for 2.5 hours, according to detailed teaching manual A: Mean 5.5 sessions G: 10-15 participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lorig K.R. et al. 1999</td>
<td>N=629; 55yrs (13.6); 30% White ethnicity from Community settings in England</td>
<td>RCT: intervention group and waiting list control group. Pre-test and 6-month post-test</td>
<td>Improvement: Self-efficacy (.44), Energy (.18), Social role limitations (.19), Psychological (.25), Health distress (.20), Exercise (.13), Communication with clinicians (.25). No improvement: General health, Pain, Diet, Visits medical doctor and Hospitalizations.</td>
<td>T: pairs of trained lay trainers and volunteer tutors D: Musculoskeletal (33.9%), Endocrine (11.7%), Circulatory (&amp;%), Fatigue (7.5%), Respiratory (6.4%), Mental health (6%), Neurological disease (6%) and others (21.5%) L: six times for 2.5 hours, according to detailed teaching manual</td>
<td></td>
</tr>
<tr>
<td>Study</td>
<td>Participants</td>
<td>Design</td>
<td>Interventions</td>
<td>Outcomes</td>
<td>Measurements</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>Richardson, G. et al. 2006</td>
<td>N=474; 65.5yrs (10); 24% People with Vietnamese, Chinese, Italian and Greek backgrounds, living in low income areas of Australia</td>
<td>RCT: intervention group and waiting list control group</td>
<td>Pre-test and 6-month post-test</td>
<td>Improvement: Self-care and Quality-adjusted life years No improvement: Mobility, Pain/Discomfort and Anxiety/Depression, Visits Medical Doctor and Hospitalizations</td>
<td>Measurements: EQ5D (mobility, self-care, usual activities, pain/discomfort and anxiety/depression).</td>
</tr>
<tr>
<td>Swerissen, H. et al. 2006</td>
<td></td>
<td>RCT: intervention group and waiting list control group.</td>
<td>Pre-test and 6-month post-test</td>
<td>Improvement: Energy, Self-rated health, Pain, Fatigue, Health distress, Self-efficacy, Exercise and Cognitive symptom management No improvement: Disability, Role function, Depression and Shortness of breath, Visits Medical Doctor and ER.</td>
<td>Measurements: self-administered</td>
</tr>
</tbody>
</table>

Measurements: self-administered Chinese version of the Chronic Disease Self-management questionnaire (Lorig et al., 1996)
A: >= 4 sessions G: 8-12 participants S: translated version EEP (Expert Patients Program)
| Haas, M. et al. 2005 | N=109; 77.2yrs (7.7); 15.6% Community-dwelling older Americans with chronic low back pain of mechanical origin | RCT: intervention group and waiting list control group. Pre-test and 6-month post-test | **Improvement:** Emotional  
**No improvement:** Pain, Energy/fatigue, Self-efficacy, Self-care, General health and Disability. Measurements: MVK pain scale, Arthritis Self-Efficacy scale and SF-36 | T: pair of lay leaders with chronic back conditions  
D: chronic low back pain of mechanical origin  
L: six times for 2.5 hours, according to detailed teaching manual, A:<3 N= 19, >=3-5 N=41%, 6 N=10  
G: small group format  
S: offering telephone support to the attendees each two weeks during 24 weeks. |
<table>
<thead>
<tr>
<th>Component</th>
<th>Improvement (+)</th>
<th>Number of studies</th>
<th>Range of mean ages</th>
<th>Sample sizes</th>
<th>Follow-up (FU)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No improvement (-)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercise</td>
<td>+</td>
<td>5</td>
<td>55-65.5</td>
<td>474-952</td>
<td>2-3</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>1</td>
<td>68</td>
<td>139</td>
<td>1-2</td>
</tr>
<tr>
<td>Healthy Diet</td>
<td>+</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>1</td>
<td>55</td>
<td>629</td>
<td>2</td>
</tr>
<tr>
<td>Tobacco</td>
<td>+</td>
<td>1</td>
<td>57</td>
<td>551</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>1</td>
<td>57</td>
<td>551</td>
<td>2</td>
</tr>
<tr>
<td>Communication</td>
<td>+</td>
<td>3</td>
<td>55-65.4</td>
<td>551-952</td>
<td>1-2</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>3</td>
<td>49-68</td>
<td>139-954</td>
<td>1-2</td>
</tr>
<tr>
<td>Self-care</td>
<td>+</td>
<td>2</td>
<td>49-55</td>
<td>476-629</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>1</td>
<td>77.2</td>
<td>109</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 3  Summary of results for Health status

<table>
<thead>
<tr>
<th>Component</th>
<th>Improvement (+)</th>
<th>Number of studies</th>
<th>Range of mean ages</th>
<th>Sample sizes</th>
<th>Follow-up (FU)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1 = FU after 6 weeks</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2 = FU after 4-6 months</td>
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<td></td>
<td>3 = FU after 1 year</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4=  FU after 2 years</td>
</tr>
<tr>
<td>Pain</td>
<td>+</td>
<td>3</td>
<td>57-65.5</td>
<td>474-954</td>
<td>2-3</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>5</td>
<td>49-77.2</td>
<td>109-952</td>
<td>1-2</td>
</tr>
<tr>
<td>Disability / Mobility</td>
<td>+</td>
<td>2</td>
<td>64-65.4</td>
<td>416-952</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>3</td>
<td>55-77.2</td>
<td>109-629</td>
<td>2</td>
</tr>
<tr>
<td>General (self-rated) health</td>
<td>+</td>
<td>4</td>
<td>57-65.5</td>
<td>474-952</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>3</td>
<td>55-77.2</td>
<td>109-629</td>
<td>1-2</td>
</tr>
<tr>
<td>Health distress</td>
<td>+</td>
<td>5</td>
<td>55-65.5</td>
<td>474-952</td>
<td>2-3</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fatigue/energy</td>
<td>+</td>
<td>4</td>
<td>55-65.5</td>
<td>474-952</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>2</td>
<td>49-77.2</td>
<td>109-476</td>
<td>2</td>
</tr>
<tr>
<td>Social Roles</td>
<td>+</td>
<td>3</td>
<td>55-64</td>
<td>551-954</td>
<td>2-3</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>3</td>
<td>65.4-68</td>
<td>139-952</td>
<td>1-2</td>
</tr>
<tr>
<td>Discomfort</td>
<td>+</td>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>1</td>
<td>65.4</td>
<td>952</td>
<td>2</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>+</td>
<td>1</td>
<td>64</td>
<td>954</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>-</td>
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Figure 1. Derived from the theoretical framework for outcome measurement CDSMP (Kennedy et al., 2007)

Health status $\rightarrow$ Healthcare utilization

Self-efficacy $\rightarrow$ Health behaviour

Hypothesised primary causal pathway

Hypothesised secondary causal pathway
Chapter 5
Do frail older persons benefit from the Chronic Disease Self-management Program in short en longer term?
Submitted
Do frail older persons benefit from the Chronic Disease Self-management Program (CDSMP) in short and longer term?

Abstract

Objectives

We conducted an intervention study with a RCT design on CDSMP in a sample of older persons in frail health and in need of elderly care. It is hypothesised that participating the CDSMP leads to improved coping resources and.

Methods

Outcome was assessed posttreatment and at 6-month follow up. The main outcome measures are psychological coping resources (Mastery, Self-esteem and Self-efficacy) and well-being (Positive affect, Life-satisfaction and Valuation of Life).

Results

We found that frail older persons with an average age over 80 years, who participated in an elderly day-care facility for one or more days a week, benefited from a six-sessions Chronic Disease Self-Management Program (CDSMP). The program improved participants’ perception of themselves to be in control of events and ongoing situations (mastery) and stabilized their valuation of life leading to a positive result of balancing negative and positive reasons for living.

Discussion

Because vulnerable older persons who are often confronted with deteriorating health, may benefit from adequate coping strategies, we consider this program to be successful due to the positive results on mastery and valuation of life. Also the fact that almost all of the participating persons scored positively on the content and style of the program, the high attendance rate, the high appreciative score and low drop-out is indicative for the applicability for this specific target group.
**Introduction**

Because of the increase in life expectancy, a greater percentage of older people will have age related diseases and may suffer from the difficulties due to persistent health decline. From all older persons in the Netherlands, 15% of the males and 22% of the females has a frail physical and/or cognitive health status (Deeg, 2007). Although the Dutch disability level is among the lowest in developed countries (Minicuci et al., 2003 and Melzer, Lan, Tom, Deeg & Guralnik, 2004) a considerable proportion of the population still will have to face the challenge of coping with health decline. Older persons confronted with deteriorating health often experience lower levels of (Kunzman, Little & Smith, 2000; Landau & Litwin, 2001 and Jonker, Comijs, Knipscheer & Deeg, 2008). The availability of coping resources like mastery, self-esteem and self-efficacy have been shown to buffer the negative influence of deteriorating health on; moreover, associations between persistent health decline and decreasing are partly explained by decreasing availability of psychological coping resources (Bandura, 1977; Folkman, Newman, Lamb & Shipley, 1988; Bisschop, Kriegsman, Beekman & Deeg, 2004a and Jonker, Comijs, Knipscheer & Deeg, in press a).

In order to optimize of the growing number of frail older persons, it seems a priority to enhance coping resources, and by doing so, to empower older persons. Therefore it is important to investigate specific interventions that are developed to maintain or improve optimal coping resources in these persons. Self-management programs are proposed as one of the ways for older persons to more actively manage their own process of ageing in such a way that the availability of coping resources and, as a consequence, is increased and maintained as long as possible (Steverink, Lindenberg & Slaets, 2005). Specifically the Chronic Disease Self-Management Program (CDSMP) is a structured intervention that emphasizes the strengthening of self-management by older persons with deteriorating health in order to empower them to keep in control of their own body and life (Lorig, et al., 1996, 1999, 2001a and Lorig, Sobel, Ritter, Laurent & Hobbs, 2001b, Jonker, Comijs, Knipscheer & Deeg, in press b).
The CDSMP is the only intervention that focuses on older people with one or more chronic diseases regardless of the specific disease, and that aims to stimulate them to become more actively involved in the management of their own health and enable them to take better care of themselves (Elzen, Slaets, Snijders & Steverink, 2006).

Recently we conducted a systematic review (Jonker, Comijs, Knipscheer & Deeg, in press b) on all of the available nine Randomized Controlled Trials with CDSMP. Overall, the reviewed studies showed that CDMSP led to more physical exercise, less health distress, better self care and had a beneficial effect on self efficacy measures. Thus, the CDSMP seems a promising intervention. However, in most RCT’s the average age was not very high. So far, the effectiveness of CDSMP is not yet determined in frail older people with heterogeneous chronic diseases and who are dependent on old age care. Therefore, we conducted an intervention study on CDSMP in such a sample. It is hypothesised that participating the CDSMP leads to improved coping resources and .

Method

The intervention

The central aim of the Chronic Disease Self-Management Program (CDSMP) is to teach people to cope with multiple chronic diseases. The CDSMP is based on prior experience with an arthritis self-management program, literature review, needs assessments and the theoretical framework of self-efficacy (Bandura, 1977 and 1997 and Lorig et al., 1999). The underlying mechanism that explains the positive effects on health behaviour, health status, self-management behaviour and health care utilization, is assumed to be self-efficacy. This is defined as ‘believing in one’s capability to organize and execute the courses of action required to produce given attainments’ (Bandura,1997). The CDSMP incorporates strategies to enhance self-efficacy and by doing so to enhance self-management behaviour and health related outcomes.
Three principal assumptions underlie the CDSMP (Lorig et al., 2000):

1. People with different chronic diseases have similar self-management problems and disease-related tasks.
2. People can learn to take responsibility for the day-to-day management of their diseases.
3. Confident, knowledgeable patients practicing self-management will experience improved health status and will utilize fewer health care resources.

The program is accessible and easy to implement, because it is inexpensive and widely available, and the intervention can be delivered by trained lay-persons. The CDSMP focuses on several topics including physical exercise, nutrition, breathing, emotions, communication and medication, which are discussed during six weekly sessions of 2.5 hours in groups of 10-15 participants. The groups are supervised by a pair of trained leaders. The CDSMP incorporates strategies to enhance self-efficacy and by doing so to enhance self-management behaviour and health related outcomes; weekly action-planning and feedback, participants modelling behaviour and problem-solving for each other, re-interpretation of symptoms, group problem solving and individual decision-making (Lorig et al., 2000).

Recruitment

We recruited older people who participated one or more days a week in a elderly day-care facility. We promoted the intervention through personal announcements and informative sessions at the day-care facility. Caregivers at the facilities were informed and potential participants were sent an informative letter by these caregivers. Those interested in participating in the study, gave written informed consent. Research assistants then contacted the participants and carried out a baseline measurement.

We aimed for power of 80% to detect a minimum difference between two independent sample means, at alpha .05. (Cohen, 1992). Therefore we needed to include 160 participants.
Randomisation

Participants were randomised to the education programme or to a waiting list control group that was promised participation after 6 months. Randomisation was stratified for the existing unit day-care groups. So, candidate participants on each location were group wise drawn by lot per weekday on which they normally received the day-care.

Registration

This trial was registered at the Dutch Trial Register as TC 1173.

Measurements

Outcome was assessed posttreatment and at 6-month follow up. The main outcome measures are psychological coping resources (Mastery, Self-esteem and Self-efficacy) and well-being (Positive affect, Life-satisfaction and Valuation of Life).

Mastery is conceptualised as the extent to which a person perceives him or herself to be in control of events and ongoing situations and reflects the perception of the ability to manage them. This was measured by a 5-item abbreviated version of the Pearlin Mastery scale (Pearlin & Schooler, 1978, Bisschop et al, 2004), which included questions like ‘I have little control over things that happen to me’. Each item is scored on a five-point scale, the total score is the sum of the ratings, with range 5-25, such that a higher rating indicates more feelings of mastery.

Self-esteem is measured by a scale that consists of four questions like, “feeling self-assured”, “positive attitude towards one’s self” and “feeling useless” that are scored on a five-point scale (Rosenberg, 1965, Bisschop et al, 2004). The score is the sum of the ratings, with range 1-20. People with higher self-esteem (i.e., higher scores) are supposed to have a more positive view of their identity.

Self-efficacy refers to personal judgements of how well behaviour can be implemented in situations that contain novel, unpredictable or stressful elements as well as ordinary situations (Bandura 1977).
Self-efficacy was measured by a twelve-item version of the Perceived Self Efficacy Scale (Sherer et al., 1982 and Bosscher and Smit, 1998). The scale included questions like ‘If I made a decision to do something, I will do it.’ and ‘I have difficulties solving problems well in my life’. Each question is scored on a five-point scale, the total score is the sum of the ratings, with range 20-60, with a higher score indicating a higher level of self-efficacy.

Positive affect was measured with the Centre for Epidemiological Studies-Depression scale (CES-D) (Radloff 1977), which assesses depressive symptoms. The CES-D is a 20-item scale that asks participants to indicate how frequently they experienced certain symptoms or feelings during the previous week. Radloff (1977) described four separate dimensions of the CES-D. One of the dimensions is positive affect, including four of the CES-D items which refer to positive feelings: ‘enjoying life’, ‘feeling happy’, ‘being hopeful about the future’ and ‘feeling as good as other people’. The items are scored on a four-point scale. This sub-scale ranges from 0 (low) to 12 (high). The use of this subscale as an independent concept is supported by others (Ranzijn & Luszcz, 2000). Higher scores indicate higher positive affect.

To assess Life satisfaction, two questions (Deeg, 2007) ‘Have you been satisfied with your life lately?’ and ‘Are you satisfied with your life, up until now?’ were asked. The questions are scored on a five-point scale, and the sum score ranged from 2 (very dissatisfied) to 10 (very satisfied).

Valuation of Life (VOL) is considered as a cognitive scheme which refers to “the subjective experienced worth of a person’s life, weighted by the multitude of positive and negative features whose locus may be either within the person or in the environment” (Lawton et al., 2001). The Dutch version of the VOL-scale (Knipscheer, van Schoor, Penninx and Smit, 2008) consists of 12 statements, about the value of life, such as: ‘It is difficult for me to find meaning in my daily routine’ or ‘At this moment I have a strong will to live’. Each item is scored on a five-point scale ranging from 12-60, higher scores indicate higher valuation of life.
Confounding variables

Variables that may confound the effect of participating CDSMP on the outcome measures were taken into account. Age, sex, income category, partner status, years of education, help with personal care and household care, chronic diseases and cognitive function were considered potential confounders. Age was measured by years and months of age and Sex was measured by observing the gender (male or female). Income category was measured by asking about income with three questions on receiving state pension (AOW), private pension, and savings. Whereas Partner status was measured by asking whether the respondent was living with someone they considered as their partner (yes/no). Education was measured by asking about the number of years education that was received. Personal care and Household care were measured by asking whether the respondent received help with personal care (yes/no).

Cognitive functioning was measured by means of the Mini Mental State Examination (MMSE) (Folstein et al, 1975), a frequently used screening instrument for global cognitive dysfunctioning. For 23 questions and tasks the respondents scored 1 or more points if they gave the correct answer or performed the task correctly. The scores could vary between 0 (all answers incorrect) and 30 (all answers correct). Higher scores indicate better cognitive functioning. The presence of chronic diseases was determined by asking the respondents whether they had any of the following diseases: cardiac disease; peripheral arteriosclerosis of the abdominal aorta or the arteries of the lower limb; stroke; diabetes mellitus; lung disease (asthma or chronic obstructive pulmonary disease); or any other major chronic diseases (Central Bureau of Statistics, 1989). The number of chronic diseases was calculated by summing all the specific diseases reported. In a validation study, the respondents’ self-reports were compared with information obtained from their general practitioners, and were found proved to be sufficiently reliable (Kriegsman, Penninx, Van Eijk, Boeke, & Deeg, 1996)
Statistical analyses

First, unpaired t-tests and chi-square tests were performed to compare the demographic characteristics and the baseline scores of the intervention and the control group regarding coping and outcomes. Next, paired t-tests and repeated measures-analyses using General Linear Models were performed to assess treatment effects between baseline and post-intervention and between baseline and 6-month follow up. Differences and changes were considered significant when $P < .05$. The analyses were performed in SPSS 15.0 (Chicago SPSS inc. 2004).

Results

Subjects

169 persons were willing to participate. Of these, 78 (46%) were assigned to the intervention group. In Figure 1 the inclusion and drop-out of participants is showed. As can be seen, no patients dropped out before starting the intervention. 7 participants did not complete the first post-intervention interview because they were (too) ill (N=3), died (N=1), or were confronted with hardship in the family (N=1). Two participants did not give a specific reason for quitting. From these drop-outs, 3 had been assigned to the intervention group. Another 10 persons did not complete the 6-month follow up interview due to illness (N=4), death (N=5) and one person from the control group stopped participation because she was unhappy waiting for the course, leaving 147 participants in the study (72 in the intervention group and 80 in the control group).

The intervention took place in existing groups in an elderly day-care facility. However, within these groups some participants had severe cognitive impairment at baseline or follow-up (MMSE $\leq 15$; Kempen, Brilman & Ormel, 1995). In order not to compromise the group dynamics and hurt peoples personal feelings, we choose to treat these participants like the others considering the follow-up interviews and actually participating in the intervention. However, the participants with severe cognitive impairment were excluded from analyses.
Therefore our study sample consisted of 132 persons of which 63 participated in the CDSMP and 69 were in the waitinglist control group. Attendance of the intervention meetings was high with an average of five of the six sessions that were offered.

Characteristics of participants at baseline are shown at table 1. At baseline, the intervention group did not differ from the control group with respect to age, sex, income, partner status, help with personal care, household care, chronic diseases and cognitive functioning.

Education level was somewhat lower in the intervention group (p=0.08). Scores on Self-efficacy, Mastery and Valuation of Life were significantly lower in the intervention group than in the control group.

**Effect of the intervention**

Paired t-tests were performed between baseline and post-intervention and between baseline and 6-month follow up (Table 2). The results from the post-intervention 6 week assessment, show that the outcome measures Self-efficacy and Valuation of Life decreased significantly (p <.01 ) for the control group whereas the intervention group stayed stable. At a 6-month follow-up, scores on Self-efficacy (p = .01) and Valuation of Life again decreased in the control group (p = .02). Furthermore, on Mastery and Depression results showed positive changes in the intervention group. Mastery improved (p = .01) whereas scores on Depression decreased (p = .05) significantly. Self esteem, Positive Affect and Life satisfaction did not show any difference between the control and intervention group, at both follow-ups.

In addition, we conducted analyses of variance by means of repeated measures to assess treatment effects, and adjusted for confounders and the baseline scores of the outcome measures. Table 3 shows the results of the effect from participating CDSMP on change in coping resources and at short and longer term. We included years of education as the only potential confounder because there was seemed to be a difference between both study groups at baseline (p .08).

A significant effect from participating CDSMP was found for Mastery and Valuation of Life.
Compared to the control group, participating in CDSMP led to significant higher scores on Mastery at short term. However, the effect size was rather small. Valuation of Life was stable for CDSMP participants immediately after the course and this effect was still there at six months, whereas participants of the control group were confronted with decreasing scores. These effects were also small (partial $\eta^2 < 0.0588$). Participating CDSMP did not lead to change in the other outcome measures.

**Qualitative evaluation of participating in the CDSMP**

Table 4 shows the results from the qualitative evaluation of the intervention among all 63 participants. The participants attended on average 5.7 sessions of the 6 sessions that were provided. They rated the CDSMP with an appreciation of 8.0 (scale 0-10). All of them enjoyed following the CDSMP and 92% claimed usefulness of the content. Almost everybody (98%) found the way that the intervention was presented pleasurable.

**Discussion**

We found that frail older persons with an average age over 80 years, who participated in an elderly day-care facility for one or more days a week, benefited from a six-sessions Chronic Disease Self-Management Program (CDSMP). The program improved participants’ perception of themselves to be in control of events and ongoing situations (mastery). However, the effects were small and the effect on mastery was no longer present after 6 months. The program did stabilize their valuation of life, leading to a positive result of balancing negative and positive reasons for living.

Thus far, no other RCT included Mastery as an outcome variable. While mastery is very important for people with deteriorating health due to chronic conditions for maintaining. It has been frequently reported that psychological coping resources, such as mastery, favorably affect a person’s way of coping with deteriorating health (Smits, Deeg & Bosscher, 1995; Penninx et al., 1998).
It has also been found that greater availability of coping resources is associated with better in chronically diseased persons (Carpenter, 1997; Dirksen, 1989 and Robinson-Smith, Johnston & Allen, 2000; Schuurmans, 2004). In addition, a mediating and moderating effect of mastery was demonstrated in our previous study on the association of deteriorating health with well-being (Jonker, Comijs, Knipscheer & Deeg, in press b).

Next to mastery, is also under pressure from deteriorating health (Jonker, Comijs, Knipscheer & Deeg, 2008). Research in older persons confronted with deteriorating health shows that various aspects of decrease (e.g. Kunzmann, Little & Smith, 2000; Landau & Litwin, 2001 and Smith, Borchelt, Mayer & Jopp, 2002). The results of our measures positive affect and life satisfaction did not show an improvement, but we did find a positive effect on Valuation of Life as an outcome measure indicating . From a review on 9 RCTs (Jonker, Comijs, Knipscheer & Deeg, in press b), only Haas et al., (2005) found an improvement on emotional among their sample of older adults with chronic low back pain. Griffith et al. (2005) and Kennedy et al. (2007) showed improvement in psychological and quality of life in younger aged persons with co-morbidity.

A beneficial effect on self-efficacy seems an almost natural consequence of participation in the CDSMP (Griffith et al., 2005; Fu Dongbo et al., 2003; Lorig et al., 2003; Kennedy et al. 2007 and Swerissen et al., 2006) in all kinds of target groups with various chronic disease. The program includes action plans that are formulated after each of the sessions and evaluated at the start of the next session. Therefore one might expect that DCDSMP would lead to better self-efficacy scores. However, we did not find an effect on self-efficacy. In a Dutch sample of chronically diseased patient, Elzen, Slaets, Snijders & Steverink (2006) did not find an effect either. They argued that this might have been caused by a ceiling-effect because their patients already had high baseline levels. Our more vulnerable population could have improved in self-efficacy, because they initially scored well below the ceiling of the scale.

Strengths and limitations
A major strength of this study is that we were able to investigate the effectivity of CDSMP in frail older persons with healthcare needs. A further strength is that we were able conduct a randomized controlled trial among these vulnerable older persons. A host of intervention studies on CDSMP were conducted with only a pre-posttest design (Jonker, Comijs, Knipscheer & Deeg, in press b) whereas only well-designed RCTs can help us to understand what type of intervention promotes a specific change in behaviour, because descriptions of interventions are often not specific or detailed enough to foster exact replication of the study and thus lead to “evidence inspired” rather than evidence based practice (Michie, & Abraham, 2004). To our knowledge no RCT on CDSMP was performed with this specific target group while it is obvious that they could benefit from such an intervention due to their vulnerable health. A limitation of our study should also be mentioned. We aimed for power of 80% but, the needed sample size of N=160 was not achieved. This reduces the power of our study, and may have led to an underestimation of the beneficiary effects of CDSMP.

Conclusion

Because vulnerable older persons who are often confronted with deteriorating health, may benefit from adequate coping strategies, we consider this program to be successful due to the positive results on mastery and valuation of life. Also the fact that almost all of the participating persons scored positively on the content and style of the program, the high attendance rate, the high appreciative score and low drop-out is indicative for the applicability for this specific target group. We feel that our vulnerable participants could have benefitted more from the program they appreciated, when it included more sessions to keep the self-management attitude under attention. When people’s health deteriorates further, participating a course will become difficult. We therefore advise to integrate the success ingredients of the program into the daily healthcare attitudes of professionals working with vulnerable older persons.
This may be achieved when professional guidance originated with peoples possibilities, considering their physical or cognitive limitations, stimulating them to focus on their own attainable goals and experiencing being successful.
Figure 1 Enrolment procedure

Total randomized  
N=169

Intervention group baseline  
N=78

Drop-out:  
N=3

Intervention group post-measurement 1  
N=75

Drop-out:  
N=3

Intervention group post-measurement 2  
N=72

Drop-out:  
N=7

Intervention group post-measurement 2  
After excluding participants with cognitive impairment  
N=63

Control group baseline  
N=91

Drop-out:  
N=4

Control group post-measurement 1  
N=87

Drop-out:  
N=7

Control group post-measurement 2  
N=80

Drop-out:  
N=11

Intervention group post-measurement 2  
After excluding participants with cognitive impairment  
N=69

Total randomized  
N=169
Table 1 Characteristics of the sample at baseline

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* t-tests and chi square test
Table 2 Differences between the intervention group and the control group with respect to the outcome measures

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Table 3 Longitudinal association between participating CDSMP and change in coping resources and (adjusted for years of education)

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Table 4 Qualitative evaluation after participation CDSMP

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<th>Usefulness (%)</th>
<th>Way of education (%)</th>
<th>Attendance (6 sessions)</th>
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Chapter 6
Defining older participants characteristics to benefit from CDSMP on and coping

Submitted
Participant characteristics that predict benefitting from a self-management program on and coping

Abstract

Objectives

in older persons with declining health may be enhanced by an intervention program that strengthens their self-management in order to empower them to keep in control of their own body and life. However, not all older persons may benefit from such intervention equally. In the present study we aimed to investigate which subgroups of vulnerable older persons benefit most from the Chronic Disease Self-management Program (CDSMP). Methods We used multivariate analyses of variance for repeated measures to examine whether the characteristics age, sex, education and cognitive functioning differentiate subgroups regarding their benefit from the intervention by testing interaction terms of each characteristic with intervention of control group status. Outcome measures examined were coping resources and .

Results

Significant interaction effects were found for education on depression, education on mastery and cognition on mastery.

Conclusion

From stratified analyses CDSMP seems effective with respect to feelings of mastery and depression in the lower educated participants and with respect to depression in those with good cognitive functioning.

When people’s health further deteriorates, participating in a course will become difficult as will maintaining competencies. We therefore advise to integrate the separate ingredients of the program into professional education schemes and promote them among professionals working with vulnerable older persons in daily health care.
Introduction
In persons with declining health, psychological coping resources have been found to positively affect (Dirksen, 1989; Carpenter, 1997; Penninx et al., 1998 & Robinson-Smith et al., 2000; Schuurmans et al. 2004; Jonker et al., 2009a). In order to promote of frail older persons, it seems therefore important to enhance coping resources, and by doing so, to empower them. By consequence, it would be of great importance that targeted interventions are developed to improve coping resources. Self-management programs are proposed as a way for older persons to learn to more actively manage their own process of ageing. In such a program the availability of coping resources and, as a consequence, is increased or maintained for a longer period of time (Steverink, Lindenberg & Slaets, 2005). The Chronic Disease Self-Management Program (CDSMP) is a structured intervention that emphasizes the strengthening of self-management in older persons with deteriorating health in order to empower them to keep in control of their own body and life (Lorig, et al., 1996, 1999, 2001a and Lorig, Sobel, Ritter, Laurent & Hobbs, 2001b, Jonker, et al. 2009b).

We earlier performed an intervention in a Randomized Controlled Trial with this self-management program (Jonker et al., submitted). The fact that all participants highly appreciated the content of the course as well as the high attendance rate and low drop-out may be considered as indicative for the applicability of the program for this specific target group. Participating in the program proved to be successful in our RCT due to the positive short-term effect on mastery and short and longer term effects on valuation of life. However, unexpectedly results were not positive regarding other outcomes such as self-efficacy and . Therefore, the results may be influenced by the heterogeneity of the intervention group. With the present study we aim to further investigate whether specific persons benefit more from the intervention than others. For instance, it may be suggested that persons with good cognition and higher education may benefit more than in persons with low cognition or education. Findings may result in a specific profile of people most likely to benefit from the program.
We hypothesize that age, sex, education, frailty and cognitive functioning may be characteristics predictive of beneficial effects (Ryff, 1989, Ryff 1991, Kunzmann 2000, Mroczek 1998, Landau 2001, Lawton 2001, Mroczek 2005, Borg 2006 and Rott 2006). The consideration of these specific characteristics is based on the assumption that older and frail persons have more difficulties incorporating new strategies to enhance coping resources and  

Method

The intervention

The central aim of the Chronic Disease Self-Management Program (CDSMP) is to teach people to cope with health decline. The CDSMP is based on experience with an arthritis self-management program, literature review, needs assessments and the theoretical framework of self-efficacy (Bandura, 1977 and 1997 and Lorig et al., 1999). The underlying mechanism that explains the positive effects on health behaviour, health status, self-management behaviour and health care utilization, is assumed to be self-efficacy. Self-efficacy is defined as ‘believing in one’s capability to organize and execute the courses of action required to produce given attainments’ Bandura,1997). [22]. The CDSMP incorporates strategies to enhance self-efficacy and by doing so to enhance self-management behaviour and health related outcomes. Ingredients are weekly action-planning and feedback, participants modelling behaviour and problem-solving for each other, re-interpretation of symptoms, group problem solving and individual decision-making [Lorig et al., 2000].

Study sample

We promoted the intervention through personal announcements and informative sessions at the day-care facility. Caregivers at the facilities were informed and potential participants were sent an informative letter by these caregivers. Those interested in participating in the study (N=169) gave written informed consent. Research assistants then contacted the participants and carried out a baseline measurement.
At baseline, the intervention group did not differ from the control group with respect to the participant characteristics (Table 1). A drop-out scheme was presented earlier (Jonker et al., submitted). We eventually included data from 134 older people who participated one or more days a week in an elderly day-care facility.

**Measurements**

Participant characteristics considered are age, sex, education, frailty and cognitive functioning. *Education* was measured by asking about the number of years education that was received. *Frailty* was measured using the Groningen Frailty Indicator (Steverink et al., 2001) a 15-item screening instrument. The Groningen Frailty Indicator screens for the loss of functions and resources in four domains of functioning: physical (mobility functions, multiple health problems, physical fatigue, vision, hearing), cognitive (cognitive complaints), social (emotional isolation), and psychological (depressed mood and feelings of anxiety). The higher the score (range 0-15), the more frailty.

*Cognitive functioning* was measured by means of the Mini Mental State Examination (MMSE) (Folstein et al, 1975), a frequently used screening instrument for global cognitive dysfunctioning. For 23 questions and tasks the respondents scored 1 or more points if they gave the correct answer or performed the task correctly. The scores could vary between 0 (all answers incorrect) and 30 (all answers correct). Higher scores indicate better cognitive functioning.

**Outcome measures**

The choice for *coping and well-being outcome measures* was based on the frequently reported evidence that psychological coping resources, such as mastery (Smits et al, 1995), self-esteem (Schieman and Campbell, 2001) and self-efficacy (Bandura, 1977) favorably affect a person’s way of coping with deteriorating health (Penninx et al., 1998; Jonker et al., 2009a; Bisschop et al., 2004).
The main outcome measures are psychological coping resources (mastery, self-esteem and self-efficacy) and well-being (depressive symptoms and valuation of Life), measured 6 months after the CDSMP was completed.

*Mastery* is conceptualised as the extent to which a person perceives him or herself to be in control of events and ongoing situations and reflects the perception of the ability to manage them. This concept was measured by a 5-item abbreviated version of the Pearlin Mastery scale (Pearlin & Schooler, 1978; Bisschop et al, 2004), which included questions like 'I have little control over things that happen to me'. Each item is scored on a five-point scale. The total score is the sum of the ratings, with range 5-25, such that a higher rating indicates more feelings of mastery.

*Self-esteem* is measured by a scale that consists of four questions like ‘feeling self-assured’, ‘positive attitude towards one’s self’ and ‘feeling useless’ that are scored on a five-point scale (Rosenberg, 1965; Bisschop et al, 2004). The score is the sum of the ratings, with range 0-16. People with higher self-esteem (i.e., higher scores) are supposed to have a more positive view of their identity.

*Self-efficacy* refers to personal judgements of how well behaviour can be implemented in situations that contain novel, unpredictable or stressful elements as well as ordinary situations (Bandura 1977). Self-efficacy was measured by a twelve-item version of the Perceived Self Efficacy Scale (Sherer et al., 1982; Bosscher and Smit, 1998). The scale included questions like ‘If I made a decision to do something, I will do it.’ and ‘I have difficulties solving problems well in my life’. Each question is scored on a five-point scale, the total score is the sum of the ratings, with range 12-60, with a higher score indicating a higher level of self-efficacy.

*Depressive symptoms* were measured with the Centre for Epidemiological Studies-Depression scale (CES-D) (Radloff 1977), which assesses depressive symptoms. The CES-D is a 20-item scale that asks participants to indicate how frequently they experienced certain psychological symptoms or feelings during the previous week.
Each question is scored on a four-point scale, the total score is the sum of the ratings, with range 0-60, with a higher score indicating more depressive feelings.

 Valuation of Life (VOL) is considered as a cognitive scheme which refers to “the subjectively experienced worth of life, weighted by the multitude of positive and negative features whose locus may be either within the person or in the environment” ( Lawton et al., 2001). The Dutch version of the VOL-scale (Knipscheer et al., 2008) consists of 12 statements about the value of life, such as: ’It is difficult for me to find meaning in my daily routine’ or ’At this moment I have a strong will to live’. Each item is scored on a five-point scale ranging from 12-60, higher scores indicate higher valuation of life.

 Statistical analyses

 Unpaired t-tests and chi-square tests were performed to compare the demographic characteristics and the baseline scores of the intervention and the control group regarding coping and outcomes.

 To examine the differential effects of the intervention, we used the longer term (six months) outcomes, corrected for baseline scores in searching for longer lasting effects. To examine which subgroups were most likely to benefit from the intervention, we examined whether the baseline characteristics age, sex, education and cognition moderated the association between the intervention and coping resources. Therefore, a series of multivariate analyses using General Linear Models was performed, one for each characteristic-outcome combination. Each multivariate model examined whether the product term (intervention X characteristic), was significant (p<.10). When the interaction term was found significant, the effect of the intervention was investigated in stratified analyses. We stratified on quartiles and median or mean of the characteristic to investigate the optimal distinction between groups.

 Results

 Characteristics of participants at baseline are shown in table 1.
Scores on self-efficacy, mastery and valuation of life were significantly lower in the intervention group than in the control group (Table 1). Therefore, we corrected our analyses for baseline scores of these outcome measures.

In investigating a moderator effect of a specific characteristic on the association of the intervention with the outcome measures, the product term of intervention X characteristic was entered into the separate models for each characteristic. The product terms intervention X education and intervention X cognitive functioning were significant for depressive symptoms as outcome. The product term intervention X education was significant with mastery as outcome (Table 2).

Several cut-offs for education and cognitive functioning were examined to reach optimal distinction between subgroups. The optimal distinction in levels of education was at <= 9 years and >9 years of education: each of which level constituted 50% of the sample. Multivariate analyses of variance showed a significant positive effect (p<.05) of intervention on mastery for respondents with low education. This was in contrast with the results for respondents with higher education, who showed no significant effect from the intervention. Stratification of the sample based on the lower or the highest quartiles of education did not show significant effects from the intervention in the separate groups.

With respect to depressive symptoms as outcome, stratification based on median scores of the MMSE (MMSE<=25 & MMSE >25) showed a trend (P=.09) that persons with better cognitive performance benefited from the intervention. This was in contrast to the results for respondents with lower cognitive performance, who showed an increase of depressive symptoms 6 months after the intervention. Stratification of the sample based on the lowest or highest quartiles of the MMSE did not show significant effects from the intervention in the distinguished groups.

Finally, when the sample was stratified for the level of education according to the median, the lowest or highest quartiles, we found no significant effects from the intervention for the outcome depressive symptoms in any subgroup.
Discussion

In the present study we aimed to investigate which subgroups of vulnerable older persons specifically benefit from the chronic disease self-management program (CDSMP). We found beneficial effects from the intervention in persons with lower educational level with respect to change in mastery. In addition, persons with good cognitive functioning profited more from the program with respect to change in depressive symptoms than persons with lower cognitive functioning.

The need for preventive measures to sustain or enhance mastery and well-being for the group of vulnerable older persons is recently suggested by several authors based on observational studies (Dalgard, 2007; Jang, et al.; 2009; Jonker et al., submitted). We consider it to be a strength that we had data from, to our knowledge, the only RCT on CDSMP that was performed with this specific target group. A limitation of our study concerns the number of participants. To perform further in-depth analyses on the original sample – that already was rather small - the number of respondents that we could include was low. This reduces the power of our study, and may have led to an underestimation of the effects of the CDSMP.

Conclusion

In addition to the evidence of an overall benefit from participating in the CDSMP in frail older age, with respect to mastery directly after the intervention and valuation of life after 6 months as we found earlier (Jonker et al., submitted) we may now conclude that low educational level and good cognitive functioning increase the likelihood of profiting from the program with respect to mastery and depressive symptoms, respectively.

Improvement of mastery for lower educated frail older persons seems of great importance considering several studies that show low educational level to be significantly associated with a lower sense of mastery (e.g. Schieman, 2001 & Jang et al., 2009) and with decreased mental health (Gadalla, 2009).
In the study of Dalgard et al. (2007) a sense of mastery even emerged as a strong mediating variable between level of education and psychological distress. In addition, higher levels of mastery are also associated with fewer depressive symptoms. Mastery then is seen as a protective agent against the negative effects of stress by poor health, leading to better mental health and vice versa (Jang et al., 2002; Turner & Noh, 1988). The observed beneficial effect of the CDSMP for frail persons with good cognitive functioning on depressive symptoms seems also relevant.

We consider the CDSMP to be successful due to the positive results on longer-term change in mastery and depressive symptoms, specifically in older people with lower educational level and good cognitive functioning. Based on our findings we expect that a narrowly defined specific group of participants is most likely to benefit from the program.

As the population is aging, an increasing number of older persons will be in need of care and especially the need for long-term elderly care will increase strongly. We therefore advise to integrate the ingredients of the program into the daily healthcare attitudes of professionals working with vulnerable older persons. These ingredients may result in professional guidance based on interpersonal equality, that starts with peoples possibilities and that explicitly considers their physical or cognitive limitations. This will facilitate older vulnerable persons to focus on their attainable goals and to experience being successful.
Table 1 Characteristics of the sample at baseline

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* t-tests and chi square test
Table 2 Interaction analysis of the effect of potential predictor and change in (GLM)

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</tbody>
</table>
### Table 3 Stratified analysis on educational level and cognitive functioning on the effect of PDF on change Depression and Mastery

#### Change in Mastery

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>P</th>
<th>Partial Eta2</th>
<th>Mean scores</th>
<th></th>
<th></th>
<th>Control</th>
<th>Intervention</th>
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<td></td>
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<td>T0</td>
<td>T2</td>
<td>T0</td>
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<tr>
<td>Education Low (&lt;=8 years)</td>
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<td>&lt;.05</td>
<td>.06</td>
<td>25.1</td>
<td>23.1</td>
<td>21.3</td>
<td>23.3</td>
<td></td>
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<tr>
<td>Education High (&gt;=9 years)</td>
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<td>.52</td>
<td>.01</td>
<td>23.8</td>
<td>24.4</td>
<td>22.9</td>
<td>24.0</td>
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</table>

#### Change in Depression

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<th>P</th>
<th>Partial Eta2</th>
<th>Mean scores</th>
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<td>T0</td>
<td>T2</td>
<td>T0</td>
<td>T2</td>
<td></td>
</tr>
<tr>
<td>Cognition Low (MMSE&lt;=25)</td>
<td>1.99</td>
<td>.16</td>
<td>.03</td>
<td>32.2</td>
<td>32.3</td>
<td>36.6</td>
<td>34.1</td>
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<td>Cognition High (MMSE&gt;=26)</td>
<td>2.89</td>
<td>.09</td>
<td>.04</td>
<td>33.3</td>
<td>35.0</td>
<td>31.4</td>
<td>30.5</td>
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#### Change in Depression

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<th>F</th>
<th>P</th>
<th>Partial Eta2</th>
<th>Mean scores</th>
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<th>Control</th>
<th>Intervention</th>
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<td>T0</td>
<td>T2</td>
<td>T0</td>
<td>T2</td>
<td></td>
</tr>
<tr>
<td>Education Low (&lt;=8 years)</td>
<td>.87</td>
<td>.35</td>
<td>.01</td>
<td>32.2</td>
<td>33.1</td>
<td>35.3</td>
<td>33.5</td>
<td></td>
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<tr>
<td>Education High (&gt;=9 years)</td>
<td>1.231</td>
<td>.27</td>
<td>.02</td>
<td>33.4</td>
<td>34.7</td>
<td>32.4</td>
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Chapter 7 Summary and general discussion

Summary
Notions on the association between ageing and functioning vary widely and have shifted during the past decades from the deficit-approach towards an orientation on successful ageing. Nowadays, to age successfully is put forward as the central aim in life at older age (Baltes, 1996; Gatz & Zarit, 1999; Von Faber, 2002). But still aging has a multifaceted nature and the ageing population is heterogeneous (Rowe & Kahn, 1987). From all older persons in the Netherlands, 15% of the males and 22% of the females has a frail physical and/or cognitive health status (Deeg, 2007). Still, life expectancy will keep increasing and therefore an increasing number of older persons will be in need of care and especially the need for long-term elder care will increase strongly (RIVM, SCP, 2004).

The studies presented in this thesis address the issue that a lot of older persons will be confronted with decreasing health, often leading to lower (Kunzman, Little & Smith, 2000; Landau & Litwin, 2001) well-being. It has frequently been reported that coping resources such as mastery and self-efficacy favourably affect a person’s way of coping with deteriorating health (Bandura, 1977; Smits, et al., 1995; Penninx et al., 1998 Schieman & Campbell, 2001). These reports suggest that a lot of the present and future vulnerable older people may benefit from gaining coping resources and in this way maintain well-being.

In this thesis the results of studies on the association between persistent health decline and as well as the role of change in coping resources in this association are presented. We also reviewed a target group-specific self-management program (CDSMP) and report about a Randomized Controlled Trial we performed in order to find evidence that resources can be increased in frail older persons.

The main findings from our studies are summarized below, after which methodological issues are discussed. Subsequently, the implications of the studies for public health care and clinical practice are discussed, followed by recommendations for further research and an overall conclusion.

Main findings

In Chapter 2 we used data from the Longitudinal Aging Study Amsterdam to address the question: ‘Does in older persons change due to persistent deterioration of functioning (PDF)?’ Persons were considered as having PDF when they met one or more of the following conditions: 1) Good cognitive functioning at baseline (MMSE=> 26) and cognitive decline during the subsequent six years; 2) An increase with more than one functional limitations and having at least two functional limitations after six years;
and 3) An increase with more than one chronic diseases and having at least two chronic
diseases after six years. In addition, the decline had to be persistent. PDF was determined
by checking if the deterioration was monotonic during both of the three year intervals
(between 1995 and 1998 and between 1998 and 2001). Mild PDF was defined as having one
of the PDF conditions and severe PDF was defined as having two or three of the PDF
conditions. We examined the possible association between (non-)PDF and three aspects of, namely
positive affect, life satisfaction and valuation of life. The results showed that PDF is
associated with decreasing. Specifically older persons with mild PDF are faced with a
significant decrease of their over time.

Chapter 3 reports on the role of three psychological coping resources; self-esteem, self-
efficacy and mastery, on the association between PDF and (life satisfaction and positive
affect), in a longitudinal design. We hypothesized that the maintenance and increase of
available coping resources are of importance to the maintenance of of people confronted
with persistent health decline. We found that self-esteem, self-efficacy and mastery mediate the association between PDF
and change in. A substantial part of the association between PDF and was explained by the
decrease of these coping resources. However, PDF remained also independently negatively
associated with. Specifically for older persons with a decrease in mastery, PDF led to a
significant decrease in life-satisfaction. This was in contrast with older persons with stable
mastery or with an increase in mastery; in this group the association between PDF and life-
satisfaction was no longer present. Such a modifying effect was not found for self-efficacy
and self-esteem.

Chapter 4 describes a narrative review on intervention studies (RCTs) focusing on the
Chronic Disease Self-management Program (CDSMP) and draws conclusions on the
benefits of the program. The Chronic Disease Self-Management Program (CDSMP) is a
structured intervention developed by Kate Lorig, which emphasizes the strengthening of self-
management in older people with multiple chronic conditions in order to empower them to
stay in control of their own body and life (Lorig, 1996; Lorig et al.1999, 2001a and 2001b).
The CDSMP is the only intervention that focuses on older people with one or more chronic
diseases, regardless of the specific disease, and that aims to stimulate them to become
more actively involved in the management of their own health and to enable them to take
care of themselves (Elzen et al, 2006). The advantage of this general management program
is that it focuses not so much on the problems related to one specific disease, but on the
problems encountered during the course of the disease, such as fatigue, pain and anxiety, which are the same for patients with different chronic diseases. The results of the studies that were reviewed suggested that the CDSMP led to an increase in physical exercise, a decrease in health distress, an improvement in self-care, and that it appeared to have a beneficial effect on self-efficacy measures. Although there is an expected relationship between self-efficacy and , there was no improvement in the latter after participation in the CDSMP. There was also no change in health care utilization after participation.

There were a lot of differences between the samples, characteristics and outcomes measured in the studies. Differences in the results of the studies could not be explained by differences in the sample sizes, the mean ages or the lengths of the follow-up period. Almost all of the studies included patients with heterogeneous chronic diseases, but the samples were rather homogeneous with regard to sex and age namely most were female with a relatively young age.

In Chapter 5 we report on the results of our RCT with the Dutch translation of the Chronic Disease Management Program, named ‘Grip op lijf en leven’ (Being in control over body and life). Chapter 6 reports on characteristics of subgroups in our intervention study that might specifically benefit from this self-management program. We performed the trial in a sample of frail older persons with an average age over 80 years, who participated in an elderly day-care facility for one or more days a week. The intervention included a six-session course in which the translated version of the Chronic Disease Self-Management Program (CDSMP) was offered to the participants included. The program improved participants’ self-perception of themselves as being in control of events and ongoing situations (mastery). However, the effect was somewhat small and the short-term effect on mastery was no longer present after 6 months. The program, however, showed participants’ experiencing a stable valuation of life, which implied no decrease in balancing negative and positive reasons for living as compared to the control group who showed a more negative valuation of life.

In a further study (chapter 6) we investigated whether specific persons benefited more from the intervention than others. We expected age, sex, education, frailty and cognitive functioning to be characteristics predictive of beneficial effects. The consideration of these specific characteristics is based on the assumption that older and frail persons have more difficulties incorporating new strategies to enhance coping resources and . Specifically, we hypothesized that persons with good cognition and higher education may benefit more than in persons with low cognition or education.
We found a beneficial effect from the intervention on longer-term change in mastery for persons with lower educational level and a marginally beneficial effect on longer-term depressive symptoms for persons with high cognitive functioning. Participants with less than 9 years of education gained in their mastery, whereas the group with higher educated participants showed a decrease in their feelings of mastery. For participants with higher cognitive functioning, feelings of depression decreased, whereas in persons with low cognitive functioning depressive symptoms increased.

External validity

*Psychological coping* in this study refers to three resources indicating feelings of mastery, self-esteem and self-efficacy. We used self-report questionnaires that reflected on personal coping strategies with questions like: ‘I have little control over things that happen to me’ and ‘When I have decided to do something, I go through performing it,’ as well as addressing issues as ‘positive attitude towards one’s self’ and ‘feeling useless’. Higher scores on the scales of the separate coping resources indicate the availability of the resource. We specifically made use of change scores (sum of the differences between the scores at follow-up measurement points corrected for initial scores) in order to calculate the change (gain or loss) in the availability of the resources. When a person is expected to gain in a coping resource, the person exhibit more e.g. mastery skills and to be better equipped to cope adequately in specific situations. Whether this individual actually copes better in a specific situation can not automatically be assumed for at least two reasons. First, the measurement instruments are imperfect and have measurement error. Second, reporting behaviour may have changed due to the course, without concomitant change in actual coping behaviour.

Strengths and limitations

An important strength of the research in the first two chapters is obviously the use of the high quality multivariable longitudinal database from LASA. This database offered the opportunity to investigate different (cognitive and affective) aspects of and made it possible to include the dynamic process of persistent health decline and change in coping resources into the analyses.

In interpreting the results of our analyses of the available data, several methodological limitations must be taken into account. First, older persons with very weak or ill health are under-represented in the LASA-sample. This may have led to an under-estimation of the strength of the associations that were found. Second, because of the small number of respondents with severe PDF we reached limited power. As a consequence we might have missed to find some associations with overall.
Also, the longitudinal design may have caused selection bias because respondents who had died in-between measurements were excluded from our sample and might have represented the weakest.

When reviewing the CDSMP, we included RCT designs only because this is the one design suitable for testing the effects of interventions and obtaining reliable results due to the inclusion of a control group. Well-designed RCTs can help us to understand what type of intervention promotes a specific change in behaviour, because they provide evidence-based knowledge, rather than ‘evidence inspired’ descriptions of interventions which are often not specific or detailed enough to exactly replicate the study (Michie, & Abraham, 2004) and lack the inclusion of a control group. Nevertheless, a considerable amount of literature on the CDSMP in studies with only a pre/post-test design has been published reporting positive results. We only found nine studies that investigated the effectiveness of the CDSMP in RCTs.

In addition, we were able to investigate the effectivity of CDSMP in a homogeneous group of frail older persons (aged over 80) with health care needs. To our knowledge no RCT on the CDSMP was performed with this specific target group although their vulnerable health makes them (obviously) pre-eminently suited to such an intervention. Thanks to the cooperation of Woonzorggroep Wilgaerden we were able to include this vulnerable sample.

Unfortunately the sample size needed of N=160 for the RCT based on a power calculation was not achieved, because a colleague-institution with two locations that initially agreed to participate suffered from internal organizational difficulties. Also the retrospective exclusion criterion on cognitive functioning, because of which data from persons with a really low score on the MMSE were excluded from analyses despite participation, diminished the final number of included participants. Excluding persons with low cognitive functioning (MMSE <=18) appeared to be a right decision since our study showed that good cognitive functioning was a prerequisite for the effectivity of the program. The smaller sample resulting reduced the power of this study, and may have led to an underestimation of the beneficiary effects of the CDSMP.

The effects of the CDSMP were however small but positive and almost all of the participants in this study, aged over 80, rated the content and style of the program positively. The high attendance rate, the high evaluation score, and the low drop-out are all indicative for the applicability of the program for this specific target group. Nevertheless, the program might not be suitable for this vulnerable group of older persons as a whole. Effectivity might be increased by selecting specific groups that are expected to benefit most likely from the course, such as the lower educated persons with good cognitive functioning.
Effectivity of the program may also increase if it includes more than the prescribed six sessions in follow-up meetings over a longer period of time to keep the self-management attitude under attention or when the ingredients of the program are integrated in the daily care of older persons.

Relevance for public health and clinical practice

This study provides a contribution to the discussion on the optimal content of high quality care for the increasing number of vulnerable older persons in the Dutch population. Combining theoretical insights and using already available data resulted in the definition of a vulnerable target group with persistent health decline (PDF). We found a negative association between PDF and change in . Furthermore, we found that vulnerable older persons who are confronted with deteriorating health and decreasing , may benefit from stimulating their coping abilities. We not only demonstrated the importance of coping resources in the longitudinal observational (LASA) data but also found evidence for a self-management program to be useful in achieving gains in coping resources and in an intervention study.

When people's health further deteriorates, however, participating in a course will become difficult as will maintaining competencies. We therefore advise to integrate the separate ingredients of the program into professional education schemes and promote them among professionals working with vulnerable older persons in daily health care. This attitude regarding professional guidance of frail older persons, should – in line with the basic concepts of CDSMP- originate with equality in the interpersonal relation between professional and participant. From the safe environment sincere mutual interest is expected to grow and within the group of peers modelling and group problem-solving will be stimulated. Based on our clinical experience from running the various CDSMP-courses within this study, we suggest that it is important to start with people's possibilities, taking into account their physical or cognitive limitations. In this context, it is possible to be stimulating in focussing on peoples' own attainable goals so that they experience being successful. This goal setting-practice forms an explicit issue within the CDSMP, leading to empowerment for the most vulnerable older persons. Considering the successfulness of participating in the Program, it seems important for every older person, who is confronted with deteriorating health, to be able to meet professionals who seriously and actively promote their coping. In order to provide professionals with sufficient means to establish this empowerment attitude, specific organizational circumstances are facilitative. E.g. small scale arrangements within regular health care institutions stimulate mutual interest in backgrounds and opinions of older clients, and intensify the interpersonal contacts between professional and older clients.
Also elbow-room for some spirit of enterprise and bottom-up management may be instrumental to facilitate the diverse individual processes in striving for a care environment compatible with each person’s own preferences leading to tailor-made care arrangements. In short, we suggest that within the field of professional care for older persons, the improvement of coping skills should be included into schooling programmes of professionals. Empowerment should become part of their attitude in daily routine. Also organizational conditions should facilitate the empowering attitude. In cases of offering the CDSMP itself, we recommend to define narrow target groups on cognitive and educational levels as well as follow-up refresher courses in time, to keep up with new competencies.

This study has policy-relevance by establishing empirical insights to found future policy-choices within the field of (institutionalized) elder care, concerning the organization of accommodations as well as the education of professionals. One could think of stimulating the use of standalone small scale facilities as well as promoting the organizational transformation of large scale institutions into smaller scale arrangements. Insights from our study stress attention for empowerment. This should be addressed in the final terms of professional education.

Recommendations for further research
Further research is required in order to increase the reliability and validity of the PDF concept in other populations and other datasets. The definition is simple, objective and measurable and may therefore be easier to apply than other more complex, extensive and subjective measurements like frailty (Steverink et al., 2001 & Puts et al., 2005). Also the fact that relevant others are able to ask and even partly answer the questions needed to define PDF makes the concept convenient for practice. The simplicity of the concept is most suited for quick scanning target groups regarding their suitability for specific interventions or (preventive) care formats. A next step in research is then to examine whether an empowering professional attitude in practice (Vass et al., 2007) indeed leads to better coping resources for older vulnerable persons and subsequently to successful aging which could be maintained when facing persistent deterioration of functioning.

Conclusion
The main objective of this thesis was to investigate whether a possible association between persistent health decline and is influenced by coping resources and whether the self-management program CDSMP contributes to enhanced coping and outcomes. When combining the results from both parts (LASA and RCT) of our study, the beneficial effect of the coping resource mastery for , is evident. We also found evidence that the
promotion of coping resources may be attainable for vulnerable older persons. Therefore we suggest an empowerment attitude derived from the CDSMP for professionals as well as the creation of small sized care facilities which makes the professional attitude leading to tailor-made care arrangements possible.
Nederlandse samenvatting

Introductie
Opvattingen over de relatie tussen veroudering en achteruitgang van functioneren lopen uiteen en zijn de laatste decennia verschoven van een negatieve benadering in termen van onvermijdelijke beperkingen en verliezen, naar een uiterst positieve benadering welke uit gaat van succesvol verouderen. Tegenwoordig lijkt dit succesvol verouderen het hoogste doel in het leven op hogere leeftijd. Maar veroudering heeft vele gezichten en de groep mensen die verouderd is eveneens divers. Van alle oudere mensen van 65 jaar en ouder in Nederland, heeft 15% van de mannen en 22% van de vrouwen een kwetsbare fysieke en/of cognitieve gezondheid. Doordat de mensen steeds ouder worden, zullen er steeds meer mensen behoefte hebben aan (langdurige) zorg.

In dit proefschrift presenteren we de resultaten van ons onderzoek naar de relatie tussen voortdurende achteruitgang van het fysiek en/of cognitief functioneren en het effect daarvan op het welbevinden. Ook bestudeerden we de rol van veranderingen in copingstijl op welbevinden bij achteruitgaande gezondheid. Daarnaast voerden we een narratieve literatuur-review uit over gecontroleerde interventiestudies gehouden met een doelgroepsspecifiek self-management programma (Chronic Disease Self-Management Program) en deden een gerandomiseerde trial met ditzelfde programma. Dit type onderzoek is van belang omdat veel mensen in hun leven geconfronteerd zullen worden met achteruitgaande gezondheid, welke kan leiden tot vermindering van hun welbevinden. Er is veel bewijs dat copingbronnen zoals competentie verwachting en regievoering een positieve uitwerking hebben op de manier waarop mensen met hun gezondheidsproblemen omgaan. Daarom hebben wij ons afgevraagd of ook kwetsbare oudere mensen gebaat zouden zijn bij – indien mogelijk - een toename van beschikbare copingbronnen en of dit zal leiden tot behoud of een verhoging van hun welbevinden, ondanks een achteruitgaande gezondheid.

De centrale bevindingen van onze onderzoeken worden hieronder samengevat. Daarop volgt de algemene discussie over de implicaties van onze resultaten voor het gezondheidszorgbeleid alsmede de ouderenzorgpraktijk. Met aanbevelingen voor verder onderzoek wordt dit proefschrift afgesloten.

De vraagstellingen van dit onderzoek zijn:

1. Verandert het welbevinden van oudere mensen als gevolg van voortdurende achteruitgang in lichamelijk en/of cognitief functioneren?
2. Wat is de rol van drie psychologische copingbronnen; zelfvertrouwen, competentie verwachting en regievoering, op de relatie tussen voortdurende achteruitgang in functioneren en welbevinden, in een longitudinaal onderzoeksontwerp?
3. Welke conclusies kunnen getrokken worden over eventuele voordelen van deelname aan een self-management programma op basis van een narratief review naar gecontroleerde interventiestudies?

4. Hebben kwetsbare oudere mensen met diverse chronische ziekten en afhankelijkheid van zorg baat bij een self-management programma?

5. Zijn er specifieke kenmerken of eigenschappen waardoor mensen meer of minder baat hebben bij het self-management programma?

**LASA**


In Hoofdstuk 2 onderzoeken we de vraag: ‘Verandert het welbevinden van oudere mensen als gevolg van voortdurende achteruitgang in functioneren (PDF)?’. We hebben eerst PDF en non-PDF gedefinieerd op basis van substantiële, objectieve en meetbare aspecten van voortdurende achteruitgang in lichamelijk en/of cognitief functioneren en de toename van chronische ziekten. We selecteerden groepen van respondenten die aan één (milde PDF) of twee en meer (ernstige PDF) of geen (niet-PDF) voorwaarden voldeden. We onderzochten de relatie tussen lidmaatschap van één van deze groepen en drie vormen van welbevinden, namelijk positief affect, tevredenheid met het leven en levenswaardering. Mensen met milde PDF scoorden lager op positief affect en tevredenheid met het leven en waardeerden het leven minder dan mensen zonder PDF. Bijna alle onderzochte verschillen in en verbanden tussen milde en niet-PDF en veranderingen in welbevinden waren significant. Ernstige PDF, daarentegen, liet alleen significante verschillen zien ten opzichte van niet-PDF, in cross-sectionele analyses met positief affect en levenswaardering. Kort samengevat, in onze populatie bleek PDF samen te hangen met een afnemend welbevinden.

In Hoofdstuk 3 rapporteren we over de rol van drie psychologische copingbronnen; zelfvertrouwen, competentieverwachtingen en regievoering op de relatie tussen PDF en welbevinden, over een langere periode. We gingen er vanuit dat de copingbronnen van groot
belang zijn voor het behoud van welbevinden voor mensen met achteruitgaande gezondheid. We toonden aan dat alle drie de copingbronnen de relatie tussen PDF en positief affect en tevredenheid met het leven medieerden. Dit houdt in dat een belangrijk deel van de relatie tussen PDF en welbevinden werd verklaard door de afnemend zelfvertrouwen, competentieverwachtingen en regievoering. PDF bleek daarnaast ook een onafhankelijk negatief effect op welbevinden te houden/hebben. Specifiek voor ouderen met een afnemende regievoering, leidde PDF tot een significante afname van hun tevredenheid met het leven. Dit negatieve effect was er niet bij ouderen met een stabiel of toenemende regievoering. Dit effect werd niet gevonden voor zelfvertrouwen en competentieverwachtingen.

**Grip op lijf en leven**

Hoofdstuk 4 beschrijft een narratieve review over gecontroleerde interventiestudies met een doelgroepspecifiek self-management programma (CDSMP) en trekt conclusies over de effectiviteit van het programma. We vonden negen relevante publicaties. De resultaten van deze studies lieten zien dat deelname aan het CDSMP leidde tot meer lichaamsbeweging, vermindering van gezondheidsstress, verbetering van zelfzorg en een verhoging van het zelfvertrouwen. En hoewel er ook een relatie werd verwacht van de interventie met zelfvertrouwen en welbevinden, bleek daarin geen verbetering. Ook werd er in de 9 studies geen verandering in het gebruik van gezondheidszorg waargenomen.

De onderlinge verschillen in resultaten van de 9 studies konden niet verklaard worden door verschillen tussen de studies, in de grootte van de steekproef, gemiddelde leeftijden noch door de follow-up perioden.

In Hoofdstuk 5 rapporteren we over de resultaten van een gerandomiseerde interventiestudie met de Nederlandse vertaling van het CDSMP, ofwel ‘Grip op lijf en leven’. In Hoofdstuk 6 beschrijven we de resultaten van een onderzoek waarin we kijken of mensen specifieke eigenschappen moeten hebben om baat te hebben bij het programma. Onze onderzoeksgroep bestond uit kwetsbare mensen met een gemiddelde leeftijd van 80 jaar, die een aantal dagdelen per week deelnamen aan dagverzorgingsprojecten van verzorgingshuizen. Uit het onderzoek bleek dat de deelnemers profiteerden van het programma. Deelname aan het programma bevorderde direct na deelname ‘de waarneming van zichzelf als iemand die controle uitoefent over gebeurtenissen en lopende zaken’ (regievoering). Het effect was verdwenen bij de nameting na 6 maanden. Daarnaast bleek dat de levenswaardering voor de deelnemers gedurende tenminste 6 maanden stabiel bleef terwijl de controle groep het leven minder gingen waarderen. Bovendien bleek dat kwetsbare ouderen de deelname aan het programma waarderden evenals de inhoud.
In aanvullend onderzoek naar noodzakelijke eigenschappen van mensen om te kunnen profiteren van het programma, veronderstelden we dat leeftijd, sekse, opleiding, lichamelijke kwetsbaarheid en het cognitief functioneren zulke kenmerken zouden kunnen zijn. We vonden positieve effecten van het programma op veranderingen in regievoering voor de langere termijn voor deelnemers met een lager opleidingsniveau. Ook constateerden we een positief maar marginaal significant effect van het programma voor mensen met beter cognitief functioneren op depressieve gevoelens. In beide gevallen gold dat de controlegroep slechter scoorde op de uitkomstmaten. Dit betekent dat het programma voor mensen met maximaal 9 onderwijsjaren, leidde tot een toegenomen regievoering, terwijl regievoering bij de mensen met meer onderwijsjaren afnam. Bij de deelnemers die goede cognitieve vermogens hadden (MMSE>=25) leverde deelname aan het programma een vermindering van depressieve gevoelens op, in tegenstelling tot een verslechtering voor de mensen met een lage MMSE.

In Hoofdstuk 7 staan de belangrijkste resultaten en conclusies beschreven en worden deze bediscussieerd. Tot slot wordt besproken wat de resultaten van het onderzoek betekenen voor de ouderenzorgpraktijk.

Conclusie en implicaties voor de praktijk
Het hoofddoel van het onderzoek dat in dit proefschrift wordt beschreven, was te onderzoeken of er een relatie was tussen voortdurende achteruitgang in functioneren (PDF) en welbevinden, en met name of veranderingen in de mate van zelfvertrouwen, competentieverwachtingen en regievoering van invloed waren op deze relatie. Vervolgens onderzochten we of een doelgroepspecifiek self-management programma (Grip op lijf en leven) de mate van zelfvertrouwen, competentieverwachtingen en regievoering zou verbeteren.

We stelden met longitudinale gegevens vast dat PDF leidt tot een afnemend welbevinden en dat afname van zelfvertrouwen, competentieverwachtingen en regievoering een groot deel van deze relatie verklaart.

In onze interventiestudie toonden we aan dat regievoering van deelnemers op de korte termijn verbeterde, en dat dit effect voor lager opgeleiden tenminste 6 maanden aanhield. Ook had de interventie een gunstig effect op de levenswaardering zowel op korte als op langere termijn. Deelnemers met een beter cognitief functioneren hadden minder depressieve gevoelens.
Op basis van bovenstaande bevindingen doen wij een aantal aanbevelingen voor het beleid van het werkveld van zorgprofessionals, zoals het ontwikkelen van scholingselementen die een empowerment-bevorderende attitude aanleren. Deze professionele attitude in het begeleiden van kwetsbare ouderen gaat uit van een gelijkwaardige interpersoonlijke relatie van waaruit oprechte belangstelling kan groeien. Ook kan een onderlinge modelfunctie en groepsgewijze probleemoplossing ontstaan. Het is belangrijk dat de zorgprofessional uitgaat van de mogelijkheden van de oudere en rekening houdt met diens lichamelijke en/of cognitieve beperkingen. Gaandeweg de relatie worden de ouderen gestimuleerd om zichzelf haalbare doelen te stellen, zich hierop te concentreren en bij het behalen ervan, succes te ervaren. Om professionals over voldoende middelen te laten beschikken om zich deze attitude aan te meten en empowerment te bevorderen, zijn bepaalde organisatorische voorwaarden nodig. Hierbij valt te denken aan kleinschalig en autonoom organiseren van een zorgaanbod dat wederzijdse interesse in levensverhaal en opvattingen stimuleert en de interpersoonlijke contacten intensifieert. Ook is ruimte voor ondernemerschap en bottom-up management nodig om de diverse individuele processen te faciliteren in het nastreven van een zorgomgeving die overeenkomt met de persoonlijke wensen van de oudere. Het lijkt belangrijk dat oudere mensen die geconfronteerd worden met voortdurende achteruitgang van hun gezondheid, vooral zorgprofessionals ontmoeten die overtuigd, serieus en actief proberen om hen te ‘empoweren’.

Als het er om gaat het programma zelf aan te bieden dan willen wij aanbevelen om een strikte doelgroep te definiëren en de cursus uit te breiden met herhalingsbijeenkomsten, zodat mensen het geleerde langer vasthouden.

Nader onderzoek is nodig om de betrouwbaarheid en validiteit van het PDF-concept in andere populaties en grotere datasets vast te stellen. De definitie is simpel, objectief en meetbaar en daarom is het makkelijker toe te passen dan sommige andere concepten van kwetsbaarheid die complexer, uitgebreider en subjectiever zijn. Ook het feit dat relevante anderen de meeste vragen kunnen beantwoorden of zelf kunnen stellen, maakt de toepasbaarheid eenvoudiger. Door deze eenvoud is het gebruik van het concept als quickscan bij het zoeken naar doelgroepen voor specifieke interventies of (preventief) zorgaanbod mogelijk.

Een wenselijke vervolgstap op ons onderzoek is te onderzoeken of een empowerment bevorderende attitude van zorgprofessionals inderdaad leidt tot een verhoging van de copingstijl en copinggedrag. Vervolgens dient bezien te worden of succesvolle veroudering voor kwetsbare ouderen dan ook mogelijk is wanneer deze ouderen geconfronteerd worden met voortdurende achteruitgang in functioneren.
General reference list


program for Bangladeshi patients with chronic disease. *British Journal of General Practice*, 55: 831-837


Jonker, A.G.C., Comijs, H.C., Knipscheer, C.P.M. & Deeg, D.J.H. Do frail older persons, benefit from the Chronic Disease Self-management Program (CDSMP) in short and longer term? (submitted)


characteristics affect the prevalence and nature of multimorbidity in the elderly. *Journal of Clinical Epidemiology*, June: 5.


Dankwoord

Vooral dankbaarheid past mij hier…
naar al degenen die onmisbaar bleken tijdens de boeiende en leerzame 7 jaren welke aan het schrijven van dit proefschrift vooraf gingen.

VU / EMGO+

Zonder promotiecommissie, geen promotie.
Kees (Knipscheer), jij reageerde in 2002 als eerste positief op mijn ‘ideetje’ om mogelijkheden te onderzoeken naar het verbeteren van de kwaliteit van leven van kwetsbare ouderen. Al snel benaderde je Dorly (Deeg) en gezamenlijk werden nut en noodzaak onderschreven van het voorgestelde onderwerp. Een gastvrijheidsverklaring van de VU volgde, met dank aan Dorly. Na overloos geploeter op het onderzoeksvoorstel voor de wetenschapscommissie, bleek zij, Hannie (Comijs), mijn reddende engel. En dat bleef je, ook binnen de promotiecommissie die jullie gedrieën vormden. Mijn ‘wetenschappelijke vorming’ vroeg van jullie de nodige (extra) inzet.

Vooral het schakelen tussen mijn functie als directeur bij Wilgaerden en 30 autominuten verderop die van ‘student’, heb ik als uitdaging ervaren: van eindverantwoordelijkheid naar eigen verantwoordelijkheid. Maar met het toenemen van de gelijkwaardigheid nam voor mij het algehele genoegen toe. Uiteindelijk heb ik gewoonweg genoten van het theoretische onderzoek, het stoeien met de LASA-data, nog veel meer artikelen analyseren voor de review, het geven van de GRIP-cursus en het rapporteren over deze eigen interventiestudie.

Praktische hulp en aanspraak die ik op prijs stelde, kwamen vanaf de afdeling van Fadime, Marleen, Jan en Geeske.

Leden van de leescommissie wil ik bedanken voor de aandacht die zij hebben besteed aan mijn proefschrift.

Wilgaerden

Diverse collega’s van het Centraal bureau, waaronder in het bijzonder mijn eigen afdeling Behandeling en Zorgadvisies en die van de locaties Avondlicht en Kersenboogerd toonden met regelmaat interesse in het project en vormden draagvlak voor de praktische implicaties van de resultaten.

Matthijs en Sjaak, ons samenwerken aan de Villa heb ik als heel boeiend ervaren en de Koepoortsweeg was ondertussen al helemaal ons ‘ding’ geworden. Zullen ze straks trotz zijn…?
Stichting JonkersZorg


Omring

Door de Raad van Bestuur benaderd. Mijn onderzoek, visie en onze praktijk sprak jullie aan. Fantastisch dat ik als ‘Projectleider visie kleinschalig wonen met dementiezorg’ op alle niveaus binnen de organisatie een bijdrage mag leveren aan het onder meer versterken van het regiegevoel van bewoners en medewerkers. Een uitdaging die ik met twee handen aangrijp!

Familie en vrienden

Ieder op zijn eigen manier heeft als (schoon-)familiedlid Jonker en Weel een rol gehad: door te informeren naar de voortgang, oppas te bieden en mijn opluchting te delen met hoopvolle berichten. Vrienden van vroeger en later, van Erik, van Bert, van mij en van ons: vooral de afleiding in de vorm van gezellig samen leuke dingen ondernemen met de gezinnen (Wil en Neline) of met elkaar (Marcel en Eline). Ik heb vooral steeds veel gevoeld maar er komen nu andere tijden.

Co en Marja, juist omdat onze relaties zo evolueerden door de jaren heen en we elkaar toch steeds meer genoeg te bieden blijven te hebben, stel ik het op erg prijs dat jullie, mij, als paranimfen, bijstaan tijdens de verdediging.

Mam en pap: het is allemaal gewaardeerd!

Hoofdrol


Mama is trots op wie jullie zijn en vol vertrouwen over wie jullie worden.

Lieb gezin...ik ben pas echt thuis. bij jullie.

De nieuwste uitdaging is, om van Mijn zelfgecreëerde hectiek naar ONZE gewenste harmonie te geraken.
Naar iedereen veel dank voor deze ervaring; wat een beleving!

Angèle
About the author

Angèle Jonker was born on September 13th, 1971. After finishing her pre-HBO education (HAVO) at Werenfridus in Hoorn, she started her study to become a hospital nurse at Medical Centre Alkmaar. She completed this in-service education in 1994, and worked at the hospital for some years, among others at the Clinical Geriatric ward. Meanwhile at HBO In-Holland she started her HEAO -management economy and law- education and earned her bachelor degree in 1998. Then she studied Social Gerontology at the Free University in Amsterdam. While studying, she worked for ten years in higher management at Woonzorggroep Wilgaerden (eldery care) in Hoorn. After completing her academic study, she started underlying research at the Institute for Research in Extramural Medicine (EMGO+) with a declaration of hospitality from the Vrije Universiteit. During this project she followed methodological and statistical courses in the Postgraduate Epidemiology Program of the EMGO and at the University of Utrecht.

She is currently actively participating at, and responsible for Stichting JonkersZorg, that exploits a specific small scale nursing home for vulnerable older persons at her own farm-like house in Hoogwoud (The Netherlands). Up until march 2010, she was working as a (project-) manager at the Care-advise and Treatment-department as well as ‘Care hotel Villa Wilgaerden’, both part of Woonzorggroep Wilgaerden, as a volunteer organizing for Alzheimercafé Medemblik, and as a member of the board of De Marke (elderly care) in Bergen (NH). Since April 2010 she has accepted a new job as a Project-leader ‘Vision on Psycho-Geriatric Care and Small Scale Living-arrangements’ at Westfriese zorggroep Omring.