Sowing in the autumn season

Exploring benefits of green care farms for dementia patients

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Abstract

In the Netherlands an increasing number of farms combine agricultural production with care services for people with care needs. It is generally believed that these green care farms (GCFs) have beneficial effects on the health status of a diversity of target groups. At present, empirical studies testing this hypothesis are scarce. The main objective of the studies described in this thesis was to gain insight into the potential benefits of day care at GCFs for community-dwelling older dementia patients. Day care at GCFs was therefore compared with day care at regular day care facilities (RDCFs). In view of the differences between both day care types regarding the day care setting and day care program it was hypothesized that they would differ in their effects on the health status of dementia patients. In two cross-sectional studies it was tested to what extent the day program of dementia patients at GCFs differed from those at RDCFs. It appeared that at GCFs, dementia patients were (physically) more active, participated in more diverse activities, were more outdoors, and had more opportunities to perform activities in smaller groups than those at RDCFs. It was tested whether these differences resulted into different effects for five domains of health: dietary intake, cognition, emotional well-being, behaviour, and functional performance. In a comparative cross-sectional study dietary intake of dementia patients attending day care at GCFs or RDCFs was recorded both at home and during their time at the day care facility. The study showed that dementia patients attending day care at GCFs had significantly higher intakes of energy, carbohydrate, and fluid than their counterparts attending day care at RDCFs. In a cohort study, rates of change during 1 year in cognitive functioning, emotional well-being, behavioural symptoms, and functional performance were compared between dementia patients attending day care at GCFs and RDCFs. Functioning in these domains remained rather stable and no differences were observed between subjects from GCFs and RDCFs. In the cohort study, also caregiver burden of family caregivers of these dementia patients was assessed. Caregivers' quality of life, emotional distress, and feelings of competence remained rather stable in family caregivers of dementia patients from both day care settings. In conclusion, the present work has shown that GCFs exceeded RDCFs in offering older dementia patients a diverse day program and in stimulating their dietary intake. The latter may result into a better preserved nutritional status in dementia patients attending day care at GCFs than in those attending day care at RDCFs. GCFs and RDCFs were equally effective in preventing significant decrease of cognitive functioning, emotional well-being, and functional performance and in preventing significant increase of the number of behavioural symptoms. Both day care types further prevented significant increase of caregiver burden. Day care at GCFs is a new and valuable addition to the present care modalities for community-dwelling older dementia patients and their caregivers.

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General introduction

1

SR de Bruin.

Introduction

This thesis focuses on green care farms for older dementia patients in the Netherlands. Green care farms (GCFs) are farms that combine agricultural production with care services for people with care needs. Main target groups of GCFs used to be mentally disabled people and psychiatric patients. Over the last years, however, GCFs offer services to an increasing number of other target groups, including (demented) older people, autistic children, people with burn-out, and long-term unemployed[1-3]. The number of GCFs has increased considerably over the last 10 years. In 1998 there were about 75 registered GCFs, whereas nowadays there are more than 900. About 10% of them offer services to older people with dementia[4]. Green care farming is not a typically Dutch phenomenon, it is also developing in other European countries including Norway, Italy, Austria, Slovenia, Switzerland, and Belgium and the United States of America[5].

One can look at green care farming from three angles of vision: the agricultural vision, the health care vision and the social vision. In the last decades, in each of these domains dynamic developments have taken place that have contributed to the considerable growth of GCFs in the Netherlands[6]. In the agricultural domain new activities and services have been increasingly exploited by farmers, so-called multifunctional farming activities, to generate additional sources of income. Provision of care services at farms ("green care farming") is one of these new initiatives, along with other examples such as recreation, home-selling, nature conservation, and education[7,8]. In the health care domain there has been a trend towards socialization and normalization of chronic care services[9,10]. Green care farming is an example of this by meeting the demand for de-institutionalization of chronic care services[10]. In the social domain there is a demand for reconnecting society and rural areas. Green care farming has given new social roles to farms and farmers and contributes to social inclusion of clients and thereby fulfils the demand for social reconnection[1,11]. Each angle of vision has its own questions for research. Studies on green care farming as a type of multifunctional agriculture concentrate on income generation and organisation of care services at the farm level. Studies on green care farming as a setting for the provision of health care services consider the potential health benefits of GCFs. Studies on green care farming as a means to reconnect society and the rural areas focus on social and societal benefits[6].

The present thesis looks at green care farming from the health care angle of vision. It is generally believed that GCFs have beneficial health effects for a diversity of target groups, and therefore have an added value over regular health care institutions. First, at GCFs people can work or spend their day in a non-institutional environment with access to outdoor areas (e.g. gardens, fields, open countryside) and animals. These environmental characteristics may positively influence health parameters such as emotional, physical and social well-being, behaviour, general health status and

appetite[12-19]. Second, GCFs offer a variety of activities (e.g. gardening, feeding animals, sweeping the yard, harvesting fruits and vegetables), according to the various needs and preferences of the different participants. People who work or spend their day at a GCF appreciate the freedom to choose an activity that they like. They further appreciate the possibility to do useful and meaningful work which is suggested to benefit their self-esteem, self-respect, feelings of responsibility, and emotional, physical and social well-being[2,20,21]. Third, with working or spending the day in a normal daily life environment, people remain part of society. They meet and cooperate with other people, which may give them a sense of belonging[2,14,21,22]. At present, hardly any empirical studies are available that test these hypotheses. Such research is of importance to establish the potential added value of this type of care innovation over the more regular care modalities. Interest in scientific evidence for the potential beneficial health effects of GCFs is growing among farmers, scientists, politicians, health care professionals, and potential clients. The focus of this thesis is on potential health benefits of GCFs for older people with dementia. GCFs offer a structured and meaningful day program for dementia patients who live in the community, and with that offer respite to their family caregivers. In the following sub-chapters the rationale for the focus on this target group is discussed.

Dementia

The Dutch society is rapidly ageing. Currently about 15% of the population is older than 65 years, and this percentage is predicted to reach 24% by 2050[23,24]. A disease syndrome typical for the old aged is dementia. Dementia is an incurable disease with substantial effects on cognitive, functional, behavioural, and psychological capacities[25,26]. There are many types of dementia of which Alzheimer's disease and vascular dementia are most common[27]. Over the next 50 years the number of dementia patients is predicted to increase worldwide from the current figure of circa 24 million to circa 81 million[28], and for the Netherlands from the current figure of circa 250,000 to circa 410,000[24]. The expected increase in the number of dementia patients has major social and economic consequences for society as a whole and for the health care system in particular[24,29,30]. The worldwide total direct costs of dementia care in 2005 were estimated at USD 210.3 billion, whereas the worldwide costs of informal care were estimated at USD 105.0 billion. The total yearly costs were in 2005 estimated at circa USD 15,000 per dementia patient[30].

Despite differences between dementia subtypes, and substantial individual variations in symptoms and duration, the process of dementia proceeds along broadly identifiable lines. Memory deficits and disturbances in other cognitive areas increase progressively. Cognitive decline is slow during the (very) early and (very) late stages of the disease and generally highest in the middle stage of the disease[25,26,31-34]. Longitudinal data show that also functional performance deteriorates

progressively. Functional performance is commonly determined by performance in basic activities of daily living (BADLs), such as feeding, toileting, ambulation, and dressing and in instrumental activities of daily living (IADLs), such as meal preparation, managing money, and grocery shopping. There is a difference in the deterioration in these two domains of functional performance. Disability in IADL performance develops often early in the dementia process, and progresses during the course of the disease whereas disability in BADL performance appears and progresses much later in dementia[25,26]. Behavioural and psychological problems, including depression, apathy, aggression, and delusions, show no regular progression during the course of the dementia process but, rather, are episodic and occur during all stages of the disease[25,35,36]. There are, however, indications that some symptoms may be more frequent and severe when there is greater cognitive dysfunction[35,37]. The prevalence of symptoms vary over the different types of dementia[25,26,35,36], and varies considerably among individuals during the course of the disease[36,38]. Traditionally, cognitive and functional decline were considered as the key features of dementia. Since the last two decades, however, interest in behavioural and psychological symptoms is growing and their clinical relevance and importance is acknowledged[36,39].

Health care services for dementia patients and their family caregivers

A wide range of caregivers is involved in the care process for dementia patients. Caregivers involved include professional caregivers, such as general practitioners, neurologists, psychologists, geriatricians, psychiatrists, and caregivers of memory clinics who are involved in diagnostics and treatment of dementia. Besides that, caregivers are involved in supporting dementia patients in their daily life[24]. More than 75% of dementia patients need daily or continuous support in activities of daily living such as self care and domestic chores[40]. Since the majority of dementia patients live in the community[41,42], most care is provided by informal caregivers such as spouses, children, and neighbours. Informal care is often supplemented by care from professional caregivers from e.g. home care organizations or long-term care institutions. The large majority of dementia patients will ultimately become entirely dependent on professional care. In those cases institutionalization will often be necessary[24,41,42].

The predicted growth in the number of dementia patients, the high costs of dementia for society, and changing preferences of (frail) older people and their family caregivers have urged the need to transform dementia care. First, there is now more attention for early detection and treatment of dementia. Timely intervention may delay progression of the disease, may reduce the effects of dementia related co-morbidities, and may facilitate involvement of the patient and his caregivers in planning medical, educational, and psychosocial interventions suited to their needs and

expectations[43]. Second, there is growing awareness of the importance of alignment and collaboration between caregivers in the dementia care process to guarantee quality and continuity of care. This has resulted into initiatives such as memory clinics, disease management programs, and appointment of case managers who monitor the entire care process for patients and their informal caregivers[24]. Third, there is growing awareness that chronic care should not only be medically and care oriented but should also be psychosocially oriented. This has resulted into more attention for maintenance and improvement of quality of life of dementia patients and the individual way they and their social network cope with the consequences of their illness[44]. Nowadays, in care interventions that are developed for dementia patients feelings, preferences, emotional needs and life habits of individual patients (tailor-made care) are more considered[10,45]. Further, the importance of the environment in which care is provided is more acknowledged. Care was traditionally provided in institutional environments. As a result of the current socialization of chronic care services, however, non-institutional elements such as nature, animals, day light, small-scale housing are increasingly applied[10,45,46]. Fourth, the crucial role of informal caregivers in the care process for dementia patients is more and more acknowledged. Their support may delay institutionalization of the dementia patient. However, it has been well established that day-to-day care for a relative with dementia is extremely demanding and stressful for family caregivers[39,47]. This may lead to depression and other mental health problems, physical morbidity, poor quality of life, and mortality[48-51]. Moreover, caregiver burden, in turn, is a major determinant of institutionalization of the dementia sufferers[52,53]. Prevention of overburdening is therefore of importance. There are several facilities available to (temporarily) ease the burden of the caregiving task and aiming to provide support and relief. These respite care services include in-home respite care, short-stay institutional respite care, special holiday arrangements, and adult day care[54,55].

Adult day care

In line with the above mentioned developments, adult day care has gained importance as a care modality for community-dwelling dementia patients and their family caregivers. Such adult day care facilities aim to realize a structured and meaningful day program for dementia patients. They additionally aim to offer respite to their family caregivers by providing support and relief by temporarily easing the burden of the caregiving task[56-58]. Most common is to organize adult day care at regular day care facilities (RDCFs). Such RDCFs are mostly housed in residential or nursing homes, and can either be socially or medically oriented. Socially oriented facilities mainly offer social and recreational activities and are mostly affiliated to a residential home. Medically oriented facilities additionally offer medical treatment, rehabilitation and/or personalized therapeutic programs and

are mostly affiliated to a nursing home[57-59]. The RDCFs referred to in the present thesis are socially oriented. In 2007, approximately 46,000 people in the Netherlands attended day care at either a socially or medically oriented day care facility[60]. As indicated in the introduction of this chapter, since the last decade a new day care modality has been developing for older dementia patients: day care at GCFs. As opposed to RDCFs, GCFs have a relatively home-like character. GCFs offer in addition to leisure and recreational activities, normal household, farm-related and outdoor activities[10]. GCFs often cooperate with regular health care institutions. In 2005, approximately 900 frail older people (including those with dementia) attended day care at a GCF. Services provided at RDCFs as well as at GCFs are currently financed by the Dutch national insurance system[1]. The so-called Exceptional Medical Expenses Act (AWBZ) up until now fully covers uninsurable chronic health care services such as home care, day care, and nursing home care[24].

Objective and outline of the thesis

Day care at GCFs is essentially different from day care at RDCFs. It is claimed that GCFs have an added value over RDCFs for several health outcomes of older people with dementia as an effect of the home-like and normal setting in which day care is provided, the access to outdoor areas and the availability of a large variety of meaningful activities. Scientific evidence for such claims is hardly available at present. The main objective of the research described in this thesis was therefore to gain insight into the potential benefits of day care at GCFs for older people with dementia. Effects of day care at GCFs were compared with effects of day care at RDCFs. The following research questions are addressed:

1. What are the differences between GCFs and RDCFs with regard to their interventions for dementia patients, and can differences in their health effects be expected on the basis of these differences? (Chapter 2)
2. What types of activities are offered and performed at GCFs and how do they compare with activities offered and performed at RDCFs? (Chapter 3)
3. Do GCFs and RDCFs differ with regard to their effects on dietary intake of community-dwelling older people with dementia? (Chapter 4)
4. Do GCFs and RDCFs differ with regard to their effects on cognitive functioning, emotional well-being, and behavioural symptoms of community-dwelling older people with dementia? (Chapter 5)
5. Do GCFs and RDCFs differ with regard to their effects on functional performance of community-dwelling older people with dementia? (Chapter 6)

6. What is the course of caregiver burden in family caregivers of dementia patients receiving day care at GCFs or at RDCFs? (Chapter 7)

A literature study, two cross-sectional studies, and a cohort study were performed to answer the research questions (Table 1).

Table 1. Overview of studies presented in this thesis.

Study	Outcome measures	Subjects	Chapter
Literature review	Integrative framework	-	2
Comparative cross-sectional study 1	Activities at day care facility	Day care groups at 2 GCFs and 2 RDCFs	3
Comparative cross-sectional study 2	Activities at day care facility	30 dementia patients of 10 GCFs and 25 dementia	3
	Dietary intake	patients[1] of 10 RDCFs	4
Cohort study	Cognitive functioning	47 dementia patients[2] of 15 GCFs and 41	5
	Emotional well-being	dementia patients[3] of 22 RDCFs	5
	Behavioural symptoms		5
	Functional performance		6
	Caregiver burden	46[4] family caregivers of dementia patients of 15 GCFs and 41 family caregivers of dementia patients of 22 RDCFs	7

Notes: 1. For Chapter 4 data of 2 subjects from the RDCF group were excluded as their data on dietary intake were incomplete; 2. Of these dementia patients, 12 also participated in cross-sectional study 2; 3. Of these dementia patients, 10 also participated in cross-sectional study 2; 4. For Chapter 7 data of 1 caregiver of a subject that attended day care at a GCF were excluded since this person was a professional caregiver rather than a family caregiver.

Chapter 2 gives an overview of the scientific literature on interventions in dementia care that are suggested to be beneficial for several health outcomes of dementia patients (e.g. cognitive functioning, behavioural symptoms, emotional well-being). GCFs and RDCFs are compared with regard to such interventions to be able to determine for which health outcomes differences in the effects of GCFs and RDCFs can be expected. The chapter concludes with an integrative framework summarizing most important differences in settings and interventions between GCFs and RDCFs. Chapter 3 describes the findings of two cross-sectional studies performed to determine the extent to which older people with dementia attending day care at a GCF participate in the activities and facilities available to them and how their activities compare with those attending day care at a RDCF. Chapter 4 presents the findings of a cross-sectional study comparing dietary intake of older people with dementia attending day care at GCFs or at RDCFs. Chapter 5 and 6 describe the findings of a cohort study comparing rates of change in cognitive functioning, emotional well-being, behavioural symptoms, and functional performance of older people with dementia attending day care at GCFs or at RDCFs. Chapter 7 focuses on caregiver burden of family caregivers of the dementia patients included in Chapters 5 and 6. Chapter 8 summarizes the most important findings of the studies

presented in this thesis and discusses their practical relevance. Also the studies' strengths and limitations are addressed. Further suggestions for future research are outlined.

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The concept of green care farms for demented older people: an integrative framework

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ABSTRACT | In the Netherlands community-dwelling demented older people can attend day care at regular day care facilities (RDCFs). Since approximately 2000, farms (so-called 'green care farms') also offer day care. The present study introduces the concept of green care farms for demented older people. We further provide an integrative framework for the expected health benefits of day care at green care farms (GCFs) for demented older people. We present an overview of evidence for dementia related interventions that correspond with the current developments in health care (i.e. environmental, activity-based and psychosocial interventions), and that are relevant for day care. We subsequently focus on the differences between day care at GCFs and RDCFs with regard to these interventions, and describe the integrative framework for the expected health benefits of GCFs for demented older people. We conclude that at GCFs interventions are naturally integrated in the environment. They are present simultaneously and continuously, which is more difficult to realize in RDCFs. We hypothesize that GCFs have more health benefits for demented older people than RDCFs.

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Introduction

The number of older people is increasing rapidly in The Netherlands. Currently about 15% of the Dutch population is older than 65 years and an increase to about 24% is expected by 2050[1]. Dementia is a disease syndrome of the old aged, and is becoming more prevalent in the near future. For the next 50 years a rise of the number of demented older people in the Netherlands is estimated from 250,000 to 410,000[2]. This trend is typical for the western part of the world.

According to the criteria in the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) dementia is characterized by 1) memory impairment (impaired ability to learn new information or to recall previously learned information); 2) one or more of the following cognitive disturbances: aphasia, apraxia, agnosia, disturbance in executive functioning; 3) the before mentioned deficits cause significant impairment in social or occupational functioning and represent a significant decline from a previous level of functioning; 4) the before mentioned deficits do not occur exclusively during the course of a delirium. There are many types of dementia, most common are Alzheimer's disease (about 70% of the cases) and vascular dementia (about 15% of the cases)[3]. Due to cognitive and functional decline, care dependency of demented older people increases progressively.

Cognitive symptoms are often accompanied by non-cognitive symptoms; the so-called behavioural problems[4]. Traditionally, cognitive symptoms in dementia had a more prominent place in diagnostic classification systems and clinical research than behavioural problems. Since the last 20 years interest in behavioural problems is growing and the clinical importance is acknowledged[5]. Behavioural problems occur during all stages of the dementia process and include a range of problems such as depression, apathy, aggression, hallucinations and restlessness. Behavioural problems cause considerable suffering for both patients and caregivers and decrease their quality of life[6,7]. They also reduce the functional level of the patient and thus aggravate disability. Several studies have demonstrated that behavioural problems, particularly apathy, are stronger predictors of caregiver distress than cognitive or functional decline[6,8]. Moreover, behavioural problems increase the likelihood of institutionalization[4,9].

However, the majority (65%) of dementia patients in the Netherlands lives in the community. Sixty percent of this group is daily or continuously care dependent. Areas of care dependency are particularly personal care (bathing, dressing and toileting), domestic tasks (cleaning and making the bed), eating and shopping[10]. Care is usually provided by informal caregivers (mainly spouses and children), and is often supplemented by care from formal caregivers from home care organizations. Community-dwelling demented older people in addition can attend adult ambulatory day care in either a residential home ('day care') or in a nursing home ('day care and treatment')[11]. The

objectives of day care are to provide day structure with a meaningful day program for frail (and/or demented) community-dwelling older people, to prevent social isolation, to unburden informal caregivers; all intended to delay or to prevent residential or nursing home admission.

Traditionally, care for demented older people had a strong medical and care orientation. Primary goal was treatment of reversible impairments. Regular day care therefore is originally strongly care-oriented. Gradually a transition is taking place from functional thinking to the subjective experiences of people with dementia and the individual way they cope with the consequences of their illness[12]. This trend is called socialization of care[13,14]. As dementia can not be cured yet, the emphasis is now on improving quality of life, with equal attention for care, living and welfare aspects. This transition has led to three important developments in health care:

- First to socialization and normalization of health care. Health care is gradually 'de-institutionalizing' and therefore environmental factors such as nature, day light and small-scale (sheltered) living are becoming more important[14,15].
- Second, there is a focus on lifestyle-related care and service: care should fit the feelings, preferences, emotional needs and life habits of individual patients, including those with dementia. This has also urged the need for tailor-made day activities[14,15].
- Third to a new psychosocial approach of demented older people in health care (e.g. emotion-oriented and cognition-oriented care). In this new approach the dementia patient as a person is central and is actively involved in the care he receives. There is interaction between the patient and the 'therapist' throughout the course of the intervention[16,17].

Following these developments new innovative activities have evolved in the Netherlands. One of these initiatives, in which the three developments are represented, is offering day care for (demented) older people at farms[14]. Day care at these 'green care farms (GCFs)' is growing since 2000. GCFs are farms where people with a health care demand can spend the day and where they can (voluntarily) contribute to agricultural production. GCFs formerly mainly focused on mentally disabled people. Gradually, however, GCFs have started to provide care to new target groups, including psychiatric patients, autistic children, (former) drug users and (demented) older people. Demented older people at GCFs in general do not contribute to agricultural production, although they are involved in a range of farm-related activities such as feeding (farm yard) animals, sweeping the yard or the stable and picking eggs. They can also participate in several (normal) domestic activities such as preparing dinner, gardening and dish washing. GCFs usually cooperate with or are part of a regular health care institution. Similar to regular day care facilities (RDCFs), GCFs provide day care to groups of approximately 5 to 15 older people per day. Currently there are more than 800 GCFs in the Netherlands. Of these farms about 20% is open for (demented) older people[18].

The first aim of the present study is to introduce the concept of GCFs for demented older people, and to compare this new type of day care with regular day care. The second aim is to provide an integrative framework for the expected health benefits of day care at GCFs for demented older people. In this paper we therefore present an overview of evidence for dementia related interventions that correspond with the current developments in health care (i.e. environmental, activity-based and psychosocial interventions), and that are also (potentially) relevant for day care for demented older people. We subsequently focus on the differences between day care at GCFs and RDCFs with regard to these interventions, and describe the integrative framework for the expected health benefits of GCFs for demented older people.

Methods

Literature searches were performed in Scopus[1]. We started to search for recent (systematic) literature reviews and meta-analyses, published since 2000 and focussing on environmental, activity-based and psychosocial interventions for people with dementia. In addition, we searched for recent intervention studies on these topics, published after the consulted literature reviews and meta-analyses but published before February 2008. We further used relevant reports and doctoral theses obtained via individual authors or research organizations.

Papers not written in English or Dutch were excluded. The key words used in the search included *(physical) environment, small-scale, sheltered living, (environmental) ambiance, indoor(s), outdoor(s), nature, gardens, horticulture, nature-based activities, animal assisted therapy, animal assisted intervention(s), animal assisted activities, pet therapy, physical exercise, physical activity, physical activities, (meaningful) activities, psychosocial approach, psychosocial interventions, emotion-oriented care, reminiscence (therapy), (multi-) sensory stimulation, snoezelen, validation (therapy), behavio(u)r-oriented care, behavio(u)r therapy, stimulation-oriented care, art therapy, recreational therapy, recreational activities, cognition-oriented care* or *reality orientation.* These keywords were combined with *dementia, demented (elderly), elderly* or *cognitive impairment*. This literature review was not intended to be a formal systematic literature review. In addition to the publications that we found with the above described keywords, we used the 'snowball effect' method by searching for relevant publications that were cited in the publications that we found initially. Results from our literature searches were input for the development of our integrative framework.

[1] Scopus is a substantive abstracts database or bibliography of over 14000 journal titles from 4,000 publishers providing access to over 25 million abstracts going back to 1966, and includes 100% Medline coverage.

Results

Environmental, activity-based and psychosocial interventions are extensively described in literature. Interventions in these three areas and the effect of these interventions on quality of life of people with dementia are more and more explored and discussed since the eighties and nineties of the last century. Our literature search yielded in total 21 relevant (systematic) literature reviews, 2 meta-analyses and 31 additional recent intervention studies.

This section is divided into three subsections, focusing either on environmental, activity-based or psychosocial interventions. Each subsection starts with an overview of relevant literature reviews followed by evidence from these reviews and recent intervention studies. The recent intervention studies are, like the literature reviews, described in separate tables. For each intervention study we report the target group, the number of participants, intervention, study design, study parameters and the results. Generally, only significant results are reported. At the end of each subsection we describe for each intervention its application at GCFs and at RDCFs.

Environmental interventions

The design of the physical environment is increasingly recognized as an important aid in the care of people with dementia. It is not only regarded as a therapeutic resource to promote well-being and functionality among people with dementia[19] or to prevent or reduce behavioural symptoms[20,21] but the environment can also be seen as 'prosthetic' by compensating for cognitive deficits[20]. As a result, new initiatives have evolved in the chronic health care sector. Smaller-scale/sheltered living, more privacy (and thus more space for an own living), attention for environmental ambiance (e.g. mealtime ambiance), incorporating more natural elements indoors and more possibilities to stay as well as being active outdoors are developments that have gathered force in chronic health care[15,22].

For day care for community-dwelling older people particularly interventions aiming to resemble normal household life and interventions aiming to incorporate natural elements (including plants, trees, animals, daylight) in daily life of demented older people, are relevant. Table 1 lists the literature reviews used.

Interventions resembling normal household life

The first small-scale living facility dates from 1985 and was established in Sweden. In the Netherlands the first facility dates from 1986, and in 2005 there were approximately 4500 places available for residents of small-scale living facilities. The expectation is that this number will be

Table 1. Overview of cited literature/review studies focusing on environmental interventions.

Authors	Intervention/ environment reviewed	Objective	Review period	Number of studies reviewed[1]
Day et al.[19]	Indoor physical environment	Reviewing literature focussing on empirical research on environmental design and dementia	1980 – not clear, probably 1999	70
Health Council of the Netherlands[2]	No specific intervention. Report about dementia and interventions in general	To shed light on dementia from various distinct points of view: biological, medical, psychological, social, ethical and legal	1995 – Sept 2001	Approx. 800
Schure et al.[23]	Small-scaled / sheltered living	Gaining insight into (evidence for) the effectiveness of small-scaled / sheltered living	No systematic literature review. Literature study preceding intervention study.	
Chalfont[24]	Nature (view, gardens, neighbourhood, horticulture)	Reviewing literature supporting connection to nature and showing why nature would benefit people with dementia.	No systematic literature review, period and number of studies reviewed not mentioned by authors.	
Bokkers[25]	Human-animal interactions	Reviewing literature to find effects of human-animal interactions in a workplace, health care and residential context	To 2006	No systematic literature review; not mentioned by author
Filan and Llewellyn-Jones[26]	Animal-assisted therapy	Reviewing literature to find evidence for the beneficial effects of animal-assisted therapy for people with dementia	1960-2005	13
Nimer and Lundahl[27]	Animal-assisted therapy	Providing a quantitative review on animal-assisted therapy	Not mentioned by authors	49
Chalfont[22]	Nature, nature-based activities (indoors and outdoors)	Reviewing literature with regard to design for nature in dementia care	No systematic literature review, period and number of studies reviewed not mentioned by author.	

Notes: 1. In this table we mention for each paper/report the total number of studies reviewed (i.e. meeting the inclusion criteria of the authors). This number may include papers not focusing on interventions aiming to resemble normal household life and interventions aiming to incorporate natural elements.

doubled by 2010[28]. In a small-scale living facility a small group of residents (5-8 persons) live, preferably, in a 'normal' house in a residential area[28]. Residents (often) have a private bed- and bathroom, a shared kitchen and living room, and a shared garden. The residents further have more autonomy with regard to activities such as getting up, going to bed and toileting, and participate in activities that concentrate on normal domestic life such as shopping, doing the laundry, taking care of plants, dish washing and preparing dinner[23].

It is expected that these facilities have a more positive effect on quality of life of demented older people than large-scale group living facilities such as nursing homes. Literature partly confirms this expectation (see also Table 2a), and shows for example that demented older people in small-scale group living facilities enjoy the environment more, have more activities to participate in, are more independent with regard to activities of daily living[28], are more satisfied, score higher on several quality of life aspects and report higher emotional well-being than demented older people living in traditional nursing homes[15]. Evidence for the effectiveness of small-scale group living for behavioural problems, cognitive and functional deterioration, however, is not conclusive[2,23,24].

Further to date no evidence is available that small-scale group living reduces psychotropic drugs use or prevents nursing home admission[2,23,24]. More studies are needed for insight into the longer-term effect and effectiveness of small-scale group living facilities, and for insight into who benefits most from living in such facilities[29].

GCFs have a normal and non-institutional character, and focus on the indoor as well as the outdoor environment (e.g. garden, orchard, yard). They further involve demented older people in a variety of domestic activities such as preparing dinner, dish washing and gardening. Hence, day care at GCFs resembles normal household life with regard to these aspects. At RDCFs these kind of interventions are less common

Nature-based interventions

Effects of nature on people with dementia have received attention only recently[30,31]. There is an overall agreement that nature (including healing gardens, restorative gardens, wandering parks) is of benefit to people with dementia and that environments can be built to support this benefit. Diaz Moore[32] applied the Attention Restoration Theory (ART) of Kaplan and Kaplan (1989) on demented older people to explain the beneficial effects of nature for this group. Kaplan and Kaplan (1989) developed the ART to explain the role of natural environments for enhancing mental functioning. Mental fatigue occurs as a result of intense and long use of cognitive capacity to focus or concentrate, which is referred to as 'directed attention'. According to the ART the overload of this capacity to maintain directed attention can have several harmful effects[33]. Capacities of executive function and attention are comprised early in the dementia process. Therefore it is assumed that the resources that people with dementia have for attention are exhausted easier than for those without such cognitive impairment. Thus attention restoration and maintenance by natural environments may play an important role in reducing some of the negative outcomes associated with stress in people experiencing dementia[32].

Literature further suggests that nature (e.g. the domestic garden) provides opportunities for daily routines and activities in and around the home. The outdoor environment is also supposed to reduce social isolation, to increase opportunities for activities of interest, to extend social contacts and to increase possibilities to reflect upon past experiences with regard to being outdoors[22,30].
Empirical research on the effect of nature on people with dementia is limited to date[30,34]. However, evidence for the beneficial effects for people with dementia is gradually increasing (see also Table 2b). Literature shows that nature has cognitive, social, psychological and physical benefits, and has positive effects on sleep, mood and behaviour (such as agitation and aggression) of people with

Table 2a. Recent intervention studies focusing on the indoor environment (small-scaled housing).

Author	Participants	Intervention	Measures	Outcome
Schure et al.[23]	75 psychogeriatric older people living in 3 small-scale living facilities (SSLF) 75 psychogeriatric older people living in a large scale nursing home	Pre-experimental (cross-sectional) design; comparison of 2 existing groups.	Well-being Apathy Affective behaviour Agitation Medication use Sleep-wake rhythm	Older people in SSLF, were sign. less: • Apathetic • Aggressive • Hours awake during the night • Hours resting during the day Older people in SSLF used sign. more sleep medication and anti-anxiety drugs
Depla and Te Boekhorst[28]	79 new residents of small-scale living facilities (SSLF) (intervention group) 132 new residents of large-scale nursing homes (LS-NH) (control group)	Quasi-experimental design (pre-test/post-test control group) design. Evaluation at admission and 6 months after admission.	Quality of life Activities of daily living (ADL) Social participation Behaviour Medication use Measures to restrict freedom Cognitive status	After 6 months, compared to residents of LS-NH, older people in SSLF: • Enjoyed the environment sign. more • Had sign. more 'activities' to participate in • Were sign. more ADL independent • Were sign. more socially engaged • Were sign. less measures to restrict freedom In both groups mood was sign. increased after 6 months. No sign. differences with regard to behavioural problems and use of psychotropic drugs
Kane et al.[15]	40 older people in small-scale living facility (SSLF) (intervention) 40 older people in traditional nursing home preparing to become a small-scale living facility (control1) 40 older people in traditional nursing homes (control2)	Quasi-experimental (pre-test/ post-test control group) design. Longitudinal study with evaluation before admission and after 6, 12 and 18 months for the intervention group. Random selection of present residents in both control groups, with evaluation at baseline, and after 6, 12 and 18 months.	Quality of life (QoL) Emotional well-being Self-reported health Functional status Satisfaction	Residents of SSLF: • Scored sign. higher on the QoL aspects privacy, dignity, meaningful activity, relationship, autonomy, food enjoyment, spiritual well-being, security and individuality than residents of control group 1 • Scored sign. higher on the QoL aspects privacy, dignity, autonomy and food enjoyment than residents in control group 2 • Reported sign. higher emotional well-being than control group 1 • Reported sign. higher satisfaction with residence than residents from control groups and were sign. more likely to recommend the facility to others • Sign. lower incidence of decline in late-loss ADL functioning than in both control groups

Table 2b. Recent intervention studies focusing on the outdoor environment (nature).

Author	Participants	Intervention	Measures	Outcome
Connell et al.[35]	Nursing home residents with dementia: 10 intervention 10 control	True experimental (pre-test/ post-test control group) design. Subjects were randomly assigned to 1 of the 2 groups. Evaluation at baseline and after the intervention. Intervention Daily structured outdoor (bright light exposure) activity program of 1 hour in groups of 4-6 persons immediately before lunch during 10 days (in existing outdoor space). Control Daily structured indoor activity program of 1 hour in groups of 4-6 persons immediately after lunch during 10 days (in an existing activity space).	Sleep disturbance (frequency of wakes; maximum sleep duration; total sleep minutes) Behavioural disturbance	• Sign. improvement in maximum sleep duration in intervention group • Sign. improvement in total sleep minutes in both groups • Sign. decline of verbal agitation in intervention group
Calkins et al.[34]	17 nursing home residents with dementia: 1 'intervention' condition 3 'control' conditions	Quasi-experimental (counter-balanced) design. Older people served as their own controls, and participated in each of the four conditions. Evaluation during each condition. Intervention Condition 1: 2 observation wks in summer, outside activity. 'Control' Condition 2: 1 observation wk in winter, no activity. Condition 3: 2 observations wks in winter, inside activity. Condition 4: 1 observation wk in summer, no activity.	Sleep Agitation	Compared with older people with low light exposure (≤3 minutes outdoors within a 24 hour period), older people with high light exposure (≥10 minutes outdoors within a 24 hour period) showed: • Sign. greater requests for attention of evening shift staff • Sign. increase in desire to get up and out of bed • Sign. improvement in sleep behaviour • Sign. decrease in the agitation behaviours: grabbing, requests for attention and strange noises • Sign. less alertness Outdoor activities sign. increased pleasure and anxiety

dementia[30,34-36]. Evidence is partly based on studies with small sample sizes, and results can be contradicting. Therefore more well-designed research is needed to support existing hypotheses and evidence[22,30,31].

Animal-assisted therapy (AAT) interventions

AAT-interventions are increasingly applied in health care. Therapeutic use of animals is suggested to increase well-being, to increase mental and physical functioning and to facilitate social interactions[27]. The use of an animal in therapy may be beneficial because animals seem to have a natural tendency to create bonds with people[27,36]. Research on the beneficial effects of AAT-interventions is growing since the nineties of the last century, but the quality of the studies and the research results varies considerably[25]. Evidence for the effectiveness of AAT-interventions for people with dementia is limited. There are indications that AAT-interventions have positive effects on well-being[27], mood[37], behaviour (such as aggression, apathy and agitation)[26,27,38,39], medical outcomes such as heart rate[27,28], social behaviour[26,39,40] and food intake[26] of (demented) older people (Table 2c).

Literature does not indicate under which conditions AAT-interventions are most beneficial. AAT interventions are often applied as a supplement to other interventions. Therefore the precise impact of AAT-interventions remains unclear[27]. Further the duration of the beneficial effects of AAT-interventions has not been explored. Also the relative benefits of 'resident' versus 'visiting' animals are unclear and are confounded by the positive effect of animal interaction on staff or caregivers[26]. Current evidence is mainly based on studies with a limited quality. More well-designed studies are necessary to be able to make recommendations about the optimal frequencies, duration and format of AAT-intervention sessions[27,28].

As a result of different outdoor areas (such as garden, yard, stable), presence of animals and outdoor activities (such as sweeping the yard, feeding animals, harvesting fruits and vegetables, walking) demented older people at GCFs have many opportunities to be connected to nature. Currently, at RDCFs application of interventions to connect demented older people to nature are generally less frequent and less widespread.

Table 2c. Recent intervention studies focusing on the outdoor environment (animals).

Author	Participants	Intervention	Measures	Outcome
Motomura et al.[38]	8 nursing home residents with dementia	Pre-experimental design, no control group. Dog therapy with 2 dogs for 1 hour over 4 consecutive days. Patients could communicate with and observe the dogs, and the dogs could interact with the older people. Evaluation before and after the therapy.	Apathy Irritability Depression Activities of daily living Cognitive functioning	• Sign. improvement of apathy state
Lutwack-Bloom et al.[37]	2 groups of residents of 2 nursing homes: 42 intervention 26 control	Quasi-experimental design (pre-test/post-test with control group). Groups were matched. Evaluation two weeks prior to beginning of visits and 2 weeks following the conclusion of visits (after 6 months). Intervention Visits of 2 volunteers who brought a dog. Visits were 15-20 minutes each, three times a week for 6 months. Control Visits of 2 volunteers without a dog. Visits were 15-20 minutes each, three times a week for 6 months.	Depression Mood	• Sign. increase in mood for intervention group
Sellers[39]	4 nursing home residents with dementia	Quasi-experimental (A-B-A-B) design. Each phase (A/B) was composed of 5 days, with a 2 day washout period between phases. During treatment phases (B), on 5 consecutive days individual 15 minute intervention with 1 dog and investigator. Intervention consisted of an opening song, discussion, one activity per session with dog and a closing song. Evaluations during each phase.	Social behaviour Agitated behaviour	Compared to baseline phases, during treatment phases: • Sign. less agitated behaviours • Sign. improved social behaviours
Kawamura et al.[41]	10 nursing home residents with dementia	Two hour visits of volunteers and 3 or 4 dogs twice a month during which each resident had about 30 minutes contact with the dogs. Evaluation 4 times within a 12 month period.	Psychological functioning Behavioural symptoms	• No significant improvements in overall scores over time

Activity-based interventions

Literature assumes that involvement in meaningful activities is beneficial for quality of life of demented older people[43,44]. It is important that there is a good match between the activities that are offered to a person with dementia (at e.g. day care facilities), and the abilities of that particular person. A good match is supposed to lead to more engagement of the people with dementia in the activities, to decrease of behavioural problems and to improvement of well-being[42-44]. Activities therefore have to be tailored continuously to the remaining strengths and abilities of the older people, taking into consideration their life history and their likes and dislikes[45]

Phinney et al.[46] showed with their study that through doing people with mild to moderate dementia find their lives meaningful. Activities are meaningful in three ways: through their involvement people experience feelings of pleasure and enjoyment, feel a sense of connection and belonging and retain a sense of autonomy and identity. Participants in the study were involved in a variety of everyday activities including leisure and recreational activities (e.g. handicrafts, puzzles, walking, making music), domestic activities (e.g. helping to prepare meals, dish washing, vacuuming, gardening), social activities/involvements (e.g. interactions with other people with dementia, visiting friends, going to church, calling family members) and work-related activities (although this was only mentioned by a few participants).

Studies to date mainly focus on recreational and art activities ('stimulation-oriented interventions') and on physical activities, which are all relevant for demented older people attending day care. Table 3 lists the literature reviews used.

Stimulation-oriented interventions

Stimulation-oriented interventions are examples of psychosocial interventions (discussed in the next section). As they, however, also belong to the category 'activity-based interventions', they are described in this section. Stimulation-oriented interventions include activities or recreational therapies (e.g. crafts, games, pets), and art therapies (e.g. music, dance, art). The aim of stimulation-oriented interventions is to provide stimulation and enrichment and thus mobilize the patient's available cognitive resources[47].

Health care professionals and researchers have put great value on the idea that activity can be beneficial to people with dementia[46]. However, until 2000 there was limited empirical support for this statement[2,46]. Since then more and more studies evaluating effects of recreational interventions have appeared[46]. Studies used to focus on (severely) demented older people in institutional settings[46,48], and show that recreational interventions in long-term care settings are effective in

Table 3. Overview of cited literature/review studies focussing on activity-based interventions.

Authors	Intervention reviewed[1]	Objective	Review period	Number of studies reviewed[2]
Fitzsimmons and Buettner[48]	Stimulation-oriented	No systematic literature review. Literature review preceding intervention study focussing on existing evidence for effectiveness of recreational therapy for behavioural problems of people with dementia.		
Gräsel et al. [49]	Stimulation-oriented	Evaluating the effectiveness of non-drug therapies for dementia	No systematic literature review, period and number of studies reviewed not mentioned by authors.	
Heyn et al.[50]	Physical exercise	Determine by meta-analysis whether physical exercises are beneficial for people with dementia and related cognitive impairments	January 1970 - October 2003	30
Verkaik et al.[51]	Stimulation-oriented	Evaluating the level of scientific evidence for the effectiveness of psychosocial interventions for reducing depressed, aggressive or apathetic behaviours in people with dementia	Not clear, probably up to February 2003	19
Livingston et al.[52]	Stimulation-oriented	Determining psychological approaches to the management of neuropsychiatric symptoms of dementia	Up to July 2003	162
Eggermont and Scherder[53]	Physical activity	Reviewing and evaluating the effects of planned physical activity programmes on mood, sleep and functional ability in people with dementia	From 1974 through October 2005	27
Kramer and Erickson[54]	Physical activity	Providing a review of human intervention literature examining the influence of fitness training on cognition, well-being, brain structure and brain function	From 2003	4 (of which 3 meta-analyses)
Jedrziewski et al.[55]	Physical activity	Reviewing literature to examine the effect of engagement in physical activity on improvement or maintenance of cognitive function	From 1999	21

Notes: 1. There are papers discussing interventions that do not belong to the group "stimulation-oriented interventions" or "physical activity interventions", these interventions are not included in this table; 2. In this table we mention for each paper the total number of studies reviewed (i.e. meeting the inclusion criteria of the authors). This number includes papers not focusing on "stimulation-oriented interventions" or "physical activity interventions".

maintaining functioning, in improving mood state and in preventing or reducing behavioural problems in dementia[48].

Gradually, the number of studies involving community-dwelling demented older people has increased (see also Table 4a), and focus more and more on individualized prescribed recreational interventions matching the individual skills, interests or so-called role identities of the older people[48,56-58]. Beneficial effects of recreational interventions vary from decreased behavioural problems (e.g. passivity, agitation, depression)[44,48,57,59-61] increased positive behaviour[44], improved

Table 4a. Recent intervention studies focusing on stimulation-oriented activities (recreational therapy).

Author	Participants	Intervention	Measures	Outcome
Fitzsimmons and Buettner[48]	30 community-dwelling demented older people	True-experimental (cross-over) design in which older people served as their own controls. Random assignment to intervention and delayed intervention group, which was called the control group. Evaluation in baseline period of 5 days before, at three times during and at the end of 2-week intervention. Intervention Individually prescribed therapeutic recreation 3 to 5 days a week for 1.5 hours per day for 2 weeks at home. Control Usual home care for 2 weeks, followed by individually prescribed therapeutic recreation 3 to 5 days a week for 1.5 hours per day for 2 weeks at home.	Behaviour	• Sign. decrease of passivity, agitation and clinging to caregiver after individually prescribed therapeutic recreation
Woodhead et al.[44]	94 adult day care participants with dementia	Pre-experimental design, no control group. Older people participated in different types of adult day care activities (engaging; social; physical; watching and listening) for 3 months. Evaluation at baseline, and 1, 2, and 3 months post-baseline.	Restless behaviour Mood behaviours Positive behaviours	• Sign. increase positive behaviour • Restless and mood behaviours were on average stable over 3 months, however individual rates of changes sign. varied around the group average rate of change • Individuals involved in more engaging activities showed sign. more decline in restless behaviour problems • Individuals attending more day care increased sign. in their restless and mood behaviours compared to individuals attending less day care
Kolanowski et al.[57]	33 nursing home residents	True-experimental (cross-over) design, in which older people served as their own controls. Random assignment to 1 of 6 possible order-of-condition presentations. Conditions were: 1. Activities matched to skill level only; 2. Activities matched to style of interest only; 3. Combination of the above conditions (need-driven dementia-comprised behaviour (NDB)); NDB-derived activities. Each condition lasted for up to 20 minutes per day for 12 consecutive days with a 2 day washout period between conditions. Evaluation at baseline and during each of the conditions.	Engagement (time on task and participation) Affect Behavioural symptoms Mood	• Sign. more time on task, greater participation, more positive affect and less passivity were found on NDB-derived and matched to interest compared to skill level only treatment or baseline • Agitation and negative affect improved under all treatments compared with baseline

Table 4a. Recent intervention studies focusing on stimulation-oriented activities (recreational therapy, *continued)*.

Author	Participants	Intervention	Measures	Outcome
Farina et al.[59]	Community-dwelling older people with mild to moderate Alzheimer's Disease: 67 intervention 31 control	Quasi-experimental (pre-test/post-test control group) design, with evaluation at the beginning, the end of training (6 weeks), 3 and 6 months follow-up. Intervention 15 training sessions of 3 hours, preceded by meal. Recreational occupational activities in groups of 4 persons, and psychotherapy for patients and caregivers for 6 weeks. Control Standard medical care.	Behavioural problems Depression Caregiver burden	For intervention group: • Sign. reduction disruptive behaviour and tendency to general reduction behavioural symptoms after 6 weeks • Sign. reduction caregiver reaction on behavioural disturbances after 6 weeks and persisting at 3 months follow-up
Graff et al.[58]	Community-dwelling patients with dementia: 68 intervention 67 control	True experimental (pre-test/post-test control group) design (single blind randomized controlled trial). Evaluation at baseline, after 6 and 12 weeks (follow-up). Intervention 10 one hour sessions over 5 weeks, focused on patients and caregivers (prioritizing meaningful activities; compensatory + environmental strategies). Control No occupational therapy.	Daily functioning	• Sign. improvement daily functioning in intervention group. Improvement was still sign. at follow-up at 3 months
Volicer et al.[60]	90 institutionalized veterans with dementia from 3 different day care settings. (Unclear how many veterans per setting)	Pre-experimental design, no control group. Older people participated in continuous activity program with responsibilities for activity staff and nursing assistants, in three different settings. Evaluation before introduction program and 3 months after program initiation, or evaluation before introduction program and monthly (for 7 months) evaluation after program initiation.	Number of hours involved in activities Agitation Use of psychotropic medications Nutrition Sleep disturbance	Setting 1 • Sign. decrease of use of psychotropic medications and behavioural symptoms; improved nutritional status, sign. less older people losing weight; sign. decrease of number of socially isolated older people Setting 2 (unclear if results are sign.) • Decrease in number of older people who spent less than 1/3 of their waking hours in activities; decrease in use of anti-anxiety/hypnotic medications Setting 3 • Sign. less administration of psychoactive medication; sign. fewer days with observed agitation; sign. less sleep disturbance

Table 4a. Recent intervention studies focusing on stimulation-oriented activities (recreational therapy, *continued)*.

Author	Participants	Intervention	Measures	Outcome
Rusted et al.[62]	45 demented older people attending day care or residential facility. Older people were randomly assigned to 4 intervention and 4 control groups. In total 3 groups of 5 older people and 5 groups of 6 older people.	True experimental (pre-test/post-test control group) design (multi-centre randomized controlled trial). Evaluation at baseline, and 10, 20, 40 while working within the group and 44 and 56 weeks after start group work (as follow-up). Intervention One hour art therapy per week, for 40 weeks in groups of max 6 persons. Control One hour recreational activity therapy per wk, for 40 wks in groups of max 6 persons.	Cognition Depression Behaviour Sociability Well-being Mood Mental acuity Physical involvement Calmness Sociability Cooperative and anti-social behaviour	• Sign. increased depression and anxious/depressed mood for intervention group at the end of 40 weeks therapy. • Sign. positive effects on mental acuity, physical involvement, calmness and sociability in intervention group over 40 weeks within sessions, This was also found in control group, but improvements were limited to 15/20 weeks attendance and sign. changed negatively.
Cohen-Mansfield et al.[63]	Older people with dementia participating in day care or living in a nursing home: 60 intervention 45 control	True experimental (pre-test/post-test control group) design. Evaluation at baseline, during the intervention and at the end of intervention period. Intervention Individual personal intervention (related to role identity; cognitive, physical and sensory abilities; demographics; sense of purpose) to engage in interactions related to their role identities (family-social role; professional role; leisure time and hobbies; achievements and traits) for 5 days for 30 minutes. Control Regular activities in the facility.	Self-identity awareness Affect (interest and pleasure) Involvement in activities Agitated behaviours Well-being Cognitive functioning	Compared with control group older people in the intervention group showed: • Sign. greater interest, pleasure, involvement in activities • Sign. decreased disorientation • Sign. reduction agitated behaviour • Sign. increase in awareness of their identity
Brooker et al.[61]	115 demented nursing home residents	Pre-experimental design, no control group. Multi-level intervention, focussing on management, staff and individual demented older people. We here only focus on the full enriching opportunities programme. Evaluation at baseline, twice during intervention, and at follow-up 7-14 months later.	(Physical) well-being Diversity of activity Health Quality of life Depression and anxiety Use of psychotropic drugs	• Sign. increase in observed well-being and in diversity of activity following the intervention • Sign. decrease levels of depression

well-being and mood[61,62], improved daily functioning[58], decreased disorientation, greater interest, involvement and pleasure in activities[57,61-63],decreased medication use, increased nutritional status and less social isolation[61]. Although current studies show promising results, both Fitzsimmons and Buettner[48] and Vernooij-Dassen[64] recommend more well-designed studies to examine the most efficient way to prescribe specific recreational interventions and at what stage and for which other aspects of quality of life they are most effective.

Art therapy is supposed to result into reduction of isolation and into an increase in feelings of identity and self-confidence. Attending art therapy sessions, however, is not possible for all dementia patients as a result of apraxis, attention and concentration problems and problems with recognizing objects[49]. Empirical support for art therapy was limited until recently. Until 2006 no reported longitudinal controlled studies on the (long-term) value of group participation in art therapy for people with dementia were available[50,53,63]. In general, available evidence for the beneficial effects of art therapy sessions is based on studies including only a limited number of subjects[49], though a recent study (see Rusted et al.[62] in Table 4b) included a larger number of subjects. Current evidence shows that art therapy sessions improve well-being during the sessions[65], lead to positive changes in responsiveness[62], and increase depression after ending the sessions as a sign that participating in the sessions led to engagement of participants with the group[62]. There are also studies revealing no significant changes in depression after attending art sessions[51].

Though stimulation-oriented activities such as recreational and art activities are offered at GCFs, the emphasis is on domestic and work-related (outdoor) activities. At RDCFs the emphasis is on stimulation-oriented activities. Domestic and work-related (outdoor) activities are less regularly offered.

Table 4b. Recent intervention studies focusing on stimulation-oriented activities (art therapy).

Authors	Participants	Intervention	Measures	Outcome
Kinney and Rentz[65]	12 demented older people attending day care.	Pre-experimental design, no control group. Older people were observed during participation in art therapy sessions and during participation in more traditional adult day centre activities.	Well-being	Sign. effects on 4 out of 7 domains of well-being: sign. more interest, sustained attention, pleasure, self-esteem and normalcy when attending art therapy session than during other activities.
Rusted et al.[62]	See Table 4a.	See Table 4a.	See Table 4a.	See Table 4a.

Physical activity interventions

Physical exercise is usually promoted for weight loss and for the prevention or the reduction of cardiovascular diseases. Growing evidence shows, however, that regular physical activity also helps people to preserve their mental ability during aging and may even offer a protection against dementia[54,66]. Literature shows that physical activity improves further various aspects of quality of life during the dementia process. Studies evaluating the effect of physical activities consider community-dwelling as well as institutionalized demented older people. Physical activities under study vary. Activities include aerobics, cardio fitness, strength training, balance and flexibility training and walking.

Current evidence shows (see also Table 4c) that physical activity leads to increased fitness, strength, mobility endurance and physical function[50,53,67,68]. Further, there are indications that physical activity leads to improved cognitive functioning[51,68,69], to better night time sleep[53], to better mood or less depressive symptoms[54,68] and to positive behaviour[50]. Evidence, however, is sometimes inconsistent.

Recommendations for type, frequency, duration and intensity of physical activity to achieve enhancement or improvement of quality of life of demented older people are insufficiently available[55,69]. Therefore more well-designed studies (bigger sample sizes, adequate comparison groups, blinding procedures) are required to strengthen current evidence[50]. Also the longer-term effectiveness of physical exercise, the interaction between activity level/fitness dose and cognitive maintenance, dementia delay or dementia prevention and/or onset of behavioural problems in demented older people require further study.

To date there are some directions to obtain positive effects of physical activity. Walking is in several studies identified as being beneficial[53,55]. Physical activity sessions lasting less than 30 minutes are not effective for cognitive function[70]. Physical activities should be offered frequently during the week, irrespective of the duration to achieve a positive impact on sleep. Care home residents need a long-term physical activity program with extensive sessions to get a positive impact on their activities of daily living[53].

Older people at GCFs are physically active by participating in different activities, such as getting vegetables from the garden, sweeping the yard and walking to the stable. Specific physical activity interventions as offered sometimes at RDCFs (e.g. gymnastics) are not common at GCFs.

Table 4c. Recent intervention studies focusing on physical activities.

Author	Participants	Intervention	Measures	Outcome
De Carvalho Bastone and Filho[68]	Nursing home residents: 20 intervention 20 control	Quasi-experimental (pre-test/post-test control group) design. Evaluation at baseline and after 6 months. Intervention 1 hour session, twice a week for 6 months: mobility and strengthening exercises. Group activities with emphasis on social interaction and enjoyment. Control Continuation nursing home routine, without participating in any physical activity.	Functional performance Isometric strength of the knee extensors Proprioception of lower limbs Cognitive decline Depression	Intervention group showed: • Sign. improvement quantitative and qualitative obstacle course, lower limb function, gait velocity and knee extensors strength • Sign. reduction depressive symptoms Control group showed: • Sign. decrease qualitative obstacle course, lower limb function, gait velocity • Sign. increase depressive symptoms • Sign. decrease cognitive functioning
Arkin[69]	Community-dwelling AD patients: 24 intervention 245 control	Pre-experimental design. Although there was a control group, these controls were drawn from a sample that were similar to older people in intervention group. Older people participated either 1, 2, 3 or 4 years (being resp. 2-3; 4-5; 6-7 or 8 semesters). Evaluation before intervention and after completion of semesters 2, 4, 6 and 8. Intervention 20 physical fitness workouts (aerobics, stretching, balance, strengthening) per semester (2 per week for 10 weeks). One session per week enriched by a series of 8 to 10 language and memory stimulation activities. The other 10 workouts, 1 each week, supervised by caregivers. In addition 10 weekly student-supervised community activity sessions (volunteer work alternating with recreational/cultural activity).→ 40 fitness and 20 community sessions per year. Control Untreated patients drawn from sample who most closely matched the 24 older people in intervention group.	Cognitive functioning Communication Global functioning Physical fitness	• Sign. decline in mental status for all cohorts, except for 4-year completers. Decline after 1st year was in intervention group less than that in control sample. • Maintenance of function occurred with cohorts that completed 2 or more years of participation • Cohorts completing 4 semesters or longer showed no sign. between-year changes after their 1st year on global functioning and on several cognitive and language measures • Sign. gains on 6-minute walk, duration of aerobic exercise per session, and upper and lower body strength in intervention group

Psychosocial interventions

Over the last few decades various psychosocial interventions have been developed in the care for dementia patients. These interventions differ in philosophy, focus and methods but have broadly overlapping goals of improving quality of life and maximizing daily functioning in the context of existing deficits. Additional goals are the improvement of cognitive skills, mood and behaviour[47]. The American Psychiatric Association[47] distinguishes the psychosocial interventions into four categories: emotion-oriented approaches, behaviour-oriented approaches, cognition-oriented approaches and stimulation-oriented approaches. Stimulation-oriented interventions have been discussed in the section before. In this section interventions applied in day care for demented older people (i.e. emotion-oriented and cognition-oriented interventions) are described in more detail than the ones only applied for institutionalized demented older people (i.e. behaviour-oriented interventions). Table 5 lists the literature reviews used for this section.

Emotion-oriented interventions

Emotion-oriented interventions aim to improve emotional and social functioning, and ultimately quality of life of people with dementia by assisting them in coping with the cognitive, emotional and social consequences of their disease, and by linking up with the individual functional abilities and the subjective perceptions of the individual[72]. Examples are validation therapy, reminiscence therapy and multi-sensory stimulation[47]. Validation therapy involves the use of various verbal and non-verbal methods of communication attuned to the patient's current stage of dementia. The therapist joins the patient in exploring his perceptions and confirming these regardless of their realism. The aim is to make the patient feel understood and accepted[12]. Reminiscence therapy is aimed to beneficially effect the patient's intrapersonal and interpersonal functioning by allowing him to relive memories, order them in some sort of structure, integrate them and discuss them with others. Multi-sensory stimulation aims to maintain or to improve contact with demented people and to improve their well-being by positive stimulation of their senses by using light, odours, sound, tastes and tangible materials[51].

Emotion-oriented interventions are developed as a reaction to the traditional, and more medical and care-oriented approach of dementia patients. The number of studies evaluating the effectiveness of these interventions has increased since the nineties of the former century (Table 6). The quality of these earlier studies, however, is divergent, and scientific evidence for the beneficial effects (e.g. for decreasing behavioural problems, depression, apathy and for increasing well-being) from these studies is limited[51,71,72]. Further, these studies mainly focus on institutionalized demented older people.

Table 5. Overview of cited literature/review studies focussing on psychosocial interventions.

Authors	Intervention[1]	Objective	Review period	Number of studies reviewed[2]
Finnema et al.[71]	Emotion-oriented	Presenting an overview of evidence for emotion-oriented interventions for people with dementia	1990 to 1999	Not mentioned by authors
Schrijnemaekers et al.[73]	Emotion-oriented	Evaluating the effectiveness of validation	1966 to 2002	16
Scott and Clare[74]	Emotion-oriented Cognition-oriented	Evaluating the effectiveness of group psychological interventions for people with dementia	No systematic literature review, period and number of studies reviewed not mentioned by authors.	
Gräsel et al.[49]	Emotion-oriented Behaviour-oriented Cognition-oriented Stimulation-oriented	Evaluating the effectiveness of non-drug therapies for dementia	No systematic literature review, period and number of studies reviewed not mentioned by authors.	
Bates et al.[17]	Emotion-oriented Cognition-oriented	Investigating the effectiveness of psychosocial interventions for people with milder dementia	Not mentioned by authors	4
Douglas et al. [75]	Emotion-oriented Behaviour-oriented Cognition-oriented Stimulation-oriented	Examining current effectiveness of current non-pharmacological approaches	No systematic literature review, period and number of studies reviewed not mentioned by authors.	
Verkaik et al.[51]	Emotion-oriented Behaviour-oriented Cognition-oriented Stimulation-oriented	Evaluating the level of scientific evidence for the effectiveness of psychosocial interventions for reducing depressed, aggressive or apathetic behaviours in people with dementia	Not clear, probably up to February 2003	19
Livingston et al. [52]	Emotion-oriented Behaviour-oriented Cognition-oriented Stimulation-oriented	Determining psychological approaches to the management of neuropsychiatric symptoms of dementia	Up to July 2003	162
Boote et al.[76]	Emotion-oriented Cognition-oriented	Investigating the effectiveness of psychosocial interventions for people with moderate to severe dementia	1969 to March 2004	6
Logsdon et al.[77]	Behaviour-oriented	Identifying psychological treatments for behavioural problems in dementia and evaluating the level of evidence of these treatments	Studies published before January 2006	14

Notes: 1. Interventions described in the papers mentioned in this table that do not belong to the group "psychosocial interventions" as classified by the APA (1997) are not included in this table; 2. In this table we mention for each paper the total number of studies reviewed (i.e. meeting the inclusion criteria of the authors). This number includes papers not focusing on psychosocial interventions.

Since 2000 the number of well-designed comparative studies focussing on the effectiveness of emotion-oriented interventions in dementia care is growing (see also Table 6). Emotion-oriented interventions result particularly in a (short-term) decrease of behavioural problems[72,78-82]. Positive effects were also found on mood[78,79], well-being[79], on adaptive behaviour[72,79,83] and on cognitive functioning and activities of daily living[80]. There are also studies that have not found beneficial effects of emotion-oriented interventions[81]. Evidence for the longer-term effectiveness of emotion-oriented interventions remains contradicting and modest. Literature further indicates the

Table 6. Recent intervention studies focusing on psychosocial interventions (emotion-oriented).

Author	Participants	Intervention	Measures	Outcome
Deponte and Missan[80]	30 nursing home residents with dementia: 10 intervention, group 1 10 intervention, group 2 10 control	True experimental (pre-test/post-test control group) design. Participants were divided in 3 groups, matched for age and functional state. Groups were randomly assigned to 1 condition. Evaluation at baseline and after 3 months. Intervention 1: 3 months validation therapy (VT) 2x/week, 45-60min per session; Intervention 2: 3 months sensorial reminiscence (SR) 2x/week, 45-60 min per session; Control: No treatment.	Cognitive functioning Activities of daily living Behavioural symptoms	• No sign. differences between groups after 3 months • Cognitive functioning and activities of daily living raised sign. for SR group • Behavioural symptoms decreased sign. for SR and VT group • Control group showed general decline, of which decline of activities of daily living was sign.
Tondi et al.[82]	60 nursing home residents with dementia: 31 intervention 29 control	Quasi-experimental (pre-test/post-test control group) design. Subjects were matched for age, sex, cognitive impairment, behavioural problems and activities of daily living. Evaluation before start and within 1 week after the end of intervention. Intervention: Usual nursing home care and individual (at least 20 min 3x/week) and group validation (45-50 min 1x/week) during 4 months; Control: Usual nursing home care.	Behavioural problems Activities of daily living	(Results were not tested for significance) • Decrease of behavioural symptoms, particularly agitation, apathy, irritability and night time behaviours for intervention group vs. a rise in the control group • Decrease of caregiver distress in intervention group vs. rise in control group
Deponte and Missan[80]	See validation	See validation.	See validation	• See validation
Ito et al.[81]	60 nursing home residents with vascular dementia: 20 intervention, group 1 20 intervention, group 2 20 control	True experimental (pre-test/post-test control group) design (randomized controlled trial). Evaluation at baseline and after 3 months. Intervention 1: Conventional care with 3 months 1 hour session/week group reminiscence (GR) and reality orientation (RO); Intervention 2: Conventional care with 3 months 1 hour session/week group reality orientation (RO) and conversation; Control: Supportive care .	Cognitive functioning Behavioural problems	• No sign. improvement of cognitive functioning and behavioural problems in intervention groups

Table 6. Recent intervention studies focusing on psychosocial interventions (emotion-oriented, *continued*).

Author	Participants	Intervention	Measures	Outcome
Yamagami et al.[84]	*Paper on reminiscence; paper could not be retrieved via library and authors.*			
Cornell[85]	*Paper on multi sensory stimulation; paper could not be retrieved via library and authors.*			
Baillon et al.[78]	25 demented older people	True experimental (cross-over) design. Random assignment to one of the 2 interventions. Older people served as their own controls. Evaluation before, during and after the sessions. Intervention 1: 3 individual 40 min snoezel sessions over 2 weeks, 'wash-out' week, 3 individual 40 min reminiscence sessions over 2 weeks; Intervention 2: 3 individual 40 min reminiscence sessions over 2 weeks, 'wash-out' week, 3 individual 40 min snoezel sessions over 2 weeks.	Mood Behaviour Agitation	• Both interventions have short-term positive effect on mood and behaviour, although considerable variation over subjects. • No sign. differences between snoezelen and reminiscence with regard to agitation, heart rate and behaviour
Cox et al.[86]	24 demented older people living in a nursing home	True-experimental (cross-over) design, in which older people participated in each of the 3 interventions. Per person 9 16-minute observations. Intervention 1: Snoezelen room for 3 individual 16-minute sessions (1 session per day): Intervention 2 Landscaped garden for 3 individual 16-minute sessions (1 session per day); Intervention 3: Normal living room activity for 3 individual 16-minute sessions (1 session per day).	Well-being (pleasure, anger, anxiety, sadness, interest, contentment)	• Sign. more 'sadness' in living room environment compared to snoezelen room and landscaped garden (although mentioned by a small number of subjects) • Sign. more pleasure in snoezelen room, landscaped garden and normal living room during intervention compared to before carer approached • Sign. less contentment in snoezelen room, landscaped garden and normal living room during intervention compared to before carer approached • Sign. more fear/anxiety in normal living room before carer approached • Sign. more sadness in snoezelen room before carer approached • No sign. differences between 3 interventions

Table 6. Recent intervention studies focusing on psychosocial interventions (emotion-oriented, *continued*).

Author	Participants	Intervention	Measures	Outcome
Van Weert al.[79]	129 demented nursing home residents: 65 intervention 64 control	Quasi-experimental (pre-test/post-test control group) design. Evaluation at baseline and after 18 months. Intervention Snoezelen integrated into activities of daily living for individual older people (implementation period 18 months). Control Usual care.	Behaviour Mood	• Sign. decrease in apathetic behaviour, loss of decorum, rebellious and aggressive behaviour and depression in intervention group • Sign. more improvements in intervention group with respect to these items than in control group • Sign. increase of well-being and adaptive behaviour in intervention group
De Lange[83]	61 nursing home residents with dementia: 33 intervention 28 control	Quasi-experimental (pre-test/post-test control group) design, with matched groups. Evaluation at baseline, after 4 and after 7 months. Intervention Usual nursing home care with 2x/week integrated emotion-oriented care. Control Usual nursing home care.	Adaptation and coping behaviour	• Intervention group performed sign. better on adaptive task 'maintaining emotional balance' and improved sign. on 'developing an adequate relationship with nursing assistants'
Finnema et al.[72]	194 nursing home residents with dementia: 100 intervention 94 control	True experimental (pre-test/post-test control group) design (multi-site randomized clinical trial with matched groups). Evaluation at baseline and after 7 months. Intervention Integrated emotion-oriented care in combination with usual nursing home care. Control Usual nursing home care.	Emotional and behavioural adaptation to illness and institutionalization	• Sign. positive effect on emotional balance (less anxiety) and self-image (less dissatisfaction) in mild to moderately demented older people in intervention group compared to control group • No sign. effect on cognitive and social adaptation • No sign. effects for severely demented older people

importance of tailor-made interventions and stresses the importance of obtaining evidence for who benefits most from these emotion-oriented interventions (which stages of dementia, what kind of older people)[52,53].

Behaviour-oriented interventions

Behaviour-oriented interventions aim to change the patient's behaviour (-al problems) with the aid of techniques based on the basic learning theory. Stimuli of which it is well-known (or suspected) that they are strongly desired by the older individual, are used as rewards in order to stimulate the desired behaviour (positive reinforcement). These stimuli can be of a social or material nature (conversation, attention, compliment, drink), but they can also involve specific activities such as walking outside or listening to music[12]. The most well-known example of behaviour-oriented care is behavioural therapy. As with emotion-oriented interventions, behavioural therapy fits in the concept of patient-centred care. The number of studies assessing the effect of behavioural therapy and the number of subjects included in the studies is still limited. According to literature, however, it appears that studies that are available show positive effects on depression and behavioural problems. More studies are needed for insight into the generalizibility and effectiveness of behaviour-oriented interventions across different settings and dementia patients[77].

As behaviour therapy is generally not applied in day care facilities for community-dwelling demented older people behaviour-oriented approaches are not discussed in more detail in this paper.

Cognition-oriented interventions

Cognition-oriented interventions aim to activate (or re-activate) cognitive functions through the use of memory training. The aim is to retain the link with reality for as long as possible[87]. Most well-known example is reality orientation. Reality orientation aims to help people with memory loss and disorientation by reminding them of facts about themselves and their environments. It can be used both with individuals and with groups[75]. From the late seventies / early eighties of the last century reality orientation has increasingly been applied and studied. Till the nineties, evidence for the effectiveness of reality orientation remained limited, particularly for the long-term effectiveness after the intervention[12]. Recent literature reviews show that reality orientation is an effective intervention in improving cognitive ability as measured by, among others, the MMSE[17,75,77], memory, orientation and orientation-related behaviour[49]. However, the most recent intervention study does not confirm these earlier findings[81] (see also Table 6, Ito et al.[81]). Evidence for other aspects, such as behavioural problems, well-being, functional performance and communication remains

limited[17,52,82]. It is still unclear if and for how long positive effects of reality orientation persist after the intervention has ended[49,52,76]. There are also studies showing the negative effects of reality orientation for demented older people, by reminding them of their deterioration[75]. Therefore reality orientation interventions should be tailor-made and more insight is needed into who benefits most from reality orientation[74].

GCFs, as opposed to RDCFs, do not offer specifically organized and well-structured emotion- and cognition-oriented interventions. Day care at a GCF is a kind of 'real life experience' that can evoke memories, stimulate the senses and help to retain the link with reality.

Discussion

This study presents current evidence for dementia related interventions that correspond with current developments in health care (i.e. environmental, activity-based and psychosocial interventions), and that are also relevant for day care for demented older people. The present study shows in the first place that a less care-oriented environment (i.e. small-scaled; more privacy; incorporation of natural elements, more exposure to daylight) seems to have positive effects on people with dementia, such as increased activities of daily living, higher satisfaction[28], improved well-being[15,28], and decreased behavioural problems[26,27,30,34,35]. The studies reviewed also show that (tailor-made) stimulation-oriented activities may have positive effects for demented older people such as decreased behavioural problems (such as apathy, aggression, depression)[47,49,58], increased well-being, better mood[62,63], improved daily functioning[58] and increased interest and involvement[58,63,64]. Physical activity also seems to have positive effects such as increased physical functioning[54,68,69], better mood, decreased depression [54,68], decreased behavioural problems and to a lower rate of cognitive decline[51,69]. Finally this study shows that there are indications that a psychosocial approach rather than a merely care-oriented approach of demented older people has positive effects on several aspects of quality of life including well-being[79], behaviour[72,80,81], depression[78,79] and cognitive functioning[50,77,81]. However, the studies reviewed sometimes show conflicting evidence and therefore more research is needed to be able to determine who benefits most from which interventions and to be able to determine the long-term efficacy and effectiveness of these interventions. The literature studied for this paper does not only focus on demented older people, but also on people with dementia in general. Further the majority of the literature (except for studies on stimulation-oriented interventions) included institutionalized people with dementia and not community-dwelling older people. It is unclear whether the interventions are beneficial for people with dementia in general or that these interventions are only beneficial for patients with

certain types or stages of dementia. As current evidence is insufficient in this respect, in our integrative framework we do not distinguish between different types and stages of dementia.

Towards an integrative framework for the beneficial effects of GCFs

The described interventions are all implemented at either GCFs or at RDCFs for demented older people. In this section we discuss the differences with respect to these interventions between RDCFs and GCFs. Most pronounced difference between GCFs and RDCFs is the type of environment in which the older people spend the day. RDCFs traditionally have a strong care orientation, related to the (residential home) environment in which they are incorporated. They are in general not home-like and small-scaled, and mainly focus on the indoor environment. We consider the institutional environment as a less stimulating and as a less activating environment for demented older people than the GCF environment. Interventions are therefore necessary to maintain or to improve quality of life of demented older people. These interventions are in general not continuously present in the environment and therefore need to be introduced. Interventions vary from psychosocial interventions (e.g. reality orientation (ROT), multi-sensory stimulation (MSS) or reminiscence) to interventions for physical activities (e.g. gymnastics), stimulation-oriented interventions (e.g. painting, playing games, singing), interventions for connection with nature (e.g. indoor horticulture activities such as flower arranging) and animal-assisted therapy interventions. Very often these interventions are not introduced simultaneously, but are offered one at a time. The institutional environment is pictured in Figure 1.

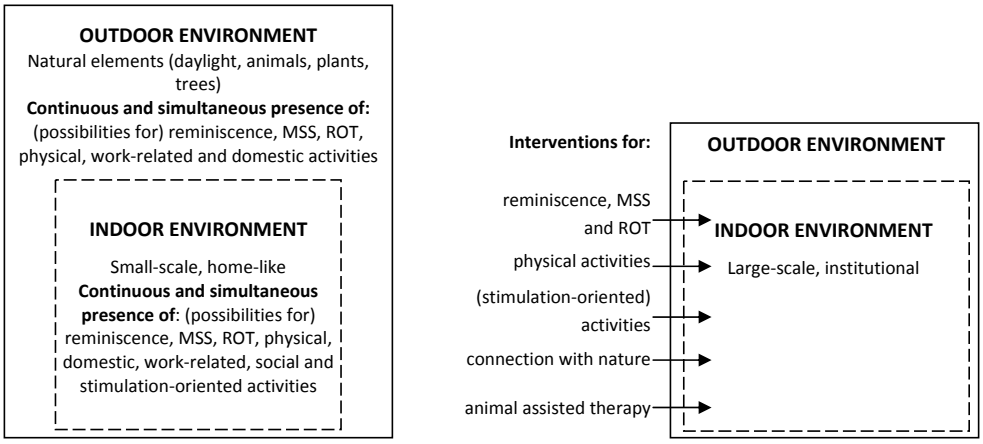

Figure 1. Characterization of GCFs (left) and RDCFs (right) according to the in the integrative framework identified beneficial interventions for dementia patients.

GCFs have a relatively normal and non-institutional character. They are in general more home-like and small-scaled, and focus on both the indoor and the outdoor environment. At farms older people have free access to nature, outdoor areas (garden, farmland, orchard and yard) and animals and are exposed more to outdoor daylight. GCFs further provide a range of activities to demented older people. These activities are mainly normal daily-life activities and are not offered as an intervention but are integrated in the environment. Activities range from domestic activities (dish washing, preparing dinner, laying the table) and work-related activities (feeding animals, sweeping the yard or the stable, gardening) to social activities (coffee breaks, dinner, conversations) and leisure/recreational activities (crafts, playing games). Activities are as well individual as group-based. Physical activities are not offered as an intervention; the environment in fact stimulates older people to be physically active, even those who are physically impaired and use (wheeled) walkers or wheelchairs. Most activities at GCFs require physical activity. Examples are walking to the stable, getting vegetables from the garden, sweeping the yard and walking to the pasture. For older people with physical limitations these activities are often adjusted.

In general, GCFs do not offer specifically organized and well-structured psychosocial interventions. These interventions are in fact naturally incorporated in the environment, and are more continuously and simultaneously present. Most older people participating in day care at GCFs grew up at a farm, were farmers themselves, have lived in a rural area or are interested in nature or the outdoor environment. Farms therefore in the first place offer possibilities to relive memories (reminiscence) related to farming (e.g. with regard to feeding animals, growing crops, sweeping the yard) or to the outdoors (e.g. nature, gardening, animals) and to discuss this with the farmer and other older people participating in day care at the farm. Farms secondly contribute to positive stimulation of the senses of demented older people (multi-sensory stimulation) by offering for example familiar odours (e.g. (manure of the) animals, hay, silage, food the older people prepare themselves), sounds (e.g. the animals, tractors), touch (e.g. animals) and tastes (e.g. raw milk, fresh fruit and vegetables). Farms thirdly can help to retain the link with reality as long as possible (reality orientation) with activities and events related to seasons (e.g. sowing, harvesting, birth of young animals, in and outdoor activities, but also temperature and precipitation) or related to places (e.g. cooking in the kitchen, feeding animals in the stable). The GCF environment is represented in Figure 1. A summary of the relevant differences between RDCFs and GCFs is given in Table 7.

To date it is unknown whether the differences between GCFs and RDCFs result in different effects on various health parameters such as neuropsychiatric and depressive symptoms, medication use, cognitive and social functioning and functional status. Empirical evidence for the beneficial

Table 7. Differences between day care at GCFs and RDCFs.

'Intervention'	Aspect	GCF	RDCF
Environmental	Type	Home-like, normal Familiar	Institutional, clinical Unfamiliar
	Scale	Small scale	Larger scale (often part of a large scale facility)
	Area	Indoor + outdoor	Mainly indoor
	Stimulation	Diverse and activating	Limited and less activating
	Connection to nature	By variety of outdoor (work-related) activities	By nature-based indoor activities
	Contact with animals	By variety of outdoor (work-related) activities	By AAT-interventions
Activity-based	Type	Focus on domestic and 'work'-related activities, also social and recreational activities Provoked by environment, daily meaningful and necessary activities	Focus on social and recreational activities, hardly domestic and work-related activities Offered as intervention
	Required physical effort	Low to high physical activity level, mainly stimulated by environment	Mainly low physical activity level. If moderate/high, then offered as intervention
Psychosocial	Type	Individual experience Continuously triggered by the environment; natural (not offered as intervention)	Group intervention Offered as short psychosocial intervention: 'artificial'

effects of GCFs on demented older people is limited. Further, it is unknown whether demented older people actually participate in the activities and facilities GCFs offer. We expect, however, based on the theoretical assumptions and available empirical evidence, that day care at GCFs has more health benefits for demented older people than regular day care.

The first reason for this assumption is that GCFs possess more potential beneficial environmental characteristics than RDCFs. These beneficial characteristics include the small-scale aspect, the non-institutional character ('enhanced' ambiance), the presence of outdoor areas and the possibilities for exposure to daylight[15,19,23,24]. GCFs further possess more outdoor areas and provide more outdoor activities. Therefore demented older people at GCFs are more often connected to nature and natural elements than demented older people at RDCFs. We consider 'nature' broader than only nature parks or reserves. We adopt the definition of Van den Berg and Van den Berg[88]: 'nature is the environment in which organisms or their biotopes expressly manifest themselves. In addition to nature reserves (i.e. natural forests and wild nature) this will also include farmland, production forest, urban green spaces and backyard gardens.' According to this definition spending time in the outdoor environment of GCFs can also be classified as 'connection to nature'. Nature has, according to literature, several beneficial effects for people with dementia[26,27,30,34,35,89]. For beneficial effects, people do not necessarily have to be outdoors. Also simply looking at nature from the indoors can for instance lead to emotional restoration, emotional well-being or physical relaxation[30]. At GCFs there are often more possibilities to watch nature from the indoors than at RDCFs. Further, at GCFs there are often (farm) animals. From literature we know that animals (AAT-interventions) for example can

reduce behavioural problems[27,28] or increase well-being[27]. To date it is unclear, however, whether farm animals have similar positive effects for demented older people as pet animals like cats and dogs[25].

At GCFs there is also a higher variety of activities for demented older people than at RDCFs. Older people at GCFs therefore are more likely to find an activity that fits their preferences and abilities than older people at RDCFs. At GCFs activities are mainly domestic in character (e.g. peeling potatoes, dish washing, laying the table) or focus on the outdoors. Literature indicates the importance of these kind of activities for demented older people, as they are often more familiar to them, as they are productive, they require a wide range of physical and cognitive skills and provide many opportunities for meaningful engagement and social interactions[45,90]. Familiarity with the environment (and activities) promotes the involvement in the activities[46].

The activities at RDCFs are different, as they usually focus on the indoors and are mainly stimulation-oriented. These activities (e.g. memory games, crafts, gymnastics, singing) are very often performed in groups, and are usually not tailor-made. Literature demonstrates the beneficial effects of stimulation-oriented activities, but the emphasis is increasingly on the importance of individually prescribed ('tailor-made') activities[49,58,59,64].

At GCFs demented older people have more possibilities for being physically active than at RDCFs. In the first place GCFs offer the older people more areas to spend their time (indoors as well as outdoors) than RDCFs. For different activities older people at GCFs have to walk from one area to the other. In the second place the activities at GCFs require more physical effort than the activities at RDCFs. At GCFs older people can feed animals, sweep the yard, work in the garden, can do craftwork, while at RDCFs most activities require low physical effort.

Finally, at GCFs psychosocial interventions are more or less naturally integrated in the environment, and are therefore offered continuously. Nature, animals and outdoor activities on the one hand provide many opportunities for reminiscence[26,89,90], but nature is also a source for multi-sensory stimulation[22,30]. Also harvesting and preparing food, to which older people at GCFs can contribute, offer a person sensory stimulation from the smell, taste, touch and sight[22]. At RDCFs psychosocial interventions are offered in brief sessions, and are very often group-based. Evidence for the effectiveness of psychosocial interventions is growing. To date, it is unclear if more beneficial effects can be achieved by either providing continuous psychosocial interventions or by providing brief interventions.

The present study is the first providing an integrative framework for the beneficial effects of GCFs for demented older people. Aim of this study was not to project RDCFs in a negative way, but rather to introduce this new kind of day care for demented older people, that fits in the current

developments in the chronic care sector. RDCFs are increasingly adopting environmental, activity-based and psychosocial interventions as well, but GCFs are unique in this way that they integrate environmental, activity-based and psychosocial activities more automatically and in a natural way. Moreover, these activities are present simultaneously and continuously, which is more difficult to realize at RDCFs.

Evidence for the effect of day care at GCFs on different health parameters (e.g. neuropsychiatric and depressive symptoms, functional status, cognitive functioning medication use) of demented older people is limited to date. We hypothesize, however, based on the theoretical assumptions and available empirical evidence that day care at GCFs contributes more positively to different health parameters of demented older people than regular day care. A pilot study performed in the Netherlands shows promising results. Demented older people participating in day care at GCFs showed fewer behavioural problems, used fewer drugs (including psychotropic drugs) and were more actively involved in normal daily activities than demented older people participating in nursing home day care[14]. More well-designed longitudinal studies are necessary to test our framework and to support the findings of Schols and Van der Schriek-Van Meel[14].

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Green care farms promote activity among elderly people with dementia

3

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ABSTRACT | In the Netherlands an increasing number of 'green care farms (GCFs)' are providing day care to community-dwelling demented elderly people. At present it is unknown whether activities, activity participation and facility use of demented elderly people at GCFs differ from those at regular day care facilities (RDCFs). Therefore we performed group and individual observations at 11 GCFs and 12 RDCFs. Activities of elderly people at GCFs were more frequent, more often outdoors, of higher physical intensity and more often aimed at individuals than those at RDCFs. The GCF environment may therefore be more beneficial for demented elderly people than the RDCF environment.

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Introduction

Dutch society is rapidly ageing. Currently about 15% of the population is older than 65 years and this figure is expected to increase to about 24% by 2050[1]. A disease syndrome typical for the old aged is dementia. Over the next 50 years the number of elderly people with dementia in the Netherlands will increase from the current figure of circa 250,000 to circa 410,000[2]. The majority (65%) of elderly people with dementia in the Netherlands live at home[3].

Traditionally, care for dementia patients was strongly medical and treatment-oriented. Nowadays, however, the emphasis is on improving quality of life, with equal attention for care, living and welfare aspects[4,5]. Health care is gradually de-institutionalizing and therefore environmental factors, such as environmental ambiance, nature, animals, privacy and small-scale sheltered living, are becoming more important[5-7]. As a result, new initiatives have evolved in the chronic health care sector. One of these initiatives, in which the before mentioned factors are represented, is offering day care for community-dwelling elderly people (with dementia) at farms[5].

Since 2000 or so, these so-called 'green care farms' (GCFs), offer services to care dependent people, like elderly people (with dementia), mentally disabled people, psychiatric patients, elderly people and autistic children. They can spend the day at the farm and take part in farm-related activities[5]. Currently, there are more than 900 GCFs in the Netherlands, of which about 10% are open to elderly people with dementia[8]. These farms enable frail elderly people to participate in activities such as feeding animals, working in the stable or cultivating fruit and vegetables, without actually having to contribute to agricultural production. They may also participate in household activities such as preparing dinner, gardening and dish washing. As with regular day care facilities (RDCFs[1]), that are often incorporated in residential homes, GCFs provide day care to groups of approximately 5 to 15 elderly people per day[5]. GCFs often cooperate with regular health care institutions. Their services are financed by the Dutch national insurance system under the Exceptional Medical Expenses Act[9].

Like RDCFs, GCFs aim to provide an adequate day structure and a meaningful day program to frail and/or community-dwelling elderly people, so as to prevent social isolation and to offer respite care to informal caregivers at home. Both types of day care seek to prevent or postpone admission to a care home. The day usually starts between 9h30 and 10h00 with coffee or tea and a conversation about, for example, what is in the news. Subsequently there is a morning activity followed by a warm

[1] In this paper we use the term 'regular day care facility' for adult ambulatory day care services for community-dwelling elderly people mostly provided in residential homes. In contrast with day care facilities provided in nursing homes, the regular day care facilities meant in this paper, do not offer individual treatment by a multidisciplinary team. Their services are restricted to social and recreational services.

meal, an afternoon nap, an afternoon activity and coffee or tea. People usually leave the day care facility between 16h00 and 16h30.

At present there is no information about the extent to which community-dwelling elderly people with dementia attending day care at a GCF participate in the activities and facilities available to them and how their activities compare with those attending a RDCF. In fact, it is therefore unclear if health benefits can be expected for elderly people with dementia attending day care at GCFs that can be attributed to the activities that they perform there.

The current paper reports the results of two studies aiming to identify, quantify and compare the activities of elderly people with dementia attending day care at either GCFs or RDCFs. The aim of study 1 was to make an inventory of the types of activities organized in each kind of day care facility, to determine the location of the activities organized and the degree of group participation in these different activities. The aim of study 2 was to gain insights into the activities carried out by elderly people with dementia in both settings through looking at types and locations of activities, and physical effort required.

Methods

Study design, settings and subjects

Both comparative cross-sectional studies took place between November 2006 and May 2008. The studies had an explorative character. Activities of elderly people were recorded at eleven[2] GCFs and twelve RDCFs. The RDCFs were located close to each of the GCFs, so as to include comparable groups of elderly people from the same regions and indicated for day care by the same Regional Central Indication Committee for Care. Observations were performed at group level (study 1) and the individual level (study 2).

The groups observed in study 1 contained different mixes of demented and non-demented elderly people and were studied as a whole for 3.5 to 5 days per day care facility. The composition of the groups varied between the observation days. During study 2, 55 individual elderly people with dementia were observed for 1 or 2 days each. Study 1 and study 2 were performed at the day care facilities during daytime, on average for approximately 6 hours. Observations were performed by researchers from Wageningen University and Radboud University Nijmegen.

[2] One of the GCFs participating in study 2 also participated in study 1.

Data collection

In study 1 the observations were performed on consecutive weekdays, except at one GCF where the observations were performed on 3 consecutive weekdays and, due to practical reasons, on one weekday six weeks later. An inventory was made of all activities that were organized for the groups throughout the entire day of day care including the location of the organized activities and the degree of group participation in the activities.

In study 2 observations were performed on either 1 or 2 weekdays per person. Thirty-six subjects (19 subjects from GCFs and 17 subjects from RDCFs) were observed for 2 days and 19 subjects (11 subjects from GCFs and 8 subjects from RDCFs) were observed for 1 day. *Ad libitum* sampling[10] was used to gain insight into the main activity (the activity with the longest duration) over every 15 minute period (subsequently referred to as an "observation unit") throughout the entire day of day care, the location of each main activity and the required physical effort.

Most activities lasted longer than 10 minutes. In the rare occasions we observed two activities with approximately similar duration in one observation unit we registered the first activity. In study 2 we also recorded gender and age of the observed individuals and measured their level of cognitive decline using the Mini Mental State Examination (MMSE)[11]. A summary of the relevant characteristics of study 1 and study 2 is given in Table 1.

Table 1. Overview of characteristics of study 1 and study 2.

	Study 1	**Study 2**
Design	Group level observations	Individual level observations
Settings	2 GCFs and 2 RDCFs: 1 GCF and 1 RDCF with day care groups predominantly containing elderly people with dementia (referred to as GCF-PD and RDCF-PD) 1 GCF and 1 RDCF with day care groups predominantly containing elderly people without dementia (referred to as GCF-PND and RDCF-PND)	10 GCFs and 10 RDCFs: No distinction made between settings predominantly receiving elderly people with or without dementia
Study population	GCFs: groups of on average 10 elderly people per day RDCFs: groups of on average 9 elderly people per day	30 individual elderly people with dementia attending day care at a GCF 25 individual elderly people with dementia attending day care at a RDCF
Inclusion criteria	Groups of 5 to 15 elderly people per day Groups which main target group is elderly people	Dementia syndrome Age ≥ 65 years Community-dwelling Indication for day care by Central Indication Committee for Care
Data collection	3.5 to 5 days of on average 6 hours per facility	1 to 2 days of on average 6 hours per person
Parameters	Of each observation day: All organized activities[1] Location of all organized activities Degree of group participation in all organized activities	Of each observation unit of 15 minutes: Main activity[2] Location of main activity Required physical effort for main activity

Notes: 1. Unorganized activities such as sitting, 'pottering', resting or smoking were left out of consideration; 2. Both organized and unorganized activities were recorded.

Data classification

After data collection the day care activities were classified before analyzing the data. The classification of the activities with regard to their required physical effort, however, was done during the data collection as there was already a classification method available[12]. To structure the types of activities, the location of activities, and the degree of group participation in the activities, we developed classification methods with clearly distinguishable categories. In the rare occasions that activities could not unambiguously be classified, the main researcher (SdB) consulted the researchers who performed the observations. If no agreement could be reached or if information was incomplete, the data were excluded from data analysis.

Types of activities

For the organized and performed activities observed in study 1 and 2 respectively, ten categories were distinguished. Activities in categories 1 to 7 were considered as organized activities, whereas the ones in categories 8 to 10 were considered as unorganized activities. Examples are given between brackets: 1. eating and drinking (the actual consumption of food and drinks and also the related social interactions); 2. farm or animal relates activities (watching or feeding animals, cleaning pens and cages, picking eggs); 3. garden or yard related activities (sweeping yards, gardening, working in greenhouse); 4. games (party games, memory games, quizzes, billiards, shovelboard); 5. crafts (flower arranging, decorating postcards, knitting, making nest boxes, sanding or painting fences); 6. other leisure and recreational activities (dancing, singing, gymnastics, going for a walk, reading, participating in group discussions); 7. domestic activities (peeling potatoes, chopping fruit and vegetables, laying the table, dish washing, shopping); 8. sitting or pottering while watching and/or chatting (no involvement in organized activity); 9. other/miscellaneous (smoking a cigarette), and 10. resting (sleeping or napping in chair or in bed). Classification was determined by the main focus of the observed activity. For example, if the elderly people were eating and drinking during a coffee break, the activity was categorized as “eating and drinking”, while if they were eating or drinking during a bingo game, we considered the main objective as participating in a game rather than consuming food or drink.

Location of activities

The locations of the organized and observed activities in study 1 and study 2 respectively were divided into 4 categories; 1. indoors (in the GCF or RDCF building); 2. outdoors/open air (in a garden,

forest, yard, pasture or at market); 3. another building belonging to a GCF[3] (stable, work shed, green house), and 4. elsewhere (e.g. in a car or shop).

Degree of group participation in activities

For the degree of group participation in each organized activity, only recorded in study 1, we distinguished three categories: 1. alone, possibly with one professional carer; 2. sub-groups of less than 75% of the total group and 3. (almost) the entire (75-100%) group.

Physical effort required for activities

As indicated, to classify the physical effort required for the activities observed in study 2, we used the classification method of Van Raaij et al.[(12)], who distinguishes between work posture and the movements required for different activities. We replaced the examples given by Van Raaij et al.[(12)] with activities relevant to our study.: 1. lying, no movements (sleeping or napping in bed or in special resting chair); 2. sitting quietly or very light sitting activity (sitting without movements or with only minor hand and arm movements such as eating and drinking, talking or reading a newspaper); 3. light-to-moderate sitting activity (sitting with arm movements such as gymnastics or playing shovelboard while sitting); 4. standing or light-standing activity (standing with and without arm movements such as dish washing or playing billiards); 5. standing activity or walking around (standing with body movements or whole-body movements such as picking eggs, pottering or light gardening work); 6. walking activity or cycling (whole-body movements such as sweeping, cleaning pens, heavy gardening work and walking at normal pace), and 7. recreational activity (whole-body movements, these activities were not observed).

Calculations and data analysis

Study 1

Group differences in activities between the elderly people attending the GCFs and RDCFs were not tested for significance as the data were limited to two locations for each setting only.

Types and location of activities and degree of group participation in activities

In each GCF and RDCF, the number of organized activities within each category during the observation days was summed. These figures were then divided by the total number of observation

[3] This category is only relevant for GCF. We did not observe activities in other buildings belonging to the RDCFs.

days to obtain the average daily frequency of activities within each category at each GCF and RDCF. A similar procedure was used to obtain the average number of activities at each location per day of day care at each GCF and RDCF. To obtain the average degree of group participation in activities the number of activities in each category recorded during the observation days was summed and the figures were expressed as percentages of the total number of observations per GCF and RDCF.

Study 2

Subject characteristics

Differences in gender distribution at both settings were analyzed using the Chi-square test for independence. The RDCFs were attended by significantly more women than the GCFs (χ^2 = 15.0; p<.001, data not shown). Because of these gender differences between both settings it was decided to analyze differences in activities between men from both settings and women from both settings ("differences within genders") rather than analyzing differences between the entire GCF and RDCF groups. Independent-samples t-test indicated that age and MMSE scores, the indicator for the rate of cognitive decline, were comparable within genders between settings (Table 2).

Table 2. General characteristics of male and female subjects with dementia at GCFs and RDCFs participating in study 2.

	Males			Females		
	GCF (n=25)	RDCF (n=7)	p	GCF (n=5)	RDCF (n=18)	p
Age (years)	77.0	80.9	.117	80.4	82.9	.464
MMSE	19.4	20.0[1]	.850	19.0	18.2[1]	.829

Note: 1. To calculate these means we excluded data of 2 male and 4 female subjects as for them the data to calculate the MMSE score could not be obtained according to the standardized and validated procedures.

Types and location of activities and the physical effort required

The elderly people at the GCFs were observed over an average of 24.0 observation units of 15 minutes per day of day care per person (6 hours of day care corresponds with 24 observation units of 15 minutes) and those at the RDCFs over an average of 23.5 observation units per person. Each observation unit provided information about 3 activity parameters: 1. the main activity that was performed during that set of 15 minutes; 2. the location of the activity, and 3. the physical effort required for the activity. For the data analysis we summed the total number of observation units of all elderly people of the GCFs and the RDCFs and categorized them by gender and the activity parameter (see preceding section about the classification of data). To test whether there was a relationship between the type of day care facility and the activities performed, we analyzed

differences between the 2 types of day care facility with regard to the frequencies of observation units that occurred in each of the categories. As the majority (65%) of the participating elderly people with dementia were observed for 2 days, it was decided to analyze data from both observation days (when such data was available). Chi square tests for independence indicated significant differences ($p<.001$) within genders, indicating that there was a relationship between setting and the activities performed. Post-hoc analyses were performed using the Fisher's Exact test to gain insights into differences between the specific categories of each of the activity parameters. Differences were considered to be significant when $p\leq.050$.

Results

Study 1

Types of activities

We observed 46 organized activities at the GCFs predominantly receiving elderly people with dementia (GCF-PD), 48 organized activities at the GCFs predominantly receiving elderly people without dementia (GCF-PND), 53 organized activities at the RDCFs predominantly receiving elderly people with dementia (RDCF-PD) and 35 at the RDCFs predominantly receiving elderly people without dementia (RDCF-PND). Some activities were observed only once, such as visiting an exhibition, while others such as coffee or snack breaks, were observed several times daily. At the GCF-PND and both RDCFs eating and drinking and other leisure and recreational activities were most frequently organized. At the GCF-PD domestic activities were compared with other activities at this farm and compared with the GCF-PND and both RDCFs most frequently organized. At the GCF-PND and the RDCF-PND the same average daily frequency of domestic activities was observed. Domestic activities at the GCFs varied from chopping vegetables, cooking, dish washing and laying and clearing the table, whereas the domestic activities at the RDCFs were limited to dish washing, laying and clearing the table. Games, such as quizzes, playing cards or shovelboard were more frequently organized at the RDCFs than at the GCFs. Farm and animal related activities and garden or yard related activities were only organized at GCFs (Table 3).

Table 3. Organized activities and location of organized activities of groups of elderly people with and without dementia at GCFs and RDCFs (participating in study 1) expressed by the average frequency (freq) that they were observed per day of day care (ddc).

Category	GCFs		RDCFs	
	PD (freq/ddc)	PND (freq/ddc)	PD (freq/ddc)	PND (freq/ddc)
Type of organized activity				
Eating and drinking	3.1	3.8	3.8	3.3
Farm or animal related activities	0.6	1.3	0.0	0.0
Garden or yard related activities	0.6	0.3	0.0	0.0
Games	0.3	1.0	2.0	1.8
Crafts	1.1	0.5	1.0	0.0
Other leisure and recreational activities	2.6	3.3	2.8	2.0
Domestic activities	4.6	1.8	1.0	1.8
Other/miscellaneous	0.0	0.3	0.0	0.0
Unknown	0.3	0.0	0.0	0.0
Location of organized activity				
Indoors	10.0	8.7	9.8	7.8
Outdoors/open air	2.0	2.0	0.6	1.0
Other building that belongs to GCF	0.3	0.0	0.0	0.0
Other building belonging to GCF and outdoors[1]	0.6	1.3	0.0	0.0
Elsewhere	0.3	0.0	0.0	0.0
Other location and outdoors[2]	0.0	0.0	0.2	0.0

Notes: 1. E.g. feeding animals in stable and outdoors; 2. E.g. shopping at market and in shop.

Location of activities

The majority of activities at both types of setting was organized indoors. These activities varied from eating and drinking, domestic activities, games, and other leisure and recreational activities. At the GCFs relatively more activities were organized outdoors (on average 2.0 activities daily) than at the RDCFs (on average 0.8 activities daily) (Table 3). These activities included going for a walk, watching animals, crafts (e.g. painting fences) and gardening. Animals were fed in the stable and outdoors. Activities that were organized outdoors at the RDCFs were limited to going for a walk and shopping at the market.

Degree of group participation in activities

At the GCFs the majority of the activities were performed by individual elderly people or by one or more sub-groups. At the RDCFs (and particularly at the RDCF-PD) more activities were performed with (almost) the entire group (Table 4). Eating and drinking were always done by the entire group at both types of setting. At the RDCFs recreational activities, such as reading, discussing the newspaper, singing, and games (e.g. quizzes and shovelboard) were also most often attended by (almost) the entire group. At both GCFs and RDCFs the activities most frequently attended by individuals or by one or more sub-groups were domestic activities and leisure and recreational activities such as going for a walk, watching animals (only at the GCFs), individually reading the newspaper or doing puzzles.

Table 4. Participants of organized activities at GCFs and RDCFs receiving groups of elderly people with and without dementia (participating in study 1), expressed by the percentage of the total number of observed organized activities at GCFs and at RDCFs.

Category	GCFs		RDCFs	
	PD (%)	PND (%)	PD (%)	PND (%)
Alone	17.4	25.0	11.3	25.7
Sub-group	45.6	39.6	17.0	25.7
(Almost) the entire group	37.0	35.4	71.7	48.6

Study 2

Types of activities

Men at GCFs were participating in organized activities during 72.3% of the observations, compared to 59.2% at the RDCFs. For women these percentages were 77.6% and 53.8% respectively. Significant gender differences were observed in the type of activities undertaken at the two types of day care facility. Men and women at the RDCFs sat and pottered significantly more than men and women at the GCFs ($p=.001$ and $p<.001$ respectively) (Table 5). Domestic activities were mainly done by women at the GCFs. They did these kind of activities significantly more frequently than women at the RDCFs ($p<.001$). Crafts were only done by men at the GCFs and by women at the RDCFs. Craft activities at the GCFs included sanding and painting fences, whereas at the RDCFs the main observed craft activities were flower arranging, painting Easter eggs and decorating postcards. Men at the RDCFs did significantly more 'other' leisure and recreational activities than men at the GCFs ($p=.004$). Men at the GCFs significantly more often played games than men at the RDCFs ($p<.001$). Both men and women at the GCFs did significantly more farm or animal related activities than their counterparts at RDCFs ($p<.001$ and $p=.002$ respectively). Garden or yard related activities at the GCFs were only performed by men.

Location of activities

At both types of setting men and women performed activities mostly indoors (Table 5). Organized indoor activities included eating and drinking, domestic activities, games, and other leisure and recreational activities. Unorganized indoor activities included sitting, pottering, and resting. Men and women at the GCFs spent significantly more time outdoors than their counterparts at the RDCFs ($p=.003$ and $p<.001$ respectively). Only men at the GCFs participated in activities in other buildings belonging to the GCF.

Table 5. Type and location of activities and required physical effort for activities of elderly people with dementia at GCFs and RDCFs (participating in study 2), expressed as the percentage of occurrence.

	Males			Females		
	GCFs (%)	RDCFs (%)	p	GCFs (%)	RDCF(%)	p
Type of activity[1]						
Eating and drinking	37.1	41.2	.260	43.0	31.6	**.004**
Farm or animal related activities	5.2	0.0	**<.001**	2.1	0.0	**.002**
Garden or yard related activities	3.6	0.0	**.001**	0.0	0.0	n.a.
Games	9.7	2.1	**<.001**	7.3	8.2	.767
Crafts	7.5	0.0	**<.001**	0.0	4.4	**.001**
Other leisure and recreational activities	6.6	12.4	**.004**	7.3	7.6	1.000
Domestic activities	2.6	3.4	.504	18.1	2.0	**<.001**
Sitting or pottering	16.8	26.2	**.001**	10.4	33.7	**<.001**
Other/miscellaneous	3.1	3.4	.835	4.7	3.7	.534
Resting	7.7	11.2	.112	7.3	8.8	.564
Location of activity[2]						
Indoors	72.6	89.7	**<.001**	91.2	97.3	**<.001**
Outdoors/open air	17.2	9.4	**.003**	8.8	2.4	**<.001**
Other building that belongs to GCF	9.9	0.0	**<.001**	0.0	0.0	n.a.
Elsewhere	0.3	0.9	.245	0.0	0.3	1.000
Required physical effort for activity[3]						
Lying	1.2	5.8	**<.001**	2.7	2.3	.788
Sitting quietly or very light sitting activity	69.5	83.6	**<.001**	79.3	89.7	**<.001**
Light-to-moderate sitting activity	1.0	0.0	.223	1.1	1.8	.748
Standing or light-standing activity	2.9	2.2	.821	6.0	1.5	**.002**
Standing activity or walking around	20.1	4.0	**<.001**	4.9	3.9	.531
Walking activity or cycling	5.3	4.4	.738	6.0	1.5	**<.001**

Notes: The number of observation units (15 minute periods) analyzed varies over the activity parameters due to missing values.

1. Results are based on 961 observation units of men from GCFs, 233 observation units of men from RDCFs, 193 observation units of women from GCFs and 753 observation units of women from RDCFs.
2. Results are based on 983 observation units of men from GCFs, 233 observation units of men from RDCFs, 193 observation units of women from GCFs and 753 observation units of women from RDCFs.
3. Results are based on 980 observation units of men from GCFs, 225 observation units of men from RDCFs, 184 observation units of women from GCFs and 726 observation units of women from RDCFs.

Physical effort required for activities

During the majority of the observations the elderly people at the GCFs and at the RDCFs were engaged in activities that could be performed whilst sitting and requiring either no movements or only minor hand and arm movements. Men and women at RDCFs, however, were significantly more frequently involved in activities that could be performed whilst sitting and requiring either no movements or only minor hand and arm movements than men and women at GCFs ($p<.001$ for both comparisons). Activities that required sitting with arm movements were rarely observed. Men at the RDCFs spent significantly more time lying down while resting than men at the GCFs ($p<.001$). Activities requiring standing with or without arm movements were more often performed by the women at the GCFs than by those at the RDCFs ($p=.002$). Standing activities involving (whole-) body movements were most frequently performed by men at the GCFs, who did these kind of activities significantly more often than men at the RDCFs ($p<.001$). Women at the RDCFs hardly ever performed walking activities that required whole-body movements. These kind of activities were significantly more often done by women at the GCFs ($p<.001$).

Discussion

These comparative cross-sectional studies allow for an evaluation of the activities of groups of elderly people (with and without dementia) and of individual elderly people with dementia at GCFs and RDCFs. Our results indicate that activities were more frequently available at the GCFs and involved more variation than at the RDCFs. Elderly people with dementia at the GCFs were involved in organized activities during about 75% of the observations, compared to about 55% at the RDCFs. At the GCFs most activities involved individuals or one or more sub-groups as opposed to the (nearly) entire day care group, which was the most frequent way of organizing activities at the RDCFs (and particularly at the RDCF with groups mainly consisting of elderly with dementia). Elderly people with dementia attending the GCFs did more activities outdoors and did activities that required more physical effort than those at the RDCFs.

Gender, age and cognitive functioning may influence the activities elderly people with dementia like and are able to do. Gender may play a role in differences in e.g. educational level, former occupation and leisure activities, whereas age and cognitive functioning may play a role in differences in co morbidity and functional status[13-16]. Age and cognitive functioning were comparable within genders. Subjects at both types of setting should therefore be considered to be able to perform similar activities. Yet study 2 showed differences in the activities that were undertaken. It seems therefore justified to conclude that the observed differences in the activities were to a large extent due to differences in the GCF and RDCF environment.

A considerable proportion of the total number of GCFs for elderly people with dementia in the Netherlands were included in these studies. During our studies, approximately 80 GCFs in the Netherlands were open to elderly people with dementia[8] and it was estimated that about half of them mainly provided day care to elderly people (with dementia) in groups comparable in size to the groups at RDCFs. It is likely that activities vary between GCFs according to their original agricultural function (e.g. dairy farm, industrial livestock farm, mixed farm), their scale (i.e. number of clients per day), indoor facilities (e.g. kitchen or workplace), interests and expertise of the farmer (‘s wife) and other caregivers (i.e. non-production animals, greenhouse, games, crafts), outdoor facilities (i.e. yard, garden, surroundings), ratio between the care and agricultural function and the extent to which they cooperate with a health care institution[9]. The farms participating in the current study were not selected on the basis of these characteristics. Therefore, it can be expected that the variation in these characteristics is comparable to the variation in GCFs for elderly people with dementia in general and that the included GCFs give a reliable insight into the day care generally available at farms for elderly people with dementia.

The RDCFs included in the study were located near the GCFs, which were mostly situated in rural areas. Thus the participating RDCFs may not be representative of RDCFs as a whole in the Netherlands. It may not be justified to generalize the results of this study to urban areas. However, the advantage of our approach was to study comparable groups of elderly people with dementia from a similar region in the Netherlands who were indicated for day care by the same regional Central Indication Committee for Care (and thereby using the same criteria for eligibility for day care). It is likely that the activities within RDCFs vary according to their scale (i.e. number of clients per day), outdoor facilities (e.g. terrace, proximity of shops and parks), interests and expertise of caregivers (i.e. sports, crafts, games).

In addition to local differences within GCFs and RDCFs, it is likely that natural variables such as season and weather also influence the activities at the RDCFs and even more at the GCFs. In this study observations were performed in spring, autumn and winter. Observations in summer may have increased the number and type of activities that were observed outdoors, particularly at GCFs.

As indicated, current studies had an explorative character and our results should therefore be considered in accordance with this for the following reasons: First, our studies provided insight into general activity patterns of elderly people with dementia at either GCFs or RDCFs. Brief activities may therefore have been under-estimated. To obtain a more accurate and precise insight into activity patterns at GCFs and RDCFs (including duration of activities), observations should be performed more systematically, e.g. by using scan sampling[10]. The current findings can be used to develop instruments to do such observations. Second, the number of GCFs and RDCFs included in study 1 was limited. Findings with respect to differences between facilities receiving either predominantly elderly people with dementia or predominantly elderly people without dementia are based on two GCFs and two RDCFs. It is therefore unknown if differences in the types of activities organized by both types of GCFs and RDCFs can be explained by differences in the composition of the day care groups or by local differences between the facilities. The same applies for the degrees of group participation in activities. This only differed between the two types of RDCF. This may suggest that GCFs offer more possibilities than RDCFs for elderly people, even if demented, to do activities individually or in sub-groups. However, this may also differ by chance, considering the limited number of RDCFs and GCFs included. More research is therefore recommended to gain insights into the factors (e.g. local differences, differences in composition of day care groups) that may explain the differences in activities of elderly people, with and without dementia, at GCFs and at RDCFs. Third, the number of women from GCFs and men from the RDCFs was limited. Despite many efforts undertaken to include a similar number of people from both genders from both types of setting, the results of study 2 show a significant difference in the number of men and women at GCFs and RDCFs. We noticed that either

the number of women or men was limited at the participating GCFs or RDCFs, respectively, or that those present did not fulfill the inclusion criteria of our study. The reason(s) for the unequal distribution of genders over both settings deserves further study. Including more GCFs and RDCFs in future research may lead to a more equal distribution of genders. However, there may also be non-methodological reasons for this finding, such as the fact that day care at a GCF is a new type of day care in the Netherlands. Relevant care institutions may therefore be unfamiliar with this day care alternative or may assume that GCFs are most suitable for men. More research will provide insight into the reason(s) behind the observed unequal gender distribution.

Although our findings should be interpreted with caution, the differences between GCFs and RDCFs may imply that their impact on health of elderly people with dementia differs, because of environmental differences between both settings. According to the environmental gerontology, the environment plays an important role in behaviour and well-being in later life[17,18]. A well-known and often applied theoretical framework, the *ecological model of aging* of Lawton and Nahemow[19], states that the goodness of fit between the environment and the needs and abilities of elderly people is therefore of importance. Three basic functions of the environment for elderly people have been differentiated: 1. the support function (the environment's potential to compensate for reduced or lost competences); 2. the maintenance function (the environment's constancy and predictability); 3. the stimulation function (the availability of stimuli in the environment)[20,21].

We assume that GCFs and RDCFs are equally effective in fulfilling the 'support function' by meeting reduced or lost competences by taking care of issues such as barrier-freeness and accessibility[21]. However, our findings may suggest that GCFs are better in fulfilling the 'maintenance function' and the 'stimulation function' than RDCFs, and that the degree of fit between the environment and the elderly people will therefore be larger.

GCFs have a non-institutional and small-scaled indoor environment and possess several outdoor areas and animals. They further offered, as shown in the current study, in addition to leisure and recreational activities, possibilities to perform normal home-like and work-like activities. De Bruin et al.[22] suggested that GCFs may evoke memories, stimulate the senses and help to retain the link with reality. This is in line with literature indicating that involvement in normal household processes, nature, animals and outdoor activities provide opportunities for reminiscence[23-25] and reality orientation, but are also a source for multi-sensory stimulation[7,26]. RDCFs, conversely, have an institutional and large-scaled indoor environment and they generally have restricted or no outdoor areas. They mainly offer, as shown in the current study, leisure and recreational activities. Considering the environmental differences between GCFs and RDCFs, it is expected that GCFs have more potential to maintain continuity and to provide a 'home' than RDCFs.

The environmental characteristics of GCFs, including the home-like environment, outdoor areas/nature, and animals have been positively related to sleep, social contacts, mood and behaviour[24-29], well-being and functional status[6,29,30].

This study may further suggest that the GCF environment is a 'richer' environment containing more stimuli for activity than the RDCF environment, that is considered as a more 'static' environment. Moreover, at the GCFs the activities seemed to be concurrently and continuously available in a more or less natural way; i.e. meals needed to be prepared, animals needed to be fed, tables needed to be laid. Conversely, at RDCFs there seemed to be less continuity in the activities offered, considering the relatively large time the subjects in study 2 were not involved in any activity.

The availability of a variety of activities in the GCF environment may enable elderly people with dementia to choose and participate in activities that match their individual skills and interests. This may give them a stronger sense of autonomy and identity[31]. Literature suggests that the match between the individual's needs and preferences may be beneficial in terms of improved well-being and mood[15,32-35], decreased behavioural problems[16,34,36-38], and increased daily functioning[39].

Also the opportunities to be physically active at GCFs may be related to several positive health outcomes for elderly people with dementia such as improved physical functioning[40-43], better mood, less depression[40,41,44], less behavioural problems[42,43], better night time sleep[41], and delayed cognitive decline[42,43,45,46].

In summary, our findings may suggest that GCFs better fulfill the environmental functions of importance for elderly people with dementia than RDCFs. GCFs may therefore have more health benefits for elderly people with dementia than RDCFs. Currently, literature about the impact of GCFs on health parameters is barely available. It is therefore hard to find scientific support for our suggestions, and to compare the results from the current studies with other studies. A Dutch pilot study by Schols and Van der Schriek-Van Meel[5] was the first to provide preliminary indications for the possible beneficial effects of GCFs for elderly people with dementia. Their study revealed that elderly people with dementia at GCFs showed fewer behavioural problems, used on average fewer psychotropic drugs, and were more actively involved in normal daily activities than their counterparts participating in nursing home day care. The current studies have more extensively evaluated the activities of elderly people with dementia in both settings and largely confirm the findings of Schols and Van der Schriek[5] with regard to the involvement in activities.

Future research should not only focus on the impact of GCFs on objective parameters, such as behavioural symptoms, use of psychotropic drugs, and functional status, but also on subjective parameters such as emotional well-being, satisfaction, and pleasure. In addition, future research on the degree to which elderly people with dementia adjust or compensate their activities during the

remainder of the day (once they are back in their home situation) may also be of interest. Such research may be useful to be able to explain possible differences in health between elderly people attending either GCFs or RDCFs. More research is of importance for future policy making with regard to care for frail elderly people[5].

The findings from the current studies and our suggestions for future research are not only relevant for the Netherlands but also for other European countries (such as Belgium, Italy and Norway) and the USA. Under the umbrella-term 'farming for health', three kinds of social agriculture are developing in these countries: 1. green care farming; 2. horticultural therapy; and 3. animal-assisted therapy. The demand for farming for health activities in a diversity of target groups is increasing. Further, an increasing number of farmers is interested in performing care activities at their farms. It is therefore expected that the number of GCFs will further increase the coming years. Moreover, farming for health activities are no longer limited to rural areas, but are also increasingly provided in urban areas[47]. Further exploring these new developments and evaluating their health impact on different target groups may help to establish these care innovations among the more regular care modalities.

Conclusion

The current studies are among few empirically exploring the activities performed by elderly people with dementia in two types of day care setting. Despite their explorative character, they indicate that the stimulating and activating environment at GCFs creates possibilities for elderly people with dementia to be more actively involved in a wider variety of activities, to be more frequently outdoors and physically more active than those attending RDCFs. The GCF environment may therefore be more beneficial for elderly people with dementia than the RDCF environment. More research, examining these suggestions is recommended.

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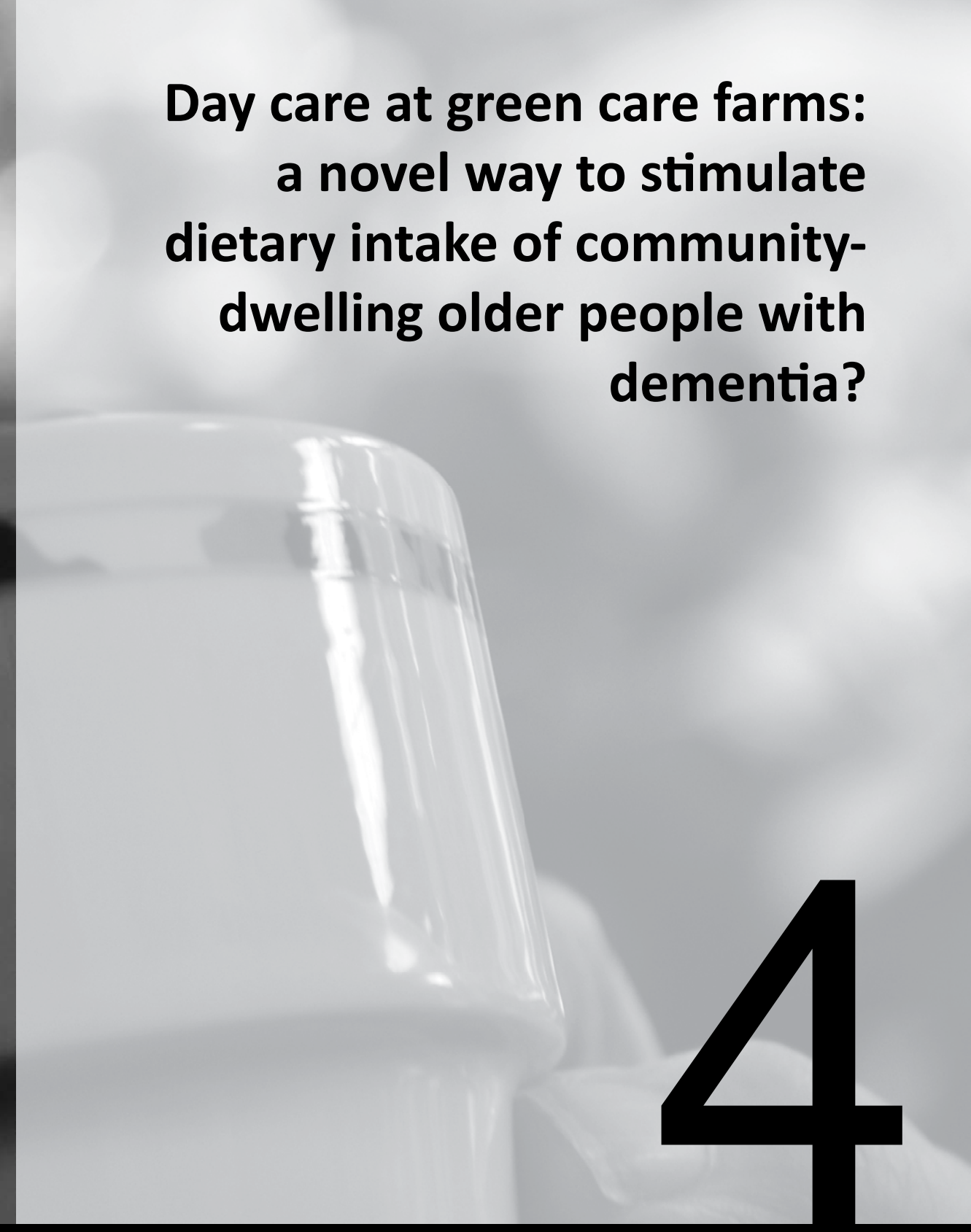
Day care at green care farms: a novel way to stimulate dietary intake of community-dwelling older people with dementia?



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SR de Bruin, SJ Oosting, H Tobi, YH Blauw, JMGA Schols, CPGM de Groot.

ABSTRACT | This study aimed to compare dietary intake of older people with dementia receiving day care at regular day care facilities (RDCFs) or at so-called green care farms (GCFs). A comparative cross-sectional study was performed at 10 GCFs and 10 RDCFs in the Netherlands. Thirty subjects from GCFs and 23 subjects from RDCFs, aged 65 years or over, were included in the study. Subjects from GCFs were mostly married males who were aged younger than the subjects from RDCFs who were mostly widowed females. Dietary intake of the subjects was observed and/or recorded both at home and during their time at the day care facility. In the GCF group, average total energy intake was significantly higher than in the RDCF group (8.8 MJ/d vs. 7.2 MJ/d). Also total carbohydrates and protein intakes were higher in the GCF group than in the RDCF group (with 257 g/d vs. 204 g/d, and 76 g/d vs. 65 g/d respectively). In addition, average total fluid intake was significantly higher in the GCF group than in the RDCF group (2577 g/d vs. 1973 g/d). Multiple linear regression analyses revealed that after taking possible confounders into account, day care type was still significantly related to the intake of energy, carbohydrates and fluids. This study suggests beneficial effects of this new type of day care on dietary intake by community-dwelling older people with dementia.

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Introduction

The Dutch society is rapidly ageing. Currently about 15% of the population is older than 65 years, and this percentage is predicted to reach 24% by 2050[1,2]. This trend is typical for the western part of the world[3]. Ageing is associated with decreased appetite and insufficient food intake[4,5]. The resulting weight loss and malnutrition[6,7] may lead to a declining functional status[6], an increased morbidity and mortality[7,8], earlier institutionalization[9,10], and a decreased quality of life[6,11-13]. Older people suffering from dementia, especially Alzheimer's Disease, may be even more prone to malnutrition and weight loss[14,15].

Almost two-thirds of dementia patients in the Netherlands live at home[16]. There are two types of day care facilities for these community-dwelling frail older people: regular day care facilities (RDCFs), mostly housed in residential homes, and day care services provided at farms, so-called green care farms (GCFs). Both aim to realize a structured and meaningful day program and offer respite care for family caregivers. GCFs offer day care services since approximately 2000, and are meant for people with care needs, including frail older people, mentally disabled people, and psychiatric patients. At these farms, people can spend the day and take part in farm-related and outdoor activities[17].

As many community-dwelling older people with dementia attend a day care facility[16], it is of importance to gain insight into the impact of these facilities on dietary intake. Earlier studies have shown that the eating environment, day program and activity level of older people with dementia differ between GCFs and RDCFs[17,18]. As there are indications that physical activity[19] and the eating environment[20,21] benefit dietary intake of older people, the aim of the present study was to compare dietary intake of older people with dementia attending day care at GCFs or RDCFs.

Methods

Design

This comparative cross-sectional study was performed between November 2006 and May 2008. Older people with dementia were recruited from ten GCFs and ten RDCFs in the Netherlands. Only GCFs having frail older people as their main target group and offering day care to groups of 5 to 15 people per day were included in the study. The recruited RDCFs were mostly located in the same region as the GCFs to limit the possible impact of regional differences.

Settings

Green care farms

GCFs have a relatively normal home-like character. They offer, in addition to leisure and recreational activities, normal home-like and farm-like activities, such as dish-washing, gardening, feeding animals, and sweeping the yard. GCFs offer services to older people with and without dementia. The number of both types of older people within the day care group vary per GCF and per day. A study of De Bruin et al.[18] suggests that older people with dementia attending day care at GCFs are more physically active than those attending RDCFs, due to more outdoor and farm-related activities. GCFs provide a hot meal at lunch time, and drinks and snacks during the remainder of the day. The participants are often involved in the meal preparation by getting vegetables from the garden, chopping vegetables, and peeling potatoes. The table dressing at mealtime is home-like: the meal is served in dishes, the participants can serve themselves, and normal cutlery and crockery are used. At coffee and tea breaks home-baked snacks and/or fresh fruits from the orchard are often served[18].

Regular day care facilities

RDCFs traditionally have a strong care orientation, related to the residential home environment in which they are often housed. Like GCFs, RDCFs offer services to older people with and without dementia. Also here, numbers of both types of older people within the day care group vary per RDCF and per day. RDCFs mainly offer leisure and recreational activities that are mostly performed indoors. They do not offer individual treatment by a multidisciplinary team, as opposed to psychogeriatric day care facilities mostly housed in nursing homes[22]. RDCFs provide a hot meal at lunch time, and drinks and snacks during the remainder of the day. The hot meal is often provided in an institutional way: it is served in plastic cups and predesigned plates divided into three sections on individually pre-plated trays. The meal is mostly prepared in a central professional kitchen[18].

Subjects

Thirty subjects attended day care at GCFs and 25 subjects at RDCFs. For privacy reasons, contact persons at the participating GCFs and RDCFs, instead of the researchers, enrolled subjects and their primary family caregivers in this study. Inclusion criteria were: 1. approval to attend day care, provided by Central Indication Committee for Care (CICC) assessing eligibility for day care; 2. dementia syndrome, according to report of CICC; 3. age ≥65 years; 4. living at home; 5. primary

family caregiver willing to participate in the study. Dietary intake of the subjects was registered during 1 or 2 weekdays depending on attendance frequency. On average, the subjects spent 6 hours per day, from 10h00-16h00, at the facility. Informed consent was obtained from primary family caregivers of the older people with dementia. The Medical Ethics Committee of Wageningen University approved the study protocol.

Data collection and procedures

Total daily dietary intake on the day the subjects attended a day care facility was recorded by registering intakes at home and at the day care facility. With this approach we could establish whether differences between the two day care settings (i.e. mealtime ambiance, physical activity level of subjects) would result into differences in dietary intake between subjects from both day care settings both at the day care facility and at home, and would thus result into differences in their total daily dietary intakes. Subjects and their primary family caregiver were instructed to use a food diary for the registration of breakfast, evening meal and snacks consumed at home. Brand names and amounts were recorded using household measures like 'cup' and 'glass', and standard portion sizes like 'slice', 'bar', and 'cube'. The diaries were checked by the researchers, and subjects and their family caregivers were contacted in case of any inadequacies or inconsistencies.

At the day care facilities, researchers of Wageningen University observed and recorded all foods and drinks consumed by the subjects. The researchers were trained by a research dietician in order to standardize the observation procedures. They used a food diary to record foods and drinks consumed during the day of day care. Amounts consumed were recorded in terms of household measures and standard portion sizes, with the exception of foods consumed during the cooked meal. These amounts were determined by weighing the meal and its leftovers. Recipes and preparation methods were obtained from the kitchen staff.

Information on sex, age, number of months at the day care facility, number of days of day care per week, marital status, housing situation, medication use, and smoking status of the subjects was obtained from the professional caregivers at the day care facility or the family caregivers.

Shortly after the arrival of the subjects at the day care facility, cognitive functioning of the subjects was assessed by the Mini Mental State Examination (MMSE). Scores on the MMSE range from 0 to 30, with scores less or equal to 23 suggesting cognitive impairment[23]. Further, the nutritional status was measured by the Mini Nutritional assessment (MNA), and some anthropometric measurements. The MNA, completed on the basis of information collected from family caregivers and observations by the researchers, assesses the risk of malnutrition in older people. Scores range from 0 to 30, and distinguish: adequate nutritional status (≥24) or risk for

malnutrition (17-23.5) from protein-calorie undernutrition (<17)[24]. Body weight was measured to the nearest 0.1 kg, with subjects wearing normal clothing without shoes. Height was measured to the nearest 0.1 cm using a height meter. For those subjects who were not able to stand upright, information on body weight was collected from the family caregiver at home, and height was estimated as: height (in cm) = 3.16*knee-to-floor height (in cm)[25]. Body mass index (BMI) was calculated as weight in kilograms divided by (estimated) height in meters squared.

Appetite was evaluated by administering the Simplified Nutritional Appetite Questionnaire (SNAQ) to the subjects. Scores range from 4 to 20, and distinguish people with an increased risk for at least 5% weight loss within 6 months (≤14) from those without an increased risk (>14)[26].

Statistical analyses

Characteristics of the GCF and RDCF group were compared by means of Fisher's Exact Test, Chi square test for independence, Mann-Whitney U test, and independent-samples t-test, as appropriate. Differences were considered significant at p≤0.05.

To analyze differences in dietary intake between the GCF and RDCF groups, nutrients were quantified using the VBS food calculation system (BAS Nutrition Software) based on the Dutch Nutrient Database[27]. The following parameters were obtained: individual intake of energy (kJ/day), macronutrient intake (protein, carbohydrate, fat) (g/day) and fluids derived from foods and beverages (g/day). For subjects attending the day care facility 1 day per week, dietary intake was registered during 1 weekday. For those who attended the day care facility 2 or more days a week, dietary intake was registered during 2 weekdays. In those cases, the average was used in the analyses. Intakes at home and at the day care facility were summed to obtain total daily dietary intake.

Multiple linear regression was used to assess determinants of total energy intake, macronutrient and fluid intake separately. In addition to the type of day care facility, possible confounders identified by comparing group characteristics, were always included in the models. In addition, medication use[28,29] and interactions were included when p≤.100. The effect of day care type was considered statistically significant at the p≤.050 level. To prevent multi-collinearity problems, interactions were omitted when they showed a high correlation (≥.80) with the independent variables. Post-hoc analyses on place of dietary intake (at home or at the day care facility) were performed in an identical manner. The effect of day care type was considered statistically significant at the p≤.010 level to reduce the multiple testing effect. All analyses were done using SPSS for Windows, release 15.0, 2006 (Chicago: SPSS Inc.).

Results

General characteristics

The majority (83%) of the GCF group were males, whereas of the RDCF group 30% was of this gender (Table 1). The mean age in the GCF group was lower than in the RDCF group (77.6 vs. 81.9 years), and a larger proportion was married (83% vs. 48%). The average SNAQ score was significantly higher in the GCF group than in the RDCF group (p=.007). Of the GCF group, 7% and 10% showed risk of weight loss within 6 months according to their SNAQ score or risk of malnutrition according to their MNA score respectively. Of the RDCF group these proportions were 26% for both parameters. In view of differences between both groups in gender, age, marital status and SNAQ score, these variables were included as possible confounders in our regression models.

Table 1. General characteristics of subjects attending day care at GCFs or RDCFs. Data shown as mean (±SD; median) or as frequency (percentage).

Characteristics	GCF (n = 30)	RDCF (n = 23)	Test statistic	p
Sex[1]				
Male	25 (83%)	7 (30%)	-	**<.001**
Female	5 (17%)	16 (70%)		
Age *(years)*[2]	77.6 (±6.0)	81.9 (±5.7)	t = - 2.6	**.011**
Marital status[1]				
Married/cohabiting	25 (83%)	11 (48%)	-	**.008**
Widowed	5 (17%)	12 (52%)		
Housing situation[1]				
Private accommodation with partner and/or children or others	28 (93%)	21 (91%)	-	1.000
Sheltered accommodation	2 (7%)	2 (9%)		
Number of months at day care facility[3]	13.7 (±14.6; 7.5)	11.8 (±8.8; 9.3)	z = -0.2	.879
Number of days per week at day care facility[3]	2.3 (±0.8; 2.0)	2.6 (±1.1; 1.0)	z = -0.8	.402
Medication use (*number*)[3]	5.1 (±2.7; 5.0)	4.3 (±4.0; 2.8)	z = -1.2	.247
Smoking status[4]				
Currently smoking	5 (17%)	3 (13%)	χ^2 = 0.5	.775
Regularly smoked in the past	9 (30%)	9 (39%)		
Never smoked	16 (53%)	11 (48%)		
Cognitive functioning (MMSE)[3]	19.3 (±6.2; 20.0)	18.8 (±7.0; 20.0)[5]	z = -0.1	.940
Appetite (SNAQ)[3]	16.6 (±1.3; 16.5)	15.1 (±2.3; 15.0)	z = -2.7	**.007**
Presence of older people at risk of weight loss[1]				
Not at risk (>14)	28 (93%)	17 (74%)	-	.065
At risk (≤14)	2 (7%)	6 (26%)		
Risk of malnutrition (MNA)[3]	25.6 (±2.5; 26.0)	25.0 (±3.4; 25.5)	z = -0.3	.759
Presence of older people with risk of malnutrition[1]				
Adequate nutritional status (≥24)	27 (90%)	17 (74%)	-	.154
At risk for malnutrition (17-23.5)	3 (10%)	6 (26%)		
Body weight (kg)[3]	77.6 (±13.0; 79.0)	72.2 (±13.5; 72.0)	z = -1.5	.134
BMI (kg/m^2)[3]	27.1 (±3.3)	27.6 (±4.1)	z = -0.3	.753

Notes: 1-4 Differences were analyzed using Fisher's Exact Test; independent-samples t-test; Mann-Whitney U Test and Chi square test for independence respectively; 5. Mean was calculated with data of 5 subjects excluded as scores were not obtained reliably.

Total dietary intake

Crude analyses revealed that in the GCF group, average total energy intake was significantly higher than that in the RDCF group (8825 kJ/day vs. 7165 kJ/d). Also the total intake of carbohydrates and protein was higher in the GCF group than in the RDCF group (with 257 g/d vs. 204 g/d, and 76 g/d vs. 65 g/d respectively). In addition, average total fluid intake was significantly higher in the GCF group than in the RDCF group (2577 g/d vs. 1973 g/d) (Table 2).

Taking possible confounders into account, day care type was still significantly related to total energy intake, intake of carbohydrates and fluid intake. Compared to attending day care at a RDCF, attending day care at a GCF increased energy intake with 1159 kJ/d (β=0.3, p = .046), carbohydrates intake with 39 g/d (β=0.3, p = .034), and fluid intake with 414 g/d (β=0.4, p = .012). Day care type did not significantly contribute to protein and fat intake. Also the number of medications significantly contributed to total fluid intake. For each additional medicine, fluid intake increased with 83 g/day (β=0.4, p = .001).

Table 2. Dietary intake (total, at day care facility, at home) of subjects at GCFs and RDCFs.

Dietary intake	Day care type			Effect of day care type		
	GCF (n = 30) (Mean ± SD)	RDCF (n = 23) (Mean ± SD)	p (*)	B (se)	β	p (**)
Main analyses						
Total						
Energy (kJ/d)	8825 ± 1848	7165 ± 1302	**.001**	1159 (565)	0.3	**.046**
Carbohydrates (g/d)	257 ± 59	204 ± 41	**<.001**	39 (18)	0.3	**.034**
Protein (g/d)	76 ± 17	65 ± 12	**.007**	6 (5)	0.2	.290
Fat (g/day)	79 ± 22	69 ± 16	.056	4 (7)	0.1	.568
Fluid intake (g/d)	2577 ± 532	1973 ± 438	**<.001**	414 (159)	0.4	**.012**
Post-hoc analyses						
At day care facility						
Energy intake (kJ/d)	4330 ± 1240	3535 ± 1053	**.017**	415 (405)	0.2	.310
Carbohydrates (g/d)	125 ± 33	97 ± 29	**.002**	19 (11)	0.3	.089
Protein (g/d)	39 ± 11	34 ± 10	.091	-	-	-
Fluid intake (g/d)	1375 ± 269	1068 ± 236	**<.001**	204 (85)	0.3	.021
At home						
Energy intake (kJ/d)	4495 ± 1400	3624 ± 993	**.014**	757 (431)	0.3	.085
Carbohydrates (g/d)	132 ± 49	108 ± 29	**.038**	21 (14)	0.3	.145
Protein (g/d)	38 ± 13	31 ± 12	**.051**	-	-	-
Fluid intake (g/d)	1203 ± 415	905 ± 306	**.006**	210 (126)	0.3	.101

Notes: (*) Unadjusted; (**) Adjusted for gender, age, marital status, and SNAQ score. Total fluid intake and fluid intake at home, were in addition adjusted for the number of medications that were used; B = unstandardized regression coefficient; β = standardized regression coefficient.

Dietary intake at day care facility

Crude analyses showed that energy and fluid intake at the day care facility was significantly higher in the GCF group than in the RDCF group (with 4330 kJ/d vs. 3535 kJ/d, and 1375 g/d vs. 1068 g/d, respectively) (Table 2). In addition, carbohydrates intake at the day care facility was significantly higher in the GCF group than in the RDCF group (125 g/d vs. 97 g/d). After taking possible

confounders into account, day care type was no longer significantly related to any of the outcome variables (Table 2).

Dietary intake at home

Crude analyses revealed that in the GCF group, the energy and fluid intake at home were significantly higher than in the RDCF group (with 4495 kJ/d vs. 3624 kJ/d, and 1203 g/d vs. 905 kJ/d, respectively) (Table 2). Also the carbohydrates and protein intake at home was significantly higher in the GCF group than in the RDCF group (with 132 g/d vs. 108 g/d, and 38 g/d vs. 31 g/d, respectively). After taking possible confounders into account, day care type was no longer significantly related to any of the outcome variables, while medication use was. For each additional medicine, fluid intake increased with 52 g/d (β=0.4, p = .010).

Discussion

The present comparative cross-sectional study in community-dwelling older people with dementia, showed that attending day care at a GCF benefits total daily energy, fluid, and carbohydrate intake. For assessing these intakes, standardized procedures were used to collect dietary intake data reliably[19,21,30,31]. To limit burden on the subjects and their family caregivers, who completed the food diaries, the use of household measures and standard portion sizes was preferred over weighing the foods and drinks. The limitation, however, is that these measures may not precisely reflect the amounts consumed. Other limitations of self-reported consumption may be altered normal food consumption, and inaccurate[32] or incomplete reporting, particularly in those subjects whose caregivers were not present all day. However, by contacting the subjects and their caregivers in case of inadequacies and inconsistencies, we believe to have taken this into account sufficiently.

The average daily energy intake in the current study population approached the recommended daily energy intake for people aged over 70 years[33] (Table 3). Fluid intake was above the minimum recommendations for older people[29]. Energy and fluid intake were in accordance with intakes measured in earlier European studies among community-dwelling older people[5,34-36]. The mean daily energy and fluid intake in our study population was higher than that of institutionalized older people[21,30,37-39]. Although the average energy intake in this study population approached the recommendations[33], appetite assessment by the SNAQ and malnutrition assessment by the MNA revealed 15% of the total study population to be at risk for weight loss and 17% to be at risk for

Table 3. Energy intake and fluid intake in the current study population compared to recommendations and intakes by other study populations. Data are shown as means or as range of means.

Authors	N	Age	Energy intake (MJ/d)	Fluid intake (g/d)
Recommendations				
Health Council of the Netherlands[33]	-	>70	M: 9.3; F: 7.8	-
Schols et al.[29]	-	Elderly people	-	at least 1700
Community-dwelling older people				
Current study	**M: 32; F: 21**	**M: 77.9; F: 81.9**	**M: 8.6; F: 7.3**	**M: 2491; F: 2047**
Moreiras et al.[5], total study population	M: 571; F: 603	75-80	M: 7.9-12.1; F: 5.5-10.2	-
Moreiras et al.[5], Dutch study population	M: 52; F: 69	75-80	M: 9.2; F: 7.6	-
Fabian and Elmadfa[34]	M: ± 6000; F: ± 7800	≥55	M: 7.4-12.3; F: 5.5-9.7	-
Haveman-Nies[35], total study population	M: 629; F: 696	75-80	-	M: 1860-2318; F: 1605-2186
Haveman-Nies[35], Dutch study population	M: 52; F: 69	75-80	-	M: 2239; F: 2186
Volkert et al.[36]	M: 583; F: 789	≥65	-	M: 2487; F: 2311
Institutionalized older people				
Nijs et al.[21]	178	77	6.3	-
Suominem et al.[38]	23	82	5.4	-
Lammes and Akner[40]	M: 11; F: 41	M: 81; F: 85	M: 7.2; F: 6.0	-
Armstrong-Esther[37]	M: 16; F: 41	68 - 90	-	1085*
Gaspar[39]	99	85	-	1968

Notes: M= Males; F=Females; * Derived from available data.

malnutrition. Sub-analyses revealed that energy intake of subjects at risk for weight loss or for malnutrition was on average 1300 kJ/d and 900 kJ/d lower respectively, compared to energy intake of subjects not at risk.

The current study showed that the subjects attending day care at a GCF differed in several aspects from their counterparts attending day care at a RDCF. The GCF group mainly consisted of married men who were on average younger than the subjects in the RDCF group that consisted mainly of widowed women. Although literature suggests gender, age and marital status to be related to several health outcomes[41-44], we did not detect differences in cognitive functioning, functional status and medication use between older people with dementia in both settings[45,46]. It is therefore unlikely that the observed differences in dietary intake in the current study can be explained by health differences between both groups.

A more likely explanation for the observed differences is the home-like eating environment at GCFs. The social context and environmental ambiance are considered as important factors for dietary intake of older people[47], and may therefore have increased the intake of energy and carbohydrates, which is in line with studies of Gibbons and Henry[20] and Nijs et al.[21]. A beneficial effect of the environmental ambiance on fat and protein intake, as suggested by Gibbons and Henry[20], was not observed in the current study. It is unsure if the higher fluid intake at GCFs is also related to the

home-like eating environment. An alternative explanation for this finding may be a higher frequency of serving drinks at GCFs than at RDCFs.

Also a higher activity level of the GCF group[18], leading to increased energy expenditure and appetite, may explain the higher energy intake at in the GCF group. However, evidence for such an interaction is inconclusive[48,49] and seems to vary among individuals[50]. A study of De Jong et al.[19] in frail older people showed a small effect (~0.5 MJ/d) of physical activity on energy intake. The difference in energy intake observed in the current study was 1.2 MJ/d. Physical activity may therefore explain only part of the observed difference.

Although the results of our study are promising, we should acknowledge the relatively limited number of subjects included and the unequal distribution of the genders over both settings. As the study was observational, subjects were not randomly assigned to one of the two settings. Despite efforts to include a similar number of subjects from both genders in both settings, we noticed that either the number of women or men was low at the participating GCFs and RDCFs respectively, or that those present did not fulfill the study's inclusion criteria.

It should further be noted that due to small numbers per day care facility, the possible effect of individual GCFs or RDCFs could not be investigated. Within GCFs or within RDCFs there may have been differences in factors important for dietary intake, such as the size of the portions offered, meat and fish consumption, the use of low-fat products, and the frequency of serving drinks. In addition, the number of observation days per day care facility was low which may have decreased the reliability of the estimates.

For future studies we therefore recommend to include higher numbers of GCFs and RDCFs, and more observation days per facility. This may decrease the effect of individual days and provide insight into differences between and within GCFs and RDCFs that are related to their strategies to increase dietary intake in older people with dementia. It is further recommended to add observations on days that the subjects are not going to a day care facility, to establish whether the time spent on the day care facility maintains or improves nutritional status sufficiently. Other additional interventions or strategies may be necessary to counteract malnutrition and dehydration in this population.

Conclusion

The current study suggests that the new type of day care provided at GCFs stimulates dietary intake in community-dwelling older people with dementia. Considering the fact that many of them attend a day care facility, it is of importance to further investigate which factors contributed to the increased dietary intake. In this way, also RDCFs may be encouraged to develop strategies to

counteract weight loss and malnutrition in this growing group of community-dwelling older people with dementia.

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Comparing day care at GCFs and at RDCFs with regard to their effects on cognitive functioning, emotional well-being, and behavioural symptoms of community-dwelling older people with dementia

5

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ABSTRACT | Day care at green care farms (GCFs) is a new care modality for community-dwelling older people with dementia. The aim of this study was to compare rates of change in cognitive functioning, emotional well-being and behavioural symptoms of older people with dementia attending day care at GCFs or at regular day care facilities (RDCFs). This cohort study included 47 subjects from GCFs and 41 from RDCFs, of whom 27 and 26 subjects respectively completed the study. Data were gathered at study entry and at 6 and 12 months follow-up by interviewing the subjects and their primary caregivers. Generally, no significant change over time in cognitive functioning, emotional well-being and the number of behavioural symptoms was observed, and hardly any differences in these rates of change were found between subjects from GCFs and RDCFs. This study may imply that GCFs and RDCFs, despite their differences, have similar effects on the health outcomes assessed.

Submitted for publication.

Introduction

Dementia is an incurable disease with substantial effects on cognitive, behavioural, psychological and functional capacities[1,2]. Traditionally, cognitive and functional decline were considered as key features of dementia. Since the last two decades, however, interest in behavioural and psychological symptoms is growing and their clinical relevance and importance are acknowledged[3,4]. New evidence suggests that these symptoms are important determinants of patients' distress and caregivers' burden[3,5], prescription of psychotropic drugs and early institutionalization[4,6,7].

Almost two-thirds of dementia patients in the Netherlands live at home of whom more than 45,000 receive yearly adult day care[8,9]. Day care facilities aim to realize a structured and meaningful day program for the demented and to offer respite care for their family caregivers. Adult day care programs may vary considerably across sites, but can roughly be classified into mainly socially oriented and mainly medically oriented day care facilities[10,11]. The focus of this paper is on socially oriented day care facilities. In the Netherlands, socially oriented day care is offered in two types of setting: at facilities that are mostly affiliated to residential homes, subsequently referred to as regular day care facilities (RDCFs), and at farms, subsequently referred to as green care farms (GCFs). Day care at GCFs is relatively new, and is provided to frail older people since approximately 2000. Unlike RDCFs, GCFs provide day care services in a non-institutional and outdoor environment. They offer, in addition to leisure and recreational activities, normal home-like, farm-related and outdoor activities. These activities stimulate the older people with dementia to be physically active and to interact with nature, animals, and other people. Considering the larger variety of activities available at GCFs than at RDCFs, older people with dementia at GCFs may have more opportunities to find activities that match their preferences and abilities than people at RDCFs[12,13].

Non-institutional and outdoor environments, physical activity and normal daily life activities have been positively related to mood, night time sleep[14-22], behaviour[23-27] and cognitive functioning[23,24,28]. It is therefore suggested that GCFs differ from RDCFs in their effects on cognitive functioning, emotional well-being and behavioural symptoms of older people with dementia[12,29]. Since no studies have assessed the effectiveness of GCFs for these health outcomes, the aim of the present study was to compare rates of change in cognitive functioning, emotional well-being and behavioural symptoms of community-dwelling older people with dementia who attend day care at GCFs or at RDCFs.

Methods

Design and procedures

This study is part of a 1-year cohort study evaluating the effectiveness of day care for several health outcomes of dementia patients and their family caregivers. The study was performed in the Netherlands between March 2006 and February 2008. Fifteen GCFs and 22 RDCFs having frail older people as their main target group and offering day care to groups of 5 to 15 people per day were included in the study. RDCFs were mostly located in the same region as the GCFs to limit the possible impact of regional differences. Dementia patients were not assigned to one of two day care types; they had already made a choice for a day care type before study entry. To gain insight into their rates of change in cognitive functioning, emotional well-being and number of behavioural symptoms, data were collected at three times with 6 months intervals: at study entry, at 6 and 12 months follow-up. Except for 1 subject, whose primary caregiver was a professional caregiver, primary caregivers were family caregivers such as spouses or children.

For privacy reasons, contact persons at the participating GCFs and RDCFs, instead of the researchers, enrolled possible participants and their primary caregivers in this study. Inclusion criteria were: 1. approval to attend day care, provided by the Central Indication Committee for Care (CICC) assessing eligibility for day care; 2. dementia syndrome, according to report of CICC that in line with national guidelines[30] receives diagnostic information from relevant physicians; 3. age ≥65 years; 4. living at home; 5. primary caregiver willing to participate in the study. Exclusion criteria were: 1. upcoming institutionalization; 2. participation in two day care types; 3. (history of) serious psychiatric problems not necessarily related to dementia; and 4. participation in other scientific studies.

Contact persons at the participating GCFs and RDCFs enrolled 161 dementia patients (84 from GCFs, 77 from RDCFs). All were contacted by telephone by the researchers who explained the study procedures. Thirty-six refused participation, for reasons including lack of motivation and too much expected burden, and seven could not participate as their health status was severely deteriorated or they died between enrolment and the first measurement. Of the remaining 118 possible participants, 30 did not meet all inclusion criteria and 88 could be included and agreed with participation. Of them, 47 subjects attended day care at a GCF and 41 subjects at a RDCF. Informed consent was acquired from a primary caregiver of the subjects. The Medical Ethics Committee of Wageningen University approved the study protocol.

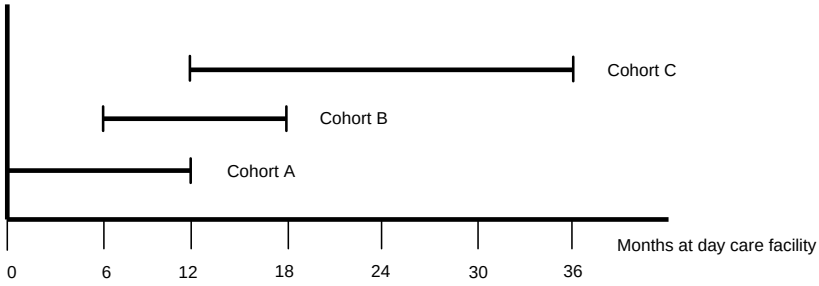

Figure 1. Length of day care attendance reflected by cohorts A, B, and C.

Three cohorts (A, B, and C) were distinguished based on the subjects' length of stay at the day care facility. Subjects in cohort A were at the start of our study about to start or had recently started (on average 1.3 months) with day care; subjects in cohort B participated in day care since approximately 6 months (on average 6.3 months) and subjects in cohort C participated in day care since approximately 12 to 24 months (on average 16.5 months). The three cohorts were distinguished since they provided insight into three distinct periods of day care use (Figure 1). Cohort A was of interest as literature suggests that during the first months of enrolment in an adult day care program dropout is largest[31,32], and GCFs and RDCFs could be compared in this respect. Cohort B and C were of interest as they both gave insight into the characteristics of the more sustained users of both day care types.

Day care settings

Green care farms

GCFs are farms that combine agricultural production with care services for people with care needs, including frail older people, mentally disabled people and psychiatric patients[13]. In 2009 the total number of GCFs in the Netherlands is over 900, of which about 10% offer day care for older people with dementia[33]. As indicated, day care programs at GCFs are socially oriented. Dementia patients can participate in activities varying from feeding animals, gardening, meal preparation and picking eggs, to making outdoor walks, crafts and playing games. Many activities are performed outdoors and stimulate physical activity. Older people with dementia spend on average 2 to 3 days of approximately 6 hours each per week at a GCF[12,13]. GCFs often cooperate with regular health care institutions. Their services are currently financed by the Dutch national insurance system[34]. Green

care farming is not a typically Dutch phenomenon, it is also developing in other European countries including Norway, Italy, Austria and Belgium and in the United States of America[35].

Regular day care facilities

Day care programs of RDCFs differ in their main focus which may be either socially oriented or medically oriented. In the Netherlands, socially oriented day care facilities are mostly affiliated to a residential home and mainly offer social and (therapeutic) recreational activities. Medically oriented day care facilities are mostly affiliated to a nursing home and additionally offer medical treatment, rehabilitation and/or personalized therapeutic programs[11,36,37]. At the socially oriented RDCFs included in this study, older people with dementia participate mainly in recreational and leisure activities, including crafts, games and participation in group conversations. The majority of activities are performed indoors and do not require much physical effort. As a consequence, older people at RDCFs are sitting the majority of the day. More detailed information on differences between GCFs and RDCFs is available in De Bruin et al.[12,29]. Also at RDCFs, older people with dementia spend on average 2 to 3 days of approximately 6 hours each per week, and also their services are currently financed by the Dutch national insurance system[12,13].

Data collection

To collect data, subjects and their primary caregivers were visited at their homes. Data collection at the homes of the subjects rather than at the day care facilities was chosen to ensure the subjects' and their caregivers' privacy, to prevent additional caregiver burden caused by travelling to the day care facility and to prevent disturbance of daily procedures at the day care facilities. The home visits lasted approximately 2 hours[1] each and were performed by researchers of Wageningen University, Radboud University Nijmegen and Utrecht University. The researchers were trained by one of the authors (SdB) to standardize the data collection procedure.

Measurements

The general characteristics sex, age, number of months at day care facility, number of days of day care per week, marital status, housing situation, educational level, primary caregiver, agricultural background, and pet ownership were collected with a questionnaire used during the first measurement. These questions were answered by the subjects and their primary caregivers.

[1] During the interviews also information on other health outcomes (e.g. functional performance, medication use, co-morbidity, caregiver burden) was collected from the subjects and their primary caregivers. These findings will be reported elsewhere.

Reliable and valid standard measurement instruments were applied to measure cognitive functioning, emotional well-being and the display of behavioural symptoms. The researchers read the questions aloud, explained the answering format, and marked the answers of the subjects and their caregivers on the questionnaires. The Mini Mental State Examination (MMSE), administered to the subjects with dementia, was used as a general measure of cognitive functioning. Scores on the MMSE range from 0 to 30, with a suggested cut-off score of 23 for the presence of cognitive impairment[38].

Emotional well-being was assessed by the Depression List and administered to the subjects with dementia. The questionnaire measures 15 depressive symptoms in people with dementia. Scores range from 0 to 30, with higher scores implying more symptoms[39]. Diesfeldt[39] distinguished three subscales in the Depression List: Feeling depressed, Feeling tired, and Feeling lonely.

The Neuropsychiatric Inventory (NPI), administered to the primary family caregivers, was used to evaluate 12 behavioural symptoms common in dementia. Of each symptom the frequency in the preceding month (on a 4-point scale) and severity score (on a 3-point scale) were taken, multiplied and subsequently added to obtain a total NPI score. Scores range from 0 to 144, with higher scores referring to more frequent and more severe symptoms[40]. Aalten et al.[41] distinguished within the 12 NPI items, four neuropsychiatric subsyndromes: Hyperactivity, Psychosis, Affective symptoms and Apathy.

Statistical analyses

Differences in characteristics between the GCF and RDCF groups within each cohort were tested by means of Fisher's Exact Test, Chi square test for independence and Mann-Whitney U test as appropriate.

Because of the limited evidence yet available, the subscales of the Depression List and NPI were tested for their reliability in this particular population using the data of all subjects at study entry (n=88). The Cronbach's alpha of the subscales was low, except for the Feeling tired subscale of the Depression List (.70) and Affective subscale of the NPI (.65).

Principal component analysis (PCA) was performed on the Depression List to detect grouping of items in our study population. Components were selected on the basis of the "eigenvalue > 1"-criterion. PCA, using an oblique rotational procedure (OBLIMIN) reduced the 15 items of the Depression List to 4 components explaining 53% of the total variance in the data. As the correlations between the components were low (ranging from -0.001 to 0.240), we subsequently used an orthogonal rotational procedure (VARIMAX). A similar component structure occurred using this procedure, indicating a robust component structure. The first component (25% of total variance)

represented *self-rated fitness* with high loadings on the items reflecting health, helplessness, tiredness and weakness. The second component (11% of the total variance) was labelled *joy of living*, with high loadings on the items reflecting cheerfulness, loneliness, feeling old, feeling depressed, feelings about the future, and feeling bored. The third component (9% of the total variance), represented *appetite and sleeping ability* with high loadings on the items appetite and sleep. The fourth component (8% of the total variance) was labelled *satisfaction with social contacts* to reflect the items on visitors, friends and overall satisfaction. We decided to use our derived subscales for further analysis. For interpretation reasons we re-scored the items to ensure that a higher score implied a higher well-being. Scores on the items of the four subscales were added to obtain a total score per subscale.

For the analyses of the behavioural symptoms, we decided to use the total number of clinically relevant (frequency score multiplied by severity score >3) behavioural symptoms per person[42,43] instead of the neuropsychiatric sub syndromes distinguished by Aalten et al.[41].

To determine rates of change in cognitive functioning, emotional well-being and the number of clinically relevant behavioural symptoms within individuals, for each individual who was interviewed three times, a linear regression was done[44]. The regression coefficient is an indicator for the individual rate of change over time and was rescaled to obtain the individual rate of change per 6 months. The individual rates of change were considered statistically significant at the $p \leq .025$ level to reduce the multiple testing effect. For each GCF and RDCF group within the three cohorts separately, the average rate of change in each of the parameters was determined. As data generally did not meet the assumptions of parametric techniques and the sizes of the GCF and RDCF groups within each of the cohorts were small, the Mann-Whitney U Test was used to determine whether rates of change in cognitive functioning, emotional well-being and the number of clinically relevant behavioural symptoms differed between the GCF and RDCF groups within the three cohorts. Differences were considered significant at $p \leq .050$. All analyses were done using PASW Statistics 17, 2009 (Chicago: SPSS Inc.).

Table 1a. General characteristics of subjects within cohort A at study entry. Data shown as mean (±SD; median) or as frequency (percentage).

	Cohort A[1]			
	GCF (n = 28)	**RDCF (n = 14)**	**Test statistic**	**p**
Sex				
Male	23 (82%)	2 (14%)	-	**<.001**
Female	5 (18%)	12 (86%)		
Age (years)	77.7 (±5.2; 78.6)	83.4 (±5.8; 84.4)	$Z_{(n=41)} = -2.7$	**.006**
Number of months at day care facility	1.3 (±1.1; 1.2)	1.2 (±0.9; 1.4)	$Z_{(n=42)} = -0.1$	.894
Days of day care per week	1.8 (±0.7; 2.0)	2.1 (±0.9; 2.0)	$Z_{(n=42)} = -1.3$	.201
Marital status				
Married/cohabiting	26 (93%)	6 (43%)	-	**.001**
Widowed	2 (7%)	8 (57%)		
Housing situation				
Private accommodation with partner and/or children or others	24 (86 %)	13 (93%)	-	.650
Sheltered accommodation	4 (14%)	1 (7%)		
Educational level				
Low	19 (68%)	11 (79%)	$\chi^2_{(2, n=42)} = 0.7$	.723
Medium	7 (25%)	2 (14%)		
High	2 (7%)	1 (7%)		
Primary caregiver				
Partner (+ others)	26 (93%)	6 (43%)	-	**.001**
(Combination of) others, not partner	2 (7%)	8 (57%)		
Agricultural background				
Living/used to live at farm	12 (43%)	6 (43%)	-	1.000
Never lived at farm	16 (57%)	8 (57%)		
Pet ownership				
(Former) pet owner	26 (96%)	12 (86%)	-	.265
Never pet owner	1 (4%)	2 (14%)		
Cognitive functioning (0-30)	19.5 (±5.6; 21.0)	20.5 (±5.3; 21.5)	$Z_{(n=42)} = -0.3$	.748
Emotional well-being				
Fitness (0-8)	6.7 (±1.8; 7.0)	6.2 (±1.4; 7.0)	$Z_{(n=41)} = -1.5$	.134
Joy of living (0-12)	10.1 (±1.5; 10.0)	9.1 (±2.2; 9.0)	$Z_{(n=41)} = -1.5$	.139
Appetite and sleep (0-4)	3.9 (±0.5; 4.0)	3.7 (±0.5; 4.0)	$Z_{(n=41)} = -1.3$	.192
Social contact (0-6)	4.9 (±1.4; 5.0)	5.3 (±0.8; 5.5)	$Z_{(n=41)} = -0.6$	.556
Number of clinically relevant behavioural symptoms (0-12)	1.8 (±1.3; 2.0)	2.1 (±1.5; 2.0)	$Z_{(n=42)} = -0.5$	.584

Notes: 1. Differences in the total number of subjects per cell are due to missing values.

Results

General characteristics subjects

Cohort A (starters)

Table 1a shows that the majority (82%) of subjects at GCFs within cohort A were male, whereas at RDCFs 14% of the subjects were of this gender (p<.001). The mean age of subjects at GCFs was lower than that at RDCFs (77.7 vs. 83.4 years) (p=.006), more subjects were married (93% vs. 43%) (p=.001) and consequently more subjects had a partner as their primary caregiver at home (93% vs. 43%) (p=.001). No significant differences with regard to the other characteristics were observed between the two groups (Table 1a).

Cohort B (day care since 6 months)

Table 1b shows that all subjects at GCFs within cohort B were still married and had a partner as their primary caregiver, whereas more than half of the subjects at the RDCFs were widowed and had (a combination of) others as their primary caregiver (p=.007 for both comparisons). The other characteristics did not differ significantly between the two groups.

Cohort C (day care since 12-24 months)

There were no statistical differences between the groups within cohort C in any of the general characteristics (Table 1c).

Table 1b. General characteristics of subjects within cohort B at study entry. Data shown as mean (±SD; median) or as frequency (percentage).

	Cohort B			
	GCF (n = 10)	**RDCF (n = 13)**	**Test statistic**	**p**
Sex				
Male	7 (70%)	6 (46%)	-	.402
Female	3 (30%)	7 (54%)		
Age (years)	75.4 (±7.5; 76.0)	82.0 (±7.2; 81.0)	$Z_{(n=23)} = -1.9$	.058
Number of months at day care facility	6.8 (±0.8; 6.7)	6.1 (±1.5; 5.9)	$Z_{(n=23)} = -1.2$	.234
Days of day care per week	2.5 (±1.3; 2.5)	1.9 (±0.7; 2.0)	$Z_{(n=23)} = -1.1$	.272
Marital status				
Married/cohabiting	10 (100%)	6 (46%)	-	**.007**
Widowed	0 (0%)	7 (54%)		
Housing situation				
Private accommodation with partner and/or children or others	10 (100%)	11 (85%)	-	.486
Sheltered accommodation	0 (0%)	2 (15%)		
Educational level				
Low	6 (60%)	10 (77%)	$\chi^2_{(2, n=23)} = 1.6$	.441
Medium	3 (30%)	3 (23%)		
High	1 (10%)	0 (0.0%)		
Primary caregiver				
Partner (+ others)	10 (100%)	6 (46%)	-	**.007**
(Combination of) others, not partner	0 (0%)	7 (54%)		
Agricultural background				
Living/used to live at farm	5 (50%)	7 (54%)	-	1.000
Never lived at farm	5 (50%)	6 (46%)		
Pet ownership				
(Former) pet owner	10 (100%)	13 (100%)	-	*n.a.*
Never pet owner	0 (0%)	0 (0%)		
Cognitive functioning (0-30)	20.2 (±7.1; 21.5)	21.4 (±4.0; 23.0)	$Z_{(n=23)} = -0.2$	.803
Emotional well-being				
Fitness (0-8)	6.4 (±1.4; 6.5)	7.0 (±1.3; 7.5)	$Z_{(n=22)} = -1.1$	.286
Joy of living (0-12)	10.9 (±1.2; 11.0)	9.8 (±2.2; 11.0)	$Z_{(n=23)} = -1.2$	.245
Appetite and sleep (0-4)	4.0 (±0.0; 4.0)	3.8 (±0.4; 4.0)	$Z_{(n=23)} = -1.3$	.204
Social contact (0-6)	5.2 (±1.6; 6.0)	5.5 (±0.7; 6.0)	$Z_{(n=23)} = -0.1$	.912
Number of clinically relevant behavioural symptoms (0-12)	1.2 (±1.5; 1.0)	1.3 (±1.1; 1.0)	$Z_{(n=22)} = -0.4$	.655

Table 1c. General characteristics of subjects within cohort C at study entry. Data shown as mean (±SD; median) or as frequency (percentage).

	Cohort C			
	GCF (n = 9)	RDCF (n = 14)	Test statistic	p
Sex				
Male	7 (78%)	5 (36%)	-	.089
Female	2 (22%)	9 (64%)		
Age	79.0 (±4.6; 78.1)	82.8 (±6.6; 81.7)	$Z_{(n=23)} = -1.5$	.137
Number of months at day care facility	18.1 (±7.0; 15.6)	15.9 (±6.2; 12.7)	$Z_{(n=23)} = -1.1$	.284
Days of day care per week	2.7 (±1.2; 2.0)	2.4 (±1.0; 2.0)	$Z_{(n=23)} = -0.4$	.713
Marital status				
Married/cohabiting	6 (67%)	6 (43%)	-	.400
Widowed	3 (33%)	8 (57%)		
Housing situation				
Private accommodation with partner and/or children or others	8 (89%)	14 (100%)	-	.391
Sheltered accommodation	1 (11%)	0 (0%)		
Educational level				
Low	7 (78%)	9 (65%)	$\chi^2_{(2, n=23)} = 0.5$	.771
Medium	1 (11%)	2 (14%)		
High	1 (11%)	3 (21%)		
Primary caregiver				
Partner (+ others)	5 (56%)	6 (43%)	-	1.000
(Combination of) others, not partner	4 (44%)	8 (57%)		
Agricultural background				
Living/used to live at farm	1 (11%)	2 (14%)	-	1.000
Never lived at farm	8 (89%)	12 (86%)		
Pet ownership				
(Former) pet owner	9 (100%)	13 (93%)	-	1.000
Never pet owner	0 (0%)	1 (7%)		
Cognitive functioning (0-30)	22.3 (±4.3; 24.0)	20.6 (±5.9; 21.5)	$Z_{(n=23)} = -0.6$	.569
Emotional well-being				
Fitness (0-8)	6.1 (±1.8; 7.0)	5.9 (±2.4; 7.0)	$Z_{(n=23)} = -0.1$	.949
Joy of living (0-12)	10.2 (±1.6; 11.0)	10.5 (±1.6; 11.0)	$Z_{(n=23)} = -0.5$	.649
Appetite and sleep (0-4)	3.3 (±0.9; 4.0)	3.5 (±1.2; 4.0)	$Z_{(n=23)} = -1.0$	.332
Social contact (0-6)	5.7 (±0.5; 6.0)	5.5 (±0.9; 6.0)	$Z_{(n=23)} = -0.1$	.907
Number of clinically relevant behavioural symptoms (0-12)	1.7 (±1.6; 1.0)	1.2 (±2.1; 1.0)	$Z_{(n=23)} = -1.1$	.288

Loss to follow-up

Figure 2 shows the number of subjects lost to follow-up. For the GCF groups within cohort A, B and C drop-out rates were 43%, 70% and 11% respectively. For the RDCF groups these rates were 43%, 38% and 29% respectively. Within all cohorts, the majority of subjects dropped-out as they were admitted to a residential or nursing home or died. Reasons for institutionalization were mostly overburden of family caregivers and/or severe deterioration in the health status of the dementia patient. Deterioration was not necessarily related to dementia but could also be related to co-morbidities such as cardiovascular diseases or cancer. Subjects lost to follow-up due to institutionalization or death did not differ significantly in cognitive functioning, emotional well-being and the number of behavioural symptoms at study entry from those who completed the study. Exception were the subjects in the RDCF group within cohort A, where drop-outs had more clinically relevant behavioural symptoms at study entry than subjects who completed the study (3.4 vs. 1.5 symptoms; p=.025). Another exception were the subjects in the RDCF group within cohort C, where

drop-outs' satisfaction with social contacts at study entry was lower than in subjects who completed the study (4.8 vs. 5.8; p=.026).

Cognitive functioning

Table 2a, 2b, and 2c show the average rates of change in cognitive functioning over 6 months in the subjects who completed the study within cohort A, B and C respectively. In all, but one subject, cognitive functioning did not change significantly over time. Average rates of change in cognitive functioning did not differ between the GCF and RDCF group within any of the cohorts.

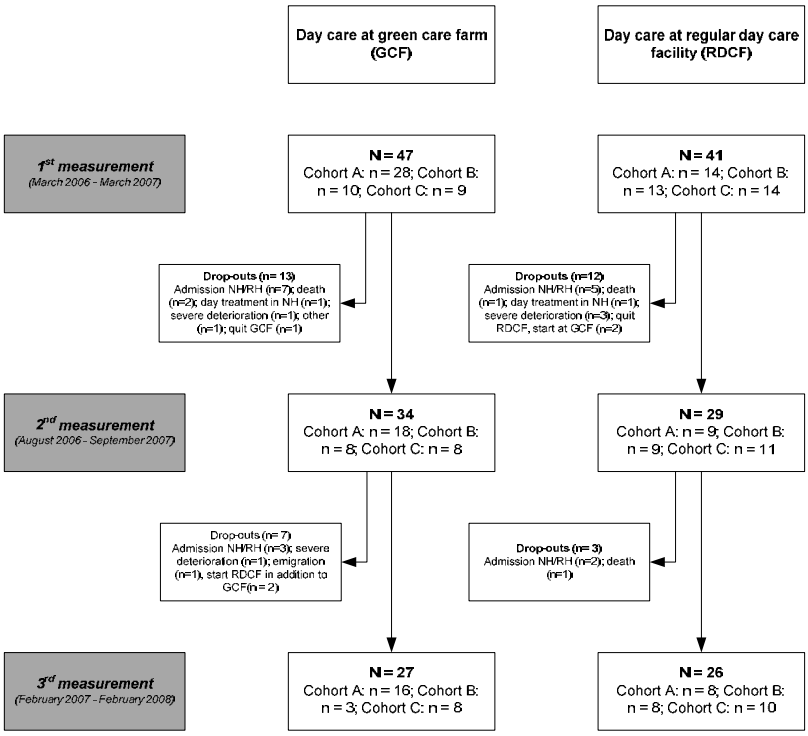

Figure 2. Flow-chart of the course of the study. Cohort A: subjects about to start or recently started with day care at GCF or RDCF; cohort B: subjects participating in day care at GCF or RDCF since approximately 6 months; cohort C: subjects participating in day care at GCF or RDCF since approximately 12 to 24 months.

Emotional well-being

Overall, the subjects experienced a relatively high emotional well-being. In all but two of the subjects, emotional well-being did not change significantly over time. Rate of change in self-rated fitness within cohort A was the only parameter on emotional well-being that significantly differed between the GCF and RDCF group (p=.009). All other rates of change did not differ significantly between both day care groups within any of the cohorts (Table 2a, 2b, 2c).

Number of clinically relevant behavioural symptoms

In all but one of the subjects, the number of clinically relevant behavioural symptoms did not change significantly over time. Rate of change in the number of clinically relevant behavioural symptoms did not differ significantly between the GCF and RDCF group within any of the cohorts (Table 2a, 2b, 2c).

Discussion

The present cohort study did not demonstrate differences in rates of change in cognitive functioning, emotional well-being and the number of behavioural symptoms between community-dwelling older people with dementia receiving day care at GCFs or at RDCFs. The only exception was the rate of change in perceived fitness within cohort A, where the difference between the GCF and RDCF group was statistically significant but not seemed to be clinically relevant.

Our findings with regard to the relative stability of subjects from GCFs and RDCFs and the lack of significant differences between them are not easy to interpret. This study was the first to compare both day care types, and comparison with other studies is consequently not possible. The relative stability of most subjects may imply that GCFs and RDCFs both do not affect cognitive functioning, emotional well-being and the number of behavioural symptoms. The present study did, however, not include subjects receiving no day care. It could therefore not be established whether socially oriented day care facilities included in this study, have an added value over no day care for these health outcomes, like medically oriented day care facilities[37,45,46]. Interestingly, however, subjects in all cohorts, generally did not significantly change in their cognitive functioning, emotional well-being and number of clinically relevant behavioural symptoms, regardless of their scores at study entry. This may imply that both day care types are able to affect functioning in these domains. So, assuming that day care at GCFs and RDCFs affect the health outcomes assessed in this study, our findings may then imply that GCFs are equally effective as RDCFs in maintaining cognitive functioning, emotional

Table 2a. Average change over 6 months in cognitive functioning, emotional well-being and number of clinically relevant behavioural symptoms of subjects within cohort A. Data shown as mean (±SD; median).

	GCF (n=16)	RDCF (n=8)	Z	p
Cognitive functioning (0 - 30)	-1.6 (±1.8; -1.2)	- 1.0 (±1.4; -0.9)	-0.7	.462
Emotional well-being				
Fitness (0 - 8)	-0.2 (±0.6; -0.2)	0.4 (±0.3; 0.6)	-2.6	**.009**
Joy of living (0 - 12)	0.1 (±0.6; 0.0)	0.6 (±0.8; 0.3)	-1.2	.244
Appetite and sleep (0 - 4)	0.0 (±0.2; 0.0)	0.0 (±0.6; 0.0)	-0.8	.398
Social contact (0 - 6)	0.3 (±0.6; 0.2)	0.3 (±0.4; 0.0)	-0.2	.819
Number of clinically relevant behavioural symptoms (0 - 12)	0.7 (±0.7; 0.7)	0.3 (±0.6; 0.3)	-1.7	.098

Table 2b. Average change over 6 months in cognitive functioning, emotional well-being and number of clinically relevant behavioural symptoms of subjects within cohort B. Data shown as mean (±SD; median).

	GCF (n=3)	RDCF (n=8)	Z	p
Cognitive functioning (0 - 30)	-2.1 (±1.6; -1.2)	-0.7 (±2.2; -0.6)	-1.2	.221
Emotional well-being				
Fitness (0 - 8)	0.2 (±0.3; 0.0)	0.1 (±0.4; 0.0)	-0.2	.813
Joy of living (0 - 12)	0.0 (±0.5; 0.0)	0.1 (±0.7; 0.0)	-0.6	.537
Appetite and sleep (0 - 4)	0.0 (±0.0; 0.0)	0.1 (±0.4; 0.0)	-0.7	.478
Social contact (0 - 6)	0.6 (±1.5; 0.0)	-0.1 (±0.7; 0.0)	-0.6	.539
Number of clinically relevant behavioural symptoms (0 - 12)	1.0 (±1.7; 0.0)	0.0 (±0.5; 0.0)	-0.6	.537

Table 2c. Average change over 6 months in cognitive functioning, emotional well-being and number of clinically relevant behavioural symptoms of subjects within cohort C. Data shown as mean (±SD; median).

	GCF (n=8)	RDCF (n=10)	Z	p
Cognitive functioning (0 - 30)	-0.8 (±1.7; -0.4)	0.3 (±1.4; 0.4)	-1.3	.183
Emotional well-being				
Fitness (0 - 8)	0.0 (±0.9; 0.0)	0.3 (±0.9; 0.0)	-0.7	.464
Joy of living (0 - 12)	0.3 (±0.8; 0.2)	0.2 (±0.5; 0.1)	-0.1	.929
Appetite and sleep (0 - 4)	0.2 (±0.5; 0.0)	0.2 (±0.5; 0.0)	-0.2	.874
Social contact (0 - 6)	0.0 (±0.6; 0.0)	-0.2 (±0.6; 0.0)	-1.2	.234
Number of clinically relevant behavioural symptoms (0 - 12)	-0.2 (±0.7; 0.0)	-0.3 (±1.2; 0.0)	-1.1	.272

well-being and preventing an increase in the number of clinically relevant behavioural symptoms. Explanations for GCFs not being more effective in maintaining or improving these health outcomes may be manifold. First, actual participation in activities positively related to health and functioning of dementia patients such as spending time outdoors, gardening, meal preparation, watching and feeding animals[16,22,47,48] at GCFs may haven been of too short duration to result into a different effect on the health outcomes assessed in the present study than RDCFs. Although subjects at GCFs may participate in a larger variety of meaningful activities, may be physically more active and more outdoors than subjects at RDCFs, the largest part of the day care program at GCFs and RDCFs is similar. In both day care settings older dementia patients participate a large part of the day in similar activities such as having meals together, having group conversations, playing games and resting.

Additionally, dementia patients in both day care settings are sitting and are indoors largest part of the day[12]. Differences between both day care settings may therefore have been too small to result into different effects on the health outcomes assessed. GCFs may therefore have to increase the frequency and/or duration of activities positively related to health and functioning of dementia patients to have an added value over RDCFs. Second, older dementia patients attended the day care facility on average 2 to 3 days of approximately 6 hours each per week. The largest part of the week they were at home. It is expected that these dementia patients were at home also involved in some meaningful activities that stimulated physical activity and that they also spent time outdoors. The possible effect of additional meaningful, physical and outdoor activities at the GCF may therefore have been overshadowed by activities performed at home.

Besides that our study is among few empirically testing the potential health benefits of day care at GCFs, it is also rather unique in assessing socially oriented day care facilities rather than medically oriented day care facilities assessed in other recent studies[37,45,46]. It further differs from other studies by including subjects with less cognitive impairment. Mean MMSE score at study entry in subjects in the present study population was at least 3 points higher than mean scores in the other study populations[45,46]. Moreover, this study included three cohorts of subjects with varying lengths of stay at the day care facility, whereas other studies only included subjects who recently started with day care[37,45,46]. Since day care at GCFs is a new care modality which has hardly been studied to date, many ideas about green care farming are consequently yet unsubstantiated assumptions. It was for example assumed that GCFs would particularly be attended by older people with an agricultural background. However, the present study indicates that the proportion of subjects with an agricultural background and with pets, either in the past or currently, was similar for the GCF and RDCF groups. This finding suggests that there is no relationship between these characteristics and the preferred day care type.

In line with literature, drop-out rates in the GCF and RDCF groups within the three cohorts, decreased according to the subjects' length of stay at the day care facility. Exception was the drop-out rate in the GCF group within cohort B. Literature suggests that community-dwelling dementia patients are either brief or sustained users of day care[31,32]. Brief use may be explained by institutionalization shortly after the start of the dementia patient with day care. Family caregivers may have become more aware of their level of stress once their relative has started with day care and may therefore be more willing to consider nursing home placement[31,32]. The present study showed that the percentage of brief day care users did not differ between GCFs and RDCFs.

More sustained use of day care may be explained by the fact that day care offers support and respite to family caregivers. They may therefore be longer able to take care of their relative which

results into delayed institutionalization, although evidence for this claim is inconsistent[32,49-51]. Differences between caregivers (e.g. relationship to dementia patient, well-being, feelings of role captivity) and dementia patients (e.g. level of impairment) are suggested to be responsible for differences in the length of time day care is used[31]. The present study showed that the more sustained users of day care (i.e. the subjects within cohort B and C), hardly changed in their cognitive functioning, emotional well-being and the number of clinically relevant behavioural symptoms, which was also observed for the subjects within cohort A.

Cognitive functioning, emotional well-being and the number of clinically relevant behavioural symptoms of the subjects that dropped-out from the study, were compared with functioning in these domains of subjects completing the study to gain insight into selective attrition. As most subjects dropped-out before the second measurement, no rates of change could be obtained from these subjects. However, it was found that subjects lost to follow-up generally did not differ significantly in cognitive functioning, emotional well-being and the number of behavioural symptoms at study entry from those who completed the study.

Some critical remarks can be made regarding this study. This cohort study was an observational study; subjects had already made a choice for a day care setting at study entry. Composition of the groups could therefore not be controlled. Consequently, the two day care groups significantly differed in gender, age, and marital status. As the proportion of subjects lost to follow-up was high (40%), no parametric tests could be used to adjust for these possible confounders. However, as none of the health outcomes differed between both day care groups within the three cohorts at study entry, comparing the groups despite differing in some demographic characteristics may be justified. It should, however, be noted that generalizibility of the present study's findings may be limited as the low number of completers may not cover the variety in cognitive decline and prevalence of psychological and behavioural symptoms in this population[1,2,4,52,53].

We should further acknowledge that our choice for the Depression List may not have been optimal. Several tools are available to assess aspects of emotional well-being (e.g. depression, life satisfaction, perceived social support, mood) in dementia patients. Of these tools the Dementia Quality of Life Questionnaire[54,55] is more often used in research among people with dementia[37,56]. In our pilot study we observed that subjects experienced difficulties in answering the 5-options questions of the Dementia Quality of Life Questionnaire. Therefore the Depression List was selected as it included statements with only 3 options (never; sometimes; always)[39]. Although the use of the Depression List is less often described in literature, advantages were the availability in Dutch, the relatively short length (15 items) and the inclusion of both positive and negative feelings. However, the Depression List may not have been sensitive enough to capture change at follow-up.

In view of the presented differences in demographic characteristics between the GCF and RDCF populations, for future research we recommend studies with a more controlled and experimental character. Since the start of our study, the number of GCFs for older people with dementia has increased[33]. It may therefore be less complicated to use a design such as a matched-pairs design, as there will be more subjects receiving day care at GCFs who can be matched on e.g. gender and age with subjects receiving day care at RDCFs. Larger numbers of subjects may in addition better cover the heterogeneity in characteristics of this population. It is additionally recommended to consider inclusion of dementia patients receiving no day care, to be able to establish whether day care at socially oriented day care facilities has an added value over no day care.

It is further recommended to explore possibilities for complementing self-reported emotional well-being with other measures, such as observations. Observing different subjective well-being indicators, such as pleasure, engagement, interest and sustained attention, sadness, self-esteem, and negative affect[57] at the day care facility may give insight into well-being associated to activities and services offered there. Since services and activities are different for GCFs and RDCFs, differences in these well-being indicators may be expected.

It is finally recommended to determine the reason for GCFs enrolling few female older people with dementia. Relevant care institutions may not be familiar with this day care alternative or may assume that GCFs are most suitable for men. It is of interest to all older people with dementia and their caregivers, that they are well informed about the different day care types, in order to make their own choice for the day care type that suits their preferences and interests best.

Conclusion

This cohort study showed that cognitive functioning, emotional well-being and the number of behavioural symptoms remained relatively stable in community-dwelling older people with dementia attending 2 to 3 days of day care per week. Hardly any differences were found between subjects from GCFs and RDCFs in the rates of change in these health outcomes. On the basis of this study we therefore conclude that GCFs and RDCFs are equally effective in maintaining cognitive functioning, emotional well-being and preventing an increase in the number of clinically relevant behavioural symptoms. Since the number of GCFs is increasing, and also the number of dementia patients is growing, further research on this new care modality is of importance to clarify its value for this target group.

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Comparing day care at GCFs and at RDCFs with regard to their effects on functional performance of community-dwelling older people with dementia

6

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ABSTRACT | Day care at green care farms (GCFs) is a new care modality for community-dwelling older people with dementia. In view of the more physical and normal daily life activities available at GCFs than at RDCFs, we investigated whether functional decline differed between subjects from both day care settings. In this observational cohort study, primary caregivers of 47 subjects from GCFs and 41 subjects from RDCFs rated the subjects' functional performance three times during 1 year. They also provided information on the subjects' diseases and medication use. Generally, no significant change over time in functional performance, the number of diseases and the number of medications was observed, and no differences in these rates of change were found between subjects from both day care settings. This study suggests that GCFs are not more effective in maintaining functional performance or slowing down its decline in community-dwelling older people with dementia than RDCFs.

Submitted for publication.

Introduction

Western societies are ageing[1]. Consequently, the number of dementia sufferers will increase dramatically in the next 50 years[2]. One of the domains affected by dementia is the patient's functional performance[3,4]. The associated morbidity, declining nutritional status, risk of fall incidents and decreased well-being may cause disability, earlier institutionalization and death[5-7].

Functional decline is commonly determined by assessing performance in basic activities of daily living (BADLs) and instrumental activities of daily living (IADLs). BADLs are basic, biologically necessary activities including feeding, toileting, ambulation and dressing. IADLs are more complex, cognitively demanding, activities including preparing meals, managing money and grocery shopping[3]. Longitudinal data indicate that disability in IADL performance develops early in the dementia process, and progresses during the course of the disease. Disability in BADL performance appears and progresses much later in dementia. As recovery from disability is uncertain and often short-lasting in this population[3,4], preventing or slowing down functional decline is of importance.

Growing evidence suggests regular physical activity (e.g. walking, household activities or exercise training) to maintain or improve functional performance of frail older people[8-11]. Adult day care facilities for community-dwelling older people with dementia often offer physical activities, exercise or rehabilitation programs[12,13], but so far, researchers were unable to show their effectiveness for functional performance[14-16].

Since about 10 years, a new type of day care facility has been developing in the Netherlands: day care at farms. Similar to regular day care facilities (RDCFs), these green care farms (GCFs) aim to realize a structured and meaningful day program for community-dwelling frail older people and offer respite care to family caregivers. Recent studies indicate that older people with dementia attending day care at GCFs are physically more active by making outdoor walks, feeding animals and gardening than their counterparts attending day care at a RDCF. Moreover, they are involved in more normal daily life activities such as dish washing and meal preparation[17,18]. Since no studies have assessed whether GCFs differ in their effect on functional performance from RDCFs, the aim of the present study was to compare longitudinal change in functional performance in community-dwelling older people with dementia who attend day care at GCFs or at RDCFs.

Methods

Design

This observational cohort study was performed between March 2006 and February 2008. Older people with dementia were recruited from 15 GCFs and 22 RDCFs in the Netherlands. Only GCFs

having frail older people as their main target group and offering day care to groups of 5 to 15 people per day were included in the study. The recruited RDCFs were mostly located in the same region as the GCFs to limit the possible impact of regional differences.

Settings

Green care farms

GCFs are farms that combine agricultural production with care services for people with care needs, including frail older people, mentally disabled people and psychiatric patients. Currently, there are over 900 GCFs in the Netherlands. About 10% of them offer day care for older people with dementia[19]. GCFs have a relatively home-like character. At GCFs, people can spend the day and, in addition to leisure and recreational activities, take part in normal home-like, farm-related and outdoor activities[18]. GCFs often cooperate with regular health care institutions. Their services are financed by the Dutch national insurance system[20]. Green care farming is not a typically Dutch phenomenon, it is also developing in other European countries including Norway, Italy, Austria and Belgium and the USA[21].

Regular day care facilities

RDCFs traditionally have a strong care orientation, related to the residential or nursing home environment in which they are often housed. They differ in their main focus which may be either socially or medically oriented. In the Netherlands, socially oriented facilities mainly offer social and (therapeutic) recreational activities and are mostly affiliated to a residential home, whereas medically oriented facilities offer medical treatment, rehabilitation and/or personalized therapeutic programs and are mostly affiliated to a nursing home[13,22,23]. The RDCFs assessed in the present study are socially oriented.

Subjects

Forty-seven subjects attended day care at GCFs and 41 subjects at RDCFs. For privacy reasons, contact persons at the participating GCFs and RDCFs, instead of the researchers, enrolled subjects and their primary caregivers in this study. Inclusion criteria were: 1. approval to attend day care, provided by Central Indication Committee for Care (CICC) assessing eligibility for day care; 2. dementia syndrome, according to report of CICC; 3. age ≥65 years; 4. living at home; 5. primary caregiver willing to participate in the study. Exclusion criteria were: 1. (history of) serious psychiatric problems not necessarily related to dementia and 2. participation in other scientific studies.

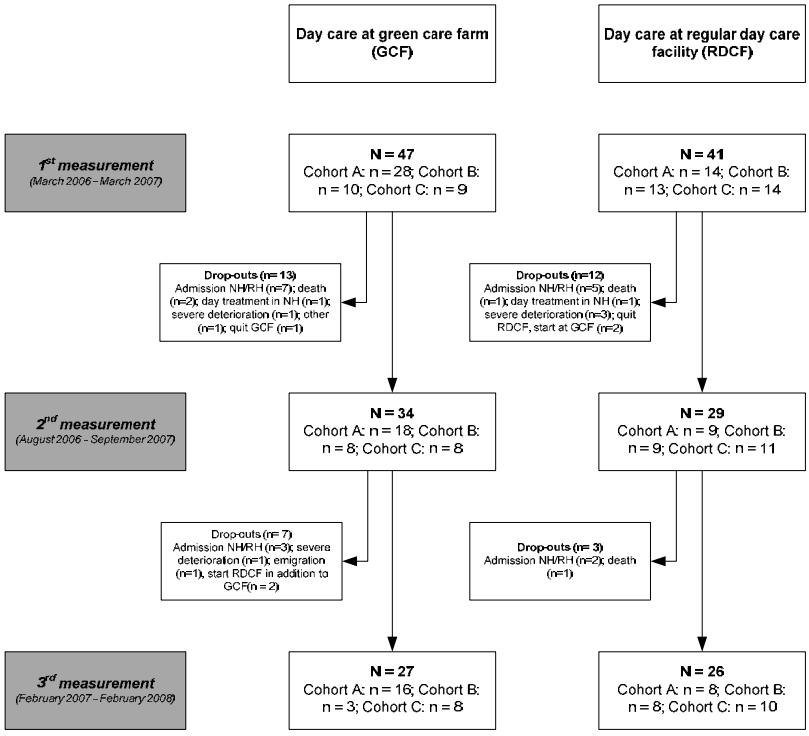

Figure 2. Flow-chart of the course of the study. Cohort A: subjects about to start or recently started with day care at GCF or RDCF; cohort B: subjects participating in day care at GCF or RDCF since approximately 6 months; cohort C: subjects participating in day care at GCF or RDCF since approximately 12 to 24 months.

Three cohorts (A, B, and C), were distinguished based on the subjects' length of stay at the day care facility. Cohort A, B, and C were subjects who, at the start of our study were about to start or had recently started (on average since 1.3 months) with day care; participated in day care since approximately 6 months; and participated in day care since approximately 12 to 24 months respectively. During the course of the study, 40% (n=35) of the subjects dropped out, mostly due to institutionalization. Once the subjects dropped-out, also their primary caregivers were excluded from the study (Figure 1). Informed consent was acquired from a primary caregiver of the subjects. The Medical Ethics Committee of Wageningen University approved the study protocol.

Data collection and procedures

Primary caregivers of the subjects were interviewed three times at their homes with 6 month intervals (at study entry, at 6 and 12 months follow-up). Except for 1 subject, primary caregivers

were family caregivers such as spouses or children. The interviews lasted approximately 2 hours[1] each and were performed by researchers of Wageningen University, Radboud University Nijmegen and Utrecht University. The researchers were trained by one of the authors (SdB) to standardize the interview procedures.

Measurements

Information on sex, age, number of months at the day care facility, number of days of day care per week, marital status, primary caregiver and duration of dementia were collected from the primary caregivers with a questionnaire used in the first interview. Duration of dementia was taken as the primary caregivers' estimate of time from onset of noticeable cognitive impairment to the first interview. The subjects' dementia type was retrieved from the report of the CICC. Cognitive functioning of the subjects was assessed by the Mini Mental State Examination (MMSE). Scores on the MMSE range from 0 to 30, with scores less or equal to 23 suggesting cognitive impairment[(24)].

The subjects' functional performance was rated by the primary caregivers by means of the Barthel Index (BI)[(25)] and the Interview for Deterioration in Daily living in Dementia (IDDD)[(26)]. The BI assesses the individual's performance on 11 BADLs. Scores range from total dependence (0) to total independence (100). The IDDD assesses the individual's performance on IADLs and comprises two subscales: the initiative and the required assistance subscale. Scores on the initiative subscale range from 0 to 36, with higher scores referring to more initiative to perform IADLs. Scores on the required assistance subscale range from 0 to 44, with higher scores referring to more required assistance to perform IADLs[(27)]. Data on co-morbidity and medication use, as related to the functional performance[(12,28)], were also recorded, and collected from the primary caregivers and the reports of the CICC.

Statistical analyses

Differences in characteristics between the GCF and RDCF groups within each cohort were tested by means of Fisher's Exact Test, Chi square test for independence and Mann-Whitney U test as appropriate. To explore longitudinal changes in functional performance, the number of diseases and the number of medications, for each individual who was interviewed three times, a linear regression model was estimated[(29)]. The regression coefficient is an indicator for the individual rate of change over time and was rescaled to obtain the individual change per 6 months. The individual rates of change were considered statistically significant at the $p \leq .025$ level to reduce the multiple testing

[1] During the interviews also information on other health outcomes (e.g. cognitive functioning, emotional well-being, behavioural symptoms) was collected from the subjects and their primary caregivers. These findings will be reported elsewhere.

effect. For each GCF and RDCF group within the three cohorts separately, the average rate of change in each of the parameters was determined. As data generally did not meet the assumptions of parametric techniques and the sizes of the GCF and RDCF groups within each of the cohorts were small, the Mann-Whitney U Test was used to determine whether rates of change in functional performance, number of diseases and number of medications differed between the GCF and RDCF groups within the three cohorts. Differences were considered significant at $p \leq 0.05$. All analyses were done using SPSS Statistics for Windows, release 17.0, 2008 (Chicago: SPSS Inc.).

Results

General characteristics subjects

Cohort A (starters)

Table 1a shows that the majority (82%) of subjects at GCFs within cohort A were male, whereas at RDCFs 14% of the subjects were of this gender ($p<.001$). The mean age of subjects at GCFs was lower than that at RDCFs (77.7 vs. 83.4 years) ($p=.006$), more subjects were married (93% vs. 43%) ($p=.001$) and consequently more subjects had a partner as their primary caregiver at home (93% vs. 43%) ($p=.001$). Furthermore, the IADL performance in terms of required help was lower in subjects at GCFs than at RDCFs ($p=.049$). No significant differences with regard to the other characteristics were observed between the two groups (Table 1a).

Cohort B (day care since 6 months)

Table 1b shows that all subjects at GCFs within cohort B were married and had a partner as their primary caregiver, whereas more than half of the subjects at the RDCFs were widowed and had (a combination of) others as their primary caregiver ($p=.007$ for both comparisons). Further, the estimated time since onset of noticeable cognitive impairment was significantly longer for the GCF group than for the RDCF group ($p=.040$). The other characteristics did not differ significantly between the two groups.

Table 1a. General characteristics of subjects within cohort A at study entry. Data shown as mean (±SD; median) or as frequency (percentage).

	Cohort A			
	GCF (n = 28)	**RDCF (n = 14)**	**Test statistic**	**p**
Sex				
Male	23 (82%)	2 (14%)	-	**<.001**
Female	5 (18%)	12 (86%)		
Age	77.7 (±5.2; 78.6)	83.4 (±5.8; 84.4)	$Z_{(n=41)} = -2.7$	**.006**
Number of months at day care facility	1.3 (±1.1; 1.2)	1.2 (±0.9; 1.4)	$Z_{(n=42)} = -0.1$	.894
Days of day care per week	1.8 (±0.7; 2.0)	2.1 (±0.9; 2.0)	$Z_{(n=42)} = -1.3$	.201
Marital status				
Married/cohabiting	26 (93%)	6 (43%)	-	**.001**
Widowed	2 (7%)	8 (57%)		
Primary caregiver				
Partner (+ others)	26 (93%)	6 (43%)	-	**.001**
(Combination of) others, not partner	2 (7%)	8 (57%)		
BADL performance (0-100)	90.7 (±16.2; 95.0)	82.2 (±19.1; 83.0)	$Z_{(n=40)} = -1.6$	.106
IADL performance				
Initiative (0-36)	15.6 (±7.5; 15.0)	17.8 (±9.7; 16.0)	$Z_{(n=40)} = -0.5$	.623
Required assistance (0-44)	23.7 (±8.4; 24.0)	20.1 (±7.8; 20.5)	$Z_{(n=41)} = -2.0$	**.049**
Number of diseases	1.9 (±1.2; 2.0)	1.6 (±0.9; 2.0)	$Z_{(n=42)} = -0.8$	.412
Medication use				
Total number of medications	4.0 (±4.0; 2.5)	2.9 (±2.3; 2.5)	$Z_{(n=42)} = -1.5$	.124
Use of psychotropic medications				
Yes	6 (21%)	2 (14%)	-	.697
No	22 (79%)	12 (86%)		
Number of psychotropic medications	0.4 (±0.9; 0.0)	0.1 (±0.4; 0.0)	$Z_{(n=42)} = -0.6$	.532
Cognitive functioning (0-30)	19.5 (±5.6; 21.0)	20.5 (±5.3; 21.5)	$Z_{(n=42)} = -0.3$	.748
Dementia type				
Alzheimer's Disease	10 (36%)	5 (36%)	$\chi^2_{(3, 41)} = 2.4$	.496
Vascular Dementia	3 (11%)	1 (7%)		
Other	4 (14%)	0 (0%)		
Cognitive impairment, not specified	11 (39%)	8 (57%)		
Estimated duration of dementia (years)	3.1 (±1.8; 3.0)	3.6 (±2.3; 4.0)	$Z_{(n=31)} = -0.7$	.469

Cohort C (day care since 12-24 months)

There were no statistical differences between the two day care groups within cohort C in any of the general characteristics (Table 1c).

Longitudinal change in BADL performance

At the start of the study, the average BADL dependence was small (ranging from 82 to 91) in all cohorts. Table 2a, 2b, and 2c show the 6 month change in BADL dependence in the subjects within cohort A, B and C respectively. In all but one subject, BADL performance did not change significantly over time. Average rates of change in BADL performance did not differ significantly between the two day care groups within the three cohorts.

Table 1b. General characteristics of subjects within cohort B at study entry. Data shown as mean (±SD; median) or as frequency (percentage).

	Cohort B			
	GCF (n = 10)	RDCF (n = 13)	Test statistic	p
Sex				
Male	7 (70%)	6 (46%)	-	.402
Female	3 (30%)	7 (54%)		
Age	75.4 (±7.5; 76.0)	82.0 (±7.2; 81.0)	$Z_{(n=23)} = -1.9$	.058
Number of months at day care facility	6.8 (±0.8; 6.7)	6.1 (±1.5; 5.9)	$Z_{(n=23)} = -1.2$	.238
Days of day care per week	2.5 (±1.3; 2.5)	1.9 (±0.7; 2.0)	$Z_{(n=23)} = -1.1$	.272
Marital status				
Married/cohabiting	10 (100%)	6 (46%)	-	**.007**
Widowed	0 (0%)	7 (54%)		
Primary caregiver				
Partner (+ others)	10 (100%)	6 (46%)	-	**.007**
(Combination of) others, not partner	0 (0%)	7 (54%)		
BADL performance (0-100)	88.5 (±17.7; 96.5)	87.9 (±17.2; 91.0)	$Z_{(n=23)} = -0.7$	.492
IADL performance				
Initiative (0-36)	14.7 (±8.4; 13.0)	18.6 (±7.9; 22.0)	$Z_{(n=22)} = -1.1$	.275
Required assistance (0-44)	24.8 (±10.5; 23.0)	21.3 (±9.5; 19.0)	$Z_{(n=22)} = -0.8$	.448
Number of diseases	2.2 (±1.4; 2.5)	2.4 (±1.4; 2.0)	$Z_{(n=23)} = -0.3$	.800
Medication use				
Total number of medications	4.9 (±3.5; 4.5)	3.9 (±2.4; 3.0)	$Z_{(n=23)} = -0.5$	.589
Use of psychotropic medications				
Yes	3 (30%)	6 (46%)	-	.669
No	7 (70%)	7 (54%)		
Number of psychotropic medications	0.4 (±0.7; 0.0)	0.5 (±0.7; 0.0)	$Z_{(n=23)} = -0.6$	.518
Cognitive functioning (0-30)	20.2 (±7.1; 21.5)	21.4 (±4.0; 23.0)	$Z_{(n=23)} = -0.2$	.803
Dementia type				
Alzheimer's Disease	5 (50%)	4 (31%)	$\chi^2_{(3, 23)} = 3.0$	.385
Vascular Dementia	1 (10%)	0 (0%)		
Other	1 (10%)	1 (8%)		
Cognitive impairment, not specified	3 (30%)	8 (62%)		
Estimated duration of dementia (years)	4.7 (±2.5; 3.5)	2.9 (±2.0; 2.0)	$Z_{(n=21)} = -2.1$	**.040**

Longitudinal change in IADL performance

At the start of the study, the average IADL performance was moderate in all cohorts. The average initiative scores ranged from 14 to 19 over the three cohorts, and the average required assistance scores ranged from 20 to 25. In all but three subjects, initiative scores did not change significantly over time. Required assistance scores did not change significantly in any of the subjects. Average rates of change in IADL performance did not differ significantly between the two day care groups within the three cohorts (Table 2a, 2b, 2c).

Longitudinal change in number of diseases and medications

At the start of the study, the average number of diseases in the GCF groups within each of the cohorts was approximately 2. Most frequent diseases were cardiovascular diseases such as hypertension and heart failure (present in 60% to 70% of the subjects), diseases of the sense organs including vision and hearing problems (present in 29% to 50% of the subjects), and endocrine diseases such as diabetes and hyperthyroidism (present in approximately 30% of the subjects).

In the RDCF group within cohort A, the average number of diseases was 1.6, whereas this number was approximately 2.5 in the RDCF groups within cohort B and C. Most frequent diseases were cardiovascular diseases (present in circa 43% of the subjects in cohort A, and in circa 70% of the subjects in cohort B and C), musculoskeletal diseases such as rheumatism and hip injuries (present in 40% to 50% of the subjects), and in cohort C in addition diseases of the sense organs (50%) and pulmonary diseases such as COPD and pneumonia (36%).

Average medication use varied from 4 to 5 medications in all GCF groups and from 3 to 4 medications in all RDCF groups. A minority of the subjects used psychotropic medication. Average psychotropic medication use was in all groups equal to or less than 0.5.

In all but one subject, the number of diseases and the number of medications did not change significantly over time. The number of psychotropic medications did not change significantly in any of the subjects. Average rates of changes in the number of diseases and medications did not differ significantly between the two day care groups within the three cohorts (Table 2a, 2 b, 2c).

Table 1c. General characteristics of subjects within cohort C at study entry. Data shown as mean (±SD; median) or as frequency (percentage).

	Cohort C			
	GCF (n = 9)	**RDCF (n = 14)**	**Test statistic**	**p**
Sex				
Male	7 (78%)	5 (36%)	-	.089
Female	2 (22%)	9 (64%)		
Age	79.0 (±4.6; 78.1)	82.8 (±6.6; 81.7)	$Z_{(n=23)} = -1.5$	.137
Number of months at day care facility	18.1 (±7.0; 15.6)	15.9 (±6.2; 12.7)	$Z_{(n=23)} = -1.1$	.284
Days of day care per week	2.7 (±1.2; 2.0)	2.4 (±1.0; 2.0)	$Z_{(n=23)} = -0.4$	.713
Marital status				
Married/cohabiting	6 (67%)	6 (43%)	-	.400
Widowed	3 (33%)	8 (57%)		
Primary caregiver				
Partner (+ others)	5 (56%)	6 (43%)	-	1.000
(Combination of) others, not partner	4 (44%)	8 (57%)		
BADL performance (0-100)	87.2 (±12.8; 89.0)	84.9 (±15.5; 87.5)	$Z_{(n=23)} = -0.3$	.800
IADL performance				
Initiative (0-36)	14.4 (±8.4; 16.0)	18.1 (±9.0; 15.0)	$Z_{(n=22)} = -0.7$	.504
Required assistance (0-44)	22.7 (±9.0; 22.0)	22.1 (±9.2; 23.5)	$Z_{(n=23)} = -0.1$	.900
Number of diseases	2.3 (±1.2; 3.0)	2.6 (±1.2; 2.0)	$Z_{(n=23)} = -0.3$	.769
Medication use				
Total number of medications	4.4 (±3.3; 5.0)	3.9 (±2.2; 4.0)	$Z_{(n=23)} = -0.4$	.703
Use of psychotropic medications				
Yes	2 (22%)	4 (29%)	-	1.000
No	7 (78%)	10 (71%)		
Number of psychotropic medications	0.3 (±0.7; 0.0)	0.3 (±0.5; 0.0)	$Z_{(n=23)} = -0.2$	.869
Cognitive functioning (0-30)	22.3 (±4.3; 24.0)	20.6 (±5.9; 21.5)	$Z_{(n=23)} = -0.6$	.569
Dementia type				
Alzheimer's Disease	2 (22%)	4 (29%)	$\chi^2_{(3, 23)} = 3.1$	.383
Vascular Dementia	3 (33%)	1 (7%)		
Other	0 (0%)	1 (7%)		
Cognitive impairment, not specified	4 (44%)	8 (57%)		
Estimated duration of dementia (years)	3.8 (±2.1; 3.0)	3.5 (±2.9; 3.0)	$Z_{(n=22)} = -0.5$	.590

Table 2a. Average change over 6 months in BADL performance, IADL performance, number of diseases and medication use in subjects within cohort A. Data shown as mean (±SD; median).

	GCF (n = 16)	RDCF (n = 8)	Z	p
BADL performance (0-100)	-6.4 (±11.5; -3.8)[1]	-0.8 (±6.8; -2.9)[3]	-0.6	.551
IADL performance				
Initiative (0-36)	-2.8 (±2.9; -3.6)	-3.1 (±2.0; -3.7)[3]	0.0	1.000
Required help (0-44)	3.3 (±2.9; 3.5)[2]	4.2 (±3.4; 4.8)	-1.0	.302
Total number of diseases	0.3 (±0.5; 0.2)	0.3 (±0.4; 0.0)	0.0	.974
Medication use				
Total number of medications	0.2 (±0.8; 0.0)	0.5 (±0.8; 0.3)	-1.3	.198
Number of psychotropic medications	0.0 (±0.3; 0.0)	0.0 (±0.0; 0.0)	0.0	1.000

Notes: 1. n=14; 2. n=15; 3. n=7 due to missing data.

Table 2b. Average change over 6 months in BADL performance, IADL performance, number of diseases and medication use in subjects within cohort B. Data shown as mean (±SD; median).

	GCF (n = 3)	RDCF (n = 8)	Z	p
BADL performance (0-100)	-3.0 (±6.7; 0.0)	0.0 (±5.7; 0.8)	-0.6	.537
IADL performance				
Initiative (0-36)	-3.0 (±4.7; -3.4)	-0.9 (±4.4; -0.4)[1]	-0.6	.569
Required help (0-44)	0.2 (±0.3; 0.0)	1.2 (±4.1; -0.3)	-0.4	.683
Total number of diseases	0.2 (±0.3; 0.0)	0.2 (±0.6; 0.0)	-0.6	.545
Medication use				
Total number of medications	0.8 (±1.4; 0.0)	-0.3 (±2.0; -0.3)	-1.3	.199
Number of psychotropic medications	0.2 (±0.4; 0.0)	-0.1 (±0.2; 0.0)	-1.5	.130

Notes: 1. n=7 due to missing data.

Table 2c. Average change over 6 months in BADL performance, IADL performance, number of diseases and medication use in subjects within cohort C. Data shown as mean (±SD; median).

	GCF (n = 8)	RDCF (n = 10)	Z	p
BADL performance (0-100)	-2.2 (±7.7; -1.1)	-1.7 (±3.2; -1.0)	-0.1	.893
IADL performance				
Initiative (0-36)	-0.5 (±4.7; 0.0)[1]	-2.3 (±2.1; -2.6)[2]	-1.0	.315
Required help (0-44)	2.3 (±5.8; 3.3)[1]	2.3 (±3.2; 2.7)	0.0	1.000
Total number of diseases	0.2 (±0.5; 0.0)	0.3 (±0.4; 0.0)	-0.4	.672
Medication use				
Total number of medications	0.1 (±1.0; 0.0)	0.5 (±0.8; 0.3)	-0.7	.497
Number of psychotropic medications	0.2 (±0.3; 0.0)	0.0 (±0.2; 0.0)	-1.0	.338

Notes: 1. n=7; 2. n=9 due to missing data.

Discussion

The present study is one of few evaluating the effectiveness of day care facilities for functional performance of older people with dementia. The present study included socially oriented day care facilities and its duration was 12 months. Other recent studies on the effectiveness of day care facilities for functional performance included medically oriented day care facilities and their duration varied from 2 to 9 months[14-16]. In addition, the present study included three cohorts of subjects with varying lengths of stay at the day care facility at study entry, whereas the other studies only included subjects who recently started with day care. Regardless of follow-up period, functional performance

declined slightly in the subjects included in the studies evaluating the effectiveness of medically oriented day care facilities. Interestingly, functional performance declined slightly in subjects receiving medically oriented day care and in subjects receiving no day care at all[14-16]. The slight decline in functional performance observed in these studies is in line with the rate of change of functional performance in the present study. In addition, despite that activities at GCFs are considered as more stimulating and require more physical effort than those at RDCFs[17,18], no significant differences were found between the rates of change in functional performance, the number of diseases, and the number of medications between subjects receiving day care at GCFs or at RDCFs. A reason for the lack of difference between groups from both settings may be that activities at GCFs such as making outdoor walks, feeding animals, gardening, and meal preparation[17,18] are not offered frequent or long enough to benefit functional performance more than activities provided at RDCFs. However, our findings together with those from the other recent studies may also imply that medically and socially oriented day care facilities are both not able to affect functional performance in older people with dementia at all.

A first reason may be that day care facilities offer services to people who live in the community. It is likely that the older people are involved in household activities or come outside for e.g. going shopping, taking a walk, or visiting family and friends. Literature suggests that such activities are related to functional performance of frail older people[11,30]. The possible effect of additional activities at a day care facility may therefore be overshadowed by activities performed at home. If day care facilities intend to benefit functional performance and to have an added value over no day care, the type, intensity and frequency of their activities and programs may need reconsideration.

A second reason given for the lack of a beneficial effect of day care for functional performance is that functional impairment, due to cognitive impairment and/or (chronic) diseases when starting with day care, is too severe to be affected by services offered[14,16]. However, it remains to be seen whether this explanation also applies to socially oriented day care facilities. In the present study population impairment at study entry was not severe. Its MMSE score was at least 3 points higher than mean scores in the other study populations[15,16]. Also our study population's functional impairment was less severe; the BADL impairment was small and IADL impairment was moderate. The present study did not include subjects receiving no day care. It can therefore not be established whether socially oriented day care facilities, like the GCFs and RDCFs in this study, have an added value over no day care in an earlier stage of the dementia process.

Some critical remarks can be made regarding this study. First, the study was an observational study with cohorts of older people with dementia receiving day care. The composition of the groups under study could therefore not be controlled. Consequently, the two day care groups could differ

significantly in gender, age and marital status. However, although these factors are related to functional performance[31-36], hardly any differences in functional performance were observed between both groups within the three cohorts at study entry. This may justify comparing longitudinal change between subjects from both day care settings, although differing in some demographic characteristics.

Second, enrolling sufficient participants for the study was difficult. The percentage of people that could not be included for reasons varying from ineligibility, upcoming institutionalization, no interest and too much expected burden related to participation was high (~45%). Also the drop-out rate was high (40%), which resulted in a low number of subjects completing the study (n=53). The drop-out rate was, however, similar to other studies focusing on dementia patients with more than 3 months follow-up[16,37].

Third, the functional performance that was rated by the subjects' primary caregivers, may have been susceptible to caregiver bias[38]. Functional performance would ideally be assessed by direct observation of dementia patients[39]. However, the time-consuming aspect of this method[40], the expected burden for the subjects and their family caregivers and the recent indications for a reasonable accuracy of family caregiver ratings[41] may justify the use of informant-based assessment tools.

Fourth, actual disability and non-performance of IADLs due to traditional gender roles could not be rated separately with the IDDD. As a result, at study entry the initiative of the male subjects may have been underestimated whereas the required assistance may have been overestimated. This may also explain the observed significant difference in the required assistance scores of the GCF and RDCF group within cohort A. The IDDD was selected for its focus on community-dwelling older people with dementia and its distinction between initiative and actual performance of IADLs[27]. The developers of the IDDD intended to take gender differences in the performance of household activities into consideration. However, we noticed that the IDDD includes several IADLs, such as housekeeping, grocery shopping and meal preparation, that were traditionally not performed by the male subjects in the present study population.

In view of the present differences in demographic characteristics between the GCF and RDCF populations, for future research we recommend studies with a more controlled and experimental character. Since the start of our study, the number of GCFs for older people with dementia have increased[19]. It may therefore be less complicated to use a design such as a matched-pairs design, as there will be more subjects receiving day care at GCFs who can be matched on gender and age, for example, with subjects receiving regular day care.

It is also recommended to assess subjective well-being parameters. There are indications that older people with dementia at GCFs participate in a larger variety of activities than their counterparts at RDCFs[17,18]. The household and farm-related activities at GCFs may be more meaningful for the older people than the recreational and leisure activities offered at RDCFs, and may therefore increase their pleasure, interest and self-esteem[42]. Insight into these subjective well-being indicators may be obtained by observing the subjects at the day care facility[43].

In line with the more client-centred approach in health care, it is further recommended to explore ways to measure clinical relevant outcomes of day care on the individual level, by using e.g. Goal Attainment Scaling. By setting individual goals and taking into account individual needs, this method may be more sensitive to capture clinically important change related to receiving day care than standard assessment tools[44,45].

Finally, it is recommended to determine the reason for GCFs enrolling few female older people with dementia. Relevant care institutions may not be familiar with this day care alternative or may assume that GCFs are most suitable for men. It is of interest to all older people with dementia and their caregivers, that they are well informed about the different day care types, in order to make their own choice for the day care type that suits their preferences and interests best.

Conclusion

This observational cohort study shows that functional performance did not significantly change in a 1-year period in community-dwelling older people with dementia attending 2 to 3 days of day care per week. The expected difference in effects between GCFs and RDCFs could not be shown. However, this new day care type is a relevant addition to the current care modalities for community-dwelling older people with dementia as it fits developments in the chronic care sector in which non-pharmacological interventions are becoming more and more important.

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Caregiver burden in family caregivers of dementia patients attending day care at GCFs or at RDCFs

7

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ABSTRACT | Day care at green care farms (GCFs) is a new type of respite intervention for family caregivers taking care of a demented relative. This cohort study examined rates of change in quality of life, emotional distress, and feelings of competence of family caregivers of dementia patients receiving day care at GCFs or at regular day care facilities (RDCFs). Forty-six caregivers of dementia patients receiving day care at GCFs and 41 caregivers of dementia patients receiving day care at RDCFs were included, of whom 50 (25 from both settings) completed the study. Data were gathered at study entry, at 6 and at 12 months follow-up by interviewing the caregivers. Family caregivers of dementia patients receiving day care at GCFs were mostly spouses whereas those of dementia patients receiving day care at RDCFs were mostly children (in law). Generally, no significant change over time was observed in quality of life, emotional distress and feelings of competence of family caregivers of dementia patients from both day care settings. The results imply that both day care types prevent a significant increase in caregiver burden over time. Day care at GCFs is an important addition to longer existing respite services, at present particularly for spousal caregivers.

Submitted for publication.

Introduction

Western societies are ageing[1]. Consequently, the number of dementia sufferers will increase dramatically in the next 50 years[2]. Almost two-thirds of dementia patients in the Netherlands live at home. They are supported by family caregivers, mostly spouses and children[3]. Day-to-day care for a relative with dementia is extremely demanding and stressful for family caregivers[4,5], and may lead to depression and other mental health problems, physical morbidity, poor quality of life, and mortality[6-9]. Moreover, caregiver burden is a major determinant of institutionalization of the dementia sufferers[10,11]. Several predictors of caregiver burden have been documented in literature[12], such as the female gender, caregiver's effectiveness to cope with and adapt to caregiving demands[13,14], close kinship, co-residence with the dementia patient, and behavioural disturbances in the dementia patient[6-8,12,15]. Over the years, different types of respite interventions have been developed for family caregivers. These interventions, aiming at providing support and relief, include in-home respite care, short-stay institutional respite, special holiday arrangements, and adult day care[16,17]. This paper focuses on adult day care facilities.

Day care facilities aim to realize a structured and meaningful day program for the demented. They additionally offer respite care to family caregivers by taking care of their demented relatives for on average 2 or 3 days per week[18,19]. In the Netherlands, about 45,000 frail older people receive yearly day care[20]. Adult day care programs may vary considerably across sites, but can roughly be classified into mainly socially oriented and mainly medically oriented programs[18,21]. The focus of this paper is on socially oriented day care facilities. In the Netherlands, socially oriented day care is offered in two types of setting: at facilities that are mostly affiliated to residential homes, subsequently referred to as regular day care facilities (RDCFs), and at farms, subsequently referred to as green care farms (GCFs). Day care at GCFs is relatively new, and is provided to frail older people since approximately 2000. About 10% of the more than 900 GCFs in the Netherlands offer day care to older dementia patients[22]. In 2005, approximately 900 older people, including those with dementia, attended day care at a GCF[23]. The number of GCFs is still increasing in the Netherlands, but also in other European countries including Norway, Italy, Austria, and Belgium and in the United States of America[24]. The setting in which day care is provided differs between GCFs and RDCFs. Day care at RDCFs is provided in an institutional setting, whereas day care at GCFs is provided in a more home-like (farm) setting. At RDCFs, mainly recreational and leisure activities (e.g. crafts, games, reading newspaper) are offered that are mostly performed indoors. At GCFs, in addition to the more conventional day care activities, several normal daily life activities are offered such as feeding and watching animals, gardening, and meal preparation. A large proportion of the activities is performed

outdoors[19]. More detailed information on differences between GCFs and RDCFs is available in De Bruin et al.[25,26].

The majority of dementia patients attending day care at GCFs are married males who are on average younger than the mostly widowed female dementia patients attending day care at RDCFs. As a consequence, family caregivers of dementia patients receiving day care at GCFs are mostly spouses whereas family caregivers of dementia patients receiving day care at RDCFs are mostly children (in law)[27,28]. The aim of the present study was to describe the rate of change in caregiver burden over a 1-year period in family caregivers taking care of community-dwelling older dementia patients receiving day care at either GCFs or at RDCFs. No comparisons were made between family caregivers of dementia patients from both day care settings since it is suggested that taking care of a demented relative affects spousal and non-spousal caregivers in a different way. Literature is, however, contradicting in stating for which caregiver type burden is highest. It is suggested that caregiver burden is higher in spouses than in children[6,29,30]. However, other studies suggest that caregiver burden is higher in children than in spouses[5,31] or is comparable for both caregiver types[32,33].

Methods

Design and procedures

This study is part of a 1-year cohort study evaluating the effectiveness of day care for health outcomes of dementia patients and their family caregivers. The study was conducted between March 2006 and February 2008. Dementia patients and their family caregivers were enrolled via 15 GCFs and 22 RDCFs in the Netherlands. They were included if the dementia patients had: 1. an approval to attend day care, provided by the Central Indication Committee for Care (CICC) assessing eligibility for day care; 2. dementia syndrome, according to report of CICC who in line with national guidelines receives diagnostic information from relevant physicians[34]; 3. an age ≥65 years. Forty-six caregivers of dementia patients receiving day care at GCFs and 41 caregivers of dementia patients receiving day care at RDCFs were included. Characteristics of the family caregivers and their demented relatives are presented in Table 1.

Three cohorts (A, B, and C) of family caregivers were distinguished based on their demented relatives' length of stay at the day care facility. Family caregivers within cohort A cared for dementia patients who were about to start or recently started (on average 1.3 months ago) with day care; family caregivers within cohort B cared for dementia patients who participated in day care since

Table 1. General characteristics of family caregivers and their relatives with dementia attending day care at GCFs or at RDCFs. Data shown as mean (±SD, median) or as frequency (percentage).

Characteristics	GCF (n = 46)	RDCF (n = 41)
Family caregivers		
Sex of primary caregiver		
Male	6 (13%)	10 (24%)
Female	39 (85%)	29 (71%)
Combination of male and female caregivers	1 (2%)	2 (5%)
Relationship dementia patient		
Partner (+ other)	41 (89%)	18 (43%)
Son(s)/daughter (s) (in law)	5 (11%)	19 (57%)
Other	0 (0%)	4 (10%)
Dementia patients		
Sex		
Male	37 (80%)	13 (32%)
Female	9 (20%)	28 (68%)
Age	76.9 (±5.8)	82.2 (±6.4)
Marital status		
Married/cohabiting	42 (91%)	18 (44%)
Widowed	4 (9%)	23 (56%)
Number of months at day care facility	5.5 (±7.1; 2.6)	7.8 (±7.2; 5.9)
Days of day care per week	2.1 (±1.0; 2.0)	2.2 (±0.9; 2.0)
Cognitive functioning (0 - 30)[1]	20.3 (±5.7; 22.0)	20.8 (±5.1; 22.0)
Primary caregiver		
Partner (+ others)	40 (87%)	17 (41%)
(Combination of) others, not partner	6 (13%)	24 (59%)
Social network[2]		
Providers informal support other than primary caregiver		
Children	36 (78%)	37 (90%)
Brothers/sisters	22 (48%)	11 (27%)
Friends	13 (33%)	9 (22%)
Neighbours	9 (20%)	7 (17%)
Providers professional support		
General practitioner	26 (57%)	19 (46%)
Medical specialist	15 (33%)	5 (12%)
Home care organization	18 (39%)	30 (73%)
Mental health care organization	9 (20%)	2 (5%)
Others[3]	23 (50%)	8 (20%)

Notes: 1. Assessed by the Mini Mental State Examination (MMSE). Scores range from 0 to 30, with scores less or equal to 23 suggesting cognitive impairment[35]; 2. Most mentioned are reported; 3. Including support services for family caregivers, physiotherapists and volunteers.

approximately 6 months (on average 6.3 months); family caregivers within cohort C cared for dementia patients who participated in day care since approximately 12 to 24 months (on average 16.5 months). These cohorts were distinguished since they provided insight into three distinct periods of day care use by family caregivers. Cohort A was of interest since literature suggests that during the first months of day care use dropout is largest, probably related to the growing awareness among caregivers once using day care or other respite services of their level of stress which may make them to consider nursing home placement of their demented relative[21,36,37]. Burden of family caregivers whose demented relatives recently started with day care could be compared with characteristics of the more sustained users of day care in cohorts B and C.

To gain insight into rates of change in emotional distress, quality of life and feelings of competence, data were collected at study entry, at 6 and at 12 months follow-up. These measurements took place at the homes of the demented relatives of the family caregivers. During these visits in addition to information on caregiver burden also information was collected from the family caregivers and the dementia patients about health outcomes of the dementia patient. These findings will be reported elsewhere[27,38]. The visits were performed by researchers of Wageningen University, Radboud University Nijmegen and Utrecht University. The researchers were trained by one of the authors (SdB) to standardize the data collection procedure. The Medical Ethics Committee of Wageningen University approved the study protocol.

Instruments

To measure caregiver burden caregivers' quality of life, emotional distress, and feelings of competence were assessed. The researchers read the questions of the instruments used aloud, explained the answering format, and marked the answers of the family caregivers on the questionnaires. Caregivers rated their overall quality of life on a visual analogue scale ranging from 0 (worst imaginable quality of life) to 100 (best imaginable quality of life). Emotional distress was measured with the caregiver distress scale of the Neuropsychiatric Inventory (NPI)[39]. For each of the 12 behavioural symptoms possibly displayed by their demented relatives, caregivers rated the level of distress they experienced on a scale from 0 (none) to 5 (extreme). The total distress score is the sum of these 12 ratings[40]. Caregiver competence was measured with the Sense of Competence Questionnaire[41]. The scale comprises three subscales including statements on three domains of caregivers' feelings of competence to care for their demented relative: 1. consequences of involvement in care for the personal life of the caregiver (8 statements). Scores range from 0 to 40, with higher scores referring to less perceived consequences for the personal life; 2. satisfaction with one's own performance as a caregiver (12 statements). Scores range from 0 to 60, with higher scores referring to more satisfaction about one's performance; 3. satisfaction with the demented person as a recipient of care (7 statements). Scores range from 0 to 35, with higher scores referring to more satisfaction about the recipient of care. Each of the statements were rated on a 5 point scale from 1 (agree very strongly) to 5 (disagree very strongly).

Statistical analyses

To determine rates of change in quality of life, emotional distress and feelings of competence, for each caregiver who was interviewed three times, a linear regression model was estimated[42]. The regression coefficient is an indicator for the individual rate of change over time and was rescaled to

obtain the individual change per 6 months. Individual rates of change were considered statistically significant at the p≤0.025 level to reduce the multiple testing effect. For each cohort, and separately for family caregivers of dementia patients from both day care types, mean rates of change in each of the parameters were calculated. In two cases, the family caregivers of the dementia patients interviewed at study entry differed from those at follow-up. Data of these caregivers were therefore excluded from the calculations for change over time. As data generally did not meet the assumptions of parametric techniques and sizes of the cohorts were small, the Kruskal-Wallis Test was used to determine whether rates of change differed between the three cohorts within both day care settings. Differences were considered significant at p≤.050. All analyses were done using PASW Statistics 17, 2009 (Chicago: SPSS Inc.).

Results

Overall quality of life

At study entry, mean overall quality of life in family caregivers of dementia patients receiving day care at GCFs varied from 64 to 72 (Table 2). In all cohorts caregivers' overall quality of life did not change significantly over time. Quality of life at study entry and the rate of change did not differ significantly between cohorts (p=.348 and p=.325 respectively).

Mean quality of life at study entry in family caregivers of dementia patients receiving day care at RDCFs varied from 73 to 82 over the three cohorts (Table 3). In all but one caregiver, overall quality of life did not change significantly over time. Scores at study entry and the rate of change over time did not differ significantly between the three cohorts (p=.207 and p=.333 respectively).

Emotional distress

At study entry, mean emotional distress score of family caregivers of dementia patients receiving day care at GCFs was relatively low and varied from 9 to 11 (Table 2). Emotional distress did not change significantly over time in any of the caregivers. Emotional distress at study entry and its rate of change did not differ significantly between the cohorts (p=.554 and p=.263).

Emotional distress in family caregivers of dementia patients receiving day care at RDCFs was relatively low at study entry and varied from 3.5 to 7.5 over the cohorts (Table 3). Differences between the cohorts were not significant (p=.323). These scores did not change significantly over time, and did not differ significantly between the cohorts (p=.446).

Table 2. Quality of life, emotional distress and feelings of competence of family caregivers of dementia patients receiving day care at GCFs at study entry and its rate of change over 6 months. Data shown as mean (±SD; median).

	Cohort A		Cohort B		Cohort C	
	At study entry (n = 28)	Mean rate of change (n = 16)	At study entry (n = 10)	Mean rate of change (n = 2)	At study entry (n = 8)	Mean rate of change (n = 7)
Quality of life (0-100)	72.4 (±16.6; 80.0)[1]	-3.5 (±10.1; -5.0)	70.0 (±9.4; 70.0)	-7.9 (±4.6; -7.9)	63.8 (±20.7; 65.0)	0.5 (±5.7; 0.0)
Emotional distress (0-60)	11.3 (±7.2; 11.0)	1.6 (±4.1; 1.3)	9.0 (±9.3; 8.5)	1.8 (±5.2; 1.8)	10.0 (±9.3; 9.0)	-1.3 (±3.6; - 0.6)
Consequences of involvement in care for the personal life of the caregiver (0-40)	21.1 (±6.7; 20.5)	-0.1 (±3.2; -0.8)	20.1 (±9.2; 20.0)	-2.0 (±1.2; -2.0)	26.5 (±9.5; 22.5)	-1.5 (±3.5; -2.4)
Satisfaction with one's own performance as a caregiver (0-60)	48.6 (±8.0; 50.0)[1]	-0.9 (±3.4; -0.8)	51.0 (±7.8; 51.0)	3.5 (±7.3; 3.5)	45.9 (±9.1; 48.0)	-1.2 (±4.1; -1.7)
Satisfaction with demented person as care receiver (0-35)	29.8 (±4.8; 31.0)	-0.6 (±2.3; -0.9)	33.2 (±2.6; 35.0)[2]	0.5 (±0.7; 0.5)	28.1 (±7.6; 30.5)	-1.5 (±3.5; -2.0)

Notes: 1. n=27 due to missing data; 2. n=9 due to missing data.

Table 3. Quality of life, emotional distress and feelings of competence of family caregivers of dementia patients receiving day care at RDCFs at study entry and its rate of change over 6 months. Data shown as mean (±SD; median).

	Cohort A		Cohort B		Cohort C	
	At study entry (n = 14)	Mean rate of change (n = 8)	At study entry (n = 13)	Mean rate of change (n = 8)	At study entry (n = 14)	Mean rate of change (n = 9)
Quality of life (0-100)	82.3 (±15.5; 90.0)[1]	2.2 (±12.4; 5.8)	72.5 (±15.4; 80.0)[2]	5.4 (±6.8; 6.0)	76.7 (±17.1; 77.5)	0.8 (±7.6; -0.1)
Emotional distress (0-60)	7.4 (±7.0; 6.5)	0.1 (±2.3; 0.6)	6.0 (±5.6; 5.5)b	-0.9 (±2.0; -0.6)	3.5 (±3.5; 3.5)	0.1 (±1.7 0.0)
Consequences of involvement in care for the personal life of the caregiver (0-40)	26.8 (±9.2; 27.0)	-2.1 (±2.5; -1.6)	27.4 (±8.5; 25.0)	-2.0 (±3.5; -1.5)	26.4 (±7.6; 26.0)	-0.5 (±2.0; -0.3)
Satisfaction with one's own performance as a caregiver (0-60)	52.9 (±7.0; 54.5)[2]	-3.3 (±2.3; 3.2)	50.7 (±8.9; 51.0)	-2.5 (±3.9; -1.9)	51.4 (±6.1; 52.5)	-1.4 (±3.5; -0.7)
Satisfaction with demented person as care receiver (0-35)	30.9 (±4.2; 32.0)[1]	-0.7 (±2.5; -0.5)	31.3 (±3.4; 32.0)	-1.8 (±1.4; -1.7)	29.1 (±7.8; 31.5)	-0.2 (±2.3; -0.3)

Notes: 1. n=13 due to missing data; 2. n=12 due to missing data.

Feelings of competence

At study entry, satisfaction with one's own performance as a caregiver and with the demented person as a care receiver was relatively high in all cohorts consisting of family caregivers of dementia

patients receiving day care at GCFs (Table 2). No significant differences were observed between cohorts (p=.426 and p=.078 respectively). Except for one caregiver, satisfaction did not change significantly over time. No significant differences in the rates of change were observed between the three cohorts (p=.666; p=.650 respectively). The consequences of involvement in care for the personal life of the caregiver were considered moderately and did not differ between cohorts (p=.349). The perceived consequences of involvement did not change significantly over time, except for one caregiver. Rates of change did not differ significantly between cohorts (p=.526).

Also in the caregivers of dementia patients receiving day care at RDCFs, satisfaction with one's own performance as a caregiver and with the demented person as a care receiver was relatively high in all cohorts and did not differ significantly between them (p=.743 and p=.948 respectively) (Table 3). Except for one caregiver, satisfaction in all cohorts did not change significantly over time. Rates of change for both parameters did not differ significantly between cohorts (p=.581 and p=.285 respectively). The consequences of involvement in care for the personal life of the caregiver were considered small to moderate, and did not differ significantly between cohorts (p=.981). Except for one caregiver, caregivers did not experience a significant change of the consequences for their personal life over time. Rate of change did not differ significantly between cohorts (p=.416).

Loss to follow-up

During the study, 41% (n=35) of the family caregivers were lost to follow-up as their demented relatives dropped-out. Drop-out rates of the dementia patients in the three GCF cohorts were 43%, 80% and 13% for cohorts A, B, and C respectively. For the RDCF cohorts these rates were 43%, 38% and 29%. Eighty percent of the dementia patients dropped-out as they were admitted to a residential or nursing home or died. Reasons for institutionalization were mostly severe deterioration in the health status of the dementia patient and/or overburden of the caregivers. Deterioration was not necessarily related to dementia but could also be related to co-morbidities such as cardiovascular diseases or cancer.

Discussion

This study showed that both in family caregivers of dementia patients receiving day care at GCFs and in those of dementia patients receiving day care at RDCFs quality of life, emotional distress, and feelings of competence did not significantly change over time. In line with literature, drop-out rates in the GCF cohorts and RDCF cohorts decreased according to the length of stay of the dementia patients at the day care facility[36,37]. Exception was the drop-out rate in cohort B including family caregivers of dementia patients receiving day care at GCFs. Caregiver burden was not related to the

length of time day care was used by family caregivers and their demented relatives. Scores at study entry and rates of change did not differ significantly between the three cohorts of family caregivers of dementia patients from both day care settings. The finding that their demented relatives generally did not change significantly over time in their functioning may explain this[27,38]. Our findings alternatively suggest that both day care types are able to prevent a significant increase in caregiver burden over time. They support family caregivers in that way in continuing their caregiving role. This study did not include family caregivers not using day care as a respite service. It could therefore not be established whether caregiver burden would significantly increase over time if no day care would have been received. Studies of Zank and Schacke[43] and Baumgarten et al.[44] included caregivers whose relatives received either day care or no day care at all. In both groups subjective well-being and caregiver burden remained rather stable over time. Also in the study of Droës et al.[45] and Warren et al.[46] stress, subjective well-being, quality of life, general health status, and burden remained rather stable over time in family caregivers whose relatives attended day care. Such findings are, however, not confirmed by Zarit et al.[47], Gaugler et al.[48] and Mossello et al.[49]. They observed in their studies that caregiver burden, stress and depression decreased in caregivers whose relatives received day care, whereas these outcomes decreased less or even increased in caregivers whose relatives did not receive such services. Using day care by family caregivers has also been related to a reduction in caregiving hours. This may already considerably benefit family members without necessarily resulting into measurable effects on depression, stress, and caregiver burden[48,50]. Differences between studies on the effectiveness of day care for family caregivers regarding their design, indicators of caregiver burden, instruments, and proportions of spousal and non-spousal caregivers[43-45,47-49] may explain the inconsistent results reported with regard to benefits for family caregivers.

As indicated, for this study it was decided not to compare family caregivers of dementia patients from both day care settings. It is, however, noteworthy that quality of life and emotional distress were significantly lower and consequences of caring for the personal life were significantly higher ($p \leq .050$, data not shown) in family caregivers of dementia patients receiving day care at GCFs (mainly spouses) than in those of dementia patients receiving day care at RDCFs (mainly children). These findings are in line with those of Baumgarten et al.[6], Pinquart and Sorenson[30], and Zanetti et al.[29] who also observed higher caregiver burden in spousal than in non-spousal caregivers.

The 2 to 4 times higher proportion of spousal caregivers in the group of dementia patients receiving day care at GCFs than in the study populations of most other recent studies on day care is

Table 4. Characteristics of the present study population and of study populations described in other recent studies on adult day care.

		Characteristics caregivers				Characteristics dementia patients				
Authors	**Country**	**N**	**Gender**	**Kinship**	**Age**	**N**	**Gender**	**Marital status**	**Age**	**MMSE**
GCF group present study	The Netherlands	46	Male: 13% Female: 85% Male + female caregivers: 2%	Spouse: 89% Child (in law): 11%	-	46	Male: 80% Female: 20%	Married: 91% Widowed: 9%	77	20.3[1]
RDCF group present study	The Netherlands	41	Male: 24% Female: 71% Male + female caregivers: 5%	Spouse: 44% Child (in law): 46% Other: 10%	-	41	Male: 32% Female: 68%	Married: 44% Widowed: 56%	82	20.8[1]
Leitsch et al.[18]	USA	154	Male: 22% Female: 78%	Spouse: 58% Child: 37% Other: 5%	64	154	Male: 51% Female: 49%	-	78	-
Leitsch et al.[18]	USA	106	Male: 19% Female: 81%	Spouse: 29% Child: 59% Other: 12%	57	106	Male: 31% Female: 69%	-	78	-
Zank and Schacke[43]	Germany	20	Male: 15% Female: 85%	Spouse: 25% Child: 45% Other: 30%	55	43	Male: 21% Female: 79%	Married: 14% Widowed: 53% Other: 33%	79	16.3
Baumgaren et al.[44]	Canada	89	Male: 27% Female: 73%	Spouse: 25% Child: 47% Other: 28%	54	108	Male: 26% Female: 74%	-	76	-
Droës et al.[45]	The Netherlands *Day care in meeting centers*	73	-	Spouse: 63% Child (in law): 26% Other: 11%	-	73	Male: 58% Female: 43%	Married: 70% Widowed or single: 30%	77	-
	The Netherlands *Regular day care*	16	-	Spouse: 38% Child (in law): 44% Other: 19%	-	16	Male: 50% Female: 50%	Married: 44% Widowed or single: 56%	75	-
Schacke and Zank[51]	Germany	37	Male: 13% Female: 87%	Spouse: 32% Child: 57% Other: 11%	58	37	Male: 27% Female: 73%	-	80	12.7
Mossello et al.[49]	Italy	30	Male: 20% Female: 80%	Spouse: 33% Child: 50% Other: 17%	59	30	Male: 33% Female: 67%	Married: 33%	80	10.0
Zarit et al.[47]	USA	194	Male: 22% Female: 78%	Spouse: 38% Child: 49% Other: 13%	58	194	Male: 35% Female: 65%	-	78	-
Gaugler et al.[48]	USA	169	Male: 18% Female: 82%	Spouse: 41%	60	169	Male: 58% Female: 42%	-	79	-
McCann et al.[36]	USA	218	Male: 12% Female: 88%	Spouse: 21% Child: 66% Other: 13%	58	218	Male: 30% Female: 70%	Married: 24%	82	12.2

Note: 1. This was measured in one of our related studies[27].

interesting. Generally, the majority of dementia patients receiving day care has a non-spousal caregiver[43,44,48,49,51] (Table 4). A reason for this is that most day care participants are female, which is also shown in Table 4. Consistent with outliving men, almost two-thirds of community-dwelling women over age 65 is widowed and therefore do not have a spousal caregiver. It is further suggested that spouses are more reluctant to use day care services as turning the care of their spouse over to a

formal care provider may conflict with their feelings of obligation and affection. Such feelings may be less in children and/or others. Moreover, children are more likely to be employed than spousal caregivers. They may therefore easier decide to use adult day care for their parents to continue their work role[36,37,52]. The high proportion of male dementia patients at GCFs may be that farms more appeal to men than RDCFs. In one of our related studies it was found that almost two-thirds of dementia patients and their family caregivers indicated that day care at a GCF was a deliberate choice. Reasons given were their dislike of the institutional environment of RDCFs and of the activities offered there. They perceived activities at GCFs as more useful and meaningful. They additionally expected that at RDCFs dementia patients would have insufficient opportunities to be physically active and to go outdoors[53]. The fact that day care at GCFs apparently appeals to male dementia patients and their mostly spousal caregivers is of importance. Day care facilities aim to postpone institutionalization. It is, however, suggested that spousal caregivers postpone using such services or even do not use these services at all. Once they do use day care, it is often in such a late stage that caregivers are already overburdened and patients severely impaired. The realization of the relief provided by day care may then expedite institutionalization rather than postpone it[37,52]. Day care at GCFs may therefore be a day care alternative for male dementia patients that may be used by spousal caregivers earlier in their caregiving process than day care at RDCFs.

The present study had several limitations that need to be addressed. First, the drop-out rate was high, resulting in small cohort sizes at the end of the study. Generalizibility of our results for family caregivers using day care for different lengths of time may therefore be limited. It was further not possible to analyze data of spousal and non-spousal caregivers within GCF and RDCFs separately. For future research it is therefore recommended to include larger number of family caregivers to be able to analyze data for spousal and non-spousal caregivers separately. Since the start of our study, the number of GCFs for older people with dementia has increased[22]. It may therefore be less complicated to include larger numbers of caregivers whose relatives receive day care at GCFs. We may in addition to the health outcomes measured in the present study, also assess family satisfaction with both day care programs like was done by Schols and Van der Schriek-Van Meel[19]. They observed that family satisfaction was higher in caregivers whose relatives attended day care at GCFs than in those whose relatives attended day care at medically oriented RDCFs.

Second, considering the cohort sizes at the end of the study no reliable conclusions could be drawn on the relationship between the length of day care attendance by the dementia patient or the number of days of day care per week and caregiver burden. A study of Baumgarten et al.[44] suggests that day care may only have beneficial effects for caregivers if their relatives receive day care at more

than 1 day per week. Future research needs to determine the number of days of day care that are necessary to offer respite sufficiently.

Third, in this study we used standardized research tools to assess the rate of change in caregiver burden. It is suggested that such tools may not adequately capture change over time in this population[43]. It is further suggested that such tools do not adequately capture the benefits that family caregivers experience individually from using day care[44]. Caregivers may experience their caregiving responsibilities in a different way. Some may become depressed, whereas others may experience stress or no stress at all. These differences between family caregivers may imply that they do not experience similar benefits (e.g. stress reduction, less depression, improved quality of life) from using respite services, such as day care, either[54,55]. We therefore recommend in accordance with Zank et al.[43] and Baumgarten et al.[44] to also consider the use of qualitative research tools (e.g. semi-open questionnaires about caregivers' experiences with day care) since these may be more sensitive to capture relief provided by day care on the individual level.

Conclusion

This cohort study showed that quality of life, emotional distress, and feelings of competence remained rather stable in family caregivers of dementia patients attending day care at GCFs and in family caregivers of dementia patients attending day care at RDCFs. This implies that both day care types are able to prevent a significant increase in caregiver burden over time, and in that way family caregivers support in continuing their caregiving role. Day care at GCFs is an important addition to the longer existing respite services for family caregivers of dementia patients, at present particularly for spousal caregivers.

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General discussion

8

SR de Bruin.

Introduction

This thesis focuses on day care at green care farms (GCFs). This is a new care modality for older dementia patients in the Netherlands, an increasing number of other European countries and in the United States of America[1,2]. It is generally believed that GCFs benefit the health status of older dementia patients. However, empirical evidence supporting these suggestions was lacking. The studies described in this thesis are among few empirically testing, both cross-sectionally and longitudinally, the effects of GCFs on five domains of health: cognition, emotional well-being, behaviour, functional performance, and dietary intake of older dementia patients. Effects of GCFs were compared with those of regular day care facilities (RDCFs) for this target group.

Main findings

To understand potential differences between GCFs and RDCFs in their effects on the health status of older dementia patients, a literature study was performed. The scientific literature provided insight into different types of interventions potentially beneficial for dementia patients. Three types of beneficial interventions were classified: 1. environmental interventions; 2. activity-based interventions; and 3. psychosocial interventions. Literature suggests that these three types of interventions improve well-being[3-7] and functional performance[7-10], decrease behavioural symptoms[11-16], and slow down cognitive decline[14-16] in dementia patients. As pointed out in the integrative framework presented in Chapter 2, it is thought that these three types of beneficial interventions are more naturally integrated in the GCF environment than in the RDCF environment. The GCF environment is regarded as a more home-like environment than the RDCF environment. It is further thought that the GCF environment is a richer and more stimulating environment that provides more possibilities for interaction with nature, animals, and other people than the RDCF environment. Therefore, at GCFs activities are present simultaneously and continuously, giving dementia patients the possibility to participate in activities that suit their interests and preferences best. The RDCF environment is regarded as a less stimulating environment since it has an institutional character. As indicated in the framework, at RDCFs activities are not integrated in the environment. Organizing activities at RDCFs requires therefore more effort since the environment does not automatically activate and stimulate dementia patients. At RDCFs, activities are mostly limited to leisure and recreational activities with limited freedom of choice of the dementia patients. In view of the differences between GCFs and RDCFs as pointed out in the integrative framework, it was hypothesized that GCFs and RDCFs would differ in their effects on the health status of older

dementia patients. These hypotheses were tested in two cross-sectional studies (Chapters 3 and 4) and in a cohort study (Chapters 5 to 7).

The first step was to make an inventory of the day care programs of older dementia patients at GCFs and RDCFs. It was unknown whether and to what extent dementia patients participate in the activities and facilities available to them. It was therefore unclear whether health benefits could be expected for the older dementia patients that could be attributed to their activities performed at the day care facility. The cross-sectional studies showed that both men and women attending day care at GCFs were significantly more frequently outdoors and more often involved in organized activities than their male and female counterparts at RDCFs. Furthermore, men and women at GCFs performed activities that required more physical effort than those at RDCFs. Moreover, at GCFs most activities involved individuals or one or more sub-groups as opposed to the RDCFs where most activities were organized with the (nearly) entire day care group (Chapter 3). The possibility at GCFs to participate in activities alone or in small groups may imply that dementia patients had more freedom of choice with regard to the activities in which they wanted to participate than dementia patients at RDCFs. The two cross-sectional studies confirmed the expectations based on the integrative framework presented in Chapter 2. Differences between both day care settings indeed resulted into differences in the day care programs of dementia patients in both settings. It was therefore concluded that differences between GCFs and RDCFs regarding their health effects could be expected. The second step of our work was to test this hypothesis for five domains of health of older dementia patients: cognition, emotional well-being, behaviour, functional performance, and dietary intake.

The study presented in Chapter 4 showed that dementia patients who attended day care at GCFs had significantly higher intakes of energy (1.2 MJ/d more), carbohydrate (39 g/d more), and fluid (441 g/d more) than their counterparts who attended day care at RDCFs. These findings are in line with our expectations, and may imply that GCFs have an added value over RDCFs for maintaining or improving dementia patients' nutritional status. The findings from the cohort study, however, did not confirm the assumptions regarding the four other domains of health. No differences in rates of change in cognition, emotional well-being, behaviour (Chapter 5), and functional performance (Chapter 6) were observed between dementia patients from both day care settings. Functioning in these domains remained rather stable in dementia patients from both day care settings. Also caregiver burden as measured by caregivers' quality of life, emotional distress and feelings of competence remained rather stable over time in caregivers of dementia patients who received day care at GCFs and in those of dementia patients who received day care at RDCFs (Chapter 7).

Reflection on findings: dementia patients

As indicated before, empirical studies on the effectiveness of GCFs are scarce. There is only one other Dutch cross-sectional study that empirically tested the effectiveness of GCFs for dementia patients[2]. That study, however, compared day care at GCFs with medically oriented day care facilities rather than with socially oriented day care facilities like the studies described in this thesis. For the present thesis comparison with socially oriented day care facilities was chosen since day care in such facilities was better comparable with regard to their organization, services, and clientele with day care at GCFs than day care in medically oriented day care facilities. The studies described in Chapters 4 to 7 differ in several aspects from other recent studies evaluating the effectiveness of day care for older dementia patients. These differences regarding the study design, day care type assessed, and the study populations' characteristics are presented in Table 1 and explained in the following sections.

By including socially oriented day care facilities, that are mostly affiliated to residential homes, the studies described in this thesis are rather unique. Many other recent studies on effectiveness of day care facilities included medically oriented day care facilities, that are mostly related to nursing homes[e.g.17,18-21]. The distinction between socially and medically oriented day care facilities is not always clear in practice, however. Day care facilities may differ considerably with regard to their activities, services, programs, staff, and clientele[22-24]. Despite this, a classification of studies with regard to the day care type assessed was made (Table 1). The main reason for this was to position the studies described in Chapters 4 to 7 among other studies, and to understand their similarities and differences. The studies described in this thesis included subjects with varying lengths of stay at the day care facility at study entry. Most other recent studies on day care included subjects who were about to start or had recently started with day care[17-19,21,22,25]. Further, the studies presented in this thesis compared two day care types, and did not include subjects receiving no day care[17,18,21,22,25]. This is in contrast with other recent day care studies. It can therefore not be established whether socially oriented day care facilities, like the GCFs and RDCFs in the present thesis, have an added value over no day care for health outcomes of dementia patients and their family caregivers. It should further be noted that the study populations described in this thesis were in an earlier stage in their dementia process than the other studies' study populations[18,20,21,25,26]. This was reflected by less cognitive and functional impairment in the study populations described in the present thesis' studies. Cognitive impairment was slight whereas it was moderately to severe in other studies. Functional impairment in our study populations was slight to moderate whereas it was moderately to severe in other studies (Table 1).

Table 1. Characteristics of dementia patients at study entry participating in the studies presented in this thesis or in other recent studies on adult day care (socially oriented day care facilities).

Authors	N	Country	Gender	Marital status	Age (y)	Primary caregiver	Length of stay at DCF	Cognitive functioning	ADL	IADL	Behavioural symptoms	Medication use
Schols and Van der Schriek-Van Meel [2] GCF group	13	The Netherlands	Male: 69% Female: 31%	-	74	-	4 months	-	Slightly dependent (Barthel index)	-	0	Total: 3.0 Psychotropic: 0.5
GCF group cross-sectional study 2 (Chapter 4)	30	The Netherlands	Male: 83% Female: 17%	Married: 83% Widowed: 17%	78	-	13.7 months	19.3	-	-	-	5.1
RDCF group cross-sectional study 2 (Chapter 4)	23	The Netherlands	Male: 30% Female: 70%	Married: 48% Widowed: 52%	82	-	11.8 months	18.8	-	-	-	4.3
GCF group cohort study (all cohorts together) (Chapters 5-7)	47	The Netherlands	Male: 79% Female: 21%	Married: 89.% Widowed: 11%	77	Spouse: 87% Child: 11% Other: 2%	Mean: 5.6 months Range: 0 months - 2.2 years	MMSE: 20.2 Average dementia duration: 3.6 years	Slightly dependent (Barthel index)	Moderately dependent (Interview for Deterioration in Daily Living in Dementia)	1.6 clinically relevant symptoms (Neuro Pshychiatric Inventory)	Total: 4.3 Psychotropic: 0.4
RDCF group current study (all cohorts together) (Chapters 5-7)	41	The Netherlands	Male: 32% Female: 68%	Married: 44% Widowed: 56%	82	Spouse: 43% Child: 57% Other: 10%	Mean: 7.7 months Range: 0 months - 2.3 years	MMSE: 20.8 Average dementia duration 3.3 years	Slighty dependent (Barthel index)	Moderately dependent (Interview for Deterioration in Daily living in Dementia)	1.5 clinically relevant symptoms (Neuro Psychiatric Inventory)	Total: 3.6 Psychotropic: 0.3
Leitsch et al.[22]	154	USA	Male: 51% Female: 49%	-	78	Spouse: 58% Child: 37 Other: 5%	About to start	-	Moderately to severely impaired (by researchers adjusted version of Lawton's IADL)		7 out of 14 symptoms Memory and Behaviour Problems Checklist)	-

Table 1. Characteristics of dementia patients at study entry participating in the studies presented in this thesis or in other recent studies on adult day care (medically oriented day care facilities).

Authors	N	Country	Gender	Marital status	Age (y)	Primary caregiver	Length of stay at DCF	Cognitive functioning	ADL	IADL	Behavioural symptoms	Medication use
Schols and Van der Schriek -Van Meel[2] GCF group	24	The Netherlands	Male: 50% Female: 50%	-	74	-	5 months	-	Moderately dependent	-	10	Total: 4.8 Psychotropic: 1.0
Baumgarten et al.[17]	108	Canada	Male: 26% Female: 74%	-	76	Spouse: 25% Child: 47% Other: 28%	About to start	MMSE (<22): 28.3%		Moderately impaired (OARS Multidimensional Functional Assessment Quest.)	-	-
Zank and Schacke[18]	43	Germany	Male: 21% Female: 79%	Married: 14% Widowed: 53% Other: 33%	79	Spouse: 25% Child: 45% Other: 30%	About to start	MMSE: 16.3 Dementia: diagnosed in 79% of subjects	Moderately impaired (Nuremberg Aging Observation Scale)	-	-	-
Leitsch et al.[22]	106	USA	Male: 31% Female: 69%	-	78	Spouse: 29% Child: 59% Other: 12%	About to start	-	Moderately to severely impaired (by researchers adjusted version of Lawton's IADL)			
Droës et al.[19] Regular day care	16	The Netherlands	Male: 50% Female: 50%	Married: 44% Widowed or single: 56%	75	Spouse: 38% Child (in law): 44% Other: 19%	About to start	Moderately to severely impaired (Global Deterioration Scale)		Slightly impaired (Assessment Scale for Elderly Patients)	-	-
Droës et al.[19] Day care in meeting centre	73	The Netherlands	Male: 58% Female: 43%	Married: 70% Widowed or single: 30%	77	Spouse: 63% Child (in law): 44% Other: 11%	About to start	Moderately impaired (Global Deterioration Scale)		Slightly impaired (Assessment Scale for Elderly Patients)	-	-
Schacke and Zank[20]	37	Germany	Male: 27% Female: 73%	-	80	Spouse: 32% Child: 57% Other: 11%	≤ 10 days	MMSE: 12.7	Moderately impaired (measurement instrument unknown)		-	-
Mossello et al.[21]	30	Italy	Male: 33% Female: 67%	Married: 33%	80	Spouse: 33% Child: 50% Other: 17%	≤ 1 week	MMSE: 10.0 Dementia duration: 5.4 years	Moderately impaired (Katz's BADL)	Severely impaired (Lawton's IADL)	-	Total: 3.5 Psychotropic: 1.3

Table 1. Characteristics of dementia patients at study entry participating in the studies presented in this thesis or in other recent studies on adult day care (day care type not specified).

Authors	N	Country	Gender	Marital status	Age (y)	Primary caregiver	Length of stay at DCF	Cognitive functioning	ADL	IADL	Behavioural symptoms	Medication use
Zarit et al.[26] (brief users)	121	USA	Male: 39% Female: 61%	-	78	Spouse: 41% Child: 46% Other: 13%	3 months	Severely impaired (measurement instrument unknown)	Moderately impaired (measurement instrument unknown)	Severely impaired (measurement instrument unknown)	7 out of 14 problematic behaviours (measurement instrument unknown)	-
Zarit et al.[26] (sustained users)	73	USA	Male: 27% Female: 73%		78	Spouse: 32% Child: 55% Other: 14%	12 months	Severely impaired (measurement instrument unknown)	Moderately impaired (measurement instrument unknown)	Severely impaired (measurement instrument unknown)	7 out of 14 problematic behaviours (measurement instrument unknown)	-
Cohen-Mansfield et al.[27]	183	USA	Male: 33% Female: 67%	Married: 33% Widowed: 55%	80	-	On average 1.4 years	Dementia diagnosed in 72% of subjects	-	Moderately to severely impaired (Lawton's IADL)	-	3.6
Gaugler et al.[25]	169	USA	Male: 58% Female: 42%		79	Spouse: 41%	About to start	Severely impaired (measurement instrument unknown)	Moderately impaired (measurement instrument unknown)	Severely impaired (measurement instrument unknown)	7 out of 14 problematic behaviours (measurement instrument unknown)	-
McCann et al.[28]	218	USA	Male: 30% Female: 70%	Married: 24%	82	Spouse: 21% Child: 66% Other: 13%	At least 3 months	MMSE: 12.2	Moderately impaired (Katz's ADL; Nagi and Rosow-Breslau disability score)	-	-	-

Notes: ADL = Activities of Daily Living, IADL = Instrumental Activities of Daily Living, MMSE = Mini Mental State Examination (Folstein), 0 = maximal cognitive impairment, 30 = no cognitive impairment.

It is further noteworthy that the proportion of male dementia patients at GCFs was higher than at the RDCFs evaluated in the studies described in this thesis and also higher than in most day care populations in other recent studies[e.g. 17,18,21,28]. The subjects attending day care at GCFs were mostly married and had a spousal caregiver as their primary family caregiver. Subjects attending day care at RDCFs were mostly female, were widowed and consequently had no spouse but rather a child as their most important family caregiver (Table 1). Additionally, subjects at GCFs were aged younger than subjects at RDCFs. To conclude, the GCFs and RDCFs described in this thesis serve another clientele than the day care facilities described in literature. The GCFs, in turn, serve another clientele than the RDCFs described in this thesis.

In view of the differences between the studies discussed in Chapters 4 to 7 and the other recent studies on day care, the latter's findings could mostly not be used for the interpretation of our findings. The findings described in this thesis therefore currently allow multiple interpretations: 1. GCFs and RDCFs are both not able to significantly improve cognitive functioning, emotional well-being, behavioural symptoms, and functional performance; 2. GCFs and RDCFs are equally effective in preventing significant deterioration of cognitive functioning, emotional well-being, behavioural symptoms, and functional performance; 3. GCFs have an added value over RDCFs for some health outcomes, including dietary intake but not for the ones assessed in the cohort study; 4. due to methodological limitations potential differences between GCFs and RDCFs could not be established. In the following sections each of these interpretations will be discussed separately.

1. GCFs and RDCFs are not able to significantly improve health outcomes of dementia patients

The cohort study showed that cognitive functioning, functional performance, emotional well-being, and the number of clinically relevant behavioural symptoms generally did not change significantly over time in subjects attending day care at GCFs or at RDCFs. These findings may imply that socially oriented day care facilities like GCFs and RDCFs both do not significantly improve functioning in these domains. Socially oriented day care facilities are primarily meant for offering a structured and meaningful day program for the demented. Possibly, they are not sufficiently equipped with staff and specific treatment programs to affect cognition, functional performance, emotional well-being and behavioural problems of dementia patients displayed at home. However, studies comparing groups of dementia patients receiving medically oriented day care with those receiving no day care at all, suggest that cognition[18], well-being[18,19], and behaviour[18,19,21] benefit from day care. These studies showed that cognitive functioning, well-being and behaviour remained rather stable or improved in subjects attending day care whereas functioning in these domains mostly deteriorated in subjects attending no day care at all. The cohort study presented in Chapters

5 and 6 of this thesis did not include subjects receiving no day care. It could therefore not be established whether socially oriented day care facilities, like the GCFs and RDCFs, have an added value over no day care for cognition, emotional well-being, and behaviour. The effectiveness of day care for functional performance is questionable[23]. Studies comparing functional decline between dementia patients receiving medically oriented day care and those receiving no day care at all, showed no effect of medically oriented day care for this health outcome, despite offering personalized therapeutic programs[17,18,21]. It can therefore be questioned whether socially oriented day care facilities, that usually provide less therapeutic activities, will be able to do so.

2. GCFs and RDCFs are equally effective in preventing significant deterioration in health outcomes of dementia patients

The finding that dementia patients participating in the cohort study (Chapters 5 and 6), regardless of their length of day care attendance and their scores at study entry, generally did not significantly change in their cognitive functioning, emotional well-being, functional performance, and number of clinically relevant behavioural symptoms may alternatively imply that GCFs and RDCFs are equally effective in preventing significant deterioration of functioning in these domains. Significant improvement of outcomes such as cognitive functioning and functional performance may not be expected in this population[23,29]. Stabilization of these health outcomes may therefore already be considered as a positive outcome of day care. Explanations for GCFs not being more effective in maintaining cognitive functioning, emotional well-being, behavioural symptoms, and functional performance of dementia patients can be manifold. First, actual participation in activities at GCFs positively related to health outcomes in dementia patients, such as spending time outdoors, gardening, meal preparation, watching and feeding animals[4,8,30,31], may haven been of too short duration to result into clear more positive effects than RDCFs. Dementia patients at GCFs participate in a larger variety of meaningful activities than those at RDCFs, however, patients in both settings participate a large part of the day in similar activities such as having meals together, having group conversations, playing games, and resting. Additionally, dementia patients at GCFs are physically more active and more outdoors than those at RDCFs, however, patients in both settings are sitting and are indoors largest part of the day (Chapter 3). Differences between both day care settings with regard to the kind and intensity of activities offered may therefore have been too small to result into different effects on the health outcomes assessed. Second, older dementia patients attended the GCFs and RDCFs on average 2 to 3 days per week for approximately 6 hours per day. The largest part of the week they were at home. It is expected that these dementia patients were at home also involved in some meaningful activities that stimulate physical activity and that they also spent time

outdoors. The possible effect of additional meaningful, physical and outdoor activities at the GCF may therefore have been overshadowed by activities performed at home. The impact of differences between GCFs and RDCFs for their effects on health outcomes in dementia patients expected on the basis of the integrative framework presented in Chapter 2 may therefore be overestimated.

3. GCFs have an added value over RDCFs for some health outcomes, including dietary intake

The findings from cross-sectional study 2 (reported in Chapter 4) suggest that effects of GCFs and RDCFs are not similar for all health outcomes. The study showed that GCFs have an added value over RDCFs for dietary intake. Apparently, differences between GCFs and RDCFs were large enough to result into different effects on dietary intake, but not on the health outcomes assessed in the cohort study. The study showed that daily intakes of energy, carbohydrate, and fluid were significantly higher in older dementia patients attending day care at GCFs than in those attending day care at RDCFs. These higher intakes may in turn improve the nutritional status of dementia patients attending day care at GCFs, which is of importance since many older people suffering from dementia are prone to malnutrition and weight loss[32,33]. The higher activity level of dementia patients attending day care at GCFs than of those attending day care at RDCFs (Chapter 3) may explain the observed differences in dietary intake between dementia patients from both day care settings. Physical activity may have led to increased energy expenditure and appetite, and therefore in turn to a higher energy intake. However, evidence for such an interaction is inconclusive[34-36], and may explain only part of the observed difference in energy intake. Additional factors may therefore have been responsible for the higher intakes in subjects attending day care at GCFs than in those attending day care at RDCFs, such as the home-like eating environment at GCFs. The social context and environmental ambiance are considered as important factors for dietary intake of older people[37], and may have increased the intake of energy and carbohydrates, which is in line with studies of Gibbons and Henry[38] and Nijs et al.[39]. A beneficial effect of the environmental ambiance on fat and protein intake, as suggested by Gibbons and Henry[38], was not observed in cross-sectional study 2. It is unsure if the higher fluid intake at GCFs is also related to the home-like eating environment. An alternative explanation for this finding may be that there is a higher frequency of serving drinks at GCFs than at RDCFs. Further, older dementia patients at GCFs were more outdoors than their counterparts at RDCFs, and they were involved in harvesting and preparing meals. Sights, sounds, and smells of preparation of food may stimulate intakes in dementia patients[40]. However, empirical evidence for such relationships is presently scarce[41]. Given the wide array of differences between GCFs and RDCFs, it is for now not possible to isolate how various factors contributed to the

results. It is further unknown whether the time spent at the GCF maintains or improves the nutritional status of dementia patients sufficiently since the study had no longitudinal design.

If differences between GCFs and RDCFs are large enough to affect dietary intake in a different way, also other health outcomes may be affected differently by GCFs and RDCFs. The main focus of the studies described in this thesis was on objectively measurable health outcomes. It would have been interesting to have included more subjectively measurable outcomes. The only subjectively measurable outcome that was assessed in the cohort study, "emotional well-being", was measured in the home situation and not at the day care facility. At home assessment of emotional well-being probably only gave insight into overall emotional well-being and not into emotional well-being related to activities and services offered at the day care facility. At home, potential effects of day care on emotional well-being may have been forgotten by the dementia patients or may have been dimmed by activities performed at home. On-site assessment could have better reflected emotional well-being associated with activities and services offered at the day care facility. Older people with dementia at GCFs participate in a larger variety of activities than their counterparts at RDCFs (Chapter 3). The household and farm-related activities at GCFs may have been perceived as more meaningful for the older people than the recreational and leisure activities offered at RDCFs. Activities at GCFs may therefore have different effects than RDCFs on indicators of emotional well-being such as pleasure and engagement, and quality of life.

4. Methodological limitations hampered demonstration of differences between GCFs and RDCFs

Some methodological limitations may also have hampered finding significant differences between subjects from both day care types. It was difficult to compare both day care groups. The studies described in this thesis were observational studies. The composition of the groups under study could therefore not be controlled, as subjects had already made a choice for a day care setting at study entry. Consequently, the GCF and RDCF groups significantly differed in gender, age and marital status. The GCF groups mainly consisted of married men who were on average younger than the subjects in the RDCF groups that consisted mainly of widowed women. Literature suggests that gender, age, and marital status are related to several health outcomes, such as perceived health, depression, anxiety, functional limitations, and physical disability[42-45]. On the basis of these arguments it might not seem wise to compare both groups. However, there are no indications that cognitive decline is affected by gender[46], and for the overall severity of psychological and behavioural symptoms the relationship with gender is inconsistent[47-50]. Nevertheless, whenever possible, data were analyzed separately for males and females (Chapter 3) or gender, age, and marital status were included into the statistical models as possible contributing factors (Chapter 4).

This was, however, not possible for the results of the cohort study (Chapters 5 and 6). Since these data generally did not meet the assumptions of parametric techniques and the sizes of the GCF and RDCF groups within each of the cohorts were small as the result of the high proportion of subjects lost to follow-up (40%), no parametric tests could be used to adjust for possible confounders in this study. However, as hardly any differences were observed in cognitive functioning, emotional well-being, behavioural symptoms, functional performance, medication use, and the number of diseases between the GCF and RDCF group within the three cohorts at study entry, comparing the groups despite their different demographic characteristics may be justified. It should be noted that generalizibility of the present study's findings may be limited as the low number of completers may not cover the variety in rates of cognitive and functional decline, and in the prevalence of psychological and behavioural symptoms in this population of community-dwelling older people with dementia[51-55].

Further, as indicated before, in each of the studies the number of participants and/or completers was rather low. This is a common problem in studies with longitudinal designs, particularly in those including frail older subjects[53]. The variation in functioning between the completers of the cohort study was additionally large. Therefore, the power for testing potential differences between dementia patients attending day care at GCFs or at RDCFs in the rates of change in their functioning was low. This may imply that it was falsely concluded that GCFs and RDCFs do not differ significantly in their effects on the outcomes evaluated in our cohort study.

Reflection on findings: family caregivers

Like studies on effectiveness of day care for dementia patients, also studies on the effectiveness of day care for their family caregivers considerably vary in their design, outcomes, instruments, and proportion of spousal and non-spousal caregivers included in the study population[17,18,21,25,29] (Table 1). These differences may explain why inconsistent results are reported with regard to benefits of day care for family caregivers[17,18,21,25,29,56-58]. The cohort study showed that both in family caregivers of dementia patients receiving day care at GCFs and in those of dementia patients receiving day care at RDCFs quality of life, emotional distress, and feelings of competence did not significantly change over time (Chapter 7). Also these findings may be interpreted in different ways. On the one hand these findings may imply that GCFs and RDCFs are not able to significantly reduce caregiver burden of family caregivers. This may be unexpected since one of the main objectives of day care is to provide respite to family caregivers of dementia patients. On the other hand the findings may also imply that both day care types are equally effective in preventing a significant increase in caregiver burden over time. They support family caregivers in that way in continuing their caregiving role. Like

for the dementia patients themselves, also for the family caregivers relative stability of health outcomes may be considered as a positive effect of day care[57]. It should be noted that the cohort study did not include family caregivers receiving no day care as a respite service. It can therefore not be established whether caregiver burden would significantly increase over time if their relatives would not have attended day care at a GCF or at a RDCF.

Reflection on research on older dementia patients

Research on older people with dementia faces several practical difficulties. Also in the studies presented in this thesis some of these difficulties were encountered. Each of them is addressed in this section. The lessons learned should be taken into account when conducting future studies in this target group.

Design

Randomized clinical trials are often considered as the preferred study design to obtain an unbiased evaluation of the efficacy of interventions[21]. Due to ethical and practical drawbacks randomization is often difficult to realize in evaluating different types of care environments for dementia patients (e.g. traditional nursing home vs. small-scale living facility; regular day care facility vs. green care farm). First, because the choice of a caring environment not only relies on clinical variables but also on preferences of family caregivers and patients. These may be difficult to satisfy when using a true experimental design[21,59]. Second, the possibility of making a choice that matches the individual skills and interests, gives people a stronger sense of autonomy and identity which has positive implications for well-being of people with dementia[60]. These two aspects are neglected when randomly assigning subjects to caring environments. Third, as psychogeriatric patients are considered as “incapacitated” by Medical Ethical Committees, randomization will not be permitted by these committees under all circumstances. For these reasons one often chooses a quasi-experimental design for studies on dementia patients. If possible, subjects from the intervention and control condition are matched on e.g. gender, age, cognitive functioning, or functional performance to enhance comparability of both groups.

In the studies described in this thesis matching of subjects from both care settings was not possible. As achieving matched pairs of participants can be a time consuming task, and finding eligible participants for the studies presented in this thesis was difficult in the first place, participants were not matched at study entry. Matching of subjects afterwards was considered. As indicated before, subjects in the GCF and RDCF groups widely differed in gender, age, and marital status. Matching on the basis of these demographic characteristics, since related to several health

outcomes[42-45], was therefore not possible. Matching on the basis of the subjects' cognitive functioning, emotional well-being, functional performance, and the number of clinically relevant behavioural symptoms, though generally similar between both groups at study entry, was not possible either since the high drop-out rates resulted in unequal group sizes at the end of the study.

Another large drawback related to the design of studies including older dementia patients is the proportion of subjects lost to follow-up, particularly in studies with longitudinal designs. Loss to follow-up is mostly due to severe deterioration, institutionalization or death of the dementia patients[53]. Also in the cohort study presented in this thesis a high drop-out rate (of about 40%) occurred. The generalizibility of our study may therefore be limited since the low number of dementia patients that completed the study may not have covered this population's large variety in rates of cognitive and functional decline and the prevalence of psychological and behavioural symptoms[51-55]. Cognitive functioning, emotional well-being, behavioural symptoms, and functional performance of subjects that dropped-out from the study were compared with functioning in these domains of subjects completing the study to gain insight into selective attrition. As most subjects dropped-out before the second measurement, no rates of change could be obtained from these subjects. However, it was found that subjects lost to follow-up generally did not differ significantly in cognitive functioning, emotional well-being, the number of behavioural symptoms, and functional performance at study entry from those who completed the study.

Enrolment of dementia patients

For the dementia patients' privacy, involvement of professional caregivers in the enrolment of potential participants using services of or living in institutes for chronic care is often required. Finding professional caregivers willing to participate takes a long time because approval has to be given by different sections of the care institutes and by family caregivers. Additionally, the work load of caregivers working in chronic care institutions is mostly high which often results in a lack of motivation to participate in scientific research.

Also in the studies presented in this thesis, enrolment of GCFs, RDCFs, and dementia patients was time consuming. The first step was finding out which GCFs provided day care services to dementia patients. In 2006, when the recruitment of GCFs was started, there were between 600 and 700 GCFs in the Netherlands[61]. A database of the Dutch National Support Centre for Agriculture and Care and a Dutch website for owners of GCFs contained addresses of 65 GCFs that had indicated to be open to older people with dementia[61]. These GCFs received an invitation letter and were contacted by telephone by the researchers who provided information about the study. It was found that at that time, less than half of the GCFs really provided day care to older dementia patients. Of

these farms, about 23 were willing to participate in our studies. Most important reasons for not willing to participate were shortage of time due to their recent start with day care for dementia patients and the expected burden caused by participation in scientific research for their clients. Seventeen GCFs actually enrolled dementia patients for our empirical studies.

The second step was finding RDCFs that were located in the same region as the GCFs. With this approach it was aimed to include comparable groups of older dementia patients from the same regions whose eligibility for day care was assessed by the same Central Indication Committee for Care. Fifty-six RDCFs were asked for participation by the researchers. In all institutions first the managers of the day care facility were approached and informed about the details of the studies. They, however, were mostly not allowed to give permission for participation and had to consult the management team of the long-term care institution to which the day care facility was often affiliated. This process took a long time, and willingness to participate was generally limited. Forty-eight RDCFs agreed with participation. Reasons for refusing participation in our studies were mostly limited time, or no interest in scientific research. The 48 RDCFs willing to participate were frequently contacted to remind them to enrol potential participants. Despite these frequent contacts, finally 27 actually enrolled potential participants. The reasons for the gradual enrolment of subjects were possibly the high work load of professional caregivers in the health care sector resulting into limited time to enrol subjects for scientific research. Another reason may be that they had no eligible clients, which may partly related to the fact that during our study day care facilities were not allowed to enrol new clients as they received no financing from the Dutch national insurance system due to financial deficits.

Once caregivers at the GCFs and RDCFs had enrolled potential participants, the third step was contacting family caregivers of dementia patients to explain the study procedures. Also this process was time consuming. Caregivers enrolled 161 dementia patients (84 from GCFs, 77 from RDCFs). They were all contacted by telephone by the researchers who explained the study procedures. Thirty-six of them refused participation and seven could not participate as their health status was severely deteriorated or they died between enrolment and the first interview. Of the remaining 118 possible participants, 30 did not meet all inclusion criteria and 88 could be included and agreed with participation. Of them, 47 subjects attended day care at a GCF and 41 subjects at a RDCF. Most important reason for refusing participation was expecting a too large burden by the family caregivers either for their demented relative or for themselves. Particularly, family caregivers and their demented relatives who were about to start or who had recently started with day care were reluctant to participate. The decision to use day care often had a large impact on the lives of dementia patients and their caregivers. Additionally, contact with the different caregivers involved in

the caregiving process was time consuming for the family caregivers. These factors resulted into reluctance to spend time on scientific research. It should therefore be acknowledged that particularly dementia patients and caregivers who represent a less distressed subpopulation of dementia patients and/or caregivers may have been included in the studies. Their findings may therefore not be valid for all community-dwelling older people with dementia and their family caregivers.

Assessment tools

A large variety of measurement instruments is available to determine cognition, behaviour, emotional well-being, and functional performance in older dementia patients. These instruments differ in the way they are administered (self-report; proxy report; trained observers), in the population of dementia patients aimed at (early stage or late stage of the disease; community-dwelling or institutionalized patients), in their psychometric properties, and in their responsiveness to change[62-64]. It is therefore not easy to select appropriate measurement instruments. This was also experienced in the studies presented in this thesis. To assess cognitive function, behavioural symptoms in dementia and caregiver distress related to behavioural symptoms, it was decided to select instruments that are widely used in intervention studies and in clinical practice: the Mini Mental State Examination (MMSE) to assess cognitive impairment[65] and the Neuropsychiatric Inventory (NPI) to assess behavioural symptoms in dementia patients and caregiver distress related to these symptoms[66,67]. For measuring performance in activities of daily living, the Barthel index (BI) is a well-known instrument[68]. For that reason, this instrument was chosen for the cohort study. Another reason for selecting standardized and validated measurement instruments for the cohort study was to increase the possibility to compare its findings with those from other national and international studies. To assess performance in instrumental activities of daily living and emotional well-being of dementia patients and caregiver burden in family caregivers a large variety of instruments is available[62,63]. The use of these instruments varies considerably among studies. Differences between studies regarding their instruments used, impede comparison and interpretation of their findings. The decision to use the Depression List, Interview for Deterioration of Daily living in Dementia (IDDD), and Sense of Competence Questionnaire was mostly based on the fact that they were more often used in Dutch studies and their availability in Dutch.

It should further be noted that grouping of symptoms of the Depression List (Feeling depressed, Feeling tired, and Feeling lonely) observed by Diesfeldt[69] and sub syndromes of the NPI (Hyperactivity, Psychosis, Affective symptoms, Apathy) observed by Aalten et al.[70,71] were not found in the study population included in our cohort study (Chapter 5). This may be related to the fact that the subjects were earlier in their dementia process, consisted of other proportions of males and

females, and had another age than the populations studied by Diesfeldt[69] and Aalten et al.[70,71]. Such differences should be taken into account before assuming that similar groupings of symptoms can be found in one's own study population.

Future directions

Despite the difficulties that will be faced when doing research in older dementia patients, further research is recommended since the findings described in this thesis raised new questions. Answering these questions is of importance since the number of dementia patients is expected to increase considerably the coming years[72,73]. Along with this increase, also the number of family caregivers taking care of a demented relative will considerably increase. This section focuses on the starting points for further research in this area.

Design

Since the start of the studies presented in this thesis, the number of GCFs for older people with dementia has increased[61]. It is expected that this increase will also lead to an increasing number of dementia patients using their services. For future studies it may therefore be less complicated to perform a study with a more controlled and experimental character, such as a matched-pairs design. There will be more subjects receiving day care at GCFs who can be matched on gender and age, for example, with subjects receiving regular day care. Larger numbers of older dementia patients will not only better reflect the variety in the different health outcomes assessed in the studies, but may also enable differentiation of effects for different dementia types. It is additionally recommended to include subjects receiving no day care to be able to establish whether socially oriented day care facilities such as GCFs and RDCFs have an added value over no day care. Such subjects may be enrolled via waiting lists for day care at GCFs or at RDCFs. As indicated above, a study with a true experimental character is probably not feasible. Since the studies described in this thesis provided insight into the drop-out rate that can be expected and into the variance in the scores on the measurement instruments used, a proper power calculation can be done for future studies. For example, supposing that a difference of 1.5 in the rate of change in the MMSE score over 6 months between subjects from GCFs and RDCFs would be considered as clinically relevant, the required group size should than be 20 subjects for the GCF group and 20 subjects for the RDCF group to be able to detect a significant difference between them (α=0.05, β=0.80, σ=1.8 for GCF group and σ=1.4 for RDCF group, see Table 2a Chapter 5). In view of the expected drop-out rate of approximately 40% over 1 year, the sample should include approximately 70 subjects at study entry if a study duration of 1 year is planned.

Settings

GCFs and RDCFs vary considerably across sites. Between sites there is considerable variation in the available indoor (e.g. kitchen, workplace) and outdoor facilities (terrace, parks, yard, garden, stable), the type and duration of activities offered, the size of the day care group, and the interests and expertise of the caregivers (e.g. sports, crafts, games, horticulture). Between GCFs there additionally is variation in their original agricultural function (e.g. dairy farm, industrial livestock farm, mixed farm), ratio between the care and agricultural function and the extent to which they cooperate with a health care institution[23,24,74]. Due to the small number of subjects per GCF and RDCF in the presented studies no relationships could be explored between health outcomes and characteristics of the GCFs and RDCFs. Future studies including more GCFs and RDCFs and more subjects per GCF and RDCF will therefore be necessary to potentially find such relationships. If relationships can be found between activities or services available and positive health outcomes in dementia patients, GCFs and RDCFs may be encouraged to implement each others activities, services, and environmental changes to improve well-being of dementia patients.

Outcomes

In the presented studies the focus was on objective health outcomes of dementia patients. As indicated before, the maximum that may be achieved for most health outcomes in this population is relative stability. Emotional well-being may be one of few outcomes that can actually be improved by socially oriented day care facilities such as GCFs and RDCFs[23,29]. It is therefore recommended to do on-site assessment of emotional well-being and quality of life as it is expected that this will better reflect well-being associated to day care use. Since self-report in this population may be difficult due to impaired cognitive abilities, it is also recommended to explore possibilities for complementing self-reported emotional well-being with other measures, such as observations[62]. Subjective well-being indicators, such as pleasure, interest, engagement, enjoyment, sustained attention, sadness, self-esteem, and negative affect[75] may be considered to be included.

The cohort study also evaluated outcomes in family caregivers: emotional distress, quality of life and feelings of competence. For future studies, inclusion of the variable family satisfaction may also be considered, like was done by Schols and Van der Schriek - Van Meel[2]. In that study it was found that family satisfaction was higher in those caregivers whose relatives attended day care at a GCF than those who attended day care at a medically oriented day care facility. Family caregivers were on the one hand satisfied with the fact that their relatives were more manageable at home and showed less restless behaviour. Caregivers were also satisfied with the respite they benefited from once their relative was at the day care facility. For future studies these aspects of satisfaction may be measured

as well. Additionally, it is recommended to measure satisfaction of the family caregivers regarding the day program offered at GCFs and RDCFs. Differences between caregivers may be expected with regard to this since the activities and services offered in both day care settings differ considerably. By including a larger number of dementia patients, also a larger number of family caregivers is included. This enables comparisons between spousal caregivers from both settings and between non-spousal caregivers from both settings.

Assessment tools

The presented studies used standard assessment tools for evaluating health outcomes. As already mentioned, dementia patients are a heterogeneous group and there is a large variety in the progression of their disease. Standard assessment tools may therefore not be sufficiently sensitive to capture clinically important change that can be attributed to the intervention ("day care") offered. In line with the more client-centred approach in health care, it is therefore recommended to explore ways to measure clinical relevant outcomes of an intervention such as day care on the individual level, by using e.g. Goal Attainment Scaling[76]. By setting individual goals and taking into account individual needs this method may be more sensitive to capture clinically important change related to receiving day care than standard assessment tools[76,77].

Also for family caregivers a more individualized assessment tool may be better able to capture relief provided by day care. Not all caregivers experience their caregiving responsibilities in a similar way. Some may become depressed, whereas others may experience stress. These differences between family caregivers may imply that they do not experience similar benefits (e.g. stress reduction, less depression, improved quality of life) from using respite services, such as day care[78,79]. Conventional research tools may not adequately capture benefits of day care on the individual level[17]. It is therefore recommended to take individual needs of family caregivers into account when assessing the effectiveness of day care. This may imply that qualitative research tools (e.g. semi-open questionnaires about their experiences with day care[18]) are needed since these may be more sensitive to capture relief provided by day care on the individual level[17,18].

Implications for policy and practice

Studies evaluating interventions for community-dwelling older people with dementia are underexposed in scientific literature. There is more literature on healthy aging and on health care services for dementia patients once they are institutionalized. This is striking, since about two-thirds of dementia patients live in the community[80,81] and many governments stimulate older people to live at home as long as possible. Also for the dementia patients themselves remaining in the

community is often preferable[73]. Therefore the findings described in this thesis are of importance since these provide insight into care modalities that are meant to delay institutionalization by improving health outcomes of community-dwelling dementia patients and their family caregivers. On the basis of the in Chapter 2 presented integrative framework it was hypothesized that RDCFs and GCFs would differ in their effects on five health domains of older people with dementia: cognition, emotional well-being, behaviour, functional performance, and dietary intake. The studies included in this thesis confirm these hypotheses only partly. This may imply that the impact of the differences between GCFs and RDCFs was overestimated. Adjustment of the assumptions regarding the added value of GCFs may therefore be necessary. However, in view of the methodological limitations of the present studies it is too early to adjust the hypotheses already. For the present it is therefore decided to maintain the assumptions made. Future studies will be necessary to ultimately accept or reject the hypotheses that were drawn on the basis of the presented integrative framework (Chapter 2).

For some, the limited evidence found in the presented studies for the added value of GCFs over RDCFs, may be disappointing. However, the finding that GCFs seem to be equally effective as RDCFs in maintaining cognitive functioning, emotional well-being, behavioural symptoms, and functional performance of older dementia patients may already be considered as a positive outcome of the studies described in this thesis. Besides that, an added value of GCFs over RDCFs may not be most important. GCFs appeal to a growing group of dementia patients and their family caregivers, and thereby increase the number of options for day care. It is further noteworthy that GCFs seem to serve a different clientele than RDCFs. Day care at GCFs was mostly attended by male dementia patients as opposed to RDCFs that were mostly attended by female dementia patients. As indicated in Chapter 7, the large proportion of male dementia patients at GCFs is exceptional since most day care facilities, at least the ones described in scientific literature, mainly serve female dementia patients. With day care at GCFs, there is an alternative day care type that appeals to men and/or their family caregivers. This is also confirmed by the reasons dementia patients and their family caregivers participating in the cohort study gave for not considering day care at RDCFs as a relevant day care alternative. Almost two-thirds of dementia patients and their family caregivers indicated that day care at a GCF was a deliberate choice[82]. Reasons given were their dislike of the institutional environment of RDCFs and the activities offered there. They perceived activities at GCFs as more useful and meaningful. They additionally expected that at RDCFs dementia patients would have insufficient opportunities to be physically active and to go outdoors. The fact that day care at GCFs apparently appeals to male dementia patients and their mostly spousal caregivers is of importance. There are indications that spousal caregivers postpone using day care services or even do not use these services at all[26,28,83]. Once they do use day care, it is often in such a late stage that caregivers

are already overburdened and patients severely impaired. The realization of the relief that provided by day care may then expedite institutionalization rather than postpone it[26,83]. Day care at GCFs may therefore be a day care alternative for male dementia patients that may be used by spousal caregivers earlier in their caregiving process than day care at RDCFs.

At the start of the studies described in this thesis, it was observed that the relevant care institutions involved in referring and assessing eligibility of dementia patients for day care were either unfamiliar with day care at GCFs or assumed that GCFs are most suitable for men. Therefore also dementia patients and their family caregivers sometimes did not know that day care at GCFs was an alternative for day care at RDCFs. Participants in the cohort study who had decided to go to a RDCF were asked whether they were familiar with day care at GCF[82]. Of them, 22% (n=9) had never heard of GCFs, while 73% (n=30) had. However, of the 30 pairs of dementia patients and their family caregivers who had heard of GCFS, 50% (n=15) did not know that GCFs also offered services to frail older people. They either thought that GCFs were meant for other target groups such as mentally disabled people or autistic children, or that GCFs offered services to older people who had no physical disabilities. Seventeen percent (n=5) of the dementia patients and their family caregivers who had heard of GCFs but decided to attend day care at a RDCF indicated that the dementia patients had no affinity with outdoor life and animals. These findings suggest that there is room for improvement with regard to information to professional caregivers involved in dementia care and relevant health care institutions responsible for referring dementia patients and assessing their eligibility for day care. We do not believe that day care at a GCF is the best option for all dementia patients. However, it is of interest to all older people with dementia and their caregivers, that they are well informed about the different day care types, in order to make their own choice for the day care type that suits their preferences and interests best.

General conclusions

On the basis of the studies described in this thesis it is concluded that:

- GCFs offer more possibilities for community-dwelling older dementia patients than RDCFs to be actively involved in a wide variety of activities, to be frequently outdoors, and to be physically active (Chapter 3);
- GCFs and RDCFs are equally effective in preventing significant deterioration of cognitive functioning, emotional well-being, and functional performance and in preventing a significant increase of behavioural symptoms in community-dwelling older dementia patients (Chapters 5 and 6);

- GCFs and RDCFs are equally effective in preventing a significant deterioration in quality of life and feelings of competence and in preventing a significant increase of emotional distress in family caregivers of community-dwelling older dementia patients (Chapter 7);
- GCFs have a more beneficial effect than RDCFs on dietary intake in community-dwelling older dementia patients which may result in a better preserved nutritional status (Chapter 4);
- GCFs are a valuable addition to the present care modalities for community-dwelling older people with dementia and their family caregivers. With day care at GCFs the number of options for care services increases. Day care at GCFs further appeals to another target group than RDCFs (i.e. male dementia patients) and thereby offers respite to another group of family caregivers than RDCFs (i.e. spousal caregivers) (Chapter 7).

The studies described in this thesis partly confirm the hypotheses based on the integrative framework. In view of the methodological limitations of the studies presented in this thesis, it is too early to adjust the hypotheses that have not been confirmed already. It is advised to consider the suggestions for future studies to be able to draw more firm conclusions about the potential benefits of this new day care type. This is of importance since the number of farms offering care services is still increasing which in turn will result into an increasing number of dementia patients attending day care at GCFs. Moreover, farming for health activities are no longer limited to rural areas, but are also increasingly provided in urban areas[(1)]. Further exploring these new developments and evaluating their health impact on different target groups may help to establish these care innovations among the more regular care modalities.

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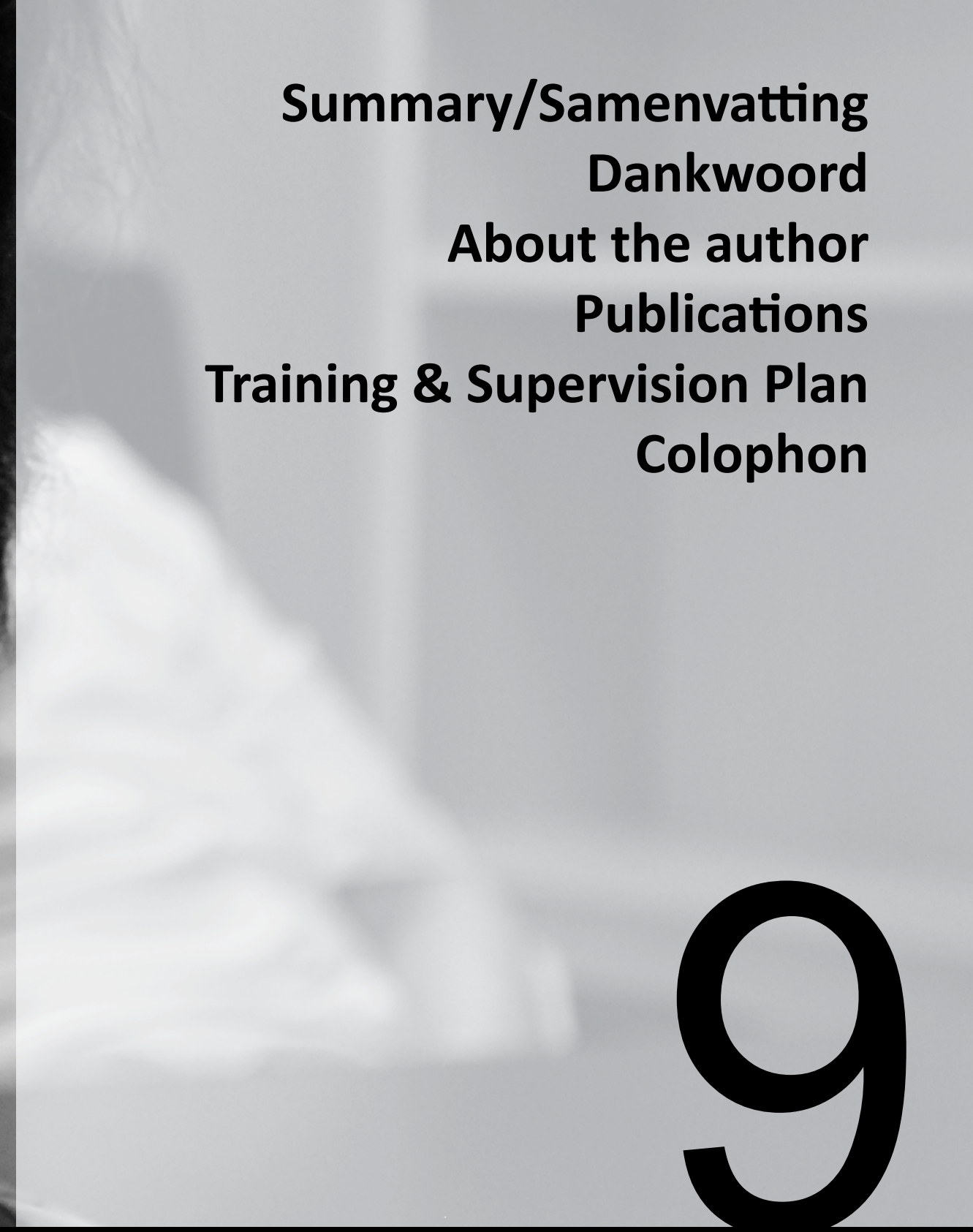

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SR de Bruin.

Summary

Green care farms (GCFs) are farms that combine agricultural production with care services for people with care needs. Main target groups of GCFs used to be mentally disabled people and psychiatric patients. Over the last years, GCFs offer services to an increasing number of other target groups, including (demented) older people, autistic children, people with burn-out, and long-term unemployed. The number of GCFs has increased considerably over the last 10 years. In 1998 the number of registered GCFs was about 75, whereas nowadays there are more than 900. About 10% of these offer services to older people with dementia. Green care farming is not a typically Dutch phenomenon. It is also developing in other European countries including Norway, Italy, Austria, Slovenia, Switzerland, and Belgium, and in the United States of America. It is generally believed that GCFs have beneficial effects on the health status of a diversity of target groups. At present, empirical studies testing this hypothesis are scarce. The main objective of the studies described in this thesis was to gain insight into the potential health benefits of day care at GCFs for community-dwelling older dementia patients. Most common is to organize adult day care at regular day care facilities (RDCFs) affiliated to either residential or nursing homes. Day care at farms is relatively new. It is provided to frail older people since approximately 2000. In view of the differences between both day care types regarding the day care setting and day care program it was hypothesized that GCFs and RDCFs would differ in their health effects on older dementia patients.

To understand potential differences between GCFs and RDCFs in their effects on health status of older dementia patients a literature study was performed (Chapter 2). The scientific literature provided insight into different types of interventions potentially beneficial for dementia patients. Three types of beneficial interventions were classified: 1. environmental interventions; 2. activity-based interventions; and 3. psychosocial interventions. Literature suggests that these three types of interventions improve well-being and functional performance, decrease behavioural symptoms, and slow down cognitive decline in dementia patients. As pointed out in the integrative framework presented in Chapter 2, it is thought that these three types of beneficial interventions are more naturally integrated in the GCF environment than in the RDCF environment. The GCF environment is regarded as a more home-like environment than the RDCF environment. It is further thought that the GCF environment is a richer and more stimulating environment that provides more interaction with nature, animals, and other people than the RDCF environment. Therefore, at GCFs activities are present simultaneously and continuously, giving dementia patients the possibility to participate in activities that suit their interests and preferences best. The RDCF environment is regarded as a less stimulating environment since it has an institutional character. As indicated in the framework, at

RDCFs activities are not integrated in the environment. Organizing activities at RDCFs requires therefore more effort since the environment does not automatically activate and stimulate dementia patients. At RDCFs activities are mostly limited to leisure and recreational activities which reduces the freedom of choice of the dementia patients. In view of the differences between GCFs and RDCFs as pointed out in the integrative framework, it was hypothesized that GCFs and RDCFs would differ in their effects on the health status of older dementia patients. These assumptions were tested in two cross-sectional studies (Chapters 3 and 4) and a cohort study (Chapters 5 to 7).

The first step was to make an inventory of the day care programs of older dementia patients at GCFs and RDCFs. It was unknown whether and to what extent dementia patients participate in the activities and facilities available to them. An inventory was made of the types of activities that were organized in both day care settings, the location of the activities organized, and the degree of group participation in these different activities through observing groups of older people with dementia attending day care at GCFs or at RDCFs (Chapter 3; cross-sectional study 1). In addition, insights into the types and locations of activities carried out by older people with dementia at both day care settings and the physical effort required for these activities was gained through observing them individually (Chapter 3; cross-sectional study 2). The studies showed that both men and women attending day care at GCFs were significantly more frequently outdoors and more often involved in organized activities than their male and female counterparts at RDCFs. Further, men and women at GCFs performed activities that required more physical effort than those at RDCFs. Moreover, at GCFs most activities involved individuals or one or more sub-groups as opposed to the RDCFs where most activities were organized with the (nearly) entire day care group (Chapter 3). The possibility at GCFs to participate in activities alone or in small groups may imply that dementia patients had more freedom of choice with regard to the activities they wanted to participate in than dementia patients at RDCFs. The two cross-sectional studies confirmed the expectations based on the integrative framework presented in Chapter 2. Differences between both day care settings indeed resulted into differences in the day care programs of dementia patients in both settings. It was therefore concluded that differences between GCFs and RDCFs regarding their effects on the dementia patients' health status could be expected. The second step of our work was to test this hypothesis for five domains of health of older dementia patients: cognition, emotional well-being, behaviour, functional performance, and dietary intake. For this purpose a cross-sectional study (Chapter 4) and a cohort study (Chapter 5 to 7) were conducted.

The findings presented in Chapter 4 confirm the expectation that GCFs and RDCFs differ in their effects on dementia patients' dietary intake. The cross-sectional study included 30 dementia patients attending day care at GCFs and 23 dementia patients attending day care at RDCFs. Subjects from

GCFs were mostly married males who were on average younger than the subjects at RDCFs who were mostly widowed females. Dietary intake of the subjects was recorded during 1 or 2 days both at home and during their time at the day care facility. The study showed that dementia patients attending day care at GCFs had significantly higher intakes of energy (1.2 MJ/d more), carbohydrate (39 g/d more) and fluid (441 g/d more) than their counterparts attending day care at RDCFs. These findings are in line with our expectations, and may imply that GCFs have an added value over RDCFs for maintaining or improving dementia patients' nutritional status. This is of importance since many of them are prone to malnutrition and weight loss.

In the cohort study differences in the effects of GCFs and RDCFs on the other four domains of health were tested (Chapters 5 and 6). The study included 47 dementia patients attending day care at GCFs and 41 attending day care at RDCFs. Also in this study dementia patients at GCFs were mostly males who had a spousal caregiver and who were on average younger than the mostly female dementia patients at RDCFs who had a child (in law) as their primary family caregiver. Three cohorts were distinguished based on the subjects' length of stay at the day care facility. Subjects in cohort A, B, and C were at study entry about to start or had recently started with day care (cohort A); participated in day care since about 6 months (cohort B); and participated in day care since about 12 to 24 months (cohort C). The three cohorts were distinguished since they provided insight into three distinct periods of day care use. Data were gathered at study entry and at 6 and 12 months follow-up by interviewing the subjects and their caregivers. Generally, no significant change over time in cognitive functioning, emotional well-being, the number of behavioural symptoms, and functional performance was observed in any of the cohorts. No differences in rates of change in these health domains were observed between dementia patients within any of the cohorts from both day care settings. The findings of the cohort study therefore do not confirm the hypotheses that day care at GCFs has an added value over RDCFs for cognition, emotional well-being, behaviour, and functional performance of older dementia patients.

In the cohort study, also caregiver burden of family caregivers of these dementia patients was assessed. Family caregivers of dementia patients receiving day care at GCFs were mostly spouses whereas those of dementia patients receiving day care at RDCFs were mostly children (in law). Therefore no comparisons were made between family caregivers from both settings. In both groups of caregivers no significant change over time was observed in quality of life, emotional distress, and feelings of competence (Chapter 7).

In conclusion, the presented work has shown that GCFs exceed RDCFs in offering older dementia patients a diverse day program and in stimulating their dietary intake. GCFs and RDCFs are equally effective in preventing significant decrease of cognitive functioning, emotional well-being, and

functional performance and in preventing significant increase of the number of behavioural symptoms. Both day care types prevent significant increase of caregiver burden. Day care at GCFs is a new and valuable addition to the present care modalities for community-dwelling older dementia patients and their caregivers. With day care at GCFs the number of options for care services for patients and their caregivers has increased. Day care at GCFs further appeals to another target group (i.e. male dementia patients) than RDCFs and thereby offers respite to another group of family caregivers (i.e. spousal caregivers) than RDCFs. The studies described in this thesis confirm the hypotheses based on the integrative framework partly. The impact of differences between GCFs and RDCFs for their effects on health outcomes of dementia patients may therefore have been overestimated. However, in view of the methodological limitations of the presented studies, it is too early to adjust the hypotheses already. Further research is necessary to ultimately accept or reject the hypotheses drawn on the basis of the integrative framework (Chapter 8).

Samenvatting

Sinds de jaren negentig is in Nederland het aantal boerderijen dat naast een agrarische functie een zorgfunctie kreeg, snel toegenomen. In 1998 waren er circa 75 zogeheten “zorgboerderijen”. Tegenwoordig zijn dat er meer dan 900. In de beginjaren verleenden zorgboerderijen met name zorg aan mensen met een verstandelijke beperking en psychiatrische patiënten. De afgelopen jaren zijn zorgboerderijen echter aan een toenemend aantal andere doelgroepen zorg gaan verlenen, zoals (dementerende) ouderen, autistische kinderen, mensen met een burnout en mensen die langdurig werkloos zijn. Het verlenen van zorg op een boerderij is geen typisch Nederlands verschijnsel. Ook in andere Europese landen zoals in Noorwegen, Italië, Oostenrijk, Slovenië, Zwitserland en België en in de Verenigde Staten hebben steeds meer boerderijen een zorgfunctie naast hun agrarische functie.

Er wordt verondersteld dat zorgboerderijen een positieve invloed hebben op de gezondheid van diverse doelgroepen. Tot op heden is daar echter weinig wetenschappelijk onderzoek naar gedaan. In dit proefschrift worden enkele van de weinige wetenschappelijke onderzoeken naar de gezondheidseffecten van zorgboerderijen beschreven. In deze onderzoeken stond de doelgroep thuiswonende dementerende ouderen centraal. Ongeveer 10% van de zorgboerderijen in Nederland biedt dagverzorging aan deze doelgroep.

Oorspronkelijk werden dagverzorging en dagbehandeling alleen verleend door reguliere instellingen zoals verzorgings- of verpleeghuizen. Sinds circa 10 jaar wordt dagverzorging ook op zorgboerderijen aangeboden. Dagverzorging op zorgboerderijen is anders dan dagverzorging in reguliere instellingen. Niet alleen qua omgeving, maar ook wat betreft de activiteiten waaraan de dementerende ouderen tijdens hun aanwezigheid kunnen deelnemen. De doelstelling van de onderzoeken die worden beschreven in dit proefschrift was het vergelijken van de effecten van zorgboerderijen en reguliere instellingen voor dagverzorging op de gezondheid van dementerende ouderen.

Om eventuele verschillen in de effecten van zorgboerderijen en reguliere instellingen voor dagverzorging te kunnen begrijpen, werd allereerst een literatuuronderzoek gedaan naar interventies die momenteel aan dementiepatiënten worden aangeboden en waarvan gedacht wordt dat zij een gunstig effect hebben op de gezondheid. De resultaten van diverse internationaal gepubliceerde onderzoeken werden hiertoe met elkaar vergeleken (Hoofdstuk 2). Er werden drie typen interventies onderscheiden: 1. interventies gericht op het bieden van zorg aan dementiepatiënten in een minder institutionele omgeving (bv. kleinschalige woonvormen, omgevingen met toegang tot natuur, buitenlucht, dieren en planten); 2. interventies die de deelname van dementiepatiënten aan activiteiten beogen te stimuleren, door rekening te houden

met hun wensen en interesses; 3. interventies die rekening houden met de emoties van dementiepatiënten door hun geheugen, zintuigen en oriëntatiegevoel te stimuleren (zogeheten psychosociale interventies). Deze drie typen interventies zijn ontwikkeld, omdat verondersteld wordt dat ze mogelijk de cognitieve en functionele achteruitgang van dementiepatiënten vertragen, het emotionele welbevinden verbeteren en gedragsproblemen voorkomen of verminderen.

Zoals in het theoretische raamwerk is aangegeven (Hoofdstuk 2), werd gesteld dat de drie beschreven interventietypen op zorgboerderijen op een meer natuurlijke wijze aanwezig zijn dan in reguliere instellingen voor dagverzorging. De zorgboerderij wordt namelijk beschouwd als een meer huiselijke omgeving dan de reguliere instelling voor dagverzorging. De zorgboerderij wordt verder beschouwd als een rijkere en sterker stimulerende omgeving, die meer mogelijkheden biedt voor interactie met natuur, dieren en andere mensen dan de reguliere instelling voor dagverzorging. Het lijkt erop alsof op zorgboerderijen activiteiten waaraan dementerende ouderen kunnen deelnemen continu aanwezig zijn. Hierbij kan gedacht worden aan activiteiten zoals dieren kijken en voeren, tuinieren, wandelen, buiten zitten en helpen met de bereiding van de warme maaltijd. Ouderen hebben daardoor de mogelijkheid om deel te nemen aan activiteiten die het beste met hun interesses en wensen overeenkomen.

Een reguliere instelling voor dagverzorging wordt beschouwd als een minder stimulerende omgeving. De activiteiten die in reguliere instellingen voor dagverzorging worden aangeboden, lijken niet op een natuurlijke wijze in de omgeving geïntegreerd te zijn. Het organiseren van activiteiten in deze instellingen lijkt daarom meer inspanning te vereisen, omdat de omgeving de dementerende ouderen niet automatisch activeert en stimuleert. In de reguliere instellingen voor dagverzorging zijn de aangeboden activiteiten meestal beperkt tot recreatieve activiteiten zoals spelletjes, handwerken, wandelen, zingen en lezen. Dit beperkt de keuzevrijheid van de dementerende ouderen.

Gezien de geschetste verschillen tussen zorgboerderijen en reguliere instellingen voor dagverzorging, concludeerden we dat er eveneens verschillen in de effecten op de gezondheid verwacht konden worden. Deze veronderstellingen werden getoetst in twee cross-sectionele onderzoeken (Hoofdstuk 3 en 4) en een cohortonderzoek (Hoofdstuk 5 tot en met 7).

Ten eerste werd een inventarisatie gemaakt van de dagprogramma's van dementerende ouderen op zorgboerderijen en in reguliere instellingen voor dagverzorging. Het was onbekend of en in welke mate dementerende ouderen daadwerkelijk deelnamen aan de beschikbare en aangeboden activiteiten en faciliteiten. Daarom werden op 11 zorgboerderijen en 12 reguliere instellingen voor dagverzorging in Nederland observaties gedaan. Er werden zowel complete dagverzorgingsgroepen geobserveerd als individuele ouderen. Met de groepsobservaties werd inzicht verkregen in het type activiteiten dat werd georganiseerd, de locatie waar de activiteiten georganiseerd werden en de

mate van groepsdeelname in deze verschillende activiteiten (Hoofdstuk 3; cross-sectioneel onderzoek 1). De individuele observaties werden gedaan om inzicht te krijgen in het type activiteiten waaraan de ouderen daadwerkelijk meededen, de locatie waar zij aan deze activiteiten deelnamen en de mate van fysieke inspanning die deelname aan deze activiteiten vereiste (Hoofdstuk 3, cross-sectioneel onderzoek 2).

De twee onderzoeken lieten zien dat op zorgboerderijen zowel mannen als vrouwen een meer gevarieerd dagprogramma hadden en vaker buiten waren dan mannen en vrouwen die deelnamen aan reguliere dagverzorging. Verder kostten de activiteiten op zorgboerderijen meer fysieke inspanning dan de activiteiten in reguliere instellingen voor dagverzorging. Bovendien konden de activiteiten op zorgboerderijen individueel of in kleine groepjes worden uitgevoerd terwijl de activiteiten in reguliere instellingen voor dagverzorging overwegend met de hele dagverzorgingsgroep werden uitgevoerd (Hoofdstuk 3). Dit laatste impliceert mogelijkerwijs dat dementerende ouderen op zorgboerderijen meer keuzevrijheid hadden met betrekking tot de activiteiten waaraan zij wilden deelnemen dan dementerende ouderen die deelnamen aan reguliere dagverzorging.

De twee cross-sectionele onderzoeken bevestigden de verwachtingen die gebaseerd waren op het theoretische raamwerk in Hoofdstuk 2. Verschillen tussen beide typen dagverzorging resulteerden inderdaad in verschillen in de dagprogramma's van de dementerende ouderen. Er werd derhalve geconcludeerd dat ook verschillen in de effecten op de gezondheid van de dementerende ouderen verwacht konden worden. De tweede stap in het onderzoek was om deze hypothese te testen voor vijf aspecten van de gezondheid van dementerende ouderen, te weten voedselconsumptie, cognitie, emotioneel welbevinden, gedrag en functionele status.

De onderzoeksresultaten die beschreven worden in Hoofdstuk 4 bevestigden de verwachting dat zorgboerderijen en reguliere instellingen voor dagverzorging verschillen in hun effect op de voedselconsumptie van dementerende ouderen. In het onderzoek participeerden 30 dementerende ouderen die deelnamen aan dagverzorging op een zorgboerderij en 23 dementerende ouderen die deelnamen aan reguliere dagverzorging. De ouderen die naar de zorgboerderij gingen, waren over het algemeen getrouwde mannen. Zij waren gemiddeld jonger dan de met name vrouwelijke en verweduwde deelnemers van reguliere instellingen voor dagverzorging. Van alle ouderen werd gedurende 1 of 2 dagen bijgehouden wat zij thuis en op de dagverzorging aten en dronken. Uit het onderzoek bleek dat dementerende ouderen die deelnamen aan dagverzorging op een zorgboerderij een hogere inname hadden van energie (1.2 MJ per dag hoger), koolhydraten (39 gram per dag meer) en vocht (441 gram per dag meer) dan dementerende ouderen die deelnamen aan reguliere dagverzorging. Deze bevindingen kunnen betekenen dat zorgboerderijen een meerwaarde hebben

ten opzichte van reguliere instellingen voor dagverzorging voor wat betreft het handhaven of verbeteren van de voedingsstatus van dementerende ouderen. Dit is een belangrijke bevinding, omdat veel dementerende ouderen risico lopen op ondervoeding of ongewenst gewichtsverlies.

In het cohortonderzoek werden verschillen in de effecten tussen zorgboerderijen en reguliere instellingen voor dagverzorging op de vier andere aspecten van de gezondheid (cognitie, emotioneel welbevinden, gedrag en functionele status) van dementerende ouderen onderzocht (Hoofdstuk 5 en 6). Aan het onderzoek deden 47 dementerende ouderen mee die deelnamen aan dagverzorging op een zorgboerderij en 41 dementerende ouderen die deelnamen aan reguliere dagverzorging. Ook in dit onderzoek waren de ouderen die deelnamen aan dagverzorging op een zorgboerderij overwegend getrouwde mannen die gemiddeld jonger waren dan de overwegend verweduwde vrouwen die deelnamen aan reguliere dagverzorging.

In het onderzoek maakten wij onderscheid tussen drie cohorten van ouderen. Het onderscheid werd gemaakt op basis van de lengte van de deelname van de dementerende ouderen aan dagverzorging. Dementerende ouderen in cohort A gingen bij aanvang van het onderzoek bijna starten met dagverzorging op een zorgboerderij of met reguliere dagverzorging of waren recentelijk gestart. Dementerende ouderen in cohort B namen sinds ongeveer 6 maanden deel aan dagverzorging terwijl dementerende ouderen in cohort C sinds ongeveer 12 tot 24 maanden deelnamen aan dagverzorging.

Gedurende het onderzoek werden de dementerende ouderen en hun belangrijkste mantelzorgers drie keer geïnterviewd om inzicht te krijgen in eventuele veranderingen in hun cognitief functioneren, emotioneel welbevinden, gedragsproblemen en functionele status. Het eerste interview vond plaats bij aanvang van het onderzoek en het tweede en derde interview na respectievelijk 6 en 12 maanden. In alle cohorten bleven de bovengenoemde aspecten van gezondheid bij de dementerende ouderen min of meer stabiel. Er werden geen verschillen gevonden tussen dementerende ouderen die deelnamen aan dagverzorging op een zorgboerderij of aan reguliere dagverzorging. Deze bevindingen bevestigden dus niet de hypothese dat zorgboerderijen een meerwaarde hebben ten opzichte van reguliere instellingen voor dagverzorging voor de cognitie, emotioneel welbevinden, gedrag en functionele status van dementerende ouderen.

In het cohortonderzoek werd ook de emotionele belasting van hun mantelzorgers geëvalueerd (Hoofdstuk 7). Tijdens de interviews werd de mantelzorgers gevraagd naar hun kwaliteit van leven, de ervaren zorglast en hun gevoelens van competentie om te zorgen voor hun dementerende familielid. Mantelzorgers van dementerende ouderen die deelnamen aan dagverzorging op een zorgboerderij waren meestal partners, terwijl de mantelzorgers van dementerende ouderen die deelnamen aan reguliere dagverzorging meestal (schoon)zoons of (schoon)dochters waren. Gezien

deze verschillen werden beide groepen van mantelzorgers afzonderlijk beschouwd. Gedurende het onderzoek bleven de kwaliteit van leven, ervaren zorglast en gevoelens van competentie van de mantelzorgers min of meer stabiel bij zowel de mantelzorgers van dementiepatiënten die deelnamen aan dagverzorging op een zorgboerderij als bij de mantelzorgers van dementiepatiënten die deelnamen aan reguliere dagverzorging.

Op basis van dit proefschrift werd geconcludeerd dat zorgboerderijen beter dan reguliere instellingen voor dagverzorging in staat zijn om dementerende ouderen een afwisselend en divers dagverzorgingsprogramma aan te bieden. Ook stimuleren zorgboerderijen de voedselconsumptie van dementerende ouderen meer dan reguliere instellingen voor dagverzorging. Zorgboerderijen en reguliere instellingen voor dagverzorging lijken echter even effectief te zijn in het voorkomen van een significante afname van het cognitief functioneren, het emotioneel welbevinden en de functionele status, evenals in het voorkomen van een significante toename van het aantal gedragsproblemen. Daarnaast lijken beide typen dagverzorging een significante toename van de emotionele belasting van mantelzorgers te voorkomen.

Dagverzorging op zorgboerderijen is een nieuwe en waardevolle toevoeging aan de huidige zorgvoorzieningen voor thuiswonende dementerende ouderen en hun mantelzorgers. Met dagverzorging op zorgboerderijen is namelijk het aantal opties voor zorgvoorzieningen voor thuiswonende dementiepatiënten en hun mantelzorgers toegenomen. Dagverzorging op zorgboerderijen lijkt daarnaast een andere doelgroep (mannen) aan te spreken dan reguliere dagverzorging en biedt daarom een andere groep van mantelzorgers (partners) respijt.

De onderzoeken die in dit proefschrift zijn opgenomen, bevestigden deels de hypotheses die op basis van het theoretische raamwerk zijn opgesteld. De verwachting dat zorgboerderijen en reguliere instellingen voor dagverzorging zouden verschillen in hun effecten op de gezondheid van dementerende ouderen zijn daarom misschien overschat. Echter, gezien de methodologische beperkingen van de in dit proefschrift beschreven onderzoeken is het vooralsnog te vroeg om de hypotheses aan te passen. Verder onderzoek is nodig om de hypotheses die op basis van het theoretische raamwerk zijn opgesteld definitief te accepteren of te verwerpen (Hoofdstuk 8).

Dankwoord

Het is klaar….het is klaar…het is klaar!! Na vier jaar hard werken, is het dan gelukt. Ik heb een proefschrift geschreven! Ruim 40.000 kilometer moest er worden afgelegd om data ten behoeve van mijn onderzoek te verzamelen; een ware wereldreis dus. Gelukkig was ik niet alleen, en kon ik gedurende mijn promotietraject op hulp en steun van diverse mensen rekenen. Daardoor heb ik mijn promotieonderzoek tot een goed einde kunnen brengen en heb ik er enorm veel plezier aan beleefd!

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goede vriendinnen geworden. Wat wij allemaal bespraken op onze kamer moet soms toch echt wel tot grote ergernis hebben geleid bij onze andere collega's. Maar ja, een werkdag zonder de activiteiten van de voorgaande avond, de plannen voor de komende avond, elkaars outfit, accessoires, liefdesleven etc. te bespreken, is gewoon geen goede werkdag. Stephanie, it was a pleasure to work in the same room as you did. Beside the workload and some worries, we also had a lot of fun! I am proud to be one of your 'daughters'!

Zonder zorgboerderijen en reguliere voorzieningen voor dagverzorging geen onderzoek. Daarom wil ik alle deelnemende zorgboerderijen (De Horst, De Port, Klein Exterkate, Erve Knippert, De Haam, Buiten Gewoon, Chaamdijk, De Piekhoorn, Ransdalerveld, D'n Aoverstep, Hemelrijksche Hoeve, Het Scheiend, Levensvreugde, Willemshoeve, De Dommelhoeve, 't Binnenveld, Op de Mozik) en reguliere instellingen voor dagverzorging (Kruiswerk West-Veluwe SWO, Stichting Welstaete, Stichting Land van Horne, Carint, Zorggroep Noord-Limburg, Thuiszorg Breda, Cicero Zorggroep, Livio, Sint Joris, SBO Oosterhout, Het Hoge Veer) bedanken voor hun inzet en interesse. Ook alle ouderen en hun mantelzorgers die de tijd hebben genomen om deel te nemen aan ons onderzoek wil ik hartelijk bedanken. Ik vind het bijzonder dat ik zulke openhartige gesprekken met jullie heb kunnen voeren. Het was bovendien geweldig om steeds warm onthaald te worden met Limburgse vlaai, zelfgebakken taart of erwtensoep. Alle interviews en observaties die ten behoeve van mijn promotieonderzoek zijn uitgevoerd had ik met geen mogelijkheid in mijn eentje kunnen doen. Daarom wil ik alle studenten (Erica, Joyce, Anja, Basia, Irma, Amber, Monique, Hester en Hilje) heel hartelijk bedanken voor hun inzet en bijdrage aan dit proefschrift.

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En dan is het nu toch echt tijd voor een wijntje!

Simone

Oktober 2009

About the author

Simone Renate de Bruin werd geboren op 4 juni 1978 te Ede. In 1996 behaalde zij haar VWO diploma aan het Christelijke Scholengemeenschap Comenius te Capelle aan den IJssel. In datzelfde jaar begon zij met de studie Huishoud- en Consumentenwetenschappen aan Wageningen Universiteit. Tijdens haar studie deed zij twee afstudeervakken en een stage aan The University of Newcastle in Australië. In januari 2001 studeerde zij *cum laude* af. In april 2001 ging zij als onderzoeker bij TNO Kwaliteit van Leven te Leiden werken, waar zij tot en met april 2005 in dienst was. In mei van datzelfde jaar begon zij als promovendus bij de Leerstoelgroep Dierlijke Productiesystemen waar zij onderzoek deed naar de effecten van dagverzorging op zorgboerderijen op de gezondheid van dementerende ouderen. Dit onderzoek werd mede mogelijk gemaakt door financiering van Wageningen Institute of Animal Sciences (WIAS). Het onderzoek dat zij uitvoerde werd in augustus 2009 afgerond en staat beschreven in dit proefschrift. Gedurende haar promotieonderzoek is zij twee jaar actief geweest in het bestuur van de PhD Council van WIAS. Sinds september 2009 is zij werkzaam als onderzoeker bij het Centrum voor Preventie en Zorgonderzoek bij het Rijksinstituut voor Volksgezondheid en Milieu (RIVM) in Bilthoven.

Simone Renate de Bruin was born on 4 June 1978 in Ede. In 1996 she graduated from the secondary school Christelijke Scholengemeenschap Comenius in Capelle aan den IJssel. In the same year she started the study Household and Consumer Science at Wageningen University. During her study she wrote two theses and completed an internship at The University of Newcastle in Australia. In January 2001 she obtained her MSc diploma with distinction. In April 2001 she started as a researcher at TNO Quality of Life in Leiden, where she worked until April 2005. In the same year she started her PhD research at the Animal Production Systems Group of Wageningen University that focused on the effects of day care at green care farms on the health status of older people with dementia. The PhD project was financed by the Wageningen Institute of Animal Sciences (WIAS). The PhD project was finished in August 2009 and is described in this PhD thesis. During her PhD project she was member of the PhD Council of WIAS. Since September 2009 she is working as a researcher at the Centre for Prevention and Health Services Research in Bilthoven.

Publications

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Awarded presentation

- De Bruin SR, Oosting SJ (2007). Values of green care farms for demented elderly, 58th Annual Meeting of the European Association for Animal Production, 26-29 August 2007, Dublin, Ireland. *Best paper award 2007.*

Training and Supervision Plan — Graduate School WIAS

Name: Simone Renate de Bruin
Group: Animal Production Systems Group
Period: 2005-2009

	Year	Credits[1]
The Basic Package		
WIAS Introduction Course	2006	1.5
MGS Course Ethics for Life Scientists	2006	3.0
International Conferences		
Farming for Health Workshop, Stavanger, Norway	2006	1.2
Annual Meeting of European Association of Animal Production, Dublin, Ireland	2007	0.9
XIXth IAGG World Congress of Gerontology and Geriatrics, Paris, France	2009	0.9
Seminars and Workshops		
WIAS Science Day (4x), Wageningen, The Netherlands	2006-9	1.2
Seminar Gezondheid, Landbouw en Groen, Wageningen, The Netherlands	2006	0.2
Seminar Fragiliteit, Kwaliteit en Autonomie, Den Bosch, The Netherlands	2007	0.3
Symposium Dementiezorg in Nederland en daarbuiten, Tilburg, The Netherlands	2008	0.2
9e Nationale Gerontologiecongres NVG, Ede, The Netherlands	2008	0.3
Presentations		
WIAS Science Day (2x)	2006-9	2.0
Farming for Health Workshop	2006	1.0
Seminar Gezondheid, Landbouw en Groen	2006	1.0
Seminar Fragiliteit, Kwaliteit en Autonomie	2007	1.0
Annual Meeting of European Association of Animal Production	2007	1.0
Symposium Met ouderen de boer op, Lollum	2007	0.3
Slotbijeenkomst Brabants Transferpunt Landbouw Zorg, Tilburg	2008	0.3
9e Nationale Gerontologiecongres NVG	2008	1.0
Bijeenkomst Zorgboerderijen Zeeland, Oostkapelle	2008	0.3
XIXth IAGG World Congress of Gerontology and Geriatrics	2009	1.0
In-depth Studies		
WIAS Advanced Statistics Course: Experimental Design	2005	1.0
MGS Quantitative Research Methods	2007-8	4.0
Psychogerontologie: Theorie en Praktijk	2007-8	6.0
Professional Skills Support Courses		
WGS Course Professional Communication Strategies	2005	1.0
OWU Basiscursus Didactiek	2005-6	3.2
OWU Cursus Afstudeervak Organiseren en Begeleiden	2006	0.9
WIAS Course Techniques for Writing and Presenting a Scientific Paper	2007	1.2
Research Skills Training		
Writing research proposal (including procedure Medical Ethical Committee)	2005	4.0
Didactic Skills Training		
Supervision BSc Excursion Biological Production	2005	0.3
Supervision BSc Course Praktijkproject Inleiding Dierwetenschappen	2005	0.7
Lecturer BSc Course Duurzame Veehouderij	2006-7	0.4
Lecturer MSc Course Future Livestock Systems	2006-8	1.5
Supervisor BSc Theses and Internships (2 students)	2006	3.0
Supervisor MSc Theses (8 students)	2006-8	12.0
Management Skills Training		
Member WIAS Associated PhD Students Council (Representative Education Committee and Wageningen PhD Council)	2006-8	6.0
Total		**63.6**

[1]One ECTS (European Credit Transfer System) credit equals a study load of approximately 28 hours.

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