The Garden/Patio in Residential Care Facilities for Older People
–Characteristics and the Users Perspectives

EVA DAHLKVIST
The Garden/Patio in Residential Care Facilities
To my wonderful and beloved Gert and our beloved sons Gustav and Alexander
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Abstract

The overall aim of this thesis was to investigate gardens/patios in residential care facilities for older people, their characteristics and design elements, the residents' and staff members' perceptions of these outdoor spaces and relationships between garden greenery and residents' self-rated health. A multilevel, cross-sectional design was used. Study I, focused at the garden/patio in elderly care and residents' and staff members' perceptions of the outdoor spaces. In total 87 managers, 415 residents and 667 staff responded on questionnaires. In Study II (subsample of Study I), 290 residents was included. Study II concerned the residents' experiences of outdoor stay and their self-rated health in relation to garden greenery. The main result showed that many gardens had several recommended design elements, and at the same time there were obvious deficiencies. The residents estimated various aspects of the garden/patio more highly than the staff. The total and direct effect of greenery showed no statistically significant values, while total indirect effect showed positive and significant values in all tests. Garden greenery affected health state, trough being away of itself, and fascination of itself, trough being away and fascination in serial, and trough being away and visitation in serial. In cases where residents faced multiple barriers, only fascination mediated the relationship between greenery and self-perceived health. In conclusion, residents in residential care facilities valued various aspects of the garden/patio more highly than the staff. The amount of greenery and other natural elements seem to promote the residents' restorative experiences of being away and fascination during visits in the garden/patio, which in turn can promote more frequent visitation and better health. However, the residents' positive experiences of being away, fascination and health may not be realized if they face multiple barriers to go outdoors.

Keywords: design elements, garden/patio, green outdoor environment, health, nursing, residential care facilities for older people, serial mediation

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**INTRODUCTION**

The value of the physical care environment, both indoors and outdoors, in residential care facilities for older people and interest in the interplay between the environment and the individual seem to have increased in Sweden (1-6) and internationally (7-10). At the same time, it has been indicated that the environmental design does not always facilitate older people's outdoor stays and that older people do not get outdoors to the extent they desire (11-14). According to the World Health Organization (WHO), an individual’s performance capacity is determined in a dynamic interaction between individual health challenges and environmental factors (15). The physical care environment can be related to older people's experience of health, self-image, and behavior (2). For this reason, when designing residential care facilities for older people, both the indoor and outdoor environment should be taken into account (1).

The focus of the present thesis is on the garden/patio in residential care facilities for older people, specifically regarding the characteristics and design elements, residents' and staff members' perceptions of these outdoor spaces and links between garden/patio greenery and residents' self-rated health.
BACKGROUND

Older people in residential care facilities

Many older people in residential care facilities suffer from complex health problems such as multi-morbidity (16), dementia diseases (17,18), ADL-disabilities (19), anxiety, pain and depression (20-23). It is not unusual that they require much formal care (24). Due to the above mentioned circumstances, older persons may spend a considerable part of the day in their own apartment/room, which, in turn, may lead to passivity and deteriorating health (25-27). Some studies (28-30) have also shown that everyday work in residential care facilities was characterized by what the staff was doing, while the residents' day was marked by monotony and boredom. However, older people have described that living in residential care facilities include a positive sense of safety, freedom, satisfaction with their own health, social relationships and meaningful activities (31-33). On the other hand, their descriptions also revealed feelings of stress, frailty and depression (34,35), anxiety and fear of the loss of lifestyle, friends and pets (36,37). A number of positive and less positive factors have been found that may be associated with living in residential care facilities. Examples of factors related to the outdoor environment that may have a positive influence on older people's well-being and health in residential care facilities are outdoor stays (8,38-41), opportunities for social contact with others, physical activities such as walking (41-45) and horticultural therapy, e.g., gardening and working indoors with plants, and cooking/baking using ingredients from one’s own garden (46-48).

The physical care environment and health

Nursing is based on the consensus concepts of what it means to be a human being, health, caring and the environment (49). Nightingale, a fore-runner, found that the relationship between the physical care environment and health is something that can be found in every human being, while care can create the conditions for promoting health. This is a matter of having, e.g., access to fresh air, sunlight and views of nature (50).

WHO's Ottawa Charter for Health Promotion describes health promotion as the process that enables the individual to increase control over and improve his/her health. The concept of health is defined as a resource in everyday life, where the individual's social, personal and physical capacity is emphasized (51). Personalization of a person’s care and environment
should thus be based on shared decisions from the person's viewpoint and on prioritizing the relationship as well as the care (52). Thus, the concept of health involves perspectives that emphasize support of the individual's own resources. However, to promote health, there must be a balance between individual personal resources and the demands of the surrounding environment. In the present thesis, a concept of health is used that focuses on the individual's self-perceived health, where the garden, as part of the physical care environment, can be seen as a resource for promoting health in the care of older people in residential care facilities.

An interesting perspective in this context is the theory of aging developed by Lawton (53). The theory emphasizes that individuals who are cognitively and behaviorally less competent are more sensitive to environmental demands. The theory is expressed by the equation $B = f(P, E, P \times E)$, where behavior ($B$) stands for a function of personal competencies ($P$); environment ($E$); and where ($P \times E$) is the interaction between them. Personal competencies refer to personal biological health, sensory perceptual abilities, cognitive capacity, motor skills, competence and ego strength. Environment consists of the physical, personal, supra-personal and social environment. The physical environment concerns non-personal and non-social factors (e.g., the light, geographic distance) and the personal includes, e.g., relatives and pets. The supra-personal environment concerns the characteristics defining a person's place in a social context (e.g., neighborhood, public transport), while the social environment refers to norms and values in the individual's society. According to Lawton, a stimulating life is of great importance to an individual's state of health and well-being, and the environment interacts with the individual's competence and behavior. When there is balance between personal skills and environmental demands, there is support for the individual's well-being. On the other hand, both high and low requirements in relation to individual skills create a risk for confusion, anxiety and sense of disease (53,54).

**The indoor environment**

Despite variation in design, the buildings used in residential care facilities for older people in Sweden, with regard to structure, often have a similar construction. The apartments are mostly reachable directly through common areas on units equipped with a kitchen, dining room, day-room and corridors (55-57). Staff working in municipal elderly care in Sweden includes the health and social care professions, and elderly care is often dominated by women. Common professions are assistant nurses and nurs-
ing auxiliaries as well as registered nurses and, e.g., occupational therapists (58).

The outdoor environment
In the literature, recommendations can be found describing the design of gardens in residential care facilities. For example, the garden should ensure a secure and home-like environment and take into account residents' socio-cultural background. Furthermore, there should be places for privacy and places that offer opportunities for socialization as well as places that provide sensory stimulation, e.g., activities such as growing flowers, working in raised garden beds and walking. The value of different plants, water-related elements, decorative objects and pets is emphasized. There should be suitable furniture and lighting, seating at frequent intervals along principal walkways with shade and sun as well as easy access for wheelchairs. Moreover, there should be toilets very near the garden to facilitate outdoor stays for persons with incontinence (59). Yet, few studies have described how gardens/patios actually are designed.

Some of the terms used for the outdoor environment in residential care facilities are, e.g., garden, patio, healing garden, restorative garden and therapeutic garden. In the present thesis, the term garden/patio is used, because these are common terms used to denote the outdoor environments in residential care facilities in Sweden. The term external design elements includes elements such as boundaries, forms of enclosure, sun exposure, views from the garden/patio, while the term internal design elements includes, e.g., landscaping, horticulture, water-related features and seating. Other concepts used are being away and fascination. These concepts are of relevance to a theory of restorative environments (60). The natural environment includes many captivating processes and objects that an individual can experience as fascinating, e.g., the sound of trickling water, a sunset and/or the sound of leaves rustling in the breeze. A psychological sense of being away refers to a sense of distance from routine mental contents and demands and may elicit experiences of distance from unexpected distractions and routines that occur in everyday life (60,61). Given this, a garden in residential care facilities for older people may, despite great health challenges, stimulate residents' fascination and induce feelings of being away, as well as be a resource for counteracting under- and/or overload, pain, depression and anxiety.

In earlier research in elderly care focusing on the characteristics and design elements of gardens/patios, barriers to use and residents' well-being
have been examined from residents' and staff members' perspectives, separately or in combination. Two studies examined what elements of the garden/patio were perceived as attractive/positive and important. The result of these studies (5,62) showed that residents preferred having access to natural elements such as greenery and fresh air, as this sometimes helped them relax and experience well-being. The importance of seating areas, flowers, plants, lawns, trees, bushes and some kind of water-related features was also mentioned. At the same time, the residents reported a lack of stable and closely spaced seating and places to sit that were equipped with protection from sun and rain. Both residents (62) and staff (3) have reported the value of residents being able to have contact with pets. In line with the residents' perceptions, studies involving staff (3,7) have revealed the importance of perceived access to seasonal plants and comfortable seating areas. However, the staff also mentioned that having a calm, safe and secure environment was especially important to residents. Moreover, the staff expressed their desire for more design elements, such as gazebos, and more activities that could be offered outdoors.

Several studies looking at residents' perspectives have investigated barriers to use of the garden/patio. One study (62) focused on what elements residents perceived to be barriers to outdoor use. The residents mentioned barriers that influenced accessibility to the garden, one being poor coordination between interior and exterior spaces (e.g., long corridors, poor surfaces for walking). Furthermore, in a recent study (63), residents stated that doorway problems were barriers to their access to the garden. The most frequently mentioned problems were high door thresholds and self-locking doors, which made it difficult or impossible for residents to leave and reenter the facility again after outdoor visits. Other studies (13,38) have pointed out that the main barriers to greater use were one's own physical limitations, lack of assistance from staff, and design issues such as lack of protection from the weather. Another study (14) also revealed that physically capable residents visited the garden/patio less than once a month, mainly due to problems with accessibility and/or that staff were not available to provide help.

Studies (8,13,64) taking the residents' perspective have investigated the importance of the garden for residents' health and well-being. These studies have revealed that residents reported high values on access to green areas and that the main reason for visiting the garden/patio was to get some fresh air, take walks and look at the views. It was also shown that both the stay in the garden and observing nature were of great importance.
to the residents' mood, sleep, recovery and peace of mind. Another study (38) found a strong association between frequency of visiting the garden and residents' self-rated health. Furthermore, some experimental studies have revealed increased concentration after residents' visits in the garden compared with rests taken indoors (65), enhanced ability to concentrate among those who spent more time outdoors and that garden visits were important for recovery from stress and fatigue (66).

In summary, the literature review showed that a garden, as part of the physical care environment, may serve as a resource in promoting health in the daily care of older people and that opportunity to stay in the garden should be optimized as it could result in positive effects on residents' recovery and health (8,40,65,66). The availability of different design elements in the garden/patio may also have a positive impact on residents, and some elements have been highlighted as being particularly important (3,5,7,62). However, it has been shown that residents' stays in a garden can be greatly affected by the garden's accessibility and perceived barriers. Deficiencies in the latter aspects may result in low utilization of the garden/patio (7,14,62).
RATIONALE

For older people, living in residential care facilities may mean security and social community. However, it may also entail experiences of being dependent on other people, with respect to physical ability and disease. It is therefore not uncommon for older persons to spend a large part of the day in their own rooms, which may lead to passivity and deteriorating health. Studies have described the benefits for older people (health benefits, among other things) of staying in the outdoor environment. Despite this, it has been shown that older people do not get outdoors to the extent they wish.

There is literature recommending how gardens/patios at residential care facilities should be designed – e.g., they should be perceived as attractive and inviting to visit – but there is less research describing how they actually are designed. Earlier research has also investigated residents’ and staff members’ perceptions of, and residents’ satisfaction with, stays in the garden/patio. Furthermore, previous research has revealed several deficiencies, which can be associated with utilization of the garden/patio. The focus of those studies has predominantly been on the staff, only to some extent including residents’ perspectives. Moreover, there is a lack of research on how garden greenery, barriers to garden use as well as restorative experiences of being way and fascination affect older people’s self-rated health. It may therefore be of great value to deepen our knowledge about factors that promote the residents’ subjective well-being and health as well as factors that either stimulate or counteract their utilization of the garden/patio.
AIM

The overall aim of the present thesis was to investigate gardens/patios in residential care facilities for older people, their characteristics and design elements, residents' and staff members' perceptions of these outdoor spaces and relationships between garden/patio greenery and residents' self-rated health.

The specific aims of the studies were:
I.
To describe the characteristics and design elements of gardens/patios at residential care facilities for older people and to describe and compare residents' and staff members' perceptions of the garden/patio, as well as to investigate factors related to residents' satisfaction with and stays in the garden/patio.
II.
To test the relationship between greenery in gardens/patios at residential care facilities and the self-rated health of the elderly residents, as mediated by experiences of being away and fascination when in the garden and the frequency of visitation there. The aim was also to examine whether this set of indirect effects is contingent on the number of barriers residents must overcome to visit the garden.
METHODS

Design
The present thesis is based on one data collection using a multilevel, cross-sectional design and comprises two studies. Overview of the study design, sample size, data collection/instruments and data analysis is presented in Table 1.

Table 1. Overview of the methods, design, sample size, data collection/instruments and data analysis used in the studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Design</th>
<th>Sample</th>
<th>Data collection/ instruments</th>
<th>Data analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Study I</td>
<td>Cross-sectional, multi-level design</td>
<td>Convenience sample 87 Residential care facilities/Gardens/patios</td>
<td>Questionnaire; Cohen-Mansfield &amp; Werner, 1999 The Perceived Restorativeness Scale [PRS] EQ-5D [EQ-5D], Version 2.0, 2009, descriptive and visual analogue scale (VAS)</td>
<td>Descriptive statistics; PCA* Mann-Whitney U-Test Friedman's test Wilcoxon signed ranks test</td>
</tr>
<tr>
<td>Part I</td>
<td></td>
<td>Convenience sample 415 Residents; 286 females, 129 males.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Random sample 667 Staff 638 females, 29 males</td>
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<tr>
<td>Part II</td>
<td></td>
<td>Subsample of study I 72 Residential care facilities/Gardens/patios</td>
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<td></td>
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<td>290 Residents</td>
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<td>290 Residents</td>
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Note *PCA = Principal component analyses
Sample and setting
The setting for Study I and II was the outdoor environment in residential care facilities for older people.

In Study I, Part I, all managers (n = 105) at residential care facilities for older people within 13 municipalities in three regions in central and northern Sweden were asked to participate; 91 agreed and 87 returned the questionnaire (response rate 83%). The manager or a contact person, designated by the manager, was asked to answer a questionnaire about the garden's/patio's characteristics and design. Most of the respondents were women (n = 85, 98%, mean age, 50.1 years, standard deviation [SD], 8.7 years; mean working experience at the facility, 8.5 years, SD, 9.4 years; mean working experience in elderly care, 20.6 years, SD, 11.0 years). Of the respondents 72 were managers, 12 licensed practical nurses (LPNs), and 3 occupational therapists.

In Study I, Part II, concerning residents' and staff members' perceptions of the garden/patio, a questionnaire was distributed to 10 residents and 10 staff members per facility. Inclusion criteria for the selection of residents were that participants should be individuals who regularly visited the garden/patio and could answer the questionnaire by themselves or with the help of a contact person. Information on possible participants was obtained from a contact person, designated by the manager. This person also asked the residents about their interest in participating in the study. Inclusion criteria for staff were that they worked morning or afternoon shifts and had worked for at least 3 months in elderly care. Lists of staff were gathered from the human resources department. Randomized selection of staff was carried out using a table of random numbers (67). At some facilities, there were not 10 eligible residents available and in some cases the total number of staff was fewer than 10.

Questionnaires were distributed to 684 residents and 907 staff; the response rate was 61% (n = 415) and 74% (n = 667), respectively. Of the residents, 286 were women and 129 men, and of the staff, 638 were women and 29 men. Mean age for residents was 85.2 years (SD, 8.2 years) and for staff 47.6 years (SD, 10.7 years). Staff members' mean length of working time at the facility was 11.9 years (SD, 8.6 years) and in elderly care 19.3 years (SD, 9.3 years). In total, 523 of the staff were LPNs, 95 nurse's aides, 7 registered nurses (RNs), and 4 occupational therapists (OTs) (data missing for 38 respondents).

In total, 83 (95%) of the facilities were multi-story buildings, where some 35 (40%) were one-story buildings, solely or in combination with
multi-story buildings. The number of stories varied between two and six. Fifty-five (63%) of the 87 facilities had special care units for persons with dementia, 26 (30%) short-time care and 11 (13%) had units for daytime activities. The number of rooms varied between 6 and 114 (mean, 39.7, SD, 22.3, median 36.0).

Study II was based on a subsample from Study I. In Study II, data were used from 290 residents in 72 of the facilities that had complete data for all of the variables in the intended analyses. The sample included 203 women and 87 men with a mean age of 84.8 years (SD = 8.3, range 53-103). The sociodemographic characteristics of residents in the present study (n=290) were compared with those of residents who had not provided data for all variables of interest (n=125). No statistically significant age or gender differences were found between residents with complete data and those without complete data. See Figure 1 for an overview of the sample procedure (flowchart).
Figure 1. Flowchart illustrating the sample procedure with participants and dropouts for Study I and II.
Data collection and procedure

Data were collected during the summer of 2011. The manager of each facility was contacted by the researcher (ED) by telephone about his/her interest in participating in the study. A questionnaire was distributed by mail to one manager, 10 residents (convenience sample) and a random sample of 10 staff members per facility. The residents and staff responded to questionnaires in conjunction with a visit in the garden/patio. The residents received this information from a contact person, designated by the manager for the facility. The researcher (ED) also informed the contact person, using written and oral information to, that if the residents were in need of help, to read the questions verbatim, calmly and to repeat them if necessary.

Instruments

A questionnaire developed by Cohen Mansfield and Werner (1999), directed to managers and administrators at residential care facilities for older people, was used to measure the characteristics and design elements of the gardens/patios (7). The questionnaire, based on the article, was translated and adapted to Swedish conditions, with the permission of Cohen-Mansfield (personal communication by e-mail). The research team translated the questionnaire carefully during several meetings and discussions and by removing irrelevant items or adding items/questions as were perceived of relevance for Swedish conditions. Literature concerning method and design of gardens for people living in residential care facilities for older people served as theoretical base (3,13-14,59,62). The Swedish version of the questionnaire consists of two parts and was further developed to also investigate residents' and staff members' perspectives about the garden/patio. The Swedish version was tested for face validity by people working in elderly care (two specialist nurses in elderly care) and with gardening (one occupational therapist, one administrator and also one gardener with PhD ethnographer competence) in Sweden (n = 5). The test revealed that the questionnaire was possible to understand and well adapted to reality for Swedish conditions.

Exploratory Factor Analysis (EFA) by factor extraction and principal component analysis (PCA) of the 19 items regarding residents' and staff members' perception of the garden/patio was also tested. The test revealed acceptable five factors solutions that corresponded for both groups. Regarding reliability, two factors in the instrument, measuring staff mem-
bers' and residents' perceptions of the garden/patio, had Cronbach's alpha values below 0.70, indicating a need for a further testing and development.

**Part I** was completed by the manager or a designated contact person, and included 41 items (11 factors) that concern the garden's/patio's characteristics and design elements. The response alternatives are mainly dichotomous and multiple choice. Three summative indexes were constructed based on four questions with several response alternatives for each question. 1) The greenery index is based on two questions: 1) "What is the main view persons who visit the garden/patio have?" Responses are green areas, forest, water areas. 2) "Which elements/characteristics are found in the garden/patio?". Responses were a) "Elements and form"; trees, shrubs, lawns, flowers, large stones, garden beds, kitchen garden, raised garden beds, seasonal plants. b) "Water-related elements"; bird baths, fountain/waterfall, ponds and brooks. The scale ranges from 0-16. 2) The Obstacles to getting out index is based on one question: 1) "Are there boundaries/obstacles that make it difficult or dangerous to move from the residents' rooms to the garden/patio?". Responses are long corridors, code locks in or outside elevators, stairs, locked doors, high thresholds, one must walk through a parking lot or over a trafficked road, walk up hill, or open a big and heavy gate. The scale ranges from 0-10. 3) The Obstacles in the garden index is based on one question: "Are there boundaries/obstacles that make it difficult or "dangerous" to move around in the garden/patio?". Responses are ditches, precipices, slopes, hilly land and stairs. The scale ranges from 0-5.

**Part II** concerns residents' and staff members' perceptions of the garden/patio and contains some items answered by both residents and staff and some items solely answered by residents and some by staff. Nineteen items (five factors) are answered by both residents and staff: characteristics and design elements (5 items); multisensory stimulation (5 items); seasonal use (4 items); noise (3 items) and accessibility (2 items). The response alternatives are rated on a 5-point Likert-type scale with minimum and maximum values ranging from 0 to 4 for all of the variables. Residents also answered a question regarding visits in the garden/patio; "How often are you in the garden/patio on average during a summer week?". Response alternatives are; 1 day/week, 2 day/week, 3 day/week, 5 day/week, 6 day/week and daily. Furthermore, the residents answered two statements regarding stress and demands; "When you visit the garden/patio, do you experience stress?" and "When you visit the gar-
den/patio, do you experience demands?". Response alternatives are from 0 (very often) to 4 (seldom). The staff answered questions regarding their perceptions of residents use of the garden (e.g., just stay in, common meals), 8 items. Response alternatives are from 0 (not at all) to 4 (very often). Furthermore, staff answered questions about their perceptions of "Actual users of the garden/patio (e.g., people with impaired hearing) and whether the garden/patio was adapted to these users" (9 items). Response alternative are for "actual users"; 0 (not at all) to 4 (very often) and for "the garden is adapted for"; 0 (not at all) to 4 (totally agree). There was also one question with 4 items regarding weather; "How do you perceive that weather affects residents' opportunities to spend time in the garden/patio?". Response alternatives are from 0 (very often) to 4 (not at all). The questionnaire also includes questions about socio-demographic characteristics.

The Perceived Restorativeness Scale [PRS], developed by Hartig (68,69), was used to measure residents' experiences of being away and fascination (study II). The subscale being away comprises sex items (e.g., "This place is a refuge from unwanted distractions"; "Spending time here gives me a break from my day-to-day routine"). The subscale 'fascination' also comprises six items (e.g., "There is much to explore and discover here"; "My attention is drawn to many interesting things here"). Responses were made on an 11-point scale (0 = not at all; 10 = completely). The internal consistency for both subscales was, for being away, \( \alpha = 0.89 \), and for fascination, \( \alpha = 0.92 \).

Before use the Swedish version of the instrument was pilot tested at 10 persons living at one residential care facility, to determine if the instrument was applicable for use on older people. The researcher (ED), sent written information by e-mail and contacted the manager at the facility by telephone, asked and got permission to do the test. After that, the manager asked residents who used to visit the garden about their interest to participate in the pilot study. The manager also gave oral and written information that participation should be strictly voluntary and that it could be discontinued without giving any reason. The researcher (ED) distributed the questionnaire to one resident at a time, in conjunction with their visit in the garden. The residents got repeated information by the researcher that their participation was strictly voluntary and that it could be discontinued without giving any reason. The researcher also showed the questionnaire and helped residents as needed to read the questions verbatim, calmly and repeat them if necessary. The test took about 30 minutes for
The EQ-5D 5L [EQ-5D-5L] (Version 2.0, 2013) was used to measure the residents’ self-rated health at the time of their visit to the garden/patio (study II). The EQ-5D consists of a descriptive system and the EQ visual analogue scale (EQ VAS). In the present thesis, only the EQ VAS was used to represent residents’ current health. The scale ranges from ‘worst imaginable health state’ (= 0) to ‘best imaginable health state’ (= 100). The instrument’s validity and reliability have been tested by the EuroQol group and shown to be good (70).

Data analysis

Study I
Statistical analyses were carried out in SPSS statistics 20.0 for Windows by using descriptive (mean, SD, median [Md], range, frequency, and percentage) and comparative statistics (Mann-Whitney U-Test, Friedman’s test, and Wilcoxon signed ranks test). The level of statistical significance was set at p < 0.05 (two-tailed). Construct validity was determined using principal component analyses (PCA) with Varimax rotation (71), for the 19 items related to residents’ and staff members’ perceptions of the garden/patio. One PCA was carried out for the residents and one for the staff. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.834 for residents and 0.901 for staff, and Bartlett’s test of sphericity was shown to be statistically significant for both groups, which justified continuing with the analysis. To determine the number of factors, Scree plot and Eigenvalues were used, and five factors were selected for both groups. The five factors explained 65.7% of the total variance for residents and 70.6% of the total variance for staff. Internal consistency for the factors was tested using Cronbach’s Alpha; and ranged from 0.62 to 0.88 for residents and from 0.58 to 0.91 for staff.

Study II
As the data had a two-level hierarchical structure, with residents clustered in residential facilities, provisional analysis indicated, given the weak clustering, that the analysis could be conducted at the resident level. A provisional linear mixed model (LMM) analysis afforded a small intraclass correlation coefficient (ICC = 0.07) and the between-cluster variation was
small (b2 = 25.3), with a relatively large standard error (21.0). There was data for only one resident in 13 of the 72 residential care facilities, and for only two residents in 13 other facilities. Ordinary least squares (OLS) multiple regression analysis and the LMM analysis showed nearly the same values for the estimated regression coefficients. Based on those considerations, were used techniques for testing multiple mediation with simple OLS regression methods. Inferences regarding the direct effect of greenery on self-rated health and indirect effects as mediated through being away, fascination, and/or visitation were based on tests of serial multiple mediator models conducted using the procedures described by Hayes (72). They were tested in serial order based on the high partial correlation between being away and fascination, controlling for greenery. To assess effect modification by barriers to access to the garden, the respective models were tested separately for the group with none or just one barrier and for the group with multiple barriers. To assist inference with all these model tests, bootstrap techniques by Hayes PROCESS macro for SPSS were used, with the number of bootstrap samples set at 5000. As gender was related to both being away and fascination, it was included as a covariate in the analyses. Age was not significantly associated with the other variables in the analyses and was therefore excluded. Point estimates for the multiple mediator models and bias-corrected and accelerated (BCa) 95% confidence intervals (CIs) have been presented. Visual inspection and the Shapiro Wilks test showed that the residuals were normally distributed. All variance inflation factor (VIF) values were below 2.0, which indicated that there were no problems with multicollinearity between the independent variables in the model. Statistical analyses were carried out using IBM SPSS Statistics 20 (SPSS, Inc., 2011). The level of statistical significance was set at p <0.05 (two-tailed) for all tests.

Ethical considerations
The Regional Ethical Review Board in Uppsala, Sweden (Reg. no. 2011/139) approved the study. Ethical regulations described in Swedish Law (2003:460) and the criteria described by the Helsinki Declaration (73) for research ethics were followed. All participants received both written and oral information about the study aim and procedures. The participants were also informed that participation was strictly voluntary and could be discontinued without giving any reason. Completion and return of the questionnaire were considered to indicate the participants’ informed consent. There was an ethical problem/risk when the contact person asked
the residents about their wish to participate. Because residents might be in a position of dependence in relation to these staff members, they may have experienced being forced to agree to participate. To remedy this, the residents were informed about the procedure and purpose of the study, told that participation was strictly voluntary and that their decision would not in any way influence their future care.
SUMMARY OF RESULTS

Study I

The main result showed that most gardens/patios had been established when the facility was built (n=60; 69%). There were both joint gardens/patios for all residents, and those that were separated for the units. Concerning perimeter design elements and characteristics of the surrounding outdoor environment, it was revealed that the garden/patio in most cases was enclosed (n=58; 67%), usually with a wooden fence. At 61% facilities, the gates were locked for residents. The garden/patio was highly (n=55; 63%) visible from different rooms (e.g., dayroom, kitchen and dining room). Views from the garden/patio were generally of buildings (n=46; 53%) and green areas (n=41; 47%), but at some facilities there were no views at all (n=10; 12%).

The principal internal design elements of the gardens/patios were walkways (n=80; 92%), lawns (n=66; 76%), trees (n=69; 79%), shrubs (n=77; 89%), familiar plants (n=55; 63%), flowers (n=77; 89%), and raised garden beds (n=47; 54%). Less common elements were, e.g., fountains (n=31; 36%), birdbaths (n=16; 18%) and pets (cats, n=23; 26% and dogs, n=16; 18%). Many of the facilities stated that there was seating in the garden/patio with access to both sun and shade (n=74; 85%) and that the main protection against the sun was parasols (n=70; 81%). Many facilities also assessed their chairs as stable (n=67; 77%) and as having armrests (n=66; 76%). However, it was also reported that just over a half of the facilities lacked seating near walkways (n=54; 62%) and some of them lacked movable benches (n=26; 30%) and stable chairs (n=20; 23%).

Regarding accessibility, in almost all facilities it proved to be possible for residents and staff to go out into the garden/patio from a common exit (n=84; 97%) and to open the door and just walk out (n=56; 64%). However, at the same time, many of the facilities reported that there were obstacles to accessibility to the garden/patio. The greatest problem, due to long corridors (n=47; 54%) and locked (n=27; 31%) and heavy doors (n=16; 18%), was for residents to get themselves out from their own apartment to the garden/patio. It was also shown that some facilities had obstacles that made it difficult for residents to get around in the garden/patio due to the presence of slopes (n=25; 29%), hilly land (n=11; 13%), trees/plants (n=10; 12%). There were also facilities with walkways that were not wide enough for two wheelchairs to pass each other (n=27;
Just over half of the facilities (51%) lacked toilet in close proximity to the garden/patio.

Looking at staff members' perceptions, the most frequent use of the garden/patio was just for stays there and/or for common meals/snacks (median, 3.0), and occasionally for activities such as cultural events and private meetings (median, 2.0). Less was mentioned concerning gardening work and training of residents' fine and gross motor skills (median, 1.0). The residents were more satisfied than the staff were with seasonal use, characteristics and design elements and accessibility. Both residents and staff were quite/rather to very satisfied with residents' possibilities to get out into the garden during the spring, summer and autumn (median, 2.5-4.0). The staff was less satisfied (median, 0.0), while the residents were least satisfied (median, 2.0), with residents' opportunities to get out during the winter months. Neither the residents nor the staff perceived that the residents were bothered by noise, and there were no significant differences between residents and staff concerning their perceptions of noise and multisensory stimulation (Table 2).

The staff reported that the weather was rather often too hot or too cold (median, 2.0) and sometimes too sunny (median, 2.5) and windy (median, 3.0) for residents to stay in the garden. However, the residents reported that they seldom felt stressed or that there were demands placed on them in conjunction with stays in the garden (median, 4.0).

Three summative indexes were constructed to study factors related to residents' satisfaction with the garden/patio ('greenery index', scale range 0-16; 'obstacles to getting out index', scale range 0-10; 'obstacles in the garden index', scale range 0-5). The residents were divided into two groups (living in a facility with high values and one with low/medium values) by the use of a median split of the indexes ('greenery index', Md 7.0; 'obstacles to getting out index', Md 1.0; 'obstacles in the garden index', Md 0.0). The residents' satisfaction with the garden/patio was in a next step compared between residents living in facilities with high 'greenery index' values (Md >7) and those living in facilities with low/medium values (Md≤ 7). This was also done for the other two indexes based on their Md values.

The main result revealed that residents who lived in residential care facilities with high values on the greenery index were more satisfied with seasonal use (median, 3.0), characteristics and design elements (median, 3.0), and multisensory stimulation (median, 2.8) than were those who lived in facilities with low/medium greenery index values (median, 2.8, 2.8...
and 2.6 respectively). At residential care facilities with low/medium values on the obstacles to getting out index, the residents were more satisfied with accessibility (median, 4.0), with noise (median, 4.0) and visited the garden/patio more frequently (median, 4.0) than did those who lived in facilities with high values (median, 3.0; 3.7 and 3.0 respectively) on the obstacles to getting out index. In residential care facilities with low/medium values on the obstacles in the garden index, the residents were more satisfied with characteristics and design elements (median, 3.0) than were those who lived in facilities with high values (median, 2.6), and they also visited the garden/patio more frequently (median, 3.0).

### Table 2. Residents’(R) and Staff Members’(S) perception of the garden/patio\(^a\) (n=415/667)

<table>
<thead>
<tr>
<th>Variables (n R/S)</th>
<th>Residents</th>
<th>Staff Members</th>
<th>(\alpha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Median (SD)</td>
<td>Median (SD)</td>
<td>P-value</td>
</tr>
<tr>
<td>Seasonal use (372/654)</td>
<td>2.8 2.7(1.0)</td>
<td>2.5 2.3(1.0)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Characteristics and design elements (412/665)</td>
<td>2.8 2.6(1.0)</td>
<td>2.0 2.0(1.1)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Accessibility (396/653)</td>
<td>3.5 3.0(1.2)</td>
<td>3.0 2.7(1.1)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Noise (406/662)</td>
<td>3.7 3.5(0.7)</td>
<td>3.7 3.4(0.8)</td>
<td>0.167</td>
</tr>
<tr>
<td>Multisensory stimulation (391/648)</td>
<td>2.6 2.5(1.0)</td>
<td>2.4 2.4(1.0)</td>
<td>0.498</td>
</tr>
</tbody>
</table>

\(\alpha\) Mann-Whitney U test.

Note. Response alternatives for items in seasonal use and characteristics and design element ranges from 0 (not at all satisfied) to 4 (very satisfied) and for accessibility from 0 (agree totally) to 4 (do not agree at all). Response alternatives for items in noise ranges from 0 (very often) to 4 (not at all) and for multisensory stimulation from 0 (seldom) to 4 (very often).

### Study II

Greenery was not significantly related to either visitation or self-rated health. However, the pattern of significant positive associations in the bivariate correlations did show a positive effect on health. The result showed that when the garden/patio area had more natural view components and other natural elements, the resident experienced higher levels of being away and fascination during their visit, and that they also tended to report better self-rated health. Experiences of being away were also associated with more frequent visits in the garden. On average, the residents visited the garden about three times a week (Table 3).
The serial mediation model indicated significantly positive effects of garden greenery on self-rated health through being away only and fascination only. Furthermore, the indirect effect of greenery on self-rated health through being away and fascination as well as being away and visitation in series was also positive and significant. The specific indirect effect through all three mediators was almost zero, and did not contribute the total indirect effect. The regression analyses revealed that the model could explain 17.6% of the variance in the outcome variable self-rated health.

Two additional models were tested to investigate whether the above-mentioned relationships differed depending on the number of barriers that the residents must overcome to visit the garden. The first model was for residents living in a residential care facility with no or only one barrier and the second model was for facilities with two or more barriers. The result for both models revealed that the total effect and the direct effect between greenery and self-rated health remained non-significant. For the model 'few barriers' (0-1), the results showed that the same indirect paths were significant as when analyzing all residents. The test of the model 'several barriers' (2-) resulted in a positive and significant indirect effect of greenery on self-rated health through fascination only (Figure 2 and Table 4).
Figure 2. The model of the effect of garden greenery on self-perceived health (H) as mediated by restorative quality variables and visitation in serial. The values represent unstandardized regression coefficients with accompanying standards errors in parentheses. The coefficients $a_i$ represent the effects of garden greenery on the mediators being away (BA), fascination (FA), and visitation (VI), controlling for earlier mediators in serial. The coefficients $b_i$ represent the effects of the mediators on self-rated health, controlling for direct effect of garden greenery and the mediators. The coefficients $d_{ij}$ represent the effects of earlier mediators on subsequent mediators in serial. The coefficient $c$ is the total effect of garden greenery on H and $c'$ is the direct effect of garden greenery on H with adjustment for the three mediators. Test was used by bootstrapped confidence intervals available through Hayes’ (2013) PROCESS macro for SPSS, with the number of bootstrap samples set at 5000. The variables are adjusted for gender. N=290. *p<0.05
### Table 4. Direct and Indirect Effects of the Relationship between Garden Greenery (GG) and Self-rated Health (H), through the Mediators Being away (BA), Fascination (FA) and Visitation (VI) - Results for all Participants and for two Levels of Barriers to Entry to the Outdoor Garden/Patio Space.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>All participants (n=290)</th>
<th>No or one barrier (n=154)</th>
<th>Multiple barriers (n=136)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Point estimate BCa 95% CI</td>
<td>Point estimate BCa 95% CI</td>
<td>Point estimate BCa 95% CI</td>
</tr>
<tr>
<td>Indirect effects</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 GG → BA → H</td>
<td>0.233 0.037,0.588</td>
<td>0.307 0.042,0.820</td>
<td>0.120 -0.090,0.855</td>
</tr>
<tr>
<td>2 GG → BA → FA → H</td>
<td>0.191 0.045,0.443</td>
<td>0.167 0.022,0.487</td>
<td>0.182 -0.138,0.784</td>
</tr>
<tr>
<td>3 GG → BA → VI → H</td>
<td>0.033 0.004,0.121</td>
<td>0.088 0.014,0.290</td>
<td>-0.003 -0.108,0.012</td>
</tr>
<tr>
<td>4 GG → BA → FA → VI → H</td>
<td>-0.001 -0.024,0.015</td>
<td>-0.001 -0.047,0.042</td>
<td>&lt;0.001 -0.022,0.018</td>
</tr>
<tr>
<td>5 GG → FA → H</td>
<td>0.353 0.152,0.670</td>
<td>0.286 0.066,0.661</td>
<td>0.468 0.099,1.158</td>
</tr>
<tr>
<td>6 GG → FA → VI → H</td>
<td>-0.001 -0.037,0.030</td>
<td>-0.001 -0.067,0.071</td>
<td>&lt;0.001 -0.041,0.036</td>
</tr>
<tr>
<td>7 GG → VI → H</td>
<td>-0.022 -0.195,0.100</td>
<td>0.233 -0.011,0.661</td>
<td>0.070 -0.377,0.573</td>
</tr>
<tr>
<td>Total Indirect effect</td>
<td>0.786 0.365,1.307</td>
<td>1.079 0.511,1.855</td>
<td>0.837 0.028,1.839</td>
</tr>
<tr>
<td>Direct effect (c')</td>
<td>-0.665 -1.609,0.278</td>
<td>-0.419 -1.508,0.671</td>
<td>-1.740 -3.567,0.087</td>
</tr>
</tbody>
</table>

Note. The direct effect (c') is the effect of garden greenery (the initial variable) on self-rated health (the outcome variable), after adjustment for the mediators. Point estimates of regression coefficients and bias corrected and accelerated (BCa) confidence intervals. Result based on 5000 bootstrap samples, with estimates adjusted gender. **Bold figures** = Statistically significant effects (p <0.05).

## DISCUSSION

### Summary of main findings

The main findings showed that many gardens had several recommended design elements, but at the same time there were obvious deficiencies. The residents appreciated various aspects of the garden more highly than the staff did. Furthermore, the total and direct effect of greenery on residents’ self-rated health was non-significant, whereas the total indirect effect was positive and significant in all tests. The specific indirect effects were positive and significant for garden greenery on health state through being away only and fascination only. The same was true for the indirect effect of greenery on health state through being away and fascination in series and through being away and visitation in series. In the case of few barriers, it was revealed that the same indirect paths were significant as when analyzing all residents, while several barriers showed a positive significant indirect effect of greenery on health state through fascination only.

### Garden greenery and health

The result (Study II) revealed that the total indirect effect of garden greenery on self-rated health was positive and significant. When there was an abundance of greenery and natural elements in the garden/patio area, the residents reported more experience of being away and fascination during their visit, and this was also associated with more frequent visitation and
better self-rated health. Studies have also shown that visits in the garden/patio can improve residents’ mood, sleep quality and peace of mind (8), experiences of health, thriving and well-being (10,14,40,74). In persons with dementia, not being able to go out has also been associated with feelings of depression (41). Furthermore, it was shown (Study I) that residents who lived in residential care facilities with reported high values on the greenery index were more satisfied with seasonal use, characteristics and design elements, and multisensory stimulation than were those living in residential care facilities with low/medium greenery index values. The present findings may be based on the fact that the garden/patio, by its very nature, incorporates many interesting processes that the residents can experience as fascination (e.g., trickling water from a fountain, the smell of flowers and the sound of leaves rustling in the breeze, sunsets). A sense of being away may even arouse their feelings of distance from unexpected distractions and various demands that can occur in everyday life (61). Lawton also emphasized that, regarding health promotion, it is important to consider an individual’s sensory perceptual capability. Lawton stated that a stimulating life may be of great importance to an individual’s sense of health and well-being and that the environment interacts with the individual’s competence and behaviour. Thus, when there is a balance between individual personal skills and environmental demands, there may be an opportunity to support the individual’s well-being. On the other hand, both high and low requirements in relation to individual skills can create confusion, anxiety and sense of disease (53,54).

From a caring perspective and to promote residents’ health, it is reasonable to assume that access to a garden/patio is of great value to residents throughout the year. Being able to go outdoors during the different seasons can give residents rich opportunities to a stimulating life. Access to a garden/patio in residential care facilities can, despite great health challenges, promote residents’ health, stimulate fascination, elicit feelings of being away, and be a resource for counteracting under- and/or overload depression and anxiety. According to Lawton (53), views, buildings, to seeing other people in the hustle and bustle of life, is also important for defining a person in a greater social environment.

Characteristics and design elements

Furthermore, the results showed (Study I) that several facilities with gardens/patios reported being equipped with internal design elements that were adapted to design recommendations (e.g., trees, shrubs, flowers,
lawns, walkways, seating, and protection against the sun). At the same
time, many of them revealed manifest weaknesses in the form of a lack of
elements recommended in the literature (59). Nearly the half of the facili-
ties reported having seasonal plants and some lacked flowers; only a few
stated that they had water-related elements, e.g., birdbaths and fountains,
and pets. A study by Cohen-Mansfield and Werner (7) showed a similar
result. However, studies (3,62,64,75) have shown that water-related ele-
ments and pets can contribute to increased sensory stimulation and there-
fore should be seen as of great importance to promoting residents' health
and well-being. Moreover, it was revealed (Study I) that some facilities did
not have enough seating in proximity to walkways, movable benches;
stable chairs and that some did not have available seating in the sun or
shade. However, earlier research (3,14,62,76,77) has highlighted that
access to the above-mentioned internal design elements can be regarded as
being of great value in that these elements provide residents with comfort-
able places, opportunities to socialize and places for privacy. It was also
reported that fewer than half of the facilities had a toilet in close proximi-
ty to the garden/patio. Taken together and seen from the perspectives of
care provision and health promotion, a lack of the above-mentioned ele-
ments is worrisome because people living in residential care facilities often
suffer from complex health problems such as multi-morbidity (16), ADL
disabilities (19), and pain (20,21,23). It is also not unusual for them to
have a fear of falling (78) and to suffer from incontinence (79). Lawton
(53,54) also stated that individuals with reduced personal competence
(e.g., biological health and cognitive capacity) are more sensitive to envi-
ronmental demands. That is, when there is a balance between individual
personal skills and environmental demands, there is support for the indi-
vidual's behavior and well-being. On the other hand, both high and low
requirements in relation to individual skills may lead to a risk for confu-
sion, anxiety and sense of disease.

Accessibility to and in the garden/patio
The indirect effect of greenery on self-rated health (Study II) remained
significant when the analysis was restricted to including residents with few
barriers (no more than 0-1) to visiting the garden. Furthermore, the pres-
ence of few barriers had a positive indirect effect on residents' experiences
of being away and fascination, as well as self-rated health during their stay
in the garden greenery. It was also shown (Study I) that residents who
lived in residential care facilities with few barriers on the way out to the
garden were more satisfied with accessibility and visited the garden/patio more frequently than did those who lived in residential facilities with two or more barriers. A great deal of the gardens/patios also reported problems with barriers in the garden/patio in forms of e.g., slopes, hilly land, and trees/plants that limited residents’ ability to get around and some of them reported that walkways not were wide enough for two wheelchairs to pass each other.

However, a majority of the surveyed facilities reported problems with accessibility to the garden/patio in the form of different barriers. Most common were long corridors, locked and heavy doors. In a study by Cohen-Mansfield and Werner (7), similar problems were disclosed. Several studies (63,76,77) have highlighted the importance of free access to the garden. One study (4) showed how safety could be improved at fully open doors to the garden with the help of IT support. This may be beneficial to residents’ safety and security and to providing places for privacy, but on the contrary it may also restrict residents’ sense of freedom. Studies (8,38) have also pointed out the value of support from staff and/or relatives in helping residents go outdoors.

Thus, barriers of various kinds may influence residents’ abilities to get themselves outdoors and may even create a sense of insecurity, possibly causing them to choose to stay indoors. This is confirmed in a study (75) showing that accessibility with clear indoor and outdoor connections to the garden influenced how much time the residents spent outdoors. The present findings are also consistent with other studies showing that the main reasons why many older persons rarely or never visited the garden/patio was accessibility, such as difficulty getting assistance to visit the garden/patio (8), and specific doorway problems, such as high thresholds, heavy and self-locking doors (63).

**The residents’ and staff members’ perceptions**

The results (Study I) demonstrated that the residents were generally more pleased than the staff were with the design of the garden/patio. This may be because residents live at the residential care facility, while the staff members shift between being there and seeing the world outside the facility/workplace. Owing to their knowledge about the routines and goals of care, the staff probably has different views on what is missing in terms of various design elements that can promote residents’ health and well-being. Another explanation may be that residents do not state their preferences and wishes about design in order to avoid being perceived as troublesome.
Earlier studies (25, 81) have shown that persons living in residential care facilities sometime feel anxious about their dependence on the staff for receiving good care.

Furthermore, the results revealed that staff reported that weather-related factors (e.g., too cold, windy or sunny) quite often influenced the decision to go outdoors. According to Rodiek (62), staying outdoors was highly dependent on the weather, particularly if shade was not provided. However, the residents in the present study were not entirely pleased with their opportunities to go outdoors during the different seasons, especially during the winter months. In addition, residents were more satisfied with seasonal use, characteristics, design elements and multisensory stimulation specifically when there were more elements of greenery, horticulture, and water-related features in the garden/patio. These results are also in line with another study (13), which found that residents in residential care facilities placed great value on having access to green areas. In Study I, the staff also reported that the most frequent use of the garden/patio was for stays and/or for common meal/snacks and less for activities such as training of residents’ fine and gross motor skills. Physical activities may be very important for some residents; at the same time, being able to sit in the garden/patio and experience a sense of being away and fascination may also be viewed as important activities.

**Methodological considerations**

The present thesis has both strengths and limitations that may have affected the results and the conclusions that can be drawn. The thesis is based on one data collection and consists of two studies (I, II).

Study I used a multi-level, cross-sectional, descriptive and comparative design. This choice of design may be viewed as appropriate given the aim to describe and compare residents’ and staff members’ perceptions, as well as to investigate factors related to residents’ satisfaction with and stays in the garden/patio. Study II had a multi-level, cross-sectional and correlative design as the aim was to test the relationship between greenery in gardens at residential care facilities, residents' self-rated health during garden visits and the frequency of their visitation there. The use of a multi-level design is strength however the use of a cross-sectional design disallows causal statements.

One overall goal of using a quantitative approach is that the results should be generalizable. A non-random sampling design and a low response rate from a target group are threats to the external validity and
generalizability. To receive a good distribution and a generalizable representative sample was included 13 municipalities (various types; major cities, suburban municipalities to major cities and rural municipalities) in three regions in central and northern Sweden. There might also be threats to construct validity, as different factors may have influenced how the residents answered the questionnaire. One factor might be that the residents were unable to answer all questions which may have resulted in an internal failure. Another factors can be that the designated contact person could have affected residents who needed help to read the questions (e.g., reading to fast, not verbatim, don’t really listen to the residents answers and/or that this person did not take the time needed and therefore was filling in own answers). To remedy this, the researcher (ED) had continuous contact by mail and telephone with the contact person. This person also got written and oral information to read the questions in the questionnaire verbatim, calmly and to repeat if necessary for residents as were in need of help. However, a methodological strength of the cross-sectional design in the present study was the relatively large sample which might strengthen the results. In Study I (Part I), all managers (n = 105) at residential care facilities for older people in 13 municipalities were asked to participate; 91 agreed and 87 returned the questionnaire, giving a response rate of 83%. In Study I (Part II), questionnaires were distributed to 684 residents and 907 staff; the response rate was 61% (n = 415) and 74% (n= 667), respectively.

Study II included a subsample from Study I, and the data used were from the 290 residents in 72 facilities who had complete data for all of the variables in the intended analysis. However, the residents represented in the thesis were facing relatively great health challenges, and the sample size for the residents may therefore be seen as strength. A convenience sample was used for the residents. There is, therefore, a risk that the sample not was representative of the general population, which in turn may have influenced the results. However, a convenience sample may be seen as a good choice when participants are to be recruited from a residential living home for older people. In Study I (Part II), randomized selection of staff was conducted; the researcher (ED) used a randomized table of numbers. This selection process can be seen as strength, because it produced a sample that was representative of the population and gave every potential participant an equal chance to participate.

Threats to construct validity should be considered to determine whether related concepts are consistent with the measurements (67). In Study I
(Part I) and Study II, an instrument (7) was used that had been carefully translated and adapted to Swedish conditions by the research group. To counteract threats to construct validity was the Swedish version of the instrument tested for face validity by people working in residential care facilities and gardening in Sweden. To remedy threats to the instruments adequacy in measuring the construct of interest was also Exploratory Factor Analysis (EFA) by factor extraction and principal component analysis (PCA) of the 19 items regarding residents' and staff members' perception of the garden/patio tested. The test revealed acceptable five factors solutions that corresponded for both groups. Regarding reliability, two factors in the instrument, measuring staff members' and residents' perceptions of the garden/patio, had Cronbach’s alpha values below 0.70, indicating a need for a further testing and development. The low values may be due to that these two factors had only two respectively three items. Regarding the indexes (greenery index, obstacles to getting out index, obstacles in the garden index), they were newly constructed and need further testing and development.

The Perceived Restorativeness Scale [PRS] (82) was used to measure to what extent the residents experienced being away and fascination in conjunction with visits in the garden/patio. Before use, a Swedish version of the instrument was pilot tested at 10 persons living at one residential care facility. The pilot test revealed that the instrument was possible to understand and well adapted to reality for use on older people. The instrument showed high internal consistency coefficients (being away, \( \alpha = 0.89 \), fascination, \( \alpha = 0.92 \)). Earlier research has also reported high reliability for these factors as well as good validity for the instrument (82,83). Intervention studies have shown these factors utility in explaining change in health as a function of contact with nature e.g., (84). The data analysis also consisted of advanced statistical methods combined with visual inspection of variable distributions and residuals to ensure conformance with the assumptions of the tests.

To measure residents' self-rated health during their visit in the garden/patio, the EQ-5D [EQ-5D-5L] (Version 2.0) was used. The EQ-5D instrument’s validity and reliability have been tested by the EuroQol group, with good results (70).
CONCLUSIONS

* The residents in residential care facilities for older people, valued various aspects of the garden/patio more highly than the staff.
* Ample with greenery and other natural elements, for older people living in residential care facilities, may promote the residents’ restorative experiences of being away and fascination during stays in the garden. This might in turn, promote more frequent visitation and better health.
* The residents’ positive experiences of being away, fascination and better self-rated health in conjunction with visits in the garden/patio, may not be realized if residents face multiple barriers to go outdoors.

Implications for practice

Earlier research has shown that the garden/patio in residential care facilities is not utilized in a sufficient manner and that older people do not get outdoors to the extent they desire. It is therefore of great value to pay attention to deficiencies in the design of gardens/patios as well as to consider accessibility and possible barriers. In view of the good qualities that a garden/patio as part of the physical care environment can be ascribed, it ought to be possible to use the garden/patio as a valuable resource in the daily care of older people in residential care facilities for older people. Through simple means, managers and staff can enhance the design of gardens/patios and their accessibility. In the short term, this is a matter of making adjustments (i.e., providing enough garden furniture, wind and sun protection, and elements that contribute to sensory stimulation, e.g., flowers, water-related features such as birdbaths and fountains). Other measures must be managed in the long term because they may be more costly or require a longer period of time to change, such as making larger physical changes in the external environment (e.g., ditches, slopes and stairs). More attention must also be paid to the residents’ and staff members’ role and to their ideas with regard to both the design and utilization of the garden.

Future research

The present findings suggest that future research is needed to increase the knowledge of what factors in the garden/patio may promote older people's health and wellbeing, and how these either might stimulate or counteract users’ utilization. Further studies are also needed to better understand the reasons for differences between residents’ and staff members’ perception.
and estimation of the garden/patio. Of interest is also to further test and develop the instrument by Cohen Mansfield and Werner.

**SAMMANFATTNING (Summary in Swedish)**


Nyckelord: design element, grön utemiljö, hälsa, omvårdnad, seriell mediering, trädgården/uteplatsen, vård- och omsorgs boenden för äldre personer.
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