This is the published version of a paper published in *Scandinavian Journal of Caring Sciences*.

Citation for the original published paper (version of record):

The physical environment, activity and interaction in residential care facilities for older people: a comparative case study.
*Scandinavian Journal of Caring Sciences*, 31(4): 727-738
https://doi.org/10.1111/scs.12391

Access to the published version may require subscription.

N.B. When citing this work, cite the original published paper.

Permanent link to this version:
http://urn.kb.se/resolve?urn=urn:nbn:se:du-23388
The physical environment, activity and interaction in residential care facilities for older people: a comparative case study

Susanna Nordin RN (Doctoral Student)1,2, Kevin McKee BSc, PhD (Professor)1, Maria Wallinder MSc (PhD Student)1, Lena von Koch RPT, PhD (Professor)2, Helle Wijk RN, PhD (Associate Professor)3,4 and Marie Elf RN, PhD (Associate Professor)1,2

1School of Education, Health and Social Studies, Dalarna University, Falun, Sweden, 2Department of Neurobiology, Care Sciences and Society, Karolinska Institute, Stockholm, Sweden, 3Sahlgrenska Academy, Institute of Health and Care Sciences, Gothenburg University, Gothenburg, Sweden and 4Sahlgrenska University Hospital, Gothenburg, Sweden

Scand J Caring Sci; 2017; 31; 727–738

The observed emotion rating scale (OERS) was used to assess residents’ affective states. Field notes and walk-along interviews were also used. Findings indicate that the design of the physical environment influenced the residents’ activities and interactions. Private apartments and dining areas showed high environmental quality at both RCFs, whereas the overall layout had lower quality. Safety was highly supported. Despite high environmental quality in general, several factors restricted resident activities. To optimise care for older people, the design process must clearly focus on accessible environments that provide options for residents to use the facility independently.

Keywords: activities, case study, interactions, mixed-method, older people, physical environment, residential care facilities.

Introduction

Activities and social interactions positively affect older peoples’ health, well-being and quality of life (1–3). The physical environment is essential for supporting older people both physically and cognitively (4, 5). Residential care facilities (RCFs) are the primary location for daily activities for many frail older people in need of care and support (6). Additional knowledge is needed regarding the complex associations between the physical environment and activities in RCFs. The present study explored environmental aspects of RCFs and how these are related to older peoples’ activities, such as interacting with others, communicating and engaging in recreational activities.

Background

Activities and social interactions are important to older people in frail health (7) and can provide structure and meaningfulness in daily life (6). Activities can also enhance quality of life (3, 8) and positively affect the cognitive abilities of people with dementia (9). Lack of social relationships can threaten the health and quality of life of older people (10). Associations exist between loneliness and higher rates of mortality, disability (11) and depression (12) as well as between social isolation and cognitive decline, nutritional problems and heart disease (13).

The number of RCFs has recently decreased in Sweden, and only those persons with high levels of frail
health have been offered residency (14). Consequently, people in RCFs have high levels of physical and cognitive disabilities and need help with personal care, during meals or when participating in social activities (15). Some studies have shown that residents are rarely engaged in activities or with the family (16, 17); furthermore, they have been observed sitting or lying approximately 90% of the day (16) and have no company 40% of the time (18). Residents and their relatives have reported a lack of stimulating activities tailored to the needs of the elderly and few opportunities to be outdoors (19).

A high-quality physical environment can ensure well-being, safety and independence for older people in frail health (4, 20). Environmental aspects are essential for supporting person-centred care (21) by facilitating activities, social interactions and creating a sense of home (22). Lawton and Nahemow stated in their ecological model of ageing that a person’s functioning is the result of biological, psychological and social resources as well as the environment and the fit between individuals and their environments (23). According to some researchers (24), the relationship between a persons’ functioning and the demands of his or her physical environment can be described in terms of accessibility. With increasing levels of frail health, an accessible physical environment becomes more important (25) and must be adjusted to support the persons’ needs (23). Today, there are demands that decisions about the design of the healthcare architecture should be based on the best available information from credible research and evaluations of existing building projects. Evidence-based design is an established concept (26, 27) as an approach for quality improvements when designing new healthcare environments (26, 28, 29).

Many people living in RCFs spend most of their time inside the facility and are dependent on a physical environment that supports activities and social interactions. Despite evidence of the importance of an active daily life, previous studies have shown deficiencies in terms of older people’s opportunities for activities in RCFs. An understanding of the complex set of relationships among older people, their activities and the environment is required. Such an understanding is crucial when designing RCFs that can support activities for people in frail health and enhance person-centred care.

Aim

The aim of the current study was to explore older peoples’ activities in RCFs in the context of the quality of the physical environment by examining how the environment influences these activities. This goal was addressed by an in-depth study of two purposively selected RCFs.

Method

Design

The present study employed a comparative case design that applied a mixed-method, convergent analysis (30). Quantitative and qualitative data were collected during field visits and analysed separately before merging the results for an overall interpretation and discussion. The data collection included nonparticipant structured and unstructured observations, environmental assessments and walk-along interviews.

Study settings and participants

The RCFs (A and B) were located in one of the largest Swedish municipalities. The intention was to include two RCFs, divergent in terms of their physical environments (one newly renovated, one nonrenovated) but similar in terms of resident and staffing profiles and care organisation. Based on the assumption that a new facility would be designed in accordance with current recommendations and evidence on how to support resident activity and well-being, we wished to compare the two RCFs. Those RCFs were also part of another study in which environmental quality was evaluated in 20 care facilities recruited to ensure variations with regard to several aspects (e.g. building design, geographic location) (31). The municipality’s executive director for social support and elderly care suggested two particular RCFs in accordance with the criteria. All residents at the selected RCFs received an information letter and were invited to participate. An equal number of residents from the RCFs were included in the structured observations of activities and interactions (n = 26 from each RCF). The staff and relatives who were at the RCFs during data collection received information and were invited to participate in the unstructured observations and walk-along interviews. In total, there were 83 people included (residents n = 54; staff members n = 25; relatives n = 4). All participants provided informed consent.

Materials

Data were collected from several sources. Residents’ functional status and demographic characteristics were obtained from staff. The quality of the physical environment was assessed via the Swedish version of the Sheffield Care Environment Assessment Matrix (S-SCEAM) (32). Resident activities, interactions and locations were collected through an adapted version of the Dementia Care Mapping (DCM) (33). The Observed Emotion Rating Scale (OERS) (34) was used to obtain data on the residents’ affective states. Field notes were taken and supplemented by walk-along interviews.
Resident functional status and demographic details. A previously used framework was employed to collect the data regarding functional status (35). The staff contact person of each resident was asked to indicate the residents’ levels of independence as either ‘good’ or ‘poor’ based on the following dimensions: communication (the abilities to understand what is being said and express themselves), orientation (the abilities to find one’s way around and recognise people), mobility (the ability to move around in the care home), emotion (generally expressing a pleased or depressed mood) and socialisation (the ability to socially interact with other people). Demographic details were also collected.

The quality of the physical environment. S-SCEAM was used to collect data on the quality of the physical environment (32). This instrument consists of 210 items that cover the entire RCF environment and are structured into the following sections: Overall Layout of the RCF, Entrance and External Area, Garden, Lounge, Dining Area and Private Apartments. The items are also classified into eight different domains representing the needs of older people: Cognitive Support, Physical Support, Safety, Normalness, Openness and Integration, Privacy, Comfort and Choice. These items are scored as either present (1) or absent (0), and the scores are aggregated into (i) an overall score for the facility, (ii) scores that represent each of the sections of the RCF and/or (iii) scores that represent each of the domains of an older person’s needs. All aggregated scores are standardised to range from 0 to 100, with higher scores indicating higher quality physical environments. S-SCEAM has good reliability and validity (32).

Resident activities and affective states. The data regarding resident activities were collected using an adapted version of the DCM (33). The original DCM is widely used in dementia care (36–38). The adapted version emphasises activities can be used to observe people with or without dementia and has been validated against measures of well-being and quality of life among older people (39). The adapted version maps observed activity onto nine behavioural category codes (BCC): (1) active social interaction, (2) passive social interaction, (3) recreation involvement, (4) social inactivity, (5) receiving care, (6) eating or drinking, (7) communicating without a response, (8) walking or wandering or (9) unavailable for observation. BCCs 1, 2 and 3 also contain information on the residents’ social interaction partners. The locations of the residents’ activities were coded at the same time as their behaviour was observed. To explore residents’ affective states during activities, the OERS (34) was combined with the DCM. Affective states were coded into one of the following categories: signs of pleasure, signs of anger, signs of anxiety, neutral, signs of depression, signs of interest or signs of contentment.

Relationships between environmental aspects and resident activities. Activities and interactions in the physical environment were recorded via field notes and supplemented by brief walk-along interviews that sought to explore how resident activity was shaped by environmental aspects (40). Walk-along interviews were used to understand the phenomena in real time and generate knowledge regarding how residents, staff members and relatives perceived the environment. This method enabled reflection on a range of environmental factors with those persons (41, 42). For example, during a visit in a residents’ private apartment, she or he could be asked to explain how the environment was perceived.

Procedure

Data were collected across a 5-week period during early spring. Prior to data collection, the first author (SN) visited the RCFS to become acquainted with their environments, residents and staff as well as to provide additional information (written and oral) about the study. SN performed the environmental quality assessments by walking through the RCFS and scoring each item on the S-SCEAM. The entrance and external areas, dining rooms, lounges, corridors and gardens were assessed. Three private apartments were sampled to provide a reliable average assessment given that the apartments within each RCF were all of a similar design.

SN and the third author (MW) performed the DCM and OERS observations. The observations occurred during weekdays from 0700 to 2100 and were conducted in 1- to 3-hour sessions across several days in order to capture residents’ ‘average’ day. A time sampling of the activities was performed via sweeps every 15 minutes. During the first 15-minute sweep, five or six people were observed. During the next sweep, other people were selected, and the process was repeated until all included residents were observed. If more than one BCC was observed at a given observation point, then the activity that indicated a more social or engaged behaviour was coded (38).

Inter-rater reliability was tested to ensure consistent assessments between the two raters. All DCM and OERS codes were discussed, and the assessments were practiced via several sessions at an RCF not included in the study. Satisfactory scores were achieved in terms of consensus estimation (BCC = 84%; OERS = 76%) and kappa values (BCC: κ = 0.741; OERS: κ = 0.582) (43).

SN and MW conducted unstructured observations of the physical environment, which were performed in relation to the residents’ activities. These observations were occasionally followed by brief walk-along interviews with the residents, a relative or staff member related to the
ongoing activity. Notes were written during the observations. Soon after the observations were completed, more extensive notes were made to describe the physical environment and observed situations, events or activities in detail. The notes from the walk-along interviews were included in the field notes.

**Data analysis**

The quantitative data were analysed using SPSS for Windows v. 21.0 (IBM Corp. Armonk, NY, USA). DCM and OERS data were aggregated across observation points within each resident spends, and each resident’s BCC activity, location and affect were expressed as the percentage of total time spent in each activity, location and expressing affect. Means, standard deviations and frequencies were determined for the S-SCEAM, DCM and OERS scores. The field notes were analysed via a qualitative content analysis (44) that applied the following steps: (i) the content was read and reviewed to obtain a sense of the whole; (ii) meaning units were extracted; (iii) meaning units were abstracted into subcategories; and (iv) subcategories were grouped into categories.

During the analysis, the subcategories were related to content areas that reflected facilitators or barriers in the physical environment. The process was iterative with a continuous movement back and forth in the text. To strengthen trustworthiness and reduce the risk of research bias (45), SN performed the analysis and repeatedly discussed and reflected upon the results with the other authors (MW and ME).

**Results**

RCF A was newly renovated, whereas RCF B was not (Table 1). Organised activities were provided on a regular basis (e.g. bingo, movies, physical exercise, outings and celebrations at both RCFs; Table 2). The physical environments of the two RCFs were distinct in several aspects. The private apartments in RCF A were generally larger than those in RCF B, whereas RCF A had several smaller dining spaces than RCF B, which had one large dining room for each unit.

The residents’ mean age and the proportion male and female residents were similar in the two RCFs (Table 3). In RCF A, the residents had slightly higher levels of independence regarding communication and socialisation and were estimated to show more positive emotions, whereas the residents in RCF B were more independent with regard to orientation and mobility.

**The quality of the physical environment**

The S-SCEAM scores showed that the private apartments and dining rooms in both RCFs were of relatively high quality, whereas the overall layout had lower scores (Table 4). Both the RCF environments supported safety, but privacy was less supported. Differences between the RCFs were also found. For example, the lounges in RCF A had higher scores than RCF B. In addition, the physical support and cognitive support in RCF A were higher than those in RCF B, whereas comfort as well as openness and integration received higher scores in RCF B than in RCF A.

**Resident activities, interactions and signs of affective states**

In both RCFs, the residents spent most of their time in their private apartments and spent the next highest proportion of time in the dining room (Table 5). The residents slept, dozed or independently engaged in self-care for the highest proportion of time; the second most common activity was active social interaction with others. The residents in both RCFs showed signs of contentment and interest during the observation periods (Table 5).

The residents of RCF A were engaged in recreational activities such as watching television or listening to the radio nearly 20% of the day, whereas those of RCF B spent 10% of their day in these activities. In contrast, the residents of RCF B were involved in passive social interaction (e.g. sitting in the lounges and observing people coming or leaving or watching the staff pass through) for 15% of the day. In RCF A, the residents spent 6% of their time passively interacting.

**Relationships between the physical environment and activities**

The analysis of the field notes resulted in three categories and 16 subcategories (Table 6). The findings indicated that the design of the physical environment influenced the residents’ activities and interactions. More activity was observed in the nonrenovated RCF B in terms of resident transfer between different locations. Building design and fixtures (e.g. open plans) seemed to facilitate independent resident activity within the building and between the floors.

**Category 1: Building design and fixtures are related to indoor and outdoor activities.** RCF B had an open plan, automatic doors and elevators in communal spaces, and the residents moved around by themselves within the building and between the floors. Residents from different units frequently used the lounges on both floors for activities such as social interactions, resting or observing events taking place indoors or outdoors. In addition, automatic doors facilitated access to the garden. The lounges in RCF B had floor-to-ceiling windows, enabling natural light throughout the day, and many of the residents expressed that they appreciated sitting in these spaces (Table 6).

In RCF A, there were closed or locked doors to the units, and heavy doors and thresholds seemed to hinder...
Table 1 Environmental characteristics of the residential care facilities

<table>
<thead>
<tr>
<th>RCF ID</th>
<th>Year of construction/renovation</th>
<th>Neighbourhood</th>
<th>Size in m²</th>
<th>Number of ward units/Number of floors</th>
<th>Size of private apartments in m²</th>
<th>Apartment facilities</th>
<th>Activity areas</th>
<th>Dining areas</th>
<th>Lounges/day areas</th>
<th>Outdoor areas</th>
<th>Overall design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newly renovated RCF A</td>
<td>1959/major refurbishment</td>
<td>Located on a small hill close to a motorway</td>
<td>6500</td>
<td>4/2</td>
<td>Approximately 30–35</td>
<td>Bathroom (including shower), kitchenette, and washing machine</td>
<td>Several activity rooms outside the ward units</td>
<td>One smaller dining room within each unit or subunit</td>
<td>One lounge within each unit or subunit</td>
<td>Large garden area with plants of different heights</td>
<td>Closed or locked doors to the ward units; Elevators outside ward units</td>
</tr>
<tr>
<td>Nonrenovated RCF B</td>
<td>1952/minor refurbishment since establishment</td>
<td>Located in a quiet residential area</td>
<td>5200</td>
<td>2/2</td>
<td>Approximately 20–40</td>
<td>Bathroom (including shower), kitchenette</td>
<td>One activity room inside the ward units, one outside the ward units</td>
<td>One large dining room within each unit; One smaller dining room outside the units</td>
<td>One day area within each unit serving as the lounge/activity room</td>
<td>Small garden; Walking loop around the building</td>
<td>Open floor plan, Automatic doors, Elevator within the ward units</td>
</tr>
</tbody>
</table>
resident activities and limit their options to use different spaces by themselves. The following field note illuminates their difficulties in using the environment:

A resident sitting in a wheelchair wants to go to the garden because one of her favourite activities is gardening. The care staff helps her, and on the way out she complains about the heavy door and the high thresholds that prevent her from reaching the garden by herself (walk-along interview with resident and staff in RCF A).

Long corridors were common in the communal spaces of both RCFs (Table 6), and they seemed to be related to resident activity. RCF B had only one dining room and one lounge on each floor, which meant long walking distances, especially for residents whose apartments were located farthest from these spaces. Some of the units in the renovated RCF A were designed with a dining room and lounge in the middle, resulting in shorter corridors. The residents of RCF A were more often observed walking in corridors than those of RCF B (Table 5).

Category 2: Building location is related to outdoor activities and contact with outdoor life. RCF B was located in a relatively flat area; moreover, it had a walking loop around the building that facilitated resident activities. Thus, the residents were observed using the walking loop outdoors (Table 6). In contrast, RCF A was surrounded by steep slopes and located near a motorway, and the residents were rarely observed outside the building. RCF B was located in a quiet residential area with ordinary homes in the neighbourhood, and the residents were able to follow events taking place outdoors from communal areas within the building or from their private apartments as illustrated by the following field note:

When visiting, one of the residents stated that she liked to watch the children play in the garden that was located next to her apartment (walk-along interview with a resident in RCF B).

Category 3: Space size is related to indoor activities and atmosphere. The size of communal spaces in the RCFs influenced the mobility, dining options and social interactions of the residents. The larger dining rooms in RCF B seemed to facilitate mobility around the space and the options to choose between various seats in the dining room. In RCF A, the dining rooms were generally smaller and seemed to hinder mobility and independent activity as the following field note illuminates:

It is difficult for older people with walkers or wheelchairs to reach the table when arriving at the same time, and they must approach the dining room in a certain order (walk-along interview with care staff in RCF A).

The residents used the larger dining rooms in RCF B for longer time periods than those in RCF A, and the
The former group were more often involved in passive social interactions such as following events or the kitchen tasks performed by the staff (Table 5). In RCF A, the larger apartments provided space for moving around as well as the option of having personal belongings and furniture. One older person was very pleased with her apartment, which she wanted to show:

The apartment is spacious and decorated with personal items and furniture from the house where she lived with her husband before moving into the care home (walk-along interview with a resident in RCF A).

Discussion

This study explored the complex set of relationships between older people’s activities and their interactions with the physical environment. The most important finding was that the design of the physical environment seemed to affect these activities and interactions. The S-SCEAM assessments revealed high environmental quality in general; nevertheless, several barriers limited the opportunities for residents to use the environment. Another key finding was that the residents in both RCFs spent most of their time alone in their apartments.

Several studies highlight the importance of supportive environments that meet the needs of older people with high levels of frail health (24, 25, 46). Lawton and Nahemow’s ecological model on ageing (23) argues that dependence on an environment increases with frailty. This model has been used in several studies over the years, and it guided our study. When comparing the two RCFs, we found that resident activity level was lower in

Table 3 Resident functional status and demographics

<table>
<thead>
<tr>
<th></th>
<th>RCF A (n = 26)</th>
<th>RCF B (n = 26)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Poor</td>
<td>Good</td>
</tr>
<tr>
<td>Communication</td>
<td>3.85%</td>
<td>96.15%</td>
</tr>
<tr>
<td>Orientation</td>
<td>19.24%</td>
<td>80.76%</td>
</tr>
<tr>
<td>Mobility</td>
<td>26.93%</td>
<td>73.07%</td>
</tr>
<tr>
<td>Emotion</td>
<td>26.93%</td>
<td>73.07%</td>
</tr>
<tr>
<td>Socialisation</td>
<td>11.54%</td>
<td>88.46%</td>
</tr>
<tr>
<td>Age range</td>
<td>74–96</td>
<td></td>
</tr>
<tr>
<td>Mean age</td>
<td>87</td>
<td></td>
</tr>
</tbody>
</table>

Table 4 Standardised S-SCEAM domain scores and location scores

<table>
<thead>
<tr>
<th></th>
<th>RCF A</th>
<th>RCF B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety</td>
<td>88.28</td>
<td>85.95</td>
</tr>
<tr>
<td>Comfort</td>
<td>78.29</td>
<td>90.79</td>
</tr>
<tr>
<td>Choice</td>
<td>78.68</td>
<td>77.98</td>
</tr>
<tr>
<td>Physical Support</td>
<td>80.81</td>
<td>63.94</td>
</tr>
<tr>
<td>Openness and Integration</td>
<td>60.00</td>
<td>74.24</td>
</tr>
<tr>
<td>Normalness</td>
<td>65.65</td>
<td>68.24</td>
</tr>
<tr>
<td>Cognitive Support</td>
<td>71.28</td>
<td>58.04</td>
</tr>
<tr>
<td>Privacy</td>
<td>64.66</td>
<td>60.39</td>
</tr>
<tr>
<td>Overall score</td>
<td>73.46</td>
<td>72.45</td>
</tr>
</tbody>
</table>

Table 5 Proportion of resident time spent in activities, affects and locations by RCF

<table>
<thead>
<tr>
<th></th>
<th>RCF A</th>
<th>RCF B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socially inactive</td>
<td>40.14</td>
<td>(18.35)</td>
</tr>
<tr>
<td>Active social interaction</td>
<td>21.63</td>
<td>(11.31)</td>
</tr>
<tr>
<td>Recreational activity</td>
<td>19.60</td>
<td>(15.01)</td>
</tr>
<tr>
<td>Passive social interaction</td>
<td>6.12</td>
<td>(5.74)</td>
</tr>
<tr>
<td>Eating/Drinking</td>
<td>5.72</td>
<td>(5.61)</td>
</tr>
<tr>
<td>Other</td>
<td>6.79</td>
<td>(12.56)</td>
</tr>
<tr>
<td>Affective states</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signs of contentment</td>
<td>52.98</td>
<td>(19.93)</td>
</tr>
<tr>
<td>Signs of interest</td>
<td>31.51</td>
<td>(20.01)</td>
</tr>
<tr>
<td>Signs of pleasure</td>
<td>7.91</td>
<td>(11.48)</td>
</tr>
<tr>
<td>Signs of anxiety</td>
<td>3.77</td>
<td>(11.17)</td>
</tr>
<tr>
<td>Signs of anger</td>
<td>0.48</td>
<td>(2.45)</td>
</tr>
<tr>
<td>Signs of depression</td>
<td>0.36</td>
<td>(1.28)</td>
</tr>
<tr>
<td>Neutral</td>
<td>2.62</td>
<td>(4.31)</td>
</tr>
<tr>
<td>Unobservable</td>
<td>0.37</td>
<td>(0.95)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Location</th>
<th>RCF A</th>
<th>RCF B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Private apartment</td>
<td>57.18</td>
<td>(24.76)</td>
</tr>
<tr>
<td>Dining areas</td>
<td>24.17</td>
<td>(17.21)</td>
</tr>
<tr>
<td>Day areas</td>
<td>10.76</td>
<td>(22.96)</td>
</tr>
<tr>
<td>Corridor</td>
<td>7.89</td>
<td>(9.73)</td>
</tr>
<tr>
<td>Outdoor areas</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
the newly renovated RCF A than in RCF B; furthermore, the residents seemed to have difficulties accessing various spaces. One observed issue was environmental barriers such as closed doors without automatic opening. Previous studies have shown that the accessibility and usability of the physical environment affect human activity (47, 48), and environmental barriers such as thresholds and heavy doors can cause problems with accessibility (49). Although we proposed that the residents’ activity levels were related to the physical environment, importantly, the residents of RCF A were slightly less independent with regard to orientation and mobility than those of RCF B. Therefore, these factors must be taken into consideration.

The residents of both RCFs spent a majority of the time in their private apartments isolated from others, which corroborates the findings of several studies of life in care homes (16, 33, 50). Residents who stay in their apartments can miss out on activities and interactions with others. However, residents can choose to withdraw from communal spaces and be by themselves. We noticed that many people were involved in recreational activities, such as watching television or listening to the radio, and these activities commonly occurred in private apartments. Other studies have also found that many older residents spend time by engaging with media (51, 52) and that watching television provides a valuable link to the world outside and contributes to a feeling of societal connectedness (53). Thus, it is important that the design of the apartment allows for the use of the TV, radio and newer technologies such as computers. The newly renovated RCF A had larger apartments in general, and the residents of RCF A spent more time in their apartments than the residents of RCF B, where many of the apartments were small and narrow. This design clearly reflects the trend in the early 1990s when the people who lived in RCFs were more mobile and independent by comparison to today’s resident population, and were expected to interact with others in communal spaces to a larger extent than now. Small private spaces often limit the

<table>
<thead>
<tr>
<th>Content areas</th>
<th>Subcategories</th>
<th>Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental facilitators</td>
<td>Open plans, automatic doors and elevators in buildings facilitated resident movement in communal areas and between floors</td>
<td>Building design and fixtures are related to indoor and outdoor activities</td>
</tr>
<tr>
<td></td>
<td>Various rooms in buildings facilitated opportunities for different types of activities, social interactions or rest and opportunities for environment changes</td>
<td>Building location is related to outdoor activities and contact with outdoor life</td>
</tr>
<tr>
<td></td>
<td>Smooth flooring and safety devices in private apartments and dining rooms made it easy for residents to use the environment</td>
<td>Space size is related to indoor activities and atmosphere</td>
</tr>
<tr>
<td></td>
<td>Automatic doors made it easy for residents to access the garden</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Garden located between the buildings offered a safe space for residents</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large windows in the building facilitated access to natural daylight and allowed residents to follow daily life activities outside the building</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Residential area, smooth ground and walking loop facilitated contact with outdoor life and independent outdoor activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Space for personal belongings, fixtures and fittings facilitated a sense of home</td>
<td></td>
</tr>
<tr>
<td></td>
<td>The large size of the private apartments and dining areas facilitated activity, social interactions and dining options</td>
<td></td>
</tr>
<tr>
<td>Environmental barriers</td>
<td>Closed doors in the buildings hindered resident movement and the use of different rooms by themselves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heavy doors and thresholds at the entrance hindered resident access to the garden</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Long corridors in the building made it difficult for residents to move around by themselves</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No handrails in the building hindered independent resident movement</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Steep slopes and traffic noise in the nearby surroundings hindered outdoor activities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Small private apartments limited mobility, activities and opportunities for social interactions</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large dining rooms resulted in loud noise</td>
<td></td>
</tr>
</tbody>
</table>

Table 6 Content areas, subcategories and categories
possibility of bringing in personal furniture and belongings which might impinge on resident identity, whereas larger apartments can support autonomy and thereby contribute to a richer everyday life (54).

Both RCFs had high environmental quality in general and met building standards in many aspects. For example, safety was highly supported in both RCFs, and this finding is in line with previous studies of long-term care (35, 55), reflecting a focus on patient safety in healthcare environments. Our findings reveal the conflict between creating a safe environment and supporting resident independence. In other studies, safe and secure environments were found to reduce choice and restrict activity (35, 56). For example, locked doors or limited access to the kitchen can reduce freedom of movement. Thus, it is of significant importance to design highly safe RCFs without compromising an older person’s independence (56). The newly renovated RCF A also received high scores for physical support and cognitive support, which are regarded as important in supporting older people in frail health. Privacy was less supported in both RCFs, despite the fact that an older person’s right to integrity and privacy are core values in elderly care (57).

Despite the relatively low environmental quality of the lounges in the nonrenovated RCF B, residents frequently used these spaces, which were accessible for people living on different floors. This is in line with another study showing that communal spaces that can be used by residents from several units can encourage them to leave their private apartments (17). In addition, RCF B was located in a residential area, and the residents were able to watch everyday life both inside and outside the building. The large windows in the lounges of this facility offered views in several directions and significant daylight, and some of the residents expressed that they felt like they were outdoors. The S-SCEAM assessments showing high-quality scores in comfort as well as openness and integration for RCF B confirm these findings. RCFs located near communities and integrated with societal life might offer stimulation and increase accessibility for relatives (58). Ecological models are focused on personal–environment processes, and it is important to account for areas that constitute something useful and meaningful for the residents. As our findings suggest, the lounges of an RCF can become a venue for observation of community life.

Our findings are of importance and highlight the need of that staff members should be sensitive to the types of activities that residents prefer and consider how management of the environment facilitate or limit these preferences. Residents’ personal needs and preferences are essential within person-centred care (59–61). Hence, an organisation that does not support the needs and preferences of the individual might result in adaption to the situation and that the resident becomes inactive. Rather than asking the residents how they define their activity needs, we observed the actual activities performed in their daily lives and found that the residents were rather inactive. However, the residents spent a relatively large proportion of their time in the dining areas, and meal situations were a driving factor that encouraged activity in various spaces within the RCFs. Meal times are of fundamental importance for residents in RCFs, as is, consequently, the dining space (62). For many of the residents in our study, meals were the only times that they socialised with others. This finding highlights the importance of creating accessible dining areas and suggests that such locations are important for stimulating activities beyond the actual mealtime by creating comfortable and pleasant spaces for social interactions.

Older people is not a homogeneous group, and it is essential to consider the needs of older people with different levels of frailty and capability, not only those who are less dependent. Thus, accessibility issues should be directed to the older people who use the facility. We find it remarkable that environmental barriers continue to exist in buildings intended for people with high levels of frailty. It was even more surprising that these barriers were present after a major renovation, as in RCF A. This finding is in line with previous studies showing that although care facilities are usually accessible for people with high levels of frail health, design details can hinder independent living among this group (63, 64). Our findings once again demonstrate the importance of interdisciplinary work when designing RCFs, including representatives from several professions such as health care, architecture and building construction, together with the user perspectives (65). Importantly, the design of the physical environment affects the healthcare organisation, but the environment is also affected by organisational aspects. Thus, it is most valuable to have a dialogue early in the design process with different stakeholders (65, 66).

Methodological considerations

The main strength of the present study was the mixed-method approach that employed both quantitative and qualitative observations to more fully understand the relationships between older people and their living environments. Other researchers have also stressed the importance of studying older people in relation to their environment by using different methods and not depend solely on quantitative assessments of the physical environment (67–69). The examination of RCFs using mixed methods enabled us to compare and contrast the elements of the two RCFs. S-SCEAM provided detailed data on environmental quality, and the observations and walk-along interviews contributed to a deeper understanding of resident activities in their natural context. This study also has
limitations. Since data were collected at only two RCFs, these findings cannot be generalised. Another limitation is that only four relatives were interviewed. One explanation could be that there were few visits from family or friends during the period of data collection resulting in limited options to conduct interviews with this important group. The finding that few residents spent time outdoors might reflect the fact that data were collected during early spring. In addition, observations were conducted only on weekdays and not on weekends, which might have provided a misleading picture of the activities that occurred in the facilities. However, data collection was conducted in the same way, and at the same time of the year in both RCFs allowing for valid comparisons in terms of the similarities and differences between the facilities. A main goal in long-term care is to maximise resident well-being and independence, and this can be highly influenced by both organisational factors and environmental aspects. Although our study focused on the role of the physical environment, the care philosophy and the culture of care play major roles in the daily lives of the residents of the RCFs, and all these aspects affect each other. These factors, as well as preferences and opinions of the residents as a whole regarding activities, were not fully assessed, and this is an obvious limitation to the study.

Conclusion

The results show that despite the high environmental quality in the two RCFs, several factors in the physical environment restricted the activities and social interactions of the residents. During the design process, there should be a clear focus on environments that are accessible to older people and provide options for them to use the facility independently. This knowledge is crucial for healthcare providers, building planners and architects to optimise person-centred care and services for older people. In addition, it is essential that decisions about the design are based on evidence regarding the needs of the user group. To conclude, when the design of the physical environment goes in hand with the organisation of care delivery, there is high potential for resident activity and well-being.

Acknowledgement

We are grateful to the people who participated in this study and shared their experiences and perceptions.

Author contributions

ME, KM and HW were responsible for study conception and design. SN and MW collected the data and analysed the quantitative data under the supervision of KM and ME. SN and MW analysed the qualitative data with support from ME. All authors contributed to the final analysis and the interpretation of the data. SN and ME drafted the manuscript, and MW, LvK, KM and HW provided critical revisions.

Ethical approval

The study has been approved by the Regional Ethical Review Board for research in Uppsala, Sweden (Ref No. 2011/323).

Funding

The School of Education, Health and Social Studies at Dalarna University supported this study.

References

5 Joseph A, Choi YS, Quan X. Impact of the physical environment of residential health, care, and support facilities (RHCSF) on staff and residents a systematic review of the literature. Environ Behav 2015; doi: 10.1177/0013916515597027
12 Golden J, Conroy RM, Bruce I, Denihan A, Greene E, Kirby M, Lawlor BA. Loneliness, social support networks, mood and wellbeing in...


54 Nord C. Architectural space as a moulding factor of care practices and resident privacy in assisted living. Age Soc 2011; 31: 934–52.


64 Helle T. Housing Accessibility Methodology Targeting Older People-Reliable Assessments and Valid Standards. 2013, Lund University, Lund, Sweden.
