Introduction

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Researchers and providers believe that many of the negative behaviors commonly associated with dementia are reactions to inadequate care and treatment in inappropriate environments rather than symptoms integral to the disease\(^1\). Many of the behaviors attributed to people with dementia are, in part, a consequence of non-therapeutic settings such as nursing home and other institutional long-term care environments\(^2\).

This study has been an attempt to assess the impact of design interventions in an existing nursing home on residents with dementia, their families and the staff of the facility. Funded by Extendicare Foundation at the end of 1999, the study was conducted by an interdisciplinary team of researchers from the University of Missouri-Columbia at Kingswood Manor in Kansas City, Missouri between September 1999 and April 2001.

The following pages contain our final report of this study. We included in the Introduction the background and the significance of the study and the methods that were devised by the team to conduct the research. In the second chapter Habib Chaudhury, Benyamin Schwarz and Ruth Brent discuss the environmental design aspects of the study. Jane E. Bostick examines in the third chapter, the resident outcomes that resulted from the renovation of the facility. In the following chapter, Teresa Cooney and Katie Dunne discuss aspects of family satisfaction with the nursing care and other effects of the renovated setting on the residents and their families. In the fifth chapter we summarize the responses of staff members to the renovations in the facility. The report concludes with conclusions and future implications.
Background and Significance

Despite the enormous diversity in American nursing homes, the ordinary nursing home looks like a host of other long-term care institutions. Hospital-like, double-loaded eight-foot-wide corridors, often jammed with laundry carts characterize its ambience. The easy-to-clean, shiny, vinyl floors reflect the stark lighting of the corridors. Frail elders, dressed in convalescent garb wander the corridors, or line up in their wheelchairs near the strategically placed nursing station.

Residents' rooms are typically crowded with two single beds, allowing one resident to be near the only window, and trapping the other on the darker side of the room, near the bathroom. The semi-private rooms can hardly seat two visitors, let alone offer them other kinds of hospitality and the sliding "privacy-curtain" that separates the beds seems to mock the concept of privacy. The toilet, sink, and mirror are shared, and so is the limited closet storage space. The paucity of wall and counter space effectively limits residents from personalizing the room and reflecting their families, lives, or interests. Bathing takes place in a room with tub fixtures designed for staff convenience rather than for residents' dignity. Meals are served three times a day in a bustling dining room, which often doubles as an activity room.

Such, now-familiar environmental attributes have been repeatedly criticized by long-term care advocates. The criticism centered on the assertion that nursing homes place their emphasis on "nursing" (efficiency and technical care) and hardly any on "home" (quality of life). Furthermore, advocates for better care argue that the efficiency of care provision that is arguably achieved in the nursing home environment is accomplished "at real cost to client autonomy. Its institutional base places far more attention on doing the right things to residents than on offering them an opportunity to live out the remainder of their lives pleasantly."

There is a growing recognition among many scholars, however, that the physical and social care milieu can enhance or diminish the quality of life for people with dementia. Favorable outcomes of intervention in dementia care have been identified in four major domains: functional competence, behavioral symptoms, positive behaviors, and subjective quality of life.
**Location**

Kingswood Manor is a nursing home located on the campus of Kingswood Continuum Care Retirement Community in Kansas City, Missouri. The campus was originally constructed in 1982 with four-story independent living apartments, two-story central commons for program space, and a two-story nursing home. The current capacity of the campus, upon the recent (2000) completion of the nursing home expansion, is 228 Independent Living residents, 86 Skilled Nursing residents, and 12 Assisted Living (Residential Care Facility) residents.

As early as 1988, the Board of Directors started looking at modification plans for the nursing home in an effort to improve the life-quality of residents, their families, and the staff. Following several alternatives, the Board approved the new plans in 1999. The final design version aimed to capitalize on therapeutic goals and design principles of environments for people with dementia in order to create a more responsive physical environment for physically and cognitively impaired elderly. The renovated setting was intended to decentralize dining and bathing facilities in order to serve smaller groups of residents creating a more personal environment. Accordingly, an addition of two new units designed as a cluster of rooms in circumference of a common living/activity room were planned on the north side of the existing building (see floor plans in the appendix). The new units include separate dining and kitchen areas for ten residents. Most rooms in the new addition were designed for single occupancy and each room includes a private bathroom, larger storage space and ample room to encourage family visitations. These arrangements, coupled with other residential accommodations and remodeling of most of the existing nursing home, have promised to contrast the medical orientation of the nursing home with a more residential environment. The design intervention in the physical environment was to be followed by new care policies and programs.

**Research design**

The interdisciplinary team of researchers was established before the construction started in Fall 1998. The purpose of the team was to assess through a multidisciplinary study the impact of a designed intervention in the nursing home environment on residents with dementia, family members, and the staff.
Although there is some evidence of the positive influence of a responsive physical environment on quality of care in long-term care settings, studies on socio-behavioral outcomes related to specific environmental variables are rare. The study attempted to examine the effect of particular environmental modifications of a nursing home (e.g., size, layout, adjacencies, furnishings, accessibility, etc) on the quality of life of the settings' major users, i.e., residents, staff and families. The main research question of this study was stated as follows:

Do design interventions induce desirable outcomes in residents with dementia, families and staff of a nursing home?

In other words, we wanted to understand whether particular environmental attributes affect the nursing home's major users, and whether specific behaviors and feelings are induced by the complex system of the modified environment. Our objective has been to answer the following questions:

1. Is there any change in the pattern of space usage by residents before and after the design intervention? If yes, how did it change?
2. What are the relationships between design interventions as inspired by advocated therapeutic goals, and residents' outcomes?
3. Is there any change in cognitive, behavioral and affective functioning in residents before and after the design intervention? If yes, how did it change?
4. Which of the environmental attributes in the renovated nursing home are perceived as significant to the residents?
5. What are the relationships between the design interventions and family involvement (e.g. frequency of visits, activities)?
6. What are the relationships between the design interventions and family satisfaction with the physical environment, service and care delivery?
7. How does the renovated setting and the changes in care philosophy affect staff perceptions of the physical setting, service and care delivery?

Existing Knowledge and Gaps
Implicit in the development of purpose-built therapeutic environments for frail elders has been the assumption that physical as well as interpersonal aspects of the environment affect quality of life outcomes. This implies that the relationship between environment and human behavior is based on some form of cause-and-effect linkage and that the environment is a major determinant of behavior. The sub-field of environment and aging has
been concerned, since its inception, with the enhancement of residential environments for older adults that would respond to the physical and mental competence level of aging individuals\textsuperscript{10}.

Several researchers have developed theoretical models to address the measurable characteristics of person-environment interaction. The most widely recognized and quoted of these models is the competence-press model developed by Lawton and Nahemow\textsuperscript{11} which draws on the classic approaches to psychology of Murray and Lewin\textsuperscript{12}. The model has helped to clarify the person and environmental characteristics that underlie older persons' optimal living arrangements with the "environmental docility hypothesis" which postulates that "the effect of an environmental press of a given magnitude on outcome is greater as personal competence diminishes"\textsuperscript{13}.

Attempts to establish elaborate frameworks that dimensionalize the relationships between the environment and the person have been made by many scholars\textsuperscript{14}. While these attempts brought about more comprehensive approaches to theoretical models, their utility for designers, policymakers and care providers has been limited\textsuperscript{15}. Clearly, there is a gap between broad environment and aging theory and application. Despite the general agreement about the importance of the connection between the physical environment and the quality of lives of the main users of nursing homes, few studies have examined how resident, family and staff actually respond to design interventions\textsuperscript{16}. Furthermore, "there is not yet a strong research base on which to predict the effect of interventions on the lives of older persons, the extent to which one intervention will be more important than another one, nor the degree to which particular intervention will interact with another"\textsuperscript{17}.

To bridge this gap, Cohen and Weisman\textsuperscript{18} advocate the use of therapeutic goals for the design of environments for older adults. These therapeutic goals, underline the design of care units for people with dementia, and reflect the transactional relationships among the three types of environments that impact resident behavior in a particular setting. The three domains are the social environment, comprised of friends and family; the organizational environment, manifested through the program's policies and the staff; and the physical environment within which the older residents live.

Pynooos and Regnier\textsuperscript{19} identified twelve similar encompassing principles based on common themes in the design and policy application literature\textsuperscript{20}. These principles serve both as guidelines for the design and management of residential environments for frail elders, and as a
research framework, sensitive to environmental design concerns and management. Pursuing Pynooos and Regnier’s principles, the design program for Kingswood Manor made effort to:

1. Provide opportunities and places in which residents can regulate their desired levels of privacy (e.g., individual sleeping and toilet/bathing areas, adequate privacy space for interacting with family).

2. Create communal spaces that allow opportunities for social exchange and interaction (e.g., cluster arrangements and common living-rooms, and small dining/activity areas to encourage casual encounters in smaller groups, which research has found predictive of enhanced psychological well-being)\(^{21}\).

3. Promote manifestations of residents’ control and autonomy. Assist residents to make choices about their lives (e.g., individually controlled heating and air conditioning devices, personal furnishings and decorations).

4. Design an aesthetically appealing environment with a more residential appearance (e.g., use of elements and features that reinforce the iconography of the residential milieu: interior scale, color, finishes and furnishings that symbolize the home environment. These are likely to contribute to a more positive mood among residents)\(^{22}\).

5. Consider opportunities for personalization and individualization of the environment (e.g., areas for display of individual mementos, choice of private room color, which are known to predict greater resident satisfaction with the institution)\(^{23}\).

6. Foster a sense of orientation and way-finding within the setting to reduce confusion and frustration and to support perceived competency and well-being (e.g., variation in the circulation areas, nodes and landmarks to prevent disorientation).

7. Provide a safe and secure environment (e.g., safety features such as grab bars, handrails, non-slip flooring, fixtures and carpeting that absorb the impact of falls).

8. Provide accessibility to all facilities and ease of operation of equipment and appliances to support comfortable functioning (e.g., easy to reach closets, accessible toilets and bathing facilities, short and unconstrained travel distances to major activities of daily living).

9. Create a safe, yet stimulating and challenging environment to keep residents active, alert and aware (e.g., environment rich in texture, color and pattern, outside views to follow the times of the day
and the change of seasons, opportunities to watch living things such as bird cages, pets, and participate in meaningful activities).

10. Design an environment that accommodates age-related losses and changes in sensory stimulation (e.g., avoid glare and provide adequate lighting levels in all areas of the setting, use sound absorbing materials to minimize the disruption of background noise, avoid public announcement system).

11. Consider the adaptability of the environment to fit capabilities of various residents and flexibility for modification for changing needs.

12. Create an environment that affords a familiar frame of reference and a sense of continuity of experiences from former dwellings (e.g., lounges that appear like residential living rooms, furnishings and accessories from residents' homes, activities to support the continuity of the self, all of which contribute to positive well-being of residents and family satisfaction).

The design intervention at Kingswood Manor promised a unique opportunity for a comprehensive, systematic, pretest-post-test study of how design interventions and program changes affect all three major users of a nursing home. The project had several strengths. First, members of the research team served as consultants in the design process. Consequently, their design objectives and concepts served as a set of hypotheses that could be tested in a post-occupancy evaluation to better understand how the various users actually responded to what was designed. Second, despite the relocation of some residents and staff to the new environment, other residents and staff remained in the existing setting, although some residents changed rooms in the existing units. This, we assumed, could provide for a comparison of those residents who do and do not experience the new environmental changes, which would facilitate the identification of the environmental impact. Third, the project focused on both aggregate-level and individual-level outcomes of the environmental intervention, whereas prior studies have not analyzed individual-level change in detail. This was expected to facilitate our understanding of the interplay of environment and human development.

And, finally, employing the new design as hypotheses for testing design attributes and policy directives was expected to assist in a better understanding of which environmental attributes improve quality of life for residents, staff and residents' families. For example, we anticipated that what helps residents to thrive in one
environment, might well differ in another setting. We thought that what affects staff's turn-around might be induced by particular design attributes which improve the ease of care provision; and, what encourages family involvement in care and enhances resident-family relationships might well be influenced by a setting which provides single-occupancy room configurations and a more home-like atmosphere.

Clearly, there is a need for understanding the context of the nursing home environment and which particular environmental attributes "work" and are catalysts for specific outcomes. Collecting and analyzing data with special emphasis on resident care outcomes, staff service and performance, and family involvement, we believed, could generate an empirical basis for improving care for and enhancing the well-being of elderly residents. In addition it could assist in measuring performance of different providers in diverse settings, devise knowledge-based regulations for long-term care settings and permit better prediction for their future design. Furthermore, conducting a study in collaborative, interdisciplinary approach enhances the reliability of the outcomes.

Methods

From the onset of the study we maintained that the complex connections between the physical environment of the nursing home and its users merited an interdisciplinary research approach. Our premise was, and still is, that multidisciplinary investigation and collaboration among scholars, who dare to cross the boundaries of their respective disciplines to conduct joint research, can yield more practical and applicable outcomes for nursing home users. Accordingly, our interdisciplinary team included researchers from the Environmental Design Department, Human Development and Family Studies, and the School of Nursing, all at University of Missouri-Columbia.

The research was designed to employ a pre-test post-test design for data collection, and include a combination of quantitative and qualitative methods. These various methods were to be applied at both the individual and aggregate levels of analyses.

To assess individual resident and family outcomes, two groups of pre-test and post-test design were to be used. The 20 residents assigned to the new wings (Treatment Group) were expected to be compared both pre and post relocation with 20 residents remaining in the existing units (Control Group). Using family visitations and Minimum Data Set (MDS) that were already collected on an on-going basis, the two groups were to be compared to determine if they differed in any systematic way prior to the design
intervention. The pre-construction data were expected to provide a baseline for assessing some of the individual outcomes to be measured for both groups at both pre and post move to the new wing.

Qualitative assessments of individual residents and families was anticipated to compare the treatment and control groups at pre and post-test as well as to examine changes in their views about the nursing home over time.

Aggregate-level analyses were planned to focus on pretest-posttest comparisons of the nursing home units (pre-existing unit and new, re-designed unit) and residents, family, and staff perceptions of these units before and then after construction. The quantitative methods (behavioral mapping and Professional Environmental Assessment Protocol (PEAP) and qualitative approaches to these aggregate level assessments are described below.

The description of the study's methods is organized according to aggregate environmental (unit) assessments, followed by outcome assessments focused on the residents, their families and nursing home staff.

1. Environmental Assessment

1.1. Professional Environmental Assessment Protocol (PEAP)

The Professional Environmental Assessment Protocol (PEAP) was used to conduct evaluation of the nursing home before and after the environmental modifications. The instrument is designed to evaluate a facility by documenting both discrete aspects of the environment (e.g., presence or absence of grab bars in toilets), as well as a global assessment of the environment's ability to support functional abilities. The PEAP includes eight indicators of environment: safety and security; environmental awareness and orientation; support of functional abilities; facilitation of social contact; provision of privacy; opportunities for personal control; regulation and quality of stimulation; and, continuity of the self. This assessment of the environment was to be conducted both by investigators of this research team, as well as two professional experts outside the team to obtain reliable assessments of specific environmental features pre and post construction, which could then be linked to user outcomes.

1.2. Behavioral Mapping

Place-centered behavioral mapping was used to observe activity patterns of residents, staff and visitors in different spaces of the nursing home. The observational instrument consists of a floor plan of various rooms in the
facility and a checklist of possible types of activities. The checklist is based upon previous behavioral mapping instrument that was used in other long-term care facilities. Data were to be gathered in random half-hour periods from 7:30 a.m. to 9:00 p.m. on random days of the week including weekends. Behavioral mapping was conducted in four time phases: a) prior to completion of the design modifications, b) immediately after relocation to the renovated setting, c) several weeks after relocation, and d) six months after relocation. Observations were conducted in the shared or common spaces, i.e., dining/activity space, lounge and hallways. For privacy reasons, behavioral mapping was not used within residents' rooms, rest rooms, and tub rooms. However, residents were observed in their rooms as much as the researchers could view the inside of resident rooms from the hallways. Frequency counts were calculated for the number of residents or staff using a room as well as the type of behavior in which they were engaged in. The frequencies were converted to percentages to provide descriptive data on how environmental design influenced the use of the nursing home’s space.

A qualitative evaluation of the types of activities, social interaction patterns, etc. occurring in the spaces were also conducted. Three long-term care experts reviewed the behavioral mapping checklist to assess its content validity prior to use. Inter-observer reliability was assessed when two researchers completed the same data gathering route for two hours and compared results.

1.3. Personal Interviews with Residents

Personal interviews with residents were conducted to assess their reactions to environmental attributes in the nursing home and their effect on the quality of their lives. A theoretical sample of 10-15 residents from the existing units and 10-15 residents from the new cluster units were to be interviewed in three phases: a) before the move to the renovated facility; b) right after the move to the completed new setting; and c) six months after the relocation. Each interviewee was given a disposable camera and asked to take 10 pictures of the most significant environmental attributes, which contribute to the quality of life for them. The developed pictures served as triggers for further discussion in the personal interviews.

All the interviews were tape-recorded and transcribed. Data analysis was to be conducted simultaneously with data collection in order to focus and shape the study as it proceeds. The information was to be categorized, searched for patterns, and interpreted. The task of the analysis was to make connections among the field data in order to identify the relevant environmental attributes and outcomes. The personal interviews were supposed to allow
residents to reflect on any change they observed and consider what they saw as the underlying influences on these changes. The personal interviews were expected to supplement the quantitative data that identified changes in functioning, activities and relationships that occurred as a result of the modification of the environment.

1.4. Focus Group Interviews with Resident Families and Staff Members

Focus group interviews were planned with resident families and staff members to gather information in regard to aspects of the physical environment of the nursing home. Advantages of focus group interviews include highly efficient qualitative data collection, checks and balance on the different opinions, and opportunities to explore emergent issues in an interactive process. Three to five focus groups, each consisting of 6-8 participants representing family members and staff were to be interviewed at three phases: a) prior to completion of the design modifications, b) six weeks after relocation, and c) six months after relocation. A semi-structured questionnaire, based on aspects of physical environment, was anticipated to serve as the guide for focus group interviews. The questions were based on salient dimensions (e.g., privacy, social interaction) of the physical environment in regard to quality of life and quality of care in long-term care settings. These environmental aspects have been validated by widely used physical environment assessment instruments used in previous studies, such as Multiphasic Environmental Assessment Procedure.

The initial plan was to ask questions such as: How safe and secure is the facility? (Egress problem, hazardous equipment, etc.) How is residents' privacy supported or not by the design of residents' rooms? What is the social interaction like among residents? Is the furniture arrangement conducive for small group interaction? How flexible or rigid is the scheduling of activities throughout the day? Is the room layout confusing for any resident or staff? Is the lighting and color scheme appropriate and does it provide a residential atmosphere? Where do families like to visit while they are with their loved ones? Is the flooring appropriate for normal walking, wheelchairs and walkers? Are there any problems/concerns in delivery of food before and during mealtimes? Any concerns/issues in regards to the housekeeping rooms? How well are the showers and bathing area working? What is the furniture like in residents' room and dining space? Do residents have a choice of roommates? Does facility policy require staff to knock on resident doors before entering? Does the facility require that residents be out of their rooms for a major part of the day? Does staff allow residents to keep the resident
room doors closed? What is the policy regarding bringing in personal furniture?

A content analysis of the focus group data was to be performed in the following manner:

1) Focus group interviews were to be videotaped and transcribed;

2) Central themes from the transcribed data were to be extracted;

3) The themes were to be categorized and organized for broader categories to identify patterns, comparisons, trends and paradoxes;

4) Matrices were to be constructed to check the validity of themes that emerged; and finally,

5) The data were to be reviewed to compare and contrast resident perspectives with those of family and staff of the same phenomena as well as to determine whether the intended design interventions were, in fact, what the users perceived as happening.33

2. Resident Outcomes

2.1. Minimum Data Set (MDS 2.0)

The impact of environmental design interventions on resident outcomes was to be assessed quantitatively using the newest version of the nursing home Minimum Data Set (MDS 2.0) instrument. Three sub-scales from the MDS 2.0 were used to compare resident outcomes of the treatment and control groups following the design intervention with pre-construction resident outcomes: (1) the Cognitive Performance Scale (CPS), (2) the behavioral problems sub-scale, and (3) the activities of daily living self-performance sub-scale. The CPS combines 5 selected MDS cognitive items (comatose status, short-term memory, ability to make decisions, making self understood, and eating performance) into a single hierarchical cognitive rating scale, ranging from 0 (no impairment) to 6 (very severe impairment)34. The behavioral problems sub-scale consists of 5 symptoms (wandering, verbally abusive behavior, physically abusive behavior, socially inappropriate or disruptive behavior, and resisting care). The activities of daily living self-performance sub-scale measures functional status based on the ability to perform 10 activities of daily living: bed mobility, transfer, walk in room, walk in corridor, locomotion on unit, locomotion off unit, dressing, eating, toilet use, and personal hygiene.

It was assumed that using MDS data for quality measurement has several advantages. It involves regular data collection on each resident (every 90 days) using a standardized instrument to measure the complex care
needs of nursing home residents, continuous monitoring of changes in residents and facility performance, and availability of nationwide data for comparison. Validity and reliability testing of the MDS instrument and subscales derived from MDS data are the focus of ongoing research. Although testing is ongoing, analyses indicate that reliable judgments based on MDS information are possible concerning the outcomes of specific residents and the quality of care provided in specific nursing homes.

A quasi-experimental one-way analysis of covariance design comparing 20 residents assigned to the cluster unit (Treatment group) and 20 residents remaining in the existing units (Control group) was utilized to analyze the data. The dependent variables were three post-construction MDS scores on the following sub-scales: Cognitive Performance Scale (CPS), behavioral problems, and activities of daily living (ADL).

The independent variable consisted of two levels: residents who were expected to move to the new unit (Treatment group) versus residents who remained in the pre-existing unit (Control group). The three co-variants were to be pre-construction MDS scores on the three sub-scales: CPS, behavioral problems, and ADL. Analysis of covariance (ANOVA) is used to increase the power of the F test by reducing error variance. In addition, ANOVA were designed to save time and money and improve the quality of the data collected because fewer subjects were needed to achieve the same precision.

It was hypothesized that after controlling for the effects of pre-construction MDS scores, the post-construction scores would dependent upon the two types of treatment: new environment versus pre-existing environment. The null hypothesis, therefore, was: There is no statistically significant difference between the mean post-construction MDS scores for the two levels of treatment after adjusting for the variance associated with the pre-construction MDS scores.

2.2. Psychological Assessment

To examine the influences of the environment on older individuals' psychological well-being, self-reported depression levels was to be assessed using the Geriatric Depression Scale (GDS) at pre and post (6-month) move for both treatment and control groups. This 30-item inventory requires simple "yes-no" answers from residents in reference to their feelings over the past week. The scale's reliability and validity have been established, and has been used successfully with the nursing home population by members of the research team. Only residents scoring 2 or less on the Cognitive Performance
Scale of the MDS were to be asked to complete this self-report measure.

2.3. Affective Reaction to Environmental Situations

In addition to examining how design influences older individuals' behavior and use of their environment, it was important to consider their affective reactions to these objective experiences. In conjunction with the Behavioral Mapping (see section 1.2.) we planned to randomly question Treatment and Control group residents about their current affective states as they spend time in various settings (e.g. own room, dining area) at pre and post-construct. A brief scale of eight 7-point semantic differential items tapping affect and activity/arousal level was to be used (e.g. alert-drowsy; excited-bored; sociable-lonely; happy-sad). The scale demonstrated strong internal validity and has been used successfully with adults beyond age seventy-five to assess short-term internal states. Multiple assessments of each participant's internal states in various settings were to be gathered over the weeks of the behavioral mapping so that average score of each resident could be calculated for each environmental setting they experience. This averaging procedure eliminates bias that could result from taking assessments on a single day that may not adequately represent a resident's more typical affective state.

3. Family Outcomes

3.1. Family Visitation

Contrary to social myth, research shows that "placement [of an elderly relative] in a nursing home neither reflects nor causes family breakdown" (p. 361). Instead, family relationships reveal a great deal of continuity after institutionalization as the family continues to visit and provide certain types of care for their resident relatives. Visitation is known to correlate positively with residents' psychosocial well being. Additionally, visits and involvement may relieve negative feelings such as guilt and shame that family members have about placement of their relatives in an institution.

The level of interaction between family members and residents in the treatment and control groups were to be compared at pre- and post-move using data from visitor sign-in sheets the facility already uses. Frequency and length of visits for various family members could be determined from these logs. Group comparisons of overall visiting and visits by the primary family member, identified as the family contact person, was to be conducted to determine whether environmental features influence the amount of contact families choose to have with the nursing home.
In addition to how often the primary family members visit, it was important to assess what those experiences are like for them, and how the environment might affect the quality of their contacts with the nursing home. To assess how time was spent on visits to the nursing home and how the visit was experienced by the primary family member, telephone calls were to be made to family members of both groups shortly after (within 1-2 days) their visits during an entire month, both pre and post-construction. To determine the activities of the primary family member during the visit we wanted to use a check-list of activities performed with/for the resident developed from similar measures used by Rubin and Shuttlesworth (1983) and Linsk et al. (1985)\textsuperscript{47}. Research indicates that family typically assume tasks centered on personalized, emotionally-sensitive care, doing things such as grooming the relative and monitoring their care\textsuperscript{38}, because they often view the treatment of nursing staff as more technical and impersonal. In addition, family members spend time observing staff interactions with other residents to see how their own relative may be treated when they are absent. Because the public and private spaces in the nursing facility were expected to change following the new design, such activities, we postulated might also change.

The affective responses of family members to visits to the nursing home were to be assessed using the same 8-item semantic differential scale used to assess residential affect during the behavioral mapping procedure (see section 2.3.). The primary family members were to be asked to recall their most recent visit and report on their loved ones' feelings (alert-drowsy; active-passive; energetic-tired; excited-bored) and affect levels (happy-sad; cheerful-irritable; friendly-angry; sociable-lonely) experienced during the visit.

3.2. Family Satisfaction Survey

The quantitative assessment of family outcomes was expected to include family members' general views of satisfaction with the nursing home. Consumer perceptions of nursing home quality have gained increasing attention from marketers and managers recently\textsuperscript{49}, the views of family are important as they often are the main decision-makers for elderly residents and their feelings of dissatisfaction can create major problems for staff and administration\textsuperscript{50}.

Family satisfaction was to be assessed at pre and post-construction (6 months) by surveying \textit{all} families of the nursing home residents. The survey was based on satisfaction surveys used in previous nursing home research\textsuperscript{51}. The surveys were mailed to families and followed-up by phone calls to families who did not return
them promptly. Aggregate-level descriptive analyses was to compare responses at pre-move and post-move, determining areas of high and low satisfaction and changes over time. Individual-level data will be compared for families of residents in the Treatment and Control Groups to determine cross-time differences and changes in their levels of satisfaction.

Comparisons of Treatment and Control Group family outcomes was to be made using a 2 (Group) X 2 (Time) repeated measures analysis of variance (ANOVA), with Time as the repeated measure. This was expected to determine cross-time changes in scores on a particular indicator for each group, as well as whether levels of change over time differed for the two groups. An interaction of Time and Group could indicate that cross-time changes for one group were stronger than for the other, which could be attributed to the environmental design differences if pre-existing group differences were minimal.

3.3. Personal Interviews with Families

At both pre- and post-move, open-ended personal interviews were to be conducted with a sub-sample of 10 families from each group to probe deeper into some of the quantitative findings regarding family experiences with the nursing home. Family members were to be asked general questions such as

- Why do family members interact the way they do with their resident relatives? (e.g., frequency of visits, activities performed)
- Why are they either satisfied or dissatisfied with certain aspects of care?
- What are the main factors that determine how often they visit their relative?
- Are there things about the facility that they think interfere with their desired level of involvement with their relative?
- Can they describe any aspects of the nursing home that influence their feelings about visiting their relative?

Families differ widely in what they do when they visit their relatives. Consequently we wanted to ask

- Why do they spend their visiting time the way they do?
- Is there any change in the way they spend the time with their relative as a result of the renovation? If yes, why?
Following transcription, the content of these interviews was to be analyzed to determine central themes in the experience of families.

4. Staff Member Perspectives

4.1. Focus Groups with Staff Members

Three focus groups were planned to identify the impact of the design interventions on nursing home staff's perceptions of resident care. Guidelines for the focus group discussion and subsequent analysis were based on the work of Krueger, who defines a focus group as "a carefully planned discussion designed to obtain perceptions on a defined area of interest in a permissive, non-threatening environment" (p. 18)\textsuperscript{52}.

A convenience sample of approximately 25 staff members was to be asked to participate on a voluntary basis in one of three focus groups held during each shift: day, evening, and night. Because long-term care is interdisciplinary, each focus group was to be comprised of 7-10 participants that were to include nurses (registered nurses and licensed practical nurses); certified nursing assistants; social workers; therapeutic recreation therapists; and physical, speech, and occupational therapists. Each focus group interview was planned for approximately one hour and was to be led by a trained research assistant and accompanied by a participant observer who was to take written field notes of the group process. The interviews were to be videotaped for later analysis.

Examples of the proposed questions included:

- How do you think the changes in the new environment have impacted the residents?
- How has the new addition affected the way you deliver care to the residents?
- How would you compare the care delivered to residents living in the new addition to care of residents living in the pre-existing units?
- How would you describe your attitude about working on the new addition?
- How would you describe your attitude about working on the pre-existing units?
- Tell me about a situation in which you have noticed a difference in a resident's behavior, cognitive status, or functional ability since moving to this new environment.
- Tell me about a situation in which you have noticed no difference in a resident's behavior, cognitive, or functional ability since the move.
A content analysis of the focus group data was to be performed in the manner described in section 1.4.

The various data collection methods and the guiding research questions are summarized in the following matrix:

5. *Summary: Research Questions and Methods Table*

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<tr>
<th>Research Questions</th>
<th>Methods</th>
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<tr>
<td>• Is there any change in the pattern of space usage by residents before and after design interventions? If yes, how did it change?</td>
<td>• Behavioral mapping</td>
</tr>
<tr>
<td>• What are the relationships between design interventions as inspired by advocated therapeutic goals and residents' outcomes?</td>
<td>• Interview with residents</td>
</tr>
<tr>
<td>• Is there any change in cognitive, behavioral and affective functioning in residents before and after design interventions? If yes, how did it change?</td>
<td>• Behavioral mapping, Resident Affect Assessment during Behavioral Mapping</td>
</tr>
<tr>
<td>• What are the relationships between design interventions as inspired by advocated therapeutic goals and resident outcomes?</td>
<td>• Interview with residents, MDS (cognitive performance scale, behavioral problems scale and ADL self-performance sub-scale), GDS (Geriatric Depression Scale)</td>
</tr>
<tr>
<td>• Which of the environmental attributes in the renovated nursing home, are perceived as significant to the residents?</td>
<td>• Interview with residents</td>
</tr>
<tr>
<td>• What are the relationships between the design interventions and family involvement (e.g., frequency of visits, activities)?</td>
<td>• Family visitation assessment, Family satisfaction survey, Interview with families, Focus groups with families, Behavioral mapping</td>
</tr>
<tr>
<td>• What are the relationships between the design interventions and family satisfaction with the physical environment, service and care delivery?</td>
<td>• Behavioral mapping</td>
</tr>
<tr>
<td>• How do the renovated setting and the changes in care philosophy affect staff perception of the physical setting, service and care delivery?</td>
<td>• Focus groups with staff, Behavioral mapping</td>
</tr>
<tr>
<td>• What is the global assessment of the facility before and after design interventions?</td>
<td>• PEAP (Professional Environmental Assessment Protocol)</td>
</tr>
</tbody>
</table>
References


6. Ibid., 41.


19. Ibid.


24 Namazi et al. (1989).


28 In his discussion of the emergence of Gerontology, Andrew Achenbaum argues that the discipline of gerontology originated as a multidisciplinary endeavor, however little research in this discipline to date truly lives up to the definition of interdisciplinarity. See Achenbaum, A. W. (1995). *Crossing frontiers: Gerontology emerges as a science*. New York: Cambridge University Press.


