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ABSTRACT

The effects of the objective physical features of the treatment environment on the well-being of elderly have previously been studied. This type of research continues to contribute to standards of quality for nursing homes, congregate housing, and health-care facilities. However, the perceived qualities of the environment may also be a key element in patient well-being and satisfaction, as well as staff morale. An instrument has been developed to measure these perceptual variables, the Physical Environment Perception Scale (PEP), a 7-point, 48-item semantic differential scale. The PEP asks both patients and staff members to rate the facility based on their perceptions of environmental attributes such as spaciousness, color and lighting, maintenance, organization, style and aesthetics, and mood or affect. The PEP was administered to nine patients and six staff members of an adult day treatment center. Results showed that, overall, patients tended to rate the physical environment more favorably than did staff members. This may represent a genuine difference in perception of the physical environment or expectations, or it may reflect the patients' reluctance to be critical of the program. Staff members may have a greater awareness of environmental problems. Results of the study also indicated a high level of internal consistency for the 48 items. The PEP proved to be feasible to administer to elderly, non-cognitively impaired patients and quick and easy for staff members to complete and return. (ABL)

SPACE, PLACE, AND AGE: DESIGNING FOR THE ELDERLY

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Space, Place, and Age: Designing for the Elderly

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ABSTRACT

Although environmental factors may be an important component of successful programs and services for the elderly, they have often been overlooked in the past. Older people usually experience limitations in their health, cognitive skills, status, or social role in our society. Such reductions in competence heighten the effects of environmental constraints and influences. This paper explores the relationship between aging and environmental influences, offering some practical suggestions and presenting a rating scale to assess perceived qualities of the environment, such as a facility or medical center.

Those involved in the health-care facility management are beginning to consider not only the more objective concerns of space planning, heating, and air flow, for example, but also more subjective qualities, such as perceived spatiousness, color and lighting, style, aesthetics, affect, and "hominess" vs. institutional appearance. How can these more subjective attributes be measured? This paper presents the development and construction of a rating scale to assess these qualities of the perceived environment, the "Physical Environment Perception Scale (PEP)," which can be used by both elderly patients and program practitioners to rate their facility on a variety of dimensions. Assessing the program environment and creating changes may further enhance therapeutic goals.

SPACE, PLACE, AND AGE: DESIGNING FOR THE ELDERLY*

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What is the relationship between aging and the environmental influence of space and place? Compared to people in their youth or middle years, older people have probably experienced some kind of limitation in their health, cognitive skills, status, or social role. Such reductions in competence heighten the effects of environmental constraints and influences. Although certain environmental factors may be an important component of succesful programs and services for the elderly, they have often been overlooked in the past:

> In the applied area, almost every policy, program, or service for older people involves an "environmental factor," which is often not specified, and even more often, not included as an explicit variable in the research evaluation of the program (Lawton, 1970, p. 41).

Those who are involved in the design and management of long-term health-care facilities, including Adult Day Treatment Centers, are beginning to consider not only the more objective concerns of facility planning (such as adequate space and bathroom facilities per person, safety features, and fire regulations), but also other more subjective qualities, which contribute to feeling of place rather than placelessness,

*Space and place are distinct concepts: "space" is abstract and objective; "place" is concrete and conveys symbolic meanings and associations. ("There is no place like home.")

orientation rather than disorientation. Such qualities include perceptions of spatiousness, color and lighting, maintenance, organization, style and aesthetics, and comfort, and judgments about affect.

The effects of the objective physical features of the treatment environment on the well-being of elderly have previously been studied (e.g., Lawton, 1983; Moos and Lemke, 1985). This type of research continues to contribute to standards of quality for nursing homes, congregate housing, and health-care facilities. However, the perceived qualities of the environment may also be a key element in patient well-being and satisfaction, as well as staff morale. Perhaps, these more subjective features would be of interest to program adminstrators and staff, but they do not have a simple and effective procedure for measuring these environmental attributes.

This paper presents an instrument which is designed to measure these perceptual variables, the Physical Environment Perception Scale (PEP), a 7-point, 48-item semantic differential scale. The PEP asks both patients and staff members to rate the facility based on their perceptions of environmental attributes such as spatiousness, color and lighting, maintenance, organization, style and aesthetics, and mood or affect. By providing objective data, it on can be used for experimental research, program evaluation, or cross-site comparisons. The development and construction of the PEP follows, after a review of related research.

For the elderly in our society, the alternative to previous independent living has very often been complete dependence, in the form of family caregiving or institutionalization when impairment occurs. Certain changes in the individual's physical environment, however, can extend the personal independence, mobility, and functioning of impaired elderly persons, as well as preserve their self-esteem and dignity. Not only physical barriers, but barriers to social and psychological functioning can be removed, as well.

An informative and nonconfusing environment, which provides for stimulation and personal space is probably more important than the arrangement of furniture (Bennet & Eisdorfer, 1975). For example, while uniform colors and textures in floors, walls, and ceilings may enhance the photogenic appearance of an institution, they provide very few cues for way-finding. Elderly people, who may already be experiencing perceptual and cognitive impairment, find it even more difficult to learn locations and find their way around an unmarked and unfamiliar environment. Providing multiple cues, however, such as changes in color and suface texture, graphics, and easy to read signage, can enable the impaired elderly to find their way, thus decreasing anxiety, and confusion.

Recently, other practical guidelines for developing day treatment environments for the elderly, especially those with cognitive impairment have recently been outlined in detail (e.g., Padula, 1985; Panella, 1987). For example:

1) Break up large space into smaller areas for concurrent activities and avoid unnecessary traffic, which may be disruptive, between areas.

2) Provide a quiet area for patients who need to be temporarily separated from the group or assisted. This area can also be used as a meeting or conference room for staff.

3) Provide office space for the director and staff where separation from patients is possible during lunch and other breaks. This space can also be used for staff and family conferences.

4) Provide access to an outside walking area or patio. This can be a valuable asset when outside time is part of the planned program.

5) Maintain even temperature and humidity in the facility, without drafts and with airconditioning, since older people are more sensitive to these aspects of the environment.

The elderly and the disabled share common needs in facility design and management (Kiyak, Small, & Allan, 1981). The movement for "barrier-free" architecture on behalf of disabled people has much in common with the notion of the "supportive" environment for the elderly. For example, the goal is the same in designing an environment which maximizes the individual's ability to move about and navigate independently, whether the person is temporarily or permanently disabled or experiencing some degree of difficulty with mobility because of advancing age. Together, both groups account for over ten percent of the population.

Very often, design solutions may be beneficial to both groups (Kiyak, et al., 1981). These solutions include accessible parking and passenger loading zones, walkways, ramps, entrances and exits, and doorways, as well as water fountains, restrooms, telephones, and legible signage or identification, conveniently

located and within reach and view of the elderly or disabled person. Furniture with wide arm rests, short seats, and high backs can enable the elderly to rise from a seated position more easily and independently. Pedestal tables are less likely to cause tripping accidents or to obstruct the mobility of people in wheelchairs or walkers than are the four-leggged variety (Andreasen,1985).

Color can improve safety and functioning, as well as having a more subjective influence on mood. The lens becomes yellow as part of the aging process, which alters the perception of color. While shades of blue, green, and violet seem are perceived as duller in tone (like adding grey), and thus less distinct, shades of yellow, red, and orange are less affected. Thus, warm colors including earth tones, oranges, reds, yellows, and pinks, would be the best choice in an environment for the elderly. Cool colors, if used at all, should be presented in vibrant tones to compensate for their faded appearance to the elderly viewer (Moeller, 1988). Unfortunately, the color choice most often seen in institutions for the elderly is white, grey, pale green and buff, presumably because these colors are neutral and easier to keep clean (Andreasen, 1985).

Color contrast may be as important as color choice in designing for older people. The elderly may experience perceptual problems with black or white because dark colors blend into the shadows, while white may cause glare. Colors can contrast in several ways, for example: 1) light vs. dark colors, 2) complementary colors, 3) colors contrasting in hue or intensity, and 4) warm vs. cool colors.

Selective use of color may facilitate the functioning of the elderly (Cooper, Gowland, & McIntosh, 1986) in several ways: 1) color can serve as a signal or cue, when it is associated with a key element in the environment (e.g., red stop signs); 2) color contrast can emphasize the location of various environmental components, making the edges of walls, floors, ceiling surfaces, and the edges of steps distinct, thus improving safety; 3) color can minimize sensory deprivation, and 4) warm, cheerful colors can enhance mood.

Areas which can be emphasized by color cueing to enhance functioning include bedrooms, washrooms, wheelchairs, eating, and grooming devices. Wall sections behind these objects can be colored to increase contrast and heighten visibility. Describing "friendly" environments for the elderly, Moeller (1988 p. 12) reported that

> To diminish the possibility of accidents, edges of counter tops, stairs, platforms, porches, wall protusions, and other potentially hazardous areas are delineated in colors that contrast sharply with background shades. Furthermore, these institutions are using dishware that includes prominent rims around plates, glasses, and trays. Dials on showers, dishwashers, stoves, washing machines, and dryers all have clearly legible markings.

Lighting can also affect the functioning of the elderly. Hughes and Neer (1981) presented a psychobiological approach to lighting for older people. Light is important because it not only provides visual information, but also helps regulate important biochemical processes. Considerations for lighting include the reduction of glare and excessive brightness, perhaps with side lighting, the use of natural lighting sources wherever

possible, or the use of special full-spectrum light tubes or a blend of incandescent and fluorescent lighting to soften the lighting. Matte surfaces will also help reduce glare. Lamps add a more home-like touch, but mounted fixtures without dangling cords are preferred for safety (Panella, 1987).

Measuring the environmental quality of programs for the elderly may be important for planning, evaluation, and policy decisions. Research suggests that objective and subjective ratings of the environment may be related, but separate factors. For example, the number of people in a room is an objective characteristic, whereas the perception of "crowding" is subjective. The relationship between objective and subjective ratings of the environment appears to decrease with age and among low income groups (Carp & Carp, 1982).

A standard instrument for the perception of the environment has yet to be developed because it would be qualified by individual adaptations and situational variables. The use of a semantic differential scale to measure environmental perception, however, has been widely accepted as a "kind of universal measure of environmental quality" (Bechtel, 1976, p. 109). In contrast to a technical environmental assessment, which is independent of the respondent's or observer's judgment (e.g., Carp & Carp, 1982), the semantic differential measures the individual's experience of the environment, qualities which cannot be directly measured.

Kasmar (1970) constructed a list of 66 adjective pairs for describing the perceived environment, with the goal of developing a lexicon of architectural descriptors that would be relevant,

meaningful, and could be used by laymen. Adjective pairs which were redundant, ambiguous, could not be used to describe specific environments, or showed gender differences in usage were eliminated from the larger set of descriptors, suggested by architects and designers. The Environmental Description Scale (EDS), consisting of a 7-point, 66 item format, showed a high level of internal consistency.

The Physical Environment Perception (PEP) Scale described in this paper is a modification and application of Kasmar's lexicon, specifically designed to measure staff and patient perceptions of the physical environment of Adult Day Health Centers. Like the EDS, the PEP is meant to provide a "potentially relevant and meaningful tool for assessing changes in the environment" (Kasmar, 1970, p. 165). Also, one could measure interactions between environmental characteristics and the behavior occurring within the environment being rated, to determine any pattern of relationship. "It then might be more possible to manipulate the environment to make it more a part of the therapeutic treatment program" (Kasmar, 1970, p. 165).

The next section descibes the development of the PEP and methods used to pilot test this instrument with Adult Day Health Care staff and patients.

METHOD

Instrumentation

From Kasmar's (1970) Environmental Perception Scale, a smaller list of 48 adjective pairs was selected, which could directly apply to the Adult Day Treatment Centers. The purpose of devising this new instrument, the "Physical Environment Perception" (PEP) Scale, was to be able to compare patient and and staff perceptions of Veterans Administration Adult Day Health Care environments and to be able to compare these ratings across several sites on a national level. This information could also be used by project staff to evaluate the environment and plan any changes.

The order of adjective pairs was rearranged from Kasmar's (1970) list and grouped into six attribute categories: Dimensions, Color and Lighting, Maintenance, Organization, Style and Aesthetics, and Affect, each consisting of eight adjective pairs. Within each attribute category, pairs were alphabetically arranged. The pairs were also arranged so that the first adjective conveyed positive meaning in four pairs and negative meaning in the remaining four pairs. A 7-point scale was used to construct items, similar to the Environmental Description Scale. (See Table 1 for attribute categories and adjective pairs.)

TABLE 1. ENVIRONMENTAL ATTRIBUTES AND ADJECTIVE PAIRS USED TO CONSTRUCT THE PHYSICAL ENVIRONMENTAL PERCEPTION SCALE

DIMENSIONS	
Adequate size	Inadequate Size
Cramped	Roomy
Full	Empty
Poorly Scaled	Well Scaled
Restricted Space	Free Space
Tiny	Huge
Uncrowded	Crowded
Wide	Narrow

ORGANIZATION	
Chaotic	Orderly
Convenient	Inconvenient
Disorganized	Organized
Efficient	Inefficient
Functional	Nonfunctional
Poorly organized	Well organized
Poorly planned	Well planned
Well balanced	Poorly balanced

COLORS AND LIGHTING	
Bad Colors	Good Colors
Bright	Dull
Bright Colors	Muted Colors
Drab	Colorful
Good lighting	Poor lighting
Soft lighting	Harsh lighting
Sparkling	Dingy

STYLE AND AESTHETICS	
Distinctive	Ordinary
Fashionable	Unfashionable
Impressive	Unimpressive
Stylish	Unstylish
Tasteless	Tasteful
Ugly	Beautiful
Unappealing	Appealing

MAINTENANCE	
Bad ventilation	Good ventilation
Dirty	Clean
Good air flow	Poor air flow
Neat	Messy
New	Old
Stale odor	Fresh odor
Uncluttered	Cluttered
Well-kept	Run-down

AFFECT	
Dreary	Uplifting
Gloomy	Cheerful
Good Acoustics	Poor Acoustics
Noisy	Quiet
Pleasant	Unpleasant
Repelling	Inviting
Uncomfortable	Comfortable
Warm	Cool

Subjects and Site Characteristics

The director of the Adult Day Treatment Center at a local hospital was asked to participate in the pilot study and to recommend appropriate patients (that is, those without severe cognitive impairment but with some degree of physical impairment) and staff members who would be willing to volunteer. Nine patients and the six staff members from the Adult Day Treatment Center agreed to participate in this pilot study. The average age of the patients was about 70, and of the staff members, mid to late 30's. Staff members had all worked at the treatment center for several years.

This Adult Day Health Center is located in an old-fashioned house on the hospital grounds, which had been altered and adapted for the purposes of Adult Day Health Care. It has a warm and homey atmosphere, with the kitchen being an important center of activity. There was also a "resident" cat and dog. Projects that had been created by patients, for example, a large and colorful crocheted afghan, were on display. The staff members and patients informed me that the greatest problem was lack of space as the program had expanded, and insufficient bathroom facilities for the increased number of patients.

Procedures

Staff members completed a self-administered form of the Physical Environment Perception Scale and returned it in self-addressed envelopes. Patients completed the same form of the PEP, except that the researcher obtained consent and interviewed the patients herself, visiting the Adult Day Treatment Center on two occasions to collect data, in January and February of 1988.

Statistical Analysis included a one-way analysis of variance for the 48 items, with staff and patients as the two groups. A reliability coefficient was also caluclated. Since this pilot study consisted of a small number of cases, conclusions based on these analyses should be interpreted with the caution that these are only preliminary results.

RESULTS AND DISCUSSION

Scoring was conducted so that high values indicated a more positive perception of the environment and low values indicated a more negative attitude. The items which received the lowest mean ratings (below 4 on a 7-point scale) were in the "Dimensions" category: "Adequate size/ Inadequate size" (3.33), "Cramped/ Roomy" (2.93), "Restricted space/ Free space" (3.53), "Tiny/ Huge" (2.67) and "Uncrowded/ Crowded" (2.60).

The highest mean ratings were obtained in the "Affect" category: "Dreary/ Uplifting" (6.27), "Pleasant/ Unpleasant" (6.60), "Repelling/ Inviting" (6.60), and "Comfortable/ Uncomfortable" (6.53). Other high mean ratings (6 or above) were found for "Good Colors/ Poor Colors" (6.00), "Dirty/ Clean" (6.20), "Disorganized/ Organized" (6.13), "Functional/ Nonfunctional" (6.20), "Poorly organized/ Well organized" (6.33), "Poorly planned/ Well planned (6.33), and "Unappealing/ Appealing." A reliability coefficient was calculated for the entire PEP scale of .93.

A series of one-way analysis of variance showed significant differences between patient and staff ratings on several items, with patients ratings the environment more positively than staff members.

These items consisted of:

Bad colors/ Good colors*
Good lighting/ Poor lighting**
Soft lighting/ Harsh ligting**
Sparkling/ Dingy**
Bad ventilation/ Good ventilation**
Dirty/ Clean**
Good air flow/ Poor air flow**
Neat/ Messy**
Stale odor/ Fresh odor**
Well-kept/ Run down**
Disorganized/ Organized**
Efficient/ Inefficient**
Functional/ Nonfunctional**
Poorly organized/ Well organized**
Poorly planned/ Well planned**
Unappealing/ Appealing**
Gloomy/ Cheerful**
Good acoustics/ Poor acoustics**
Noisy/ Quiet*

* $p < .05$
** $p < .01$

Overall, patients tended to rate the physical environment more favorably than staff members (see figure 1). This may represent a genuine difference in perception of the physical environment or expectations of how the Adult Day Center should appear. However, another possibility is the patients' reluctance to be critical of a program which they feel has been very helpful to them. In addition, staff members may have a greater awareness of environmental problems or constraints and feel a greater sense of responsibility toward solving such issues.

FIGURE 1

One-Way Anova: PEP Ratings by Patients and Staff

Source	DF	SS	MS	F	Significance
Between Groups	1	4.49	4.49	17.4	.0011
Within Groups	13	3.35	.26		
Total	14	7.84			

CONCLUDING REMARKS

The Physical Environment Perception (PEP) scale was developed for several purposes. One goal was enable those who are working with the elderly to measure subjective attributes of the environment for planning and evaluating facility design. The PEP can be used, for example, to assess the environmental aspects of a particular site where the elderly are receiving services, to study the effects of environmental changes, or to compare the patient and staff satisfaction with the physical environment of the treatment facility across sites.

A pilot study was described in which the PEP was found feasible to administer to elderly, non-cognitively impaired patients and quick and easy for staff members to complete and return. In general, patients enjoyed completing this scale, since the attention was focused on their experience of the environment rather than their illness or dysfunction.

Other results of the pilot study indicated a high level of internal consistency for the 48 items. On the average, patients rated the environment in more positive terms than did the staff members. Such differences may be due to actual differences in perception, the influence of age, or the patients' reluctance to find fault with a program and staff they perceive as helpful. The comparison of patient and staff environmental ratings and the reasons for any differences would be interesting to explore further.

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