
REVIEWS AND RESEARCH REPORTS

ELDERLY PERSONS' APPRAISAL OF ANIMALS IN THE RESIDENTIAL ENVIRONMENT

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Abstract. *At present in the United States, nearly 31 million people are aged 65 or older, and this group is expected to swell to nearly 22% of the total U.S. population by the year 2030. As more people live longer, efforts to identify how they can maintain a dignified, sustained quality of life are vital. The elderly individual too often becomes disconnected from valued people, places, and activities, and person-animal transactions, too, change with changes in physical and sensory capabilities and one's transactions with the built environment. Nevertheless, animals are a source of companionship throughout life. A functionalist-evolutionary perspective of human functioning and environmental press-competence theory provided a theoretical foundation for a survey administered to 59 respondents residing independently or in congregate housing. Relationships among personal characteristics, well-being, and characteristics of the home environment were explored for their role in a preference for involvement or noninvolvement with animals. The results of the survey showed, among other findings, that elderly persons endeavor to maintain indirect, passive, yet sustained involvement with animals to replace*

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the actual, direct contact they experienced earlier in life. Specifically, a preference for involvement or noninvolvement with animals was predicted by age, visual acuity, physical mobility, type of residence, the presence of sufficient outdoor space adjacent to the residence, and the perceived adequacy of support space for pets indoors. Implications of the findings, limitations, and directions for further work are discussed. The results suggest that increased efforts should be made to create supportive environments to facilitate elderly persons' interactions with pets and other animals.

INTRODUCTION

At present in the United States, nearly 31 million people are aged 65 or older, and this group is expected to swell to nearly 22% of the total U.S. population by the year 2030 (American Association of Retired Persons 1988). Research in the fields of gerontology and geriatrics and in the area of environment and aging has addressed physiological and interpersonal dimensions of the aging experience; the elderly individual's ability to adapt to changes in social patterns, lifestyles, physical capabilities, occupational activities, and surroundings; and the function of the built environment as a support mechanism. Recreational, residential, and institutional environments have been studied in terms of their capacity to support the maintenance of overall equilibrium on a daily and long-term basis (American Institute of Architects 1985; Høglund 1985; Kalicki 1987; Calkins 1988). Research has also confirmed that animals are a source of companionship and that people develop close bonds with their pets (Gale 1983; Serpell 1986; Rowan 1988). Nonverbal communication has also been shown to exist between people and animals (Corson, O'Leary-Corson, and Alexander 1980).

For the elderly individual, contact with companion animals may in fact be therapeutic (Katcher and Beck 1983). Yet the role of person-animal-environment transactions in the aging ex-

perience has not been examined to any significant extent. A study by Verderber and colleagues (1988) explored elderly persons' environmental preferences with respect to their urban zoological park in an effort to reveal patterns of usage of the environment and to identify settings perceived as uninteresting or threatening to one's well-being. Certain renovated settings were preferred less than "traditional" animals-in-cages zoo environments. In addition, persons with physical limitations were not particularly interested in visiting the zoo regardless of the availability of adequate access and support mechanisms. These findings suggested that the trend toward participatory, interactive zoo environments should be tempered by consideration of the special cognitive and functional capabilities, aesthetic preferences, and expectations of the aged.

The research reported below is an extension of the aforementioned work and strives to address the key questions raised at its conclusion: (1) Do an individual's attitude to and contact with animals change over the years? (2) What effect do an individual's immediate residential and adjacent exterior environment and health status, well-being, and other pertinent background characteristics have on the preference for contact with animals late in life? Restated, what architecturally distinguishes a functionally supportive from a nonsupportive residential setting, and what fosters an appropriate degree of well-being with respect to the perceived capacity to care for a pet successfully? (3) What policies are needed (if any) to facilitate meaningful person-animal-environment relationships for the elderly?

As in the work by Verderber and colleagues (1988), the underlying theoretical structure of this study is bidimensional. It is drawn from two avenues of work. One is the functionalist-evolutionary view of human functioning in the environment (Kaplan 1972; Kaplan and Kaplan 1982; Kaplan and Talbot 1983), which postulates that humans evolved in uncertain, dangerous environments. Success in functioning—which depended on processing complex levels of multisensory information—and in protecting territory ensured survival. The relationship between humans and animals is deep-rooted and perhaps constitutes the core of survival from a functionalist-evolutionary perspective, in that an-

imals were depended upon for protection—alerting their human partners to unknown dangers—as well for sustenance. Animals are valuable amenities to humans, providing protection, nourishment, and, in modern Western culture, recreation.

The information-processing view of human functioning has been carried into the realm of architectural research in the study of surrogate views—that is, responses to scenes of animals and mammals in natural settings compared to scenes of harsh urban environments, the effects of windowlessness and informationally deficient windows and views on health status (Verderber 1983, 1986; Verderber and Reuman 1987), and the impact of informationally deficient ceilings in hospital rooms occupied by paralyzed inpatients (Barrington, Chester, and Verderber 1984). From this perspective, the human fascination with nature and animals is timeless. Animals are both loved and feared in a curious, enduring dialectic.

The second theory central to the present work, also transactional in essence, is drawn directly from the fields of environment and aging and from gerontology. M. P. Lawton's (1985) environmental press-competence theory focuses on perceived challenges in the built environment, that is, the "press" inherent in an environmental setting, relative to one's competency and ability to cope. Environmental press is conceptually viewed as interactive with projected and actual competency levels (in terms of mobility, autonomy, and proactivity) in elderly persons. Hoglund (1985) discussed housing environments for the aged in light of this theory. Specifically, Lawton's autonomy/support dialectic encompasses actual and perceived health status and mobility and sensory adroitness and is explored here with regard to the press inherent in the home environment.

It is hypothesized that people autonomous in terms of well-being and functional competence who reside in spatially supportive residential settings prefer to care for pets. Conversely, people less competent (loss of autonomy) in spatially restrictive residential settings (nonsupportive) generally prefer not to have direct involvement with animals in the form of caring for one or more pets. It was assumed from the outset that elderly people who enjoy pets and cared for pets when

Table 1. Standardized Regression Coefficients for Respondent and Setting Attributes Relative to Person-Animal Interaction in the Residential Environment

| | X | Preference for noninvolvement ^a | Preference for involvement ^b |
|---|------|--|---|
| Respondent characteristics | | | |
| Age (in years) | — | -.212** | .093 |
| Sex | — | .062 | .032 |
| Visual acuity ^c | 2.63 | -.129* | .101 |
| Physical mobility (walking) | 2.41 | -.117* | .209** |
| Use of upper extremities | 3.12 | .149* | .173*** |
| Hearing | 2.76 | -.079 | .023 |
| Speech | 3.44 | .107 | .019 |
| Cognitive abilities | 3.11 | -.073 | .039 |
| Length of present residence (in years) | — | .051 | .070 |
| Residential setting characteristics | | | |
| Type of residence (house, apartment, extended care) | — | .027 | -.129* |
| Prior type of residence (house, apartment, extended care) | — | -.036 | -.112* |
| Architectural factors ^d | — | .044 | -.124* |
| Adequacy of support space (indoors/outdoors) ^e | — | .103* | .157** |
| Pets allowed/not allowed | — | .032 | .014 |

^a $F = 4.39$; $df = 14, 21$; $p < .05$; adjusted $R^2 = .101$.

^b $F = 5.92$; $df = 14, 33$; $p < .05$; adjusted $R^2 = .097$. Two respondents were undecided as to preference/nonpreference for pets.

^cRespondents were assessed on a four-point scale (poor, adequate, good, very good) for each of six health status indices.

^dArchitectural attributes consisted of the presence of a backyard, front porch, balcony.

^eThis was assessed in terms of environmental support for pets (yes/no).

* $p < .05$

** $p < .01$

*** $p < .001$

younger would continue to do so if they could and that the architectural environment is a determinant, as are policies concerning the presence or absence of pets in the immediate residential setting and the types of pets allowed.

Respondents

Fifty-nine respondents residing independently or in congregate housing responded to a survey, developed in response to the research hypothesis and assumptions just described, administered at two continuing-care retirement communities (CCRC) and two community-based day activity programs for the elderly. The respondents' residential settings differed in terms of architectural attributes, that is, size, neighborhood, age, condition, density.

Respondents were largely homogeneous in terms of socioeconomic background and formal education (10.8 years). The sample was 86% white and 14% black. Income level was not elicited in the full-scale fieldwork phase.¹ All respondents resided in metropolitan New Orleans,

in a long-established urban residential district in the city's uptown. The mean age of respondents was 78.7 years. The group consisted of 37 (62.7%) females and 22 (37.3%) males. Each respondent was assessed on a four-point scale ranging from "poor" to "excellent" in terms of six indicators of health status: visual acuity, physical mobility (walking), use of upper extremities, hearing, speech, and overall cognitive abilities. The staff member most knowledgeable about a given respondent did the assessment, based on precise written criteria provided by the interviewer. Most respondents experienced impaired vision, requiring corrective eyeglasses (86%); most were ambulatory and had relatively full control of their upper extremities; only 4.6% required wheelchairs. A cane, walker, or other mobility assistance device was required by 26.3% of the respondents. Table 1 presents the means for the six health status indicators. The average length of residence at the present address was 6.2 years. Fourteen (23.7%) respondents did not have pets when they were younger, 25 (42.4%) had had a dog or cat only, and 17 (28.8%) had

had two or more pets. Thirty-five (59.3%) indicated that they would like to care for a pet at this time in their lives, 22 (37.3%) said that they would not, and 2 (3.4%) were undecided.

The questionnaire also contained items intended to render a typological and spatial profile of the residential environment. Types of residence differed: 6 (10%) respondents lived alone in their own houses, 33 (56%) lived in apartments (89% residing alone), and 20 (34%) resided in extended-care facilities. Prior to their current residences, 39 (66%) had lived in their own houses, 17 (29%) had resided in a CCRC apartment, and 3 (5%) had resided in a different CCRC or extended-care facility. With respect to specific architectural attributes of the residential settings, 21 (35.6%) had backyards, and 38 (64.4%) did not; 35 (59.3%) had front porches, and 24 (40.7%) did not; 15 (25.4%) had balconies, and 44 (74.6%) did not; 12 (20.3%) "generally had enough space indoors to care for a pet," and 47 (79.7%) did not; and 18 (30.5%) "generally had enough space outdoors to care for a pet," and 41 (69.5%) did not. Pets were allowed in the residences of 12 (20.3%) respondents and not allowed in the residences of 47 (79.7%) of the respondents.

METHODS AND PROCEDURE

A four-page questionnaire was developed to gather data in a systematic manner. The first set of questions focused on past experience with respect to patterns of person-animal-environment interaction; each of the 12 questions was preceded by the lead-in, "How often did you do the following when you were younger?" Items addressed visits to the zoo at different points in life, places and activities involving direct contact with domesticated and/or wild animals, and interest in animals in literature and/or media. Each item was accompanied by a four-point response scale: "never," "seldom," "often," "very often."

The second set of questions focused on the present situation: "How often do you currently engage in the following activities?" The eight items referred to the same issues addressed in the first set of questions and were responded to on the same four-point scale.

The third set of survey questions (9 response items) sought information on the participants'

appraisal of the relevance of caring for pets at this time of life, their preferences for seeking out contact with animals (e.g., visits to the local zoo), their preferences regarding contact with animals (direct or indirect) at this time, and their views as to whether animals are a health threat to people of their age. For each response item, the lead-in was, "To what extent do you agree with the following statements?" The four-point response scale was "strongly disagree," "somewhat disagree," "somewhat agree," "strongly agree."

The fourth and fifth parts of the survey measured the extent to which participants felt that direct involvement with animals would or would not be important at this point in their lives, relative to whether this would give them more exercise, get them outdoors more frequently, merely function recollectively as a flashback to youth, or for other reasons. For those who preferred noninvolvement, typical responses included lack of interest, belief that pets are too much bother to care for, too expensive, or harmful to one's health, and a lack of room at home. Part 6 assessed whether the participant would like to care for a pet at this time, and, if so, why.

The remainder of the survey contained a series of background questions about design features of the residential environment and about personal characteristics (results reported above in the respondent profile).

Data were gathered during the summer and fall of 1989. The staff member most knowledgeable about the resident population in each fieldwork location provided a list of potential participants, and volunteers were solicited individually. A range of functional capabilities was sought among elderly persons able to live independently or semi-independently. People requiring 24-hour nursing care were not included in the study. The rate of acceptance was 74% among those invited to participate in the study.

The interview-survey lasted approximately 20 to 25 minutes and occurred in private away from major areas of social activity in each facility. Interviews were conducted between the hours of 9:00 A.M. and 5:00 P.M. The identities of respondents remained confidential. Prior to the full-scale fieldwork phase, a pretest was conducted with 8 people at a different senior day-care center in the same area of the city in order

to evaluate the format and content of the instrument and procedure. These 8 respondents were matched with the 59 respondents in the full-scale fieldwork phase in terms of age, health, lifestyle, type of residence, and socioeconomic status.

The research team consisted of four graduate students in public health working under the close supervision of the project director (the author). A training session was held to ensure consistency in the interview format. All key instructions and introductory statements were prepared ahead of time and read verbatim from a script. Interviewers were assigned in a balanced manner across the four settings where data were gathered. Each interviewer gathered data at two or more settings to counter possible response bias stemming from the interviewer's age, sex, and so on. Interviewers were in their early twenties, white, and female. Each interviewer began by reading the prepared introduction and instructions to the respondent; all respondents completed subsequent parts of the survey according to identical instructions. As a precautionary measure, a list of likely questions and answers was supplied to each interviewer.

ANALYSIS AND RESULTS

Data were analyzed via descriptive statistics, including means and standard deviations (Table 2), and multiple regression analyses (Table 1) with a stepwise procedure to explore relationships between variables (Hors 1965). This strategy was selected because transactional environment-behavior functions can be examined concurrently; the number of significant effects (11) was greater than that attributable to random effects. All preference scale data and background data were formatted as ordinal variables prior to analysis.² Multivariate linear effects of respondent and setting attributes were explored for their predictive influence on person-animal interaction/noninteraction in the residential environment. As a result, contextual questions on preferences and attitudes, respondent characteristics, and residential setting characteristics are treated as independent variables, and the two variables on person-animal interaction/noninteraction are treated as dependent. Predictive effects at or below .05 are reported.

Patterns of Interaction/Noninteraction with Animals

Patterns of past experience with animals are reported in Table 2. Virtually all respondents had had direct contact with animals ($X = 3.23$) or had a pet of their own at some point ($X = 3.13$). Fewer had had contact with pets in rural settings (2.63), in zoos overall (2.45), between the ages of 25 and 40 (2.16), and through films and books about animals (2.35). Respondents very seldom visited zoos between the ages of 40 and 50 (1.75) and even less in later years (1.39).

In their present situations (Table 2), most respondents less frequently read (2.46) or watched TV programs (2.42) about animals. Persons came in direct contact with animals in their residential settings (2.26) or at the residences of friends or relatives (2.12). At the time of the survey, respondents very seldom or never visited the zoo themselves (1.81) or came in contact with animals away from home (1.17).

Attitudinal assessment data generally fell into one of three types of response (Table 2). First, respondents rather strongly agreed with five statements: "pets remind me of my youth" (3.44); "caring for a pet would get me more exercise" (3.31); "caring for a pet would get me outdoors more often" (3.23); and "contact with animals is of great importance to me" (3.23). However, most respondents stated that they used to be more interested in having a pet than they are now (3.12). Second, respondents agreed only somewhat with three statements: "caring for a pet would keep me in closer contact with people" (2.97); "I don't have the room to care for a pet at home" (2.83); and "persons over age 65 are most interested in animals" (2.54). Third, respondents disagreed with these statements: "zoos are mostly for families" (2.37); "zoos are mostly for children" (2.07); "pets are too expensive to care for" (2.03); "it is too dangerous for me to be near animals" (1.76); and "zoos are not places for people my age" (1.53).

To summarize, these findings indicate that respondents' involvement with animals was considerable in their youth and has lessened over time. However, a lower yet sustained level of indirect (passive) involvement has supplanted the earlier predilection for active, direct contact with pets and other animals. This is evidenced in the

Table 2. Patterns of Person-Animal-Environment Interaction

| | X | SD |
|---|------|------|
| Past experience (N = 59)^a | | |
| a. Had contact with friends who had pets | 3.23 | 1.12 |
| b. Actively involved in caring for a pet | 3.13 | 1.15 |
| c. Had contact with animals in rural settings | 2.63 | 1.02 |
| d. Visited the zoo as a child | 2.45 | 0.77 |
| e. Interested in films/books on animals | 2.35 | 0.92 |
| f. Visited the zoo between the ages of 25 and 40 | 2.16 | 0.86 |
| g. Visited the zoo between the ages of 40 and 50 | 1.75 | 0.76 |
| h. Visited the zoo between the ages of 50 and 65 | 1.39 | 0.74 |
| Present situation (N = 59)^a | | |
| a. Read about animals | 2.46 | 0.78 |
| b. View television on subject of animals | 2.42 | 0.88 |
| c. Have direct contact with pets at home | 2.26 | 1.01 |
| d. Visit friends/relatives with pets | 2.12 | 0.93 |
| e. Visit the zoo | 1.81 | 0.76 |
| f. Have contact with animals in rural setting | 1.17 | 0.62 |
| Attitudinal assessment (N = 59)^b | | |
| a. I don't have the room to care for a pet at home | 2.83 | 1.12 |
| b. Pets are too expensive to care for | 2.03 | 1.02 |
| c. Zoos are mostly for children | 2.07 | 1.04 |
| d. Zoos are mostly for families | 2.37 | 1.06 |
| e. Zoos are not places for people my age | 1.53 | 0.81 |
| f. Persons over age 65 are most interested in animals | 2.54 | 1.07 |
| g. I used to be more interested in caring for a pet than I am now | 3.12 | 0.98 |
| h. Contact with animals is of great importance to me | 3.23 | 0.96 |
| i. It is too dangerous for me to be near animals | 1.76 | 0.90 |
| j. Pets remind me of my youth | 3.44 | 1.31 |
| k. Caring for a pet would get me outdoors more often | 3.23 | 1.26 |
| l. Caring for a pet would get me more exercise | 3.31 | 0.99 |
| m. Caring for a pet would keep me in closer contact with people | 2.97 | 0.86 |

^aFour-point response scale: never (1.00), seldom (2.00), often (3.00), very often (4.00).

^bFour-point response scale: strongly disagree (1.00), somewhat disagree (2.00), somewhat agree (3.00), strongly agree (4.00).

overall mean for past experience response items (2.39), which is higher than the mean for current involvement response items (2.04). These results therefore suggest that there is still interest in maintaining some involvement, even if indirect, because of its perceived positive effect on well-being and health. Pets are not viewed as being prohibitively expensive to care for, and zoos are viewed as amenities for people of all ages. This information provides a contextual backdrop for exploring specific spatial features of the environment.

Predictive Influence of Respondent and Residential Setting Characteristics

The results reported in Table 1 address the second research question: the effect (if any) of the

immediate residential environment and the well-being of respondents on the preference (or lack of it) for contact with animals. The results are described first for respondents preferring noninvolvement ($N = 22$) and then for those preferring involvement ($N = 35$). Of those responding no to the survey question "Would you like to have direct contact with pets at this point in your life?" 78% lived in institutional or CCRC settings. This is likely attributable to their lower level of functional competency compared to those living independently in the community.

Five factors, four of them respondent characteristics, were associated with people preferring noninvolvement. Age has a predictive effect in that the oldest respondents were not interested in direct contact with animals. Next, people with poor to adequate visual acuity were not inter-

ested. Nor were those with only poor to adequate physical mobility. Also, persons with limited use of their arms were not interested in direct involvement. In terms of residential setting, only one factor had a predictive effect on outcome: the perceived adequacy of the residence in terms of the support it afforded for caring for a pet. Specifically, 78.9% and 69.5% of all respondents stated that they lacked adequate space indoors and outdoors, respectively. It is noteworthy that no other residential setting factor (among those studied) had a predictive influence on outcome.

For the 35 respondents preferring direct involvement, six factors were found to be associated with outcome. However, only two were person-based; the other four are environment-based. Person-based factors consisted of the role of functional competency: those who have good to very good physical mobility prefer direct involvement, as do those who can use their arms without too much trouble. With respect to the role of the home environment, people living independently—that is, in their own houses or apartments—preferred contact with pets in contrast to people who do not live in independent residential settings. The type of residence respondents lived in prior to their present residences had an effect on outcome: people who had lived in single-family homes, including those who had had pets when younger, continued to prefer contact with pets at this stage of life. Of the five architecturally based spatial features addressed in the survey, only the presence of a yard had a predictive influence on outcome for people who preferred direct involvement with animals. Finally, people who considered their present residences and environs to provide adequate support space for a pet preferred direct involvement. However, this group represented only 20.3% (with sufficient indoor space at present) and 30.5% (with sufficient outdoor space at present) of all respondents. Somewhat surprisingly, whether residential rules allowed pets had no bearing on this measure of outcome.

Summary

Regarding the first research question, attitude toward animals did change through the years, from a preference for direct involvement to pref-

erence for a lower degree of sustained, yet indirect involvement. However, regarding the second question, the respondent group was somewhat divided over whether they should have direct involvement at this stage of their life. A sizable number stated that a combination of physical health limitations and spatial limitations in their home environments made it impractical for them to care for pets at this point in their lives. The regression analyses yielded three patterns of outcome: (1) aged people with health problems express little interest in caring for pets regardless of whether their home environments are supportive architecturally; (2) relatively autonomous, mobile, and healthy aged people continue to prefer both direct and indirect involvement with pets and other animals if their home environments are adequate; and (3) those in independent living settings, particularly with adjacent outdoor space, prefer direct involvement compared to people who live in congregate housing settings. Regarding the third research question, it was found that the presence/absence of rules prohibiting animals from a residence has no overt bearing on the decision to seek involvement.

DISCUSSION

It was hypothesized that elderly people relatively competent in terms of personal autonomy in spatially supportive residential settings would prefer direct involvement with animals and that, by contrast, people who see themselves as, or in fact are, less competent because of health problems and/or restricted mobility (loss of autonomy) in restrictive (nonsupportive) residential settings would feel otherwise. The results generally support this hypothesis and further suggest that people with a sustained lifelong predilection for animals will continue to seek contact with them as long as they are healthy enough to do so and the physical environment is sufficiently supportive, regardless of whether contact is allowed.

Viewed in relation to Lawton's model of environmental press–competence, the results imply that a decrease in environmental press coupled with an increase in personal competency gives rise to an increased preference for involvement in the care of a pet. In theory, this should be

possible well into retirement given a sufficient level of well-being and an architecturally supportive home environment. In this study, the 22 aged people not interested in pets tended to reside in quasi-institutional settings that were somewhat restrictive of residents' activities.

Two key implications of the findings are apparent. First, the elderly endeavor to maintain some type of contact with animals, even if it is only through books, TV, films, or wildlife posters and calendars. This implies that a typology of interactions exists—perhaps as a continuum ranging from sole responsibility for the care of a dog, through visiting a zoo, to passive activities such as reading. This phenomenon may be further understood when considered in light of the architectural attributes of the home and adjacent outdoor space. A preference for passive involvement with pets is associated with a low degree of architectural support, while a preference for active involvement is associated with a high degree of support. This study focused essentially on the quantity of support afforded; additional work should examine the quality of support. If quantity relates to the size of interior rooms, yards, and porches, then quality-based factors include the sense of safety and protection needed in a particular situation and, if a pet was chosen for that reason, the extent to which the indoor and outdoor spaces are petproof and such factors as the amount of direct sunlight and the type and condition of exterior surfaces.

From a functionalist-evolutionary theoretical perspective, humans, as a species, endeavor to make sense of their surroundings, to process and filter large quantities of information on a daily, if not momentary, basis. Because of sensory impairments and restricted mobility, the elderly—especially the less healthy elderly—have a particularly difficult time coping with the inherent uncertainty of the immediate environment and with the ongoing challenge of information processing. Yet, direct contact with animals is a deep-rooted tendency—a source of fascination, fear, rapture, and sustenance. Pets provide companionship, a sense of being needed, and, in some cases, compensate for the loss of friends and family (Gale 1983; Serpell 1986; Rowan 1988). This fear/love dialectic remains throughout life; it does not vanish or need to be forgotten in old age.

Indeed, the desire for contact transcends the vague distinctions of young-old, mid-old, and old-old used by gerontologists to describe persons typically aged 65 and older. The elderly simply require a balance whereby contact with animals does not become too challenging, dangerous, or fatiguing, regardless of the home environment.

The second key implication is the effect of specific architectural features on contact with animals. With the notable exception of the yard, these do not play a major role. Rather, a collective appraisal is probably arrived at in the form of "I do/don't have enough space for a pet." This construct may supersede appraisals of specifics such as stairs, doors, windows, floor surfaces, size of residence, storage space, and so on.

This work has perhaps yielded additional insight to the literature on person-animal-environment transactions. It represents an attempt to build upon and extend a theory of environment and aging into the design of the architectural residential environment. Architects require specific design criteria to ensure that the needs of residents can be successfully accommodated in new and renovated residential settings. This information has been lacking in the literature to date. Retirement communities, adult day-care settings, independent housing, congregate housing, and institutional settings such as hospitals and nursing homes should be planned, designed, and managed to bring pets into the day-to-day lives of the elderly, especially those who are confined indoors.

Certain limitations of the study warrant mention. First, a larger sample size would have made it possible to explore differences in the residential settings reflected in the sample relative to the other variables examined. This would have allowed comparisons among people residing alone in their longtime homes, in apartments, in retirement communities, and in extended-care facilities. Second, each residence could have been documented more systematically (with floor plans, annotated checklists, photographs) to allow for further correlation of architectural details with responses to the survey.

An analysis that claims causality must pay careful attention to possible colinearity among variables. In our society, variables such as health and quantity of residential space are significantly

and often highly correlated with individuals' incomes or other economic resources. Variables such as support space do not cause income; typically, the reverse is true. If income data had been included in the regression analysis, or otherwise controlled for, perhaps some of the significant effects would have dropped out as non-significant. Income, however, was dropped from the survey, as previously stated, because it was found to be of an overly sensitive nature and so was judged by the research team to have an adverse effect on the larger purpose of the study. Perhaps data on income and degree of financial stability could be obtained apart from the survey itself, for example, through archival data or blind forms placed in a box and coded with numbers corresponding to numerically coded survey forms.

Future efforts on this topic should explore institution-home differences in terms of person-animal-environment interactions, level of income, specific visitation/ownership policies, additional quantitative and qualitative architectural characteristics that potentially function in support of meaningful person-animal interactions, the development of research-based architectural design guidelines, the role of resource management and policy in the regulation of person-pet transactions, and the influence of functional competency on preference for passive or active involvement.

The role of advanced technology and computerized "smart buildings" will become more important to the person-animal-environment dialectic. Elderly people who at present are unable to care for pets may be helped by emerging technologies such as computer-based pet-monitoring systems using implanted microchips (Uzelac 1989), automatic doors, and infrared vision-enhancement devices, as well as by communal care concepts—for example, a group whose members share responsibility for an animal's well-being. Achieving the maximum fit will require appropriate administrative policies. At present, only a few hospitals in the United States, such as Columbia Hospital in Milwaukee, have policies regarding pet visitation. Many more will adopt them in the 1990s. The recently signed Americans with Disabilities Act (Harrison 1990) will help the disabled by mandating that, beginning in 1992, public facilities and housing

must be barrier-free. It is highly likely that architects will be expected to design barrier-free housing and shared support spaces for the aged specifically to accommodate the care of pets in the interior architectural environment. In the seminal book *A Pattern Language* (1977), Christopher Alexander and his colleagues stated that people need to have opportunities for contact with animals, as this is a timeless dimension of everyday life. The therapeutic benefits for the aged and infirm must not be overlooked, for the relationship among people, animals, and the built environment is enduring and undeniable.

NOTES

1. In the pretest, numerous respondents considered annual income to be too personal a topic to reveal. The question eliciting this information was therefore omitted largely because inclusion potentially would have reduced the participation rate even though this data would have been useful.
2. Three items responded to by less than 85% of the total study group were dropped from the regression analyses; these asked whether the respondent rode/rides horses and went/goes fishing and requested an account of the respondents' related "other activities."

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