

HEALTH ENHANCEMENT AND COMPANION ANIMAL OWNERSHIP

Alan M. Beck¹ and N. Marshall Meyers²

¹School of Veterinary Medicine, Purdue University West Lafayette, Indiana 47907-1243 and ²Pet Industry Joint Advisory Council, 1220 19th Street, N.W., Washington, D.C. 20036

KEY WORDS: animals interaction, pets, epidemiology

ABSTRACT

The relationship between people and companion animals, on the one hand, explains the bites and zoonotic diseases that occur among those with companion animals and, on the other hand, appears to enhance the psychological and physiological well-being of many people. Presently, no less than 56% of households in the United States have animals, typical of developed countries around the world. It is well documented that people denied human contact do not thrive well. All indications are that companion animals play the role of a family member, often a member with the most desired attributes. Animals play special roles for children, aiding the teaching of nurturing behavior and appreciation of nonverbal communication. Ordinary interactions with animals can reduce blood pressure and alter survival after a heart attack. For some, pets increase the opportunities to meet people, while for others pets permit them to be alone without being lonely.

Introduction

In 1994, no less than 56% of U.S. households (53 million) have companion animals and more than half of these owners have more than one animal (1). In addition to animals that live in the home, 2% of the households own an average of 2.54 horses for a horse population of 4.9 million, down, in 1991, from 6.6 million horses four years earlier (2).

In Australia, approximately 60% of the 6.2 million households have one or more pets; 53% of the households have either a dog or a cat (44). Examples of dog, cat, and/or bird ownership in European households include Belgium (71%), France (63%), Netherlands (60%), Britain (55%), Italy (61%), Germany (West) (37%), Ireland (70%), and for all 17 European countries surveyed (52%)

Table 1 U.S. Animal ownership and population estimates, 1991

Species	Households with at least one animal (percent)	Estimated population of species (millions)
Dogs	38.2	55.0
Cats	32.3	63.8
Caged birds	7.7	31.0
Small animals	5.0	12.2*
Reptiles	3.0	7.3*
Freshwater fish	10.0	82.7*
Marine fish	0.6	4.6*
Total	56.0	256.6

*Unpublished industry data and U.S. Fish and Wildlife Service import data indicate substantially greater populations. For example, current Iguana imports approximate 800,000 animals annually; domestic ferret population estimated at 5 million animals; reptiles are the fastest growing area with more than 4 million reptiles imported annually. Source: References 2, 36, 50.

(52). All existing cultures keep pets, although the favorite species vary. The sheer numbers of pet animals is only one facet of the “pet phenomenon”; one also has to appreciate who are the benefactors of the “pet experience” (11). As clearly demonstrated by the data, companion pet ownership is neither rare nor random; it is an integral part of society (see Table 1).

Changing social attitudes toward companion pets, along with changing lifestyles, influence decisions regarding ownership. Major demographic trends, notably smaller households, aging populations, coupled with increasingly hectic lifestyles and reduced leisure time, are altering pet population demographics. While more U.S. households own dogs than any other pet, the number of households with a dog or cat is declining (50). Conversely, ownership of birds, small animals, reptiles, and freshwater fish is increasing (1).

In the United States, the people who associate with pets tend to be younger than the general population; dogs, cats, and small mammals are far more common in families that have children. For instance, while young and middle-aged people without children compose 5.2% and 10.9%, respectively, of all U.S. households, only 4.3% and 8.1% of these households, respectively, have any pet, which is less than expected. However, young and middle-aged parents with children at home compose 12.6% and 12.9% of all households, and of these 14.6% and 17.5%, respectively, have a pet—more than expected (2). It is believed the same general pattern exists among European countries (44).

Children with pets in their homes enjoy more leisure activities and work not related with school than their counterparts. Pets are a common and relatively

important feature of children's social network (41). Children also learn important values and attitudes from animals. By preschool, children can appreciate the differences between dogs, cats, puppies, and kittens. They begin to understand the role of the adult animals as caregivers for baby animals. Boys as they mature usually increase their knowledge of and caring for animals, while there is typically a decline in their interest and care for human infants (42). Boys, in particular, may be helped to understand the importance of nurturing by watching pet behaviors and by interacting with their pets. Pets are nonjudgmental in their love and facilitate a child's learning about responsibility. There is even evidence that the mere presence of animals positively alters children's attitudes about themselves and increases their ability to relate to others (39, 45). Animals as varied as dogs, birds, and spiders facilitate social interaction and are catalysts for social and verbal interaction. Live animals are focal points of interest; toy animals do not hold a child's interest in the same degree (47).

Animals are perceived to be especially valued as companions for older adults (15, 24, 48, 53, 58, 59). Animals may replace children who have grown and moved away or perhaps those who were never born. They may afford opportunities for an increase of human-to-human social interaction and, finally, they may permit older adults to live alone without being lonely.

Various studies have found that the household pet is perceived to be a member of the family, sharing many of the attributes of a favored family member. It is typical to talk to the animal as if it were a person. Carrying its photograph and sharing a bedroom are also within the norm (8). While nearly half of adults confide in their pet, more than 70% of adolescents do so (10, 30, 31).

At the very least, interaction with animals positively influences transient physiological states, resulting in improved morale. The impact may be mediated directly, involving physiological functions like blood pressure, or by influencing the person's psychological well-being (e.g. improving morale and lessening risky behaviors) or psychosocial interactions with others. Besides immediate changes in blood pressure and feelings of well-being, there appear to be long-term effects of animal interaction, most notably influencing the attitudes and behaviors of young children. "The basis for the positive effect of health and well-being resulting from the interactions with a pet has come to be known as the companion-animal bond or the human-companion animal bond" (51). Preserving the bond between people and their animals, like encouraging good nutrition and exercise, appears to be in the best interests of those concerned with public health.

Epidemiological Findings

There is a long history of using animals as sentinels for humans at risk. "Birds and mice may be used to detect carbon monoxide, because they are much more sensitive to the poisonous action of the gas than are men" (14).

Epidemiological studies of pet animals with spontaneously occurring disease could serve as sentinels and supplement human epidemiological research (6). Compared with humans, animal diseases have a shorter latency after exposure and occur with less confounding factors, such as occupational or self-selected exposures like workplace pollutants or smoking tobacco. In contrast to laboratory experiments, spontaneous tumors in pets reflect natural exposures to a wide variety of environmental carcinogens; pets could therefore be sentinels for the humans that share the home (25, 46).

Companion animals may receive detailed physical evaluations comparable to those of their owners. The veterinary community stands ready to be part of the human health research team, but for the most part is rarely asked to participate. Companion animals are an unrecognized alternative to study many of the health problems facing people today (6).

While there is no clearly identified *single* explanation for the positive effect pets have on their owners, there is growing epidemiologic evidence that people who feel an attachment for nature (57) or for companion animals have lessened risks of disease and disease processes compared with people without such experiences (8). It is well documented that people denied good human contact and interaction do not thrive well (40). One way people can be protected from the ravages of loneliness is through animal companionship.

A 1980 report first documented the value of pet ownership. A study of people hospitalized after a heart attack found that ownership of any animal correlated with improved survival: 94% of those who owned pets were alive after the first year compared with 72% of those who did not own any animal. A discriminate analysis demonstrated that pet ownership accounted for 2–3% of the variance (22). Although 2–3% may seem small, the impact is significant and cost effective considering the frequency of heart disease.

A more recent study of the benefits of interactions with animals found that pet owners had reductions in some common risk factors for cardiovascular disease, lower systolic blood pressures, plasma cholesterol, and triglyceride values (3). Socioeconomic profiles of the two groups were very similar and although pet owners engaged in more exercise, they also ate more meat and “take-out” foods.

Physiological Effects

Differences were observed in the way pet owners talk to their animals by species (28, 30); these are influenced by the handling needs of the animals and social stereotypes, but people find comfort in talking to their animals (32, 33). Unlike talking to other humans, people experience a decrease of blood pressure talking to pets, indicating that they are more relaxed than with people (5, 23, 33). Even in the presence of unfamiliar dogs, people experience a temporary

decrease in blood pressure (23). Blood pressure also decreases for people with normal pressures and those with hypertension when watching fish in a standard aquarium; systolic and diastolic levels for hypertensive subjects often fall within normal ranges. The decreased physiological arousal indicated by the reduction of blood pressure is associated with stereotypical changes in facial expression and vocal pattern; the face becomes more relaxed with a decrease in muscle tension, especially around the eyes (29), and subjects talking to their companion dogs, cats, and birds talk more slowly and with a more relaxed mode (30), which, in itself, tends to reduce blood pressure.

Psychological/Social Effects

It has been hypothesized that pet ownership improves survival because it influences psychosocial risk factors that lessen the risk of coronary heart disease (49).

The general tendency to overestimate the importance of personal factors relative to environmental considerations in making judgments about a person or situation is well recognized and has been named "the fundamental attribution error" (53a, 53b, 60). A good example is that people perceive others observed in the company of animals more positively and with more favorable attributes than observed without animals present. This "fundamental attribution error" occurs when people are observed live or in photographs (39). Our experimental observations of normal and handicapped subjects in public situations, and anecdotal accounts of the behavior of politicians, suggest that the presence of pet animals improves the social attractiveness of human subjects.

There may also be less dramatic effects from pet ownership than increasing survival rates or reducing anxiety. Serpell (54) reported that dog owners experienced fewer minor health problems and increased the number and durations of their recreational walks. The effects persisted over the ten-month study period and there was no clear explanation for the results.

Many naturally occurring events are enhanced by animal companionship. People walking with their dog experience more social contact and longer conversations than when walking alone (45). Even rabbits and turtles can encourage approaches by other people and stimulate conversations between children and unfamiliar adults in a community park setting (27). Wilson (58) reported that companion animals alleviate anxiety and relax college students of all ages and races.

Probably the most conclusive study of the stress-managing value of animal interaction used subjects who were scheduled for molar extractions at a School of Dental Medicine. People who contemplated an aquarium underwent dental surgery very much like those who were hypnotized prior to the procedure (34). Although measuring the anxiolytic effect of a pet on a human companion is not a simple task, there appears to be a real effect (12).

Companion animals could have a positive impact on societal health. Katcher & Wilkins (35) used carefully designed educational programs structured around animal contact with children who had attention-deficit hyperactive disorders (ADHD) and defiant disorders (CD). The children in the animal contact groups had better attendance and improved measurements in a variety of knowledge and skills objectives. The children whose educational experiences included animal contact exhibited significantly less antisocial and violent behavior.

Abusing animals and abusing other humans are related behaviors (4, 19). Prisoners with crimes involving aggression to others are statistically more likely to have a history of multiple acts of cruelty to animals than noncriminals or those whose crimes did not involve violence (37). Nearly a century ago, Sigmund Freud (21) suggested that clinicians attend to "children who are distinguished by evincing especial cruelty to animals and playmates," but it was not until 1987 that cruelty to animals was added to the list of diagnostic criteria for *Conduct Disorders in the Diagnostic and Statistical Manual of Mental Disorder*, 3rd revised (DSM-III-R).

If being cruel to animals is associated with being cruel to people, it is reasonable to hypothesize the opposite effect, i.e. that good animal contact reduces anti-social behavior. There is a need to assess the widespread but largely untested belief that we should teach children to be kind to animals. For example, children exposed to humane education programs displayed enhanced empathy for humans compared with children who were not exposed to such programs (4).

One long-recognized but often ignored value of animal contact is that many people find joy and even humor in interacting with animals. Animals often permit people to laugh at themselves or at their surroundings; note the role animals play in cartoon humor. The writer Norman Cousins described the role of laughter in diminishing pain, even reducing the inflammatory process that afflicted him (17). McCulloch observed that animals owned by his psychiatric outpatients played a clear and identified role in their lives; the animals helped all the patients to laugh and maintain a sense of humor (43). Laughter, or at least encouragement to find humor, is a recognized medical intervention, and animals are a frequent source of that humor.

Animals As Therapy

In the last few years, popular and scientific discussion of pet therapy or, more appropriately, Animal Facilitated Therapy (AFT) has flourished. Much of the early literature documents nothing more than fortuitous interactions with animals that happen to be present in a therapeutic setting (8). There were no scientific goals or expected effects other than what normally occurs when people and animals interact (9). The animals were to provide a diver-

sion from routines in institutional settings or companionship to those living alone.

In one study, nearly 1000 noninstitutionalized older adult Medicare patients were evaluated prospectively. Those subjects who owned pets appeared to experience less distress and to require fewer visits to their physicians than nonowners. While animal ownership generally had value, the most remarkable benefits to health were for dog owners (55). Most people noted that the pets provided them with companionship and a sense of security and the opportunity for fun/play and relaxation. Animals allowed people to experience bonding. Siegel (56) suggested that pets have a stress-reducing effect. As a result, support has grown for protecting the right of pet ownership for senior citizens living in the community and for encouraging animal contact for patients in long-term nursing home settings.

Animals can also play a role in improving the well-being of people of all ages who are stigmatized or whose special needs make them less able to function in normal settings. Kidd & Kidd (38) interviewed 105 homeless people and noted the importance of pets for companionship, friendship, and love for this population, although the provision of food and veterinary care for the animals was a problem. Wheelchair-users were more likely to experience positive social interactions when with a dog (26, 18). Psychiatric inpatients were more comfortable talking and participating in group therapy sessions in the presence of birds than in the same room with no animals present (13). Animals are becoming a frequent adjunctive in many therapeutic settings, for all ages and for a wide variety of circumstances (8).

Conclusion

Animals have been part of human households since humans started living in villages, some 12,000 years ago. Interaction with companion animals may well be one of our more successful strategies for survival. All cultures have maintained a commitment to carrying for and protecting animals kept solely for companionship. Today, animals continue to play a major role in the lives of many people. Nevertheless, the medical history of our relationship with animals documents mostly the detrimental effects of animal contact, addressing allergies, infectious diseases, zoonoses, parasitism, and traumatic injury from bites and kicks. To be sure, animal contact carries risk, but the frequency of most zoonotic diseases can be lessened, even eliminated, with animal management practices that would serve both humans and the animals themselves. Veterinary care to manage bacterial, viral, and parasitic infections, mechanical restraints like leashes and cages, selective breeding, responsible legislation, and owner education have made animal ownership a safe and rewarding experience for many.

The reports by Friedmann et al (22) and Anderson et al (3) have not promoted interest in funding studies on the links between human-animal interactions and cardiovascular health. The reports have had a limited impact on subsequent cardiovascular research since few researchers have added questions about pet ownership and attachment to animals. One independent ancillary study to the Coronary Arrhythmia Suppression Trial (CAST) (16), a National Institutes of Health (NIH) clinical trial, is finding that pet ownership, lower anxiety, and social support are all associated with an increased likelihood of one-year survival after a myocardial infarction (23a).

Research on human-animal interactions is needed for reasonably large study populations. Most grants to study human-animal interactions are for less than \$10,000, whereas large epidemiological studies are much more expensive. Such an amount would be sufficient to support the addition of a few questions on human-animal interactions to larger epidemiological surveys, but only if those controlling the large study are supportive; they are usually not.

The lack of funding is not exclusive to the study of human-animal interactions. People who pray and participate more actively in their religions have better health at all ages. People associated with conservative religious affiliations have poorer health than those with more liberal affiliations (20). While society generally believes that being religious is valuable to health, there have been few studies (12). There is stronger evidence for the benefit of animal contact than there is for the benefit of being religious, yet we still have trouble accepting animals as more than the "therapeutic clown" of society (8).

At the final presentation of the 1987 NIH Technology Assessment Workshop, *Health Benefits of Pets*, Beck & Glickman (7) proposed that "All future studies of human health should consider the presence or absence of a pet in the home and, perhaps, the nature of this relationship with the pet, as a significant variable. No future study of human health should be considered comprehensive if the animals with which they share their lives are not included."

In sum, there is substantial evidence to support the positive benefits of animal companionship for various segments of the population, especially children, the elderly, socially isolated, and the handicapped. Research needs to be directed to establish both the scope of these benefits and ways to channel them more effectively to improve the public health of the community.

Any *Annual Review* chapter, as well as any article cited in an *Annual Review* chapter, may be purchased from the Annual Reviews Preprints and Reprints service.
1-800-347-8007; 415-259-5017; email: arpr@class.org

Literature Cited

1. American Pet Products Manufacturers Association (APPMA). 1994. *1994 National Pet Owners Survey*. Scarsdale, NY; NFO Research, Inc.
2. American Veterinary Medical Association (AVMA). 1993. *US Pet Ownership and Demographic Sourcebook*. Schaumburg, IL: Cent. Inform. Manage.
3. Anderson WP, Reid CM, Jennings GL. 1992. Pet ownership and risk factors for cardiovascular disease. *Med. J. Aust.* 157:298-301
4. Ascione, FR. 1992. Enhancing children's attitudes about the humane treatment of animals: generalization to human-directed empathy. *Anthrozoös* 5:176-91
5. Baun MM, Bergstrom, N, Langston NF, Thoma L. 1984. Physiological effects of petting dogs: influences of attachment. In *The Pet Connection*, ed. RK Anderson, BL Hart, LA Hart, 18:162-70. Minneapolis: Univ. Minnesota Press. 451 pp.
6. Beck AM. 1995. Animals and Society. In *The World Congress on Alternatives and Animal Use in Life Sciences: Education, Research, Testing*, ed. A Goldberg, LFM Van Zutphen, H:59-64, New York: Mary Ann Liebert
7. Beck AM, Glickman LT. 1987. Future research on pet facilitated therapy: a plea for comprehension before intervention. *Health Benefits of Pets*, NIH Technol. Assess. Workshop, Sept. 10-11
8. Beck AM, Katcher AH. 1983. *Between Pets and People: The Importance of Animal Companionship*. New York: Putman. 317 pp.
9. Beck AM, Katcher AH. 1984. A new look at pet-facilitated therapy. *J. Am. Vet. Med. Assoc.* 184:414-21
10. Beck AM, Katcher AH. 1989. Bird-human interaction. *J. Assoc. Avian Vet.* 3:152-53
11. Beck AM, Meyers NM. 1987. The pet owner experience. *N. Engl. Reg. Allergy Proc.* 8:29-31
12. Beck AM, Rowan AN. 1994. The health benefits of human-animal interactions. *Anthrozoös* 7:85-89
13. Beck AM, Serarydarian L, Hunter GF. 1986. Use of animals in the rehabilitation of psychiatric inpatients. *Psychol. Rep.* 58:63-66
14. Burrell GA, Seibert FM. 1916. *Gases Found in Coal Mines, Miner's Circular* 14. Bur. Mines, Washington, DC: Dep. Interior
15. Bustad LK. 1980. *Animals, Aging, and the Aged*. Minneapolis: Univ. Minnesota Press. 227 pp.
16. CAST. 1989. The Coronary Arrhythmia Suppression Trial Investigators. Preliminary report: effect of encainide and fleixinide on mortality in a randomized trial of arrhythmia suppression after myocardial infarction. *N. Engl. J. Med.* 321:406-12
17. Cousins N. 1979. *Anatomy of an Illness as Perceived by the Patient: Reflections on Healing and Regeneration*. New York: Norton. 215 pp.
18. Eddy J, Hart LA, Bolts RP. 1988. The effects of service dogs on social acknowledgements of people in wheelchairs. *J. Psychol.* 122:39-45
19. Felthous AR, Kellert SR. 1986. Violence against animals and people: Is aggression against living creatures generalized? *Bull. Am. Acad. Psychiatr. Law* 14:55-69
20. Ferraro KF, Albrecht-Jensen CM. 1991. Does religion influence adult health? *J. Sci. Study Relig.* 30:193-202
- 20a. Fogle B, ed. 1981. *Interrelations Between People and Pets*. Springfield, IL: Charles C Thomas. 352 pp.
21. Freud S. 1905. Three contributions to the theory of sex. In *The Basic Writings of Sigmund Freud*, ed. AA Brill, 1938, pp. 594. New York: Random House
22. Friedmann E, Katcher AH, Lynch JJ, Thomas SS. 1980. Animal companions and one-year survival of patients after discharge from a coronary care unit. *Public Health Rep.* 95: 307-12
23. Friedmann E, Katcher AH, Thomas SA, Lynch JJ Messent PR. 1983. Social interaction and blood pressure: influence of animal companions. *J. Nerv. Mental Dis.* 171:461-65
- 23a. Friedmann E, Thomas SA. 1995. Pet ownership, social support and one year survival after acute myocardial infarction in the cardiac suppression trial (CAST). *Am. J. Cardiol.* In press
24. Garrity TF, Stallones L, Marx MB, Johnson TP. 1989. Pet ownership and attachment as supportive factors in the health of the elderly. *Anthrozoös* 3:35-44
25. Glickman LT, Domanski LM. 1986. An alternative to laboratory animal experi-

- mentation for human health risk assessment: epidemiological studies of pet animals. *ATLA* 13:267-85
26. Hart LA, Hart BL. 1987. Socializing effects of service dogs for people with disabilities. *Anthrozoös* 1:41-44
27. Hunt SJ, Hart LA, Gomulkiewicz R. 1992. The role of small animals in social interactions between strangers. *J. Soc. Psychol.* 132:245-56
28. Katcher AH. 1981. Interactions between people and their pets: form and function. See Ref. 20a, 3:41-67
- 28a. Katcher AH, Beck AM, eds. 1983. *New Perspectives on Our Lives with Companion Animals*. Philadelphia: Univ. Pennsylvania Press. 588 pp.
29. Katcher AH, Beck AM. 1983. Safety and intimacy: physiological and behavioral responses to interaction with companion animals. *The Human-Pet Relationship: Proc. Int. Symp. Occas. 80th Birthday Nobel Prize Winner Prof. DDr. Konrad Lorenz*, pp. 122-28. Vienna: IEMT
30. Katcher AH, Beck AM. 1986. Dialogue with animals. *Trans. Stud. Coll. Phys. Phila.* 8:105-12
31. Katcher AH, Beck AM. 1987. Health and caring for living things. *Anthrozoös* 1:175-83
32. Katcher AH, Beck AM. 1989. Human-animal communication. In *International Encyclopedia of Communications*, ed. E Barnow, 2:295-96. London: Oxford Univ. Press
33. Katcher AH, Friedmann E, Beck AM, Lynch JJ. 1983. Looking, talking and blood pressure: the physiological consequences of interaction with the living environment. See Ref. 28a, 31:351-59
34. Katcher AH, Segal H, Beck AM. 1984. Comparison of contemplation and hypnosis for the reduction of anxiety and discomfort during dental surgery. *Am. J. Clin. Hypnosis* 27:14-21
35. Katcher A, Wilkins G. 1993. Dialogue with animals: its nature and culture. In *The Biophilia Hypothesis*, ed. SR Kellert, EO Wilson, 5:173-97. Washington, DC: Island Press. 484 pp.
36. Kaytee Products. 1994. *Bird Study*. Chilton, WI
37. Kellert S, Felthouse A. 1983. Noncriminals and criminals in Kansas and Connecticut. See Ref. 29, pp. 72-81.
38. Kidd AH, Kidd RM. 1994. Benefits and liabilities of pets for the homeless. *Psychol. Rep.* 74:715-22
39. Lockwood R. 1983. The influence of animals on social perception. See Ref. 28a, 8:64-71
40. Lynch JJ. 1977. *The Broken Heart: The Medical Consequences of Loneliness*. New York: Basic Books. 271 pp.
41. Melson GF. 1988. Availability of and involvement with pets by children: determinants and correlates. *Anthrozoös* 2:45-52
42. Melson, GF, Fogel A. 1989. Children's ideas about animal young and their care: a reassessment of gender differences in the development of nurturance. *Anthrozoös* 2:265-73
43. McCulloch MJ. 1981. The pet as prosthesis defining criteria for the adjunctive use of companion animals in the treatment of medically ill, depressed outpatients. See Ref. 20a, 6:101-23
44. McHarg M, Baldock C, Headey B, Robinson A. 1995. *National People and Pets Survey*. Urban Animal Management Coalition. Aust.
45. Messent PR. 1983. Social facilitation of contact with other people by pet dogs. See Ref. 28a, 5:37-46
46. National Research Council (NRC). 1991. *Animals As Sentinels of Environmental Health Hazards*, chair. LT Glickman. Washington, DC: Natl. Acad. Press
47. Neilsen JA, Delude LA. 1989. Behavior of young children in the presence of different kinds of animals. *Anthrozoös* 3:119-29
48. Ory MG, Goldberg EL. 1983. Pet possession and life satisfaction in elderly women. See Ref. 28a, 26:303-17
49. Patronek GJ, Glickman LT. 1993. Pet ownership protects the risks and consequences of coronary heart disease. *Med. Hypotheses* 40:245-49
50. Pet Food Institute. 1995. *US Pet Trends*. Washington, DC
51. Pritchard WR, ed. 1988. *Future Directions for Veterinary Medicine*. Durham, NC: Pew Natl. Vet. Educ. Progr.
52. Reader's Digest Association, Inc. 1991. *A Consumer Survey of 17 European Countries*. London: Reader's Digest Eurodata
53. Robb SS, Stegman CE. 1983. Companion animals and elderly people: a challenge for evaluation of social support. *Gerontologist* 23:277-82
- 53a. Ross L. 1977. The intuitive psychologist and his shortcomings: distortions in the attribution process. In *Advances in Experimental Social Psychology*, ed. L Berkowitz, pp. 173-220. New York: Academic
- 53b. Ross L, Nisbett RE. 1991. *The Person and the Situation*. Philadelphia: Temple Univ. Press
54. Serpell J. 1991. Beneficial effects of pet

- ownership on some aspects of human health and behavior. *J. Roy. Soc. Med.* 84:717-20
55. Siegel JM. 1990. Stressful life events and use of physician services among the elderly: the moderating role of pet ownership. *J. Pers. Soc. Psychol.* 58:1081-86
56. Siegel JM. 1993. Companion animals: in sickness and in health. *J. Soc. Issues* 49:157-67
57. Ulrich RS. 1993. Biophilia, biophobia, and natural landscapes. See Ref. 35, 3:73-137.
58. Wilson CC, Netting FE. 1983. Companion animals and the elderly: a state-of-the-art summary. *J. Am. Vet. Med. Assoc.* 183:1425-29
59. Zasloff RL, Kidd AH. 1993. Loneliness and pet ownership among single women. *Psychol. Rep.* 75:747-52
60. Zebrowitz X. 1990. *Social Perception*. Pacific Grove, CA: Brooks/Cole. 231 pp.