

American Behavioral Scientist

<http://abs.sagepub.com>

Future Directions in Human-Animal Bond Research

Alan M. Beck and Aaron H. Katcher
American Behavioral Scientist 2003; 47; 79
DOI: 10.1177/0002764203255214

The online version of this article can be found at:
<http://abs.sagepub.com/cgi/content/abstract/47/1/79>

Published by:

 SAGE Publications

<http://www.sagepublications.com>

Additional services and information for *American Behavioral Scientist* can be found at:

Email Alerts: <http://abs.sagepub.com/cgi/alerts>

Subscriptions: <http://abs.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Citations (this article cites 48 articles hosted on the
SAGE Journals Online and HighWire Press platforms):
<http://abs.sagepub.com/cgi/content/refs/47/1/79>

Future Directions in Human-Animal Bond Research

ALAN M. BECK

Purdue University

AARON H. KATCHER

Human-animal contact can influence psychological and physiological parameters important to health and welfare; nevertheless, there has been relatively little research on the variables that influence or mediate those health consequences. In addition, little attention has been paid on how to create or alter the animal interactions for the betterment of people and their animals. The investigation can be guided by two theoretical perspectives, which make powerful but different and testable predictions: the biophilia hypothesis and social support theory. Along with this theoretically driven research, there is a need for replication of salient research findings to resolve important discrepancies in the literature. Last, animal-assisted therapy (AAT) has to be placed in the context of alternative therapies now available to define its specificity, risks, and overall benefits.

Keywords: *human-animal relationships; humans and nature; animal-assisted therapy; human-animal bond*

A small pet animal is often an excellent companion for the sick.

—Florence Nightingale (1820-1910) (*Notes on Nursing*, 1860)

More than 15 years ago, the National Institutes of Health (NIH) convened the NIH Technology Assessment Workshop on the Health Benefits of Pets (National Institute of Health [NIH], 1988). At that time, the major evidence for such health benefits was a report that pet owners experienced increased 1-year survival after discharge from a coronary care unit (Friedmann, Katcher, Lynch, & Thomas, 1980). This was widely noted in popular literature and served as the first study published in a medical journal that documented animal ownership as a factor that contributes to the prevention of disease. A decade later, Anderson, Reid, and Jennings (1992) reported that pet owners had slightly lower systolic blood pressures, plasma cholesterol, and triglyceride values than non-pet owners and an independent ancillary study to the Coronary Arrhythmia Suppression Trial (CAST), a National Institute of Health (NIH) clinical trial, found that dog

AMERICAN BEHAVIORAL SCIENTIST, Vol. 47 No. 1, September 2003 79-93

DOI: 10.1177/0002764203255214

© 2003 Sage Publications

ownership, lower anxiety, and human social support are all associated with an increased likelihood of 1-year survival after a myocardial infarction (Friedmann & Thomas, 1995). It appears that pet ownership reduces the incidence of cardiovascular disease because it influences psychosocial risk factors (Patronek & Glickman, 1993).

The final presentation of the NIH Technology Assessment Workshop 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. (Beck & Glickman, 1987)

THEORETICAL PERSPECTIVE

Two complementary ways of interpreting the health data are the biophilia hypothesis and social support theory. The biophilia hypothesis was suggested by E. O. Wilson (Kellert & Wilson, 1993; E. O. Wilson, 1984, 1993) and posited that throughout most of human evolutionary development, fitness was increased by an ability to hunt animals and locate sources of vegetable food. Thus, the brain was hardwired with a predisposition to pay attention to animals and the stimulus properties of the surrounding environment. In seeking to deploy this theoretical framework to understand the putative health benefits of animals and the effects of AAT, three limitations should be noted. The theory does not imply that we have an inborn tendency to maximize the welfare of animals because our survival for almost all of the past 3 million years was dependent on sneaking up on animals and killing them (Katcher & Wilkins, 1993). Second, the theory cannot be tested in its general form, it can only be tried in specific cases that will prove or disprove the specific instance. Third, it is almost impossible to separate out cultural influences from biologic ones without extensive testing in diverse social groups.

Social support theory, another theoretical perspective, is buttressed by a large volume of research describing the positive health effects of human social companionship (Lynch, 1977, 2000). This kind of support ranges from the positive benefits of marriage, having a confidant, being in a community of faith, perceiving ones neighbors to be friendly, or even receiving a telephone call from a helpful nurse. Animals are demonstrably a source of social support, as indicated by the number of Americans who say that the pet is "a member of the family," talk to their pet as they would a person, or consider their pet a confidant (Cain, 1983; Katcher, 1981), although what people mean by the trope "a member of the family" has not yet been clearly defined (Cohen, 1998, 2002). Companion animals also increase the frequency of human social support (Eddy, Hart, & Boltz, 1988;

Messent, 1983). Indeed, it is difficult to separate out biophilia, the cultural response to animals of different kinds (Lawrence, 1993) and the effects of social support on both animals and humans. These theoretical approaches can be used alternatively or in combination to enlarge the focus of research and obviate to narrow a focus on companion animals as the sole source of health benefits from contact with the nonhuman environment. With this ecological approach we can pursue research to determine how we can enrich the human environment by inclusion of a variety of experiences and suggest that gardens, houseplants, the availability of a view of trees and park land, and the way in which natural spaces are used in walks could all play a role in human well-being. The role of both the animal and the "green" component of the environment cannot be tested apart from multivariate epidemiological studies that would inquire about both an environmental and animal impact. Yet, the epidemiological studies of the health effects of animal contact have narrowly focused on companion animals. By way of illustration, pet ownership is strongly associated with single-family ownership and the chance for confounding the effects of pets and gardens is very real.

Failure to take a theoretical perspective based on biophilia has led to some important omissions or oversights in the literature. Are avocations such as hunting or fishing or bird watching done in a family or social context as protective of health as keeping a pet? Does raising a farm animal for a 4-H competition improve the social facility of children the way it that has been reported for pet keeping (Guttman, Predovic, & Zemanek, 1983; Melson, 2001)? In therapy, the prevalent use of dogs has obscured the research literature suggesting that animals to which the patient is not bonded improve health status. Finches in a communal cage (Beck, Seraydarian, & Hunter, 1986) and fish in tanks (Katcher, Segal, & Beck, 1984) as well as trees in a park (Ulrich, 1984, 1993) all have demonstrable effects on health and well-being.

ANIMALS AND CHILDREN

Future research also should focus on healthy populations because there are indications that animal contact is beneficial; at the very least, there are theoretical reasons to believe so (Beck & Katcher, 1996). Such is the case with young children (Davis, 1985; Levinson, 1964, 1969; Melson, 2001; Melson, Schwarz, & Beck, 1997). European investigators have demonstrated that animal contact may favorably influence the development of communication skills in young children (Filiatre, Millot, & Montagner, 1983; Guttman et al., 1983). Animals are so much a part of children's lives and their literature that it is reasonable to assume that animals have some affect on their development. As an example, the *Diagnosis and Statistical Manual of Mental Disorders* (DSM IV), the official manual of mental disorder classification, notes that stuttering is often absent during oral reading, singing, or talking to inanimate objects or pets (American

Psychological Association [APA], 1980). Melson (2001) suggests that caring for pets is a way children learn to nurture, especially important for male children in our society who have few, if any, games that mold caring and nurturing. Animals play important roles in motivating children and shaping how they view the world (Beck, Melson, da Costa, & Liu, 2001; Katcher & Wilkins, 2000; Rud & Beck, 1999, 2000). However, the biophilia hypothesis suggests that keeping pets is only one way that children can be engaged with animals and nature. As noted above, we need studies of a wide variety of contacts with animals and nature. At this stage in our knowledge, we do not know if the value of animals for children is resident in the animals' ability to focus attention as predicted by the biophilia hypothesis, participation in the adult roles of caring for another, the human social support from family or community that it generates, animal social support from the bond between children and pets, or a combination of all of those factors (Beck & Meyers, 1987).

THE PHYSIOLOGICAL AND PSYCHOLOGICAL STUDIES

The short-term physiological responses to looking at animals, or pictures of animals, undergoing stressful tasks, with and without the animal present, and interacting with animals have been recently reviewed by Friedmann (2000). She did not include in that review the similar effects of looking at natural scenery or pictures of such scenery and modulation of stress by such sights (Frumkin, 2001). Research is needed to assess the physiological effects of animal interaction beyond measures of blood pressure and overt behavior. This is already possible with reliable, minimally invasive techniques of measuring immune function, patterns of brain activity, and endocrine function.

There is some evidence in the literature that pets should be prescribed for certain vulnerable populations (Rowan & Beck, 1994). Before it is possible to make so strong a recommendation, certain real discrepancies in the literature need to be addressed.

There is a suggestion in the literature that dogs are more valuable for the protection of health than cats (Friedmann & Thomas, 1995; Serpell, 1991; Siegal, 1990). However, the literature is not uniform in this observation (Anderson et al., 1992; Friedmann et al., 1980). Part of the problem is the tendency of women enlisted in these studies, who are more likely to be the owners of only cats, to have poorer health and less social support (Friedmann, 2000). It would be desirable to have this question resolved by a larger trial in which it is possible to match health and human social support status of cat and dog owners.

One group of investigators has produced evidence that pets, including cats and dogs, are so effective in reducing the response to stressors and lowering ambient blood pressure in mild hypertensives that a case can be made for

treating hypertension with pet ownership (Allen, Blaskovich, Tomaka, & Kelsey, 1991; Allen, Shykoff, & Izzo, 2001). However, their data is not supported by other investigators who have observed only a modest decrease in ambient blood pressure with pet ownership and a smaller and less consistent protection from the effects of stressors (Baun, Bergstrom, Langston, & Thoma, 1984; Friedmann, Katcher, Thomas, Lynch, & Messent, 1983; Friedmann, Locker, & Lockwood, 1993; Katcher, 1981; Katcher, Friedmann, Beck, & Lynch, 1983; Straatman, Hanson, Endenburg, & Mol, 1997; Watson, & Weinstein, 1993; C. C. Wilson, 1987, 1991). Before we can confidently prescribe pets for hypertension, we need the conflict resolved by investigators using comparable methodologies, including studying people in their homes (Friedmann, Katcher, & Meislich, 1983; Katcher, Friedmann, Goodman, & Goodman, 1983; Voith, 1985).

If we think pets are beneficial for some people, we have to accept the evidence that they are associated with decreased health and morale in others. The reports of Ory and Goldberg (1983); Lago, Knight, and Connell (1983); Miller and Lago (1990); and Stallones, Marx, Garrity, and Johnson (1990) have all reported no effect of pets or evidence of decreased morale and health in some populations. It would be important to more precisely define those populations. Simon (1984) has suggested that a close attachment to pets can attenuate bonds to people. People with an impaired capacity for intimacy with other human beings would be at risk for lack of human social support. Recent information bearing on this issue has been found in the observation that in some populations a high attachment to pets is associated with high scores on a dissociation index (Brown & Katcher, 1997, 2001). Dissociation as a defense mechanism and the dissociative disorders are often associated with an impaired capacity for intimacy with people. Thus, this population might be vulnerable because of a lack of human companionship despite the presence of animal companionship.

THE CULTURAL SIGNIFICANCE OF ANIMALS AND NATURE

The symbolic role of animals in society may be as important as the physiological impact on people. For example, many police forces carry teddy bears in their cruisers as part of their trauma kits. Advertising is full of animal images, as are our everyday lives and speech, and yet very little attention has been given to trying to understand how these symbols are important to us as individuals and to society as a whole. In the real world, even rabbits and turtles can encourage approaches by other people and stimulate conversations between children and unfamiliar adults (confederates) in a community park setting. This is an example of animals as "social lubricants" (Hunt, Hart, & Gomulkiewicz, 1992). Each year, people visit area zoos more than they go to professional sporting events

(E. O. Wilson, 1993). Animals are important to people; we must study how to better use that interest at times of physical and psychological need.

ANIMAL-ASSISTED THERAPY (AAT)

The public health implications of animal ownership may be particularly important to older adults, whose family and friends may live at some distance or have even died. In the United States, about 95% of the elderly live in the community and 30% of those live alone (Harris, Rinehart, & Gerstman, 1993). The evidence is that animals play a positive role for elderly persons living alone (Siegel, 1990, 1993). Animal owners appear to experience improvement of life satisfaction and levels of personal safety after retirement compared to non-owners (Norris, Shinew, Chick, & Beck, 1999).

Although older adults appear to derive at least some benefit from animal contact, they frequently are not pet owners (American Pet Products Manufacturers Association [APPMA], 2003). This may be a function of their economic situation and housing constraints. Future studies with older adults should clearly document the value of animal contact and, where possible, record the costs or cost savings involved. Such information will help older adults keep their animals and may even help subsidize the care. It would be important to study the social and psychological characteristics of those senior citizens most likely to benefit from an association with a companion animal.

Although most older adults live in the community, others reside in independent living facilities and nursing homes. These institutional settings have been used for a variety of AAT programs that use varying assessment instruments and interventions, including resident mascots and visiting animals (Banziger & Roush, 1983; Brickel, 1979, 1984; Corson, Corson, & Gwynne, 1975; Fick, 1993; Francis, Turner, & Johnson, 1985; Harris et al., 1993; Hendy, 1984; Kongable, Buckwalter, & Stolley, 1989; Perelle & Granville, 1993; Robb, 1983).

Presently, Alzheimer's disease is an area of great interest because the disease now affects 1 in 10 people age 65 and nearly half of all people age 85 and older (Hingley & Ruggeri, 1998). There is evidence that the presence of a dog can increase social behaviors when the animal is available temporarily or permanently. Behaviors including smiles, laughs, looks, leans, and touches were more normal for many people and those who did not appear to benefit from the animal were always the same individuals (Batson, McCabe, Baun, & Wilson, 1997; Kongable et al., 1989). Often, animals other than dogs are more appropriate in such settings and more programs are using fish tanks to improve morale and even improve eating habits (Edwards & Beck, 2002; Hundley, 1991; Riddick, 1985). There is evidence that older people with Alzheimer's disease would benefit from contact with animals in whatever their living environment (Verderber, 1991). Future research should be directed toward identifying how to alleviate

the more common problems facing patients in their home environment, including lack of stimulation, social isolation, agitation, and staff morale.

AAT CAN BE PROBLEMATIC

There are risks associated with any animal contact; although there is little indication that animal programs are particularly dangerous, there are few reports of adverse effects (Schantz, 1990; Walter-Toews, 1993). AAT has a good safety record, but the potential for problems increases as programs involve more people and more animals (Beck, 2000). To justify any risk associated with animal contact, we must demonstrate a value to the patients. The most common criticism of animal-facilitated therapy programs is that they are not goal oriented and even when goals are identified, evaluation is often unclear (Beck, 2000; Beck & Katcher, 1984; Draper, Gerber, & Layng, 1990; Hundley, 1991). To justify any risk and secure acceptance within the health care industry, programs have to be assessed with appropriate methodology, including studies of moderate or long duration and especially multi-centered studies using comparable protocols. Choosing the best animal for a particular subject in a given therapeutic setting requires more information than is currently available. It is also important to understand the attributes of a pet that are most likely to positively impact the health and well-being of people of different cultural backgrounds and histories. Without this knowledge, we may make generalizations that lead to false expectations and failure in AAT.

If clear demonstration of efficacy remains a problem, specificity is a variable of treatment for which there is little evidence in the AAT literature. We do not know under what circumstances and for what patients it is to be the treatment of choice and how it compares to other alternative therapies. It will be difficult to obtain this data as long as AAT remains a volunteer activity by therapists dedicated to one particular species of companion animal (Katcher, 2000).

It is important to identify the people or situations where contact with animals is potentially problematic or inappropriate for either the people or the animals. Resident animals, often institutional mascots, pose some of the ethical problems that face all owned animals, that is, they must be well maintained with appropriate food, water, shelter, social interaction, and veterinary care. For animal welfare and basic scientific reasons, it is time to conduct studies on the possible health effects that people have on animals, that is, look at the animal side of the human-animal bond. For social animals such as dogs and many birds, interaction with people may produce many of the same health benefits that animals afford humans or it may increase stress. Objective assessment of physiologic stress and a better understanding of captive behavior may provide new insights into the human-animal bond and the management of captive animals. There is a growing literature on how to define and measure stress in animals (Moberg,

1985), but more work in this area is needed. Assessing the most ethical and safest way to include visiting and residential animals in any setting should be an area on continuing study (Beck, 2000). Last, future studies should include a focus on the health benefits and risks for the animals involved in human-animal interaction. Such an expansion of the study scope would not only be humane but might provide a better model for understanding the impact of animals on humans. There is some support for the idea that human-animal interactions benefit the animals as well as the people (Lynch, Fregin, Mackie, & Monroe, 1974; Lynch & McCarthy, 1969; Odendaal & Lehmann, 2000; Sato, Tarumizu, & Hatae, 1993). If social companionship is an evolutionary development, then it is only logical that both sides of the social interaction will benefit.

Because of the intimacy of the relationship between pets and people, the sudden death of a pet also can have deleterious consequences. More research is needed to identify people likely to have an excessive grief response, how to best deal with bereavement, and how this population may help us to better understand human loss as well. In addition, there is a great need for longitudinal studies on bereavement after pet loss to determine its immediate and long-term consequences. Research is especially needed in how prolongation of a chronically ill animal's life affects mourning. The development of newer treatments in oncology that prolong life but do not necessarily cure and the growing popularity of hospice care within veterinary medicine has generated a need for research in this area. We do not know if it is in the best interests of all pet owners to prolong an ailing animal's life. Moreover, we do not know which owners would benefit and which would suffer. If AAT encourages or creates new human-animal bonds, we can no longer ignore the consequences should the bond be broken due to death or illness of the pet. The loss of a mascot animal, for whatever reason, impacts on the welfare of the human residents and more study is needed on how to best address the problem.

There are published and well-recognized links between animal abuse and abusive behavior toward other humans (Arluke, Levin, Luke, & Ascione, 1999; Ascione & Arkow, 1999; Lockwood & Ascione, 1998), but there are also indications of the opposite effect. For example, children exposed to humane education programs displayed enhanced empathy for humans compared with children not exposed to such programs (Ascione, 1992). Although there is growing literature on the relationship between animal abuse and human violence, there is little directed research on understanding the underlining social and psychological mechanisms and even less on how to use animals to reduce antisocial behavior.

There is also a need for more study on some of the difficulties that can occur in human-animal contact. We need a better appreciation of the diseases and injuries that are or might be associated with animal interactions as well as more data on the problems of human psychological dependence on companion animals. Potential problems include excessive grief responses on the death of a companion animal and the accumulation of large numbers of "companion" animals to

the point where they constitute a threat to animal and human welfare; people who accumulate excessive numbers of animals believing they are serving those animals is a serious and understudied aspect of the human-animal bond (Patronek, 1999; Worth & Beck, 1981).

CONCLUSION

After reviewing available data, we conclude that animals do play a significant role in the lives of many people. However, the resources available to those doing basic human-animal bond research are not sufficient to answer the questions raised here today. Future knowledge into the specific health benefits of pets must come from the many studies of human health that will be conducted by other scientists over the next few years. Think of how much more we would know about the effects of animals on human health if questions regarding pet ownership had been included in the well-known longitudinal Framingham Heart Study, the Health and Nutrition Examination Survey (NHANES), or the Systolic Hypertension in the Elderly Program pilot project (Siegel et al., 1987).

In addition, the U.S. Census also should begin to include questions on the number and types of animals in people's homes and how people use gardens and green spaces. If this were done, we could begin to address a wide variety of public health issues, including potential zoonoses with long incubation periods and subtle positive effects of animals on chronic and stress-related diseases. Just as tobacco and coffee consumption are considered important because they alter the risk of many diseases given their widespread use, we must be alert to the health-promoting potential of pet ownership as well as the characteristics of those groups for which it might not be beneficial. Encouragement of the inclusion and consideration of pet exposure as a possible risk factor in NIH-funded studies of human health would be cost-effective and is an idea whose time has come.

To accomplish this, we must first generate an increasing awareness of the potential importance of human-animal, human-nature interaction and involve scientists from a wide variety of fields for interdisciplinary collaborative research. All future studies of human health should consider the presence or absence of a pet in the home, the nature of this relationship with the pet, and how the occupants interact with other aspects of the living environment as a significant variable. No future study of human health should be considered as comprehensive if the animals with which they share their lives are not included.

In sum, there is solid evidence that animal contact has significant health benefits and that it positively influences transient physiological states, morale, and feelings of self-worth; however, there are many inconsistencies in the literature. We do not know the magnitude of the health benefit, the populations that are beneficially or adversely affected, or even how pet ownership compares to other ways of enjoying the living environment, such as gardening, walking in green

and tree-shaded spaces, bird watching, hunting, fishing, or raising animals for production. The AAT literature is badly in need of carefully controlled experiments in which the control group shares some of the appeal or attractiveness of animal contact. If AAT is to progress beyond its current state and earn reimbursement from the companies managing medical care there needs to be multicentered therapeutic trials and comparisons with other kinds of alternative therapies, including horticulture, nature study, dance, music, and psychodrama, to name but a few. At present, most of AAT is conducted by volunteers who are devoted to particular animals, which almost precludes developing precise criteria for specificity of any kind of AAT. Research is needed to identify the scope of the influence of animal contact and how to better focus the effect for people at large and at risk. This will require an interdisciplinary approach by veterinarians, biologists, psychologists, and medically trained personnel.

REFERENCES

- Allen, K. M., Blascovich, J., Tomaka, J., & Kelsey, R. M. (1991). Presence of human friends and pet dogs as moderators of autonomic responses to stress in women. *Journal of Personality and Social Psychology*, 61, 582-589.
- Allen, K., Shykoff, B. E., & Izzo, J. L., Jr. (2001). Pet ownership but not ACE inhibitor therapy blunts home blood pressure responses to mental stress. *Hypertension*, 38, 815-820.
- American Pet Products Manufacturers Association. (APPMA). (2003). *American Pet Products Manufacturers Association national pet owners survey*. Greenwich, CT: Author.
- American Psychological Association. (1994). *The Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV)*. Washington, DC: Author.
- Anderson, W. P., Reid, C. M., & Jennings, G. L. (1992). Pet ownership and risk factors for cardiovascular disease. *Medical Journal of Australia*, 157, 298-301.
- Arluke, A., Levin, J., Luke, C., & Ascione, F. (1999). The relationship of animal abuse to violence and other forms of antisocial behavior. *Journal of Interpersonal Violence*, 14(9), 963-975.
- Ascione, F. R. (1992). Enhancing children's attitudes about the humane treatment of animals: Generalization to human-directed empathy. *Anthrozoos*, 5(3), 176-191.
- Ascione, F. R., & Arkow, P. (Eds.). (1999). *Child abuse, domestic violence, and animal abuse: Linking the circles of compassion for prevention and intervention*. West Lafayette, IN: Purdue University Press.
- Banziger, G., & Roush, S. (1983). Nursing homes for the birds: A control-relevant intervention with bird feeders. *The Gerontologist*, 23(5), 527-531.
- Batson, K., McCabe, B., Baun, M. M., & Wilson, C. (1997). The effect of a therapy dog on socialization and physiological indicators of stress in persons diagnosed with Alzheimer's disease. In C. C. Wilson & D. C. Turner (Eds.), *Companion animals in human health* (pp. 203-215). London: Sage.
- Baun, M. M., Bergstrom, N., Langston, N. F., & Thomas, L. (1984). Physiological effects of human companion animal bonding. *Nursing Research*, 33, 126-129.
- Beck, A. M. (2000). The use of animals to benefit humans, animal-assisted therapy. In A. H. Fine (Ed.), *The handbook on animal assisted therapy: Theoretical foundations and guidelines for practice* (pp. 21-40). San Diego, CA: Academic Press.
- Beck, A. M., & Glickman, L. T. (1987, September 10-11). *Future research on pet facilitated therapy: A plea for comprehension before intervention*. Paper presented at the NIH Technology Assessment Workshop: Health Benefits of Pets, Washington, DC.

- Beck, A. M., & Katcher, A. H. (1984). A new look at pet-facilitated therapy. *Journal of the American Veterinary Medical Association*, 184, 414-421.
- Beck, A. M., & Katcher, A. H. (1996). *Between pets and people: The importance of animal companionship*. West Lafayette, IN: Purdue University Press.
- Beck, A. M., Melson, G. F., da Costa, P. L., & Liu, T. (2001). The educational benefits of a ten-week home-based wild bird feeding program for children. *Anthrozoos*, 14(1), 19-28.
- Beck, A. M., & Meyers, N. M. (1987). The pet owner experience. *New Eng and Regional Allergy Proceedings*, 8(3), 29-31.
- Beck, A. M., Seraydarian, L., & Hunter, G. F. (1986). The use of animals in the rehabilitation of psychiatric inpatients. *Psychological Reports*, 8, 63-66.
- Brickel, C. M. (1979). The therapeutic roles of cat mascots with a hospital based geriatric population: A staff survey. *The Gerontologist*, 19, 368-372.
- Brickel, C. M. (1984). Depression in the nursing home: A pilot study using pet-facilitated therapy. In R. K. Anderson, B. L. Hart, & L. A. Hart (Eds.), *The pet connection* (pp. 407-415). Minneapolis: University of Minnesota.
- Brown, S., & Katcher, A. (1997). The contribution of attachment to pets and attachment to nature to dissociation and absorption. *Dissociation*, 10(2), 125-129.
- Brown, S., & Katcher, A. (2001). Pet attachment and dissociation. *Society & Animals*, 9, 25-42.
- Cain, A. O. (1983). A study of pets in the family system. In A. H. Katcher & A. M. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 351-359). Philadelphia: University of Pennsylvania Press.
- Cohen, S. P. (1998). *The role of pets in some urban American families*. Unpublished doctoral dissertation, Columbia University, New York. (UMI 9910568)
- Cohen, S. P. (2002). Can pets function as family members? *Western Journal of Nursing Research*, 24(6), 621-638.
- Corson, S. A., Corson, E. O., & Gwynne, P. H. (1975). Pet-facilitated psychotherapy. In R. S. Anderson (Ed.), *Pet animals and society* (pp. 19-36). London: Baillière Tindall.
- Davis, J. H. (1985). Children and pets: A therapeutic connection. *Pediatric Nursing*, 11, 377-379.
- Draper, R. J., Gerber, G. J., & Layng, E. M. (1990). Defining the role of pet animals in psychotherapy. *Psychiatric Journal of the University of Ottawa*, 15(3), 169-172.
- Eddy, J., Hart, L. A., & Boltz, R. P. (1988). The effects of service dogs on social acknowledgements of people in wheelchairs. *Journal of Psychology*, 122, 39-44.
- Edwards, N. E., & Beck, A. M. (2002). Animal-assisted therapy and nutrition in Alzheimer's disease. *Western Journal of Nursing Research*, 24(6), 697-712.
- Fick, K. M. (1993). The influence of an animal on social interactions of nursing home residents in a group setting. *American Journal of Occupational Therapy*, 47(6), 529-534.
- Filiatre, J. C., Millot, J. L., & Montagner, H. (1983). New findings on communication behaviour between the young child and his pet dog. In *The human-pet relationship: International symposium on the occasion of the 80th birthday of Nobel Prize Winner Prof. Dr. Konrad Lorenz* (pp. 50-57). Vienna: IEMT.
- Francis, G., Turner, J. T., & Johnson, S. B. (1985). Domestic animal visitation as therapy with adult home residents. *International Journal of Nursing Studies*, 22, 201-206.
- Friedmann, E. (2000). The animal-human bond: Health and wellness. In A. H. Fine (Ed.), *The handbook on animal assisted therapy: Theoretical foundations and guidelines for practice* (pp. 41-58). San Diego, CA: Academic Press.
- Friedmann, E., Katcher, A. H., Lynch, J. J., & Thomas, S. A. (1980). Animal companions and one-year survival of patients after discharge from a coronary care unit. *Public Health Reports*, 95, 307-312.
- Friedmann, E., Katcher, A. H., & Meislich, D. (1983). When pet owners are hospitalized, significance of companion animals during hospitalization. In A. H. Katcher & A. M. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 346-350). Philadelphia: University of Pennsylvania Press.

- Friedmann, E., Katcher, A. H., Thomas, S. A., Lynch, J. J., & Messent, P. R. (1983). Social interaction and blood pressure: Influence of animal companions. *Journal of Nervous and Mental Disease*, 171, 461-465.
- Friedmann, E., Locker, B. Z., & Lockwood, R. (1993). Perceptions of animals and cardiovascular responses during verbalizations with an animal present. *Anthrozoos*, 6, 115-134.
- Friedmann, E., & Thomas, S. A. (1995). Pet ownership, social support, and one-year survival after acute myocardial infarction in the cardiac arrhythmia suppression trial (CAST). *American Journal of Cardiology*, 76, 1213-1217.
- Frumkin, H. (2001). Beyond toxicity: Human health and the natural environment. *American Journal of Preventive Medicine*, 20(3), 234-240.
- Guttman, G., Predovic, M., & Zemanek, M. (1983). The influence of pet ownership on non-verbal communication and social competence in children. In *The human-pet relationship: International symposium on the occasion of the 80th birthday of Nobel Prize Winner Prof. Dr. Konrad Lorenz* (pp. 58-63). Vienna: IEMT.
- Harris, M. D., Rinehart, J. M., & Gerstman, J. (1993). Animal-assisted therapy for the homebound elderly. *Holistic Nurse Practice*, 8(1), 27-37.
- Hendy, H. M. (1984). Effects of pets on the sociability and health activities of nursing home residents. In R. K. Anderson, B. L. Hart, & L. A. Hart (Eds.), *The pet connection* (pp. 430-437). Minneapolis: University of Minnesota Press.
- Hingley, A. T., & Ruggeri, L. (1998). Alzheimer's. *FDA Consumer*, 32(3), 26-31.
- Hundley, J. (1991). Pet project: The use of pet facilitated therapy among the chronically mentally ill. *Journal Psychosocial Nursing*, 29(6), 23-26.
- Hunt, S. J., Hart, L. A., & Gomulkiewicz, R. (1992). The role of small animals in social interactions between strangers. *Journal of Social Psychology*, 132(2), 245-256.
- Katcher, A. H. (1981). Interactions between people and their pets: Form and function. In B. Fogle (Ed.), *Interrelations between people and pets*. Springfield, IL: Charles C. Thomas Press.
- Katcher, A. H. (2000). The future of education and research on the animal-human bond and animal-assisted therapy. In A. H. Fine (Ed.), *The handbook on animal assisted therapy: Theoretical foundations and guidelines for practice* (pp. 461-473). San Diego, CA: Academic Press.
- Katcher, A. H., Friedmann, E., Beck, A. M., & Lynch, J. J. (1983). Looking, talking and blood pressure: The physiological consequences of interaction with the living environment. In A. H. Katcher & A. M. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 351-359). Philadelphia: University of Pennsylvania Press.
- Katcher, A. H., Friedmann, E., Goodman, M., & Goodman, L. (1983). Men, women, and dogs. *California Veterinarian*, 2, 14-16.
- Katcher, A. H., Segal, H., & Beck, A. M. (1984). Comparison of contemplation and hypnosis for the reduction of anxiety and discomfort during dental surgery. *American Journal of Clinical Hypnosis*, 27, 14-21.
- Katcher, A. H., & Wilkins, G. (1993). Dialogue with animals: Its nature and culture. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 173-197). Washington, DC: Island Press.
- Katcher, A. H., & Wilkins, G. (2000). The centaur's lessons: Therapeutic education through care of animals and nature study. In A. H. Fine (Ed.), *The handbook on animal assisted therapy: Theoretical foundations and guidelines for practice* (pp. 153-177). San Diego, CA: Academic Press.
- Kellert, S. R., & Wilson, E. O. (Eds.). (1993). *The biophilia hypothesis*. Washington, DC: Island Press.
- Kongable, J. G., Buckwalter, K. C., & Stolley, J. M. (1989). The effects of pet therapy on the social behavior of institutionalized Alzheimer's clients. *Archives Psychiatric Nursing*, 3, 191-198.
- Lago, D. J., Knight, B., & Connell, C. (1983). Relationship with companion animals among the rural elderly. In A. H. Katcher & A. M. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 328-340). Philadelphia: University of Pennsylvania Press.

- Lawrence, E. (1993). The sacred bee, the filthy pig, and the bat out of hell: Animal symbolism as cognitive biophilia. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis*. Washington, DC: Shearwater Press.
- Levinson, B. M. (1964). Pets: A special technique in psychotherapy. *Mental Hygiene*, 48, 243-248.
- Levinson, B. M. (1969). *Pet-oriented child psychotherapy*. Springfield, IL: Charles C. Thomas Press.
- Lockwood, R., & Ascione, F. R. (Eds.). (1998). *Cruelty to animals and interpersonal violence*. West Lafayette, IN: Purdue University Press.
- Lynch, J. J. (1977). *The broken heart: The medical consequences of loneliness*. New York: Basic Books.
- Lynch, J. J. (2000). *A cry unheard: New insights into the medical consequences of loneliness*. Baltimore: Bancroft.
- Lynch, J. J., Fregin, G. F., Mackie, J. B., & Monroe, R. R., Jr. (1974). Heart rate changes in the horse to human contact. *Psychophysiology*, 11(4), 472-478.
- Lynch, J. J., & McCarthy, J. F. (1969). Social responding in dogs: Heart rate changes to a person. *Psychophysiology*, 5(4), 389-393.
- Melson, G. F. (2001). *Why the wild things are: Animals in the lives of children*. Cambridge, MA: Harvard University Press.
- Melson, G. F., Schwarz, R. L., & Beck, A. M. (1997). Importance of companion animals in children's lives: Implications for veterinary practice. *Journal of the American Veterinary Medical Association*, 211(12), 1512-1518.
- Messent, P. R. (1983). Social facilitation of contact with other people by pet dogs. In A. H. Katcher & A. M. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 351-359). Philadelphia: University of Pennsylvania Press.
- Miller, M., & Lago, D. (1990). The well being of older women: The importance of pet and human relations. *Anthrozoos*, 3, 245-252.
- Moberg, G. P. (Ed). (1985). *Animal stress*. Bethesda, MD: American Physiological Society.
- National Institute of Health. (NIH). (1988). *Health benefits of pets: Summary of working group*. Washington, DC: U.S. Department of Health and Human Services.
- Norris, P. A., Shinew, K. J., Chick, G., & Beck, A. M. (1999). Retirement, life satisfaction, and leisure services: The pet connection. *Journal of Park and Recreation Administration*, 17(2), 65-83.
- Odendaal, J. S. J., & Lehmann, S. M. C. (2000). The role of phenylethylamine during positive human-dog interaction. *ACTA Veterinaria Brno*, 69, 183-188.
- Ory, M. G., & Goldberg, E. L. (1983). Pet possession and life satisfaction in elderly women. In A. H. Katcher & A. M. Beck (Eds.), *New perspectives on our lives with companion animals* (pp. 303-317). Philadelphia: University of Pennsylvania Press.
- Patronek, G. J. (1999). Hoarding of animals: An under-recognized public health problem in a difficult-to-study population. *Public Health Reports*, 114, 81-87.
- Patronek, G. J., & Glickman, L. T. (1993). Pet ownership protects the risks and consequences of coronary heart disease. *Medical Hypotheses*, 40, 245-249.
- Perelle, I. B., & Granville, D. A. (1993). Assessment of the effectiveness of a pet facilitated therapy program in a nursing home setting. *Society and Animals*, 1(1), 91-100.
- Riddick, C. C. (1985). Health, aquariums, and the non-institutionalized elderly. In M. B. Susman (Ed.), *Pets and the family* (pp. 163-173). New York: Haworth.
- Robb, S. S. (1983). Companion animals and elderly people: A challenge for evaluators of social support. *The Gerontologist*, 23, 277-282.
- Rowan, A. N., & Beck, A. M. (1994). The health benefits of human-animal interactions. *Anthrozoos*, 7, 85-89.
- Rud, A. G., Jr., & Beck, A. M. (1999). Send us your favorite pet stories: Moral and development dimensions of children's entries in a newspaper contest. *Anthrozoos*, 122, 115-120.
- Rud, A. G., Jr., & Beck, A. M. (2000). Kids and critters in class together. *Phi Delta Kappan*, 82(4), 313-315.

- Sato, S., Tatumizu, K., & Hatae, K. (1993). The influence of social factors on allogrooming in cows. *Applied Animal Behaviour Science*, 38, 235-244.
- Schantz, P. M. (1990). Preventing potential health hazards incidental to the use of pets in therapy. *Anthrozoos*, 4, 14-23.
- Serpell, J. (1991). Beneficial effects of pet ownership on some aspects of human health and behaviour. *Journal Royal Society Medicine*, 84, 717-720.
- Siegel, D., Kuller, L., Lazarus, N. B., Black, D., Feigal, D., Huges, G., et al. (1987). Predictors of cardiovascular events and mortality in the Systolic Hypertension in the Elderly Program pilot project. *American Journal of Epidemiology*, 126, 385-399.
- Siegel, J. M. (1990). Stressful life events and use of physician services among the elderly: The moderating role of pet ownership. *Journal of Personality and Social Psychology*, 58(6), 1081-1086.
- Siegel, J. M. (1993). Companion animals: In sickness and in health. *Journal of Social Issues*, 49(1), 157-167.
- Simon, L. J. (1984). The pet trap: Negative effects of pet ownership on families and individuals. In R. K. Anderson, B. Hart, & L. Hart (Eds.), *The pet connection* (pp. 226-240). Minneapolis: University of Minnesota Press.
- Stallones, L., Marx, M., Garrity, T., & Johnson, T. (1990). Pet ownership and attachment in relation to the health of U.S. adults, 21 to 64 years of age. *Anthrozoos*, 4, 100-112.
- Straatman, I., Hanson, E. K. S., Endenburg, N., & Mol, J. A. (1997). The influence of a dog on male students during a stressor. *Anthrozoos*, 10, 191-197.
- Ulrich, R. S. (1984, April 27). View through a window may influence recovery from surgery. *Science*, 224, 420-421.
- Ulrich, R. S. (1993). Biophilia, biophobia, and natural landscapes. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis*. (pp. 73-137). Washington, DC: Island Press.
- Verderber, S. (1991). Elderly persons' appraisal of animals in the residential environment. *Anthrozoos*, 4, 164-173.
- Voith, V. L. (1985). Attachment of people to companion animals. In J. Quackenbush & V. L. Voith (Eds.), *Veterinary Clinical of North American*, 15(2), 289-295.
- Walter-Toews, D. (1993). Zoonotic disease concerns in animal assisted therapy and animal visitation programs. *Canadian Veterinary Journal*, 34, 549-551.
- Watson, N. L., & Weinstein, M. (1993). Pet ownership in relation to depression, anxiety, and anger in working women. *Anthrozoos*, 6(2), 135-138.
- Wilson, C. C. (1987). Physiological responses of college students to a pet. *Journal of Nervous and Mental Disease*, 175, 606-612.
- Wilson, C. C. (1991). The pet as an anxiolytic intervention. *Journal of Nervous and Mental Disease*, 179, 482-489.
- Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.
- Wilson, E. O. (1993). Biophilia and the conservation ethic. In S. R. Kellert & E. O. Wilson (Eds.), *The biophilia hypothesis* (pp. 31-41). Washington, DC: Island Press.
- Worth, D., & Beck A. M. (1981). Multiple ownership of animals in New York City. *Transactions and Studies of the College Physicians Philadelphia*, 3, 280-300.

ALAN M. BECK has his BA from Brooklyn College and his MA from California State University at Los Angeles. He received his doctor of science in animal ecology from the Johns Hopkins University School of Public Health. His 1973 book *The Ecology of Stray Dogs* is considered a classic in the field of urban ecology and was republished in 2002. Together with Dr. Aaron H. Katcher, he edited the book *New Perspectives on Our Lives With Companion Animals* and coauthored the popular book *Between Pets and People: The Importance of Animal Companionship*, first published in 1983 and then revised in 1996. He directed the animal programs for the New York City Department of Health for 5 years and then was the director of the Center for the Interaction of Animals and Society at the University of Pennsylvania, School of Veterinary Medicine, for 10 years. In 1990, he became the Dorothy N.

McAllister Professor of Animal Ecology and director of the Center for the Human-Animal Bond in the School of Veterinary Medicine, Purdue University, West Lafayette, Indiana. The center was established to develop a comprehensive understanding of the relationship between people and their companion animals.

AARON H. KATCHER, MD, is a graduate of Williams College and the University of Pennsylvania Medical School. For the past 25 years he has been studying the cognitive and physiological consequences of human animal interaction. At present, he directs an educational program based upon animal care and nature study designed for children in special education.