

Recent Discoveries About Our Relationships With The Natural World

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Overview

Clinical observations and the results of recent research lend credibility to the centuries-old belief that the association of people with animals and the natural environment contributes to overall health and well-being. Recently we have "rediscovered" that a close relationship between people and the natural environment, most especially animals, is vital to the well-being of our planet, its inhabitants and its habitat. This relationship helps fulfill our inherent need to nurture. The roots of this relationship, often referred to as a "bond," go back thousands of years; but urbanization, industrialization, mechanization and other forces have caused the diminution of the opportunities for nurturing and affectionate interaction with people and our natural surroundings. This deprivation of nurturing opportunities has resulted in increased stress and consequent challenges to our health.

This unhealthy state of affairs is being vigorously addressed by many people in many disciplines with the object of helping to restore health to communities everywhere. We in the Delta Society and in our sister organizations in other countries are directing our efforts to these ends by exploring the interaction of people, animals and the environment through scientific study, service and teaching.

In the past two decades, research and clinical observations have shown that animal association may contribute to:

* Higher one-year survival rates following coronary heart disease (Friedmann et al, 1980; Friedmann and Thomas, 1995)

- * Reduction in blood pressure and stress level in healthy subjects, as well as changes in speech pattern and facial expression , and lower plasma triglyceride and cholesterol levels (Baun et al., 1984; Katcher et al., 1984; Katcher, 1987; Wilson, 1991; Allen et al., 1991; Anderson et al., 1992)
- * Improvement in quality of life for elderly persons (Robb, 1987; Stallones, 1990)
- * Socialization of young children with their peers (Hart et al, 1987; Nielsen and Delude, 1989)
- * Development of nurturing behavior and humane attitudes in children who may grow to be more nurturing adults (Melson, 1990; Ascione, 1992)
- * A sense of constancy for foster children (Hutton, 1985)
- * More appropriate social behavior in mentally impaired elderly people and prisoners (Burke et al, 1988; Jecs, Dawn, personal communication; Lee, David, personal communication; Hendy, 1984; Katcher et al., 1989)
- * Success in psychotherapy sessions and in psychiatric institutions in helping patients work through their anxiety and despair (Peacock, 1984; Beck et al., 1986; Holcomb and Meacham, 1989)
- * Improved balance, coordination, mobility, muscular strength, posture and language ability as a result of therapeutic horseback riding (ITRC, 1988; Biery and Kauffman, 1989; Dismuke, 1984)
- * Reduction in the demand for physicians' services for medically nonserious problems among Medicare enrollees, and an apparent buffering effect against psychological stress (Siegel, 1990; Siegel, 1993)
- * Facilitation of social interaction between strangers (Hunt et al., 1992)
- * Highly significant reduction in minor health problems and highly significant improvement in psychological components of general health, plus a dramatic increase in recreational walks by dog-owners (Serpell, 1991)
- * Encouragement of preadolescents' emotional reciprocity and caring responsibility, as well as lessening feelings of loneliness (Davis and McCreary Juhasz, 1995)

Those studying the interactions between people, animals and the natural environment find it very difficult to overestimate the significance of animals in the lives of people everywhere (Anderson, 1975; Anderson et al., 1984; Arkow, 1986, 1989; Fogle, 1981, 1983, 1986; IIRHPR, 1985; Katcher and Beck, 1983; Rowan, 1988; and Delta Annual Meeting Abstracts and the journal *Anthrozoös*). The number of animals in our society is impressive. At this time, the generally cited number of dogs in the U.S. is 55 million, and of cats 60 million. Determining the number of cats is especially difficult because many people feed free-ranging cats that are not officially claimed by anyone. In this regard, the number of stray and feral cats is estimated at 25-40 million. This number is not included in the owned population. Researchers are now addressing the problems inherent in estimating dog and cat populations and have proposed ways to arrive at more realistic population data (Patronek and Glickman, 1994; Patronek, 1995; Patronek and Rowan, 1995).

Even homeless men and women often contrive to maintain pets whose affection and companionship are highly important to them (Kidd and Kidd, 1994). This has been recognized in England, where the Hope Project was started in 1991 to provide veterinary services to homeless people with dogs, including vaccination, worming, flea prevention and free neutering (Kase, 1996). Beginning in London, this project has been extended to other cities.

Animals (or their images) often appear in art, comics, celebrations, dreams (up to 57 percent of dreams of 4-year-old boys involve animals, according to Van de Castle, 1983), fables, folklore, food, imagination, language, medicine, music, photographs, religion, wishes, work and worries. At long last, animals are gaining some legitimate recognition among more and more members of the professions involved in providing health care. In fact, we are reaching a point where, for some conditions, animal interaction is the therapy of choice.

The importance of animals to the well-being of people is becoming more and more evident. This is especially true as we realize that at no time in history have so many members of Western society been devoid of healthy interaction among themselves and with the environment. More and more people are electing to live alone; many who are married choose not to have children. Singles or couples who have children are compartmentalized. Many fathers and mothers work outside the home, usually in different locations and sometimes on different schedules. Children are usually born in a hospital, spend a great deal of time in daycare centers, and then proceed to kindergarten, elementary school and high school—usually all in different locations (the one-room school I attended is a thing of the past). When at home, children are watching television or wearing headphones attached to a source of sound, usually loud music. This deprivation of nurturing opportunities and compartmentalization has resulted in increased stress, depression, loneliness, and overall serious challenges to the health and well-being of a significant segment of our population. Companion animals have refused compartmentalization and serve as nurturers for many people; they also are objects of nurture, promoting touching, playing, and sharing with few time restraints.

In a study of a multi-ethnic sample of 877 Los Angeles County adolescents (Siegel, 1995) about half lived in households that owned pets. Among the pet owners, 64% reported that their pets were very or extremely important to them; only 10% said the pets were "not at all" or "not too" important. Adolescents with no siblings living at home rated their pets as more important than did others; so did those with sole responsibility for care of the pet.

Many studies demonstrate the importance of touch in human-animal interactions. Aaron Katcher has been an articulate spokesman relative to the importance of touch; he reminded us (Katcher, 1981) that in the English language, a companion animal is a "pet" which means to touch and caress. He found that although men

in Western societies initiate and respond to touching much less frequently than women, in waiting rooms of veterinary clinics there were no differences between men and women in the frequency, amount and kind of touching of their pets. It seems that dogs, and possibly other animals, serve as appropriate and safe objects of nurture through which both men and women can express and receive affection, even in public.

Children, especially males, when they reach the ages from 5 to 8, decline and even resist physical contact by and between parents or other adults. But Katcher suggests that the presence of a pet can renew the joys of touch for the child who can set the "rules" and time and nature of affectionate displays.

I believe there is overwhelming evidence that human health and well-being depend on the quality of social interrelationships (significantly touch) throughout life (House et al., 1988; Lynch, 1977). One of the most impressive examples of this is the dire effect on infants resulting from lack of contact with mothers, a condition seen in both humans and animals (Pauk et al, 1986; Schanberg and Field, 1987; Bartolme et al, 1987, 1989; Barnes, 1988; Katcher, 1988). When social contact is absent, infants have been seen to manifest an immobilization response with decreased activity and sensitivity, increased secretion of endorphins and concomitant decrease in the secretion of growth hormone.

In many domestic animals, as well as other mammals (Bustad, 1987) and birds (Gross and Siegel, 1982), gentle handling and social contact increase their resistance to diseases, their survival from major surgery, their growth, efficiency of feed utilization and conception rate, and makes them more relaxed and more easily handled. Of significance, too, is the psychophysiological response to contact comfort that persists into adulthood. A study of beef and dairy cows (Sato et al., 1993) showed that closely related and same-age cows licked each other most often, but such grooming was also frequent among others in the herd. The researchers suggest that grooming contact may reinforce social bonds and suppress aggressiveness.

As Katcher (1988) has noted "...the process of giving care to others, the acts of nurturing, touching, holding, protecting, giving food, and guiding, evoked the same feelings, and the same physiological events as being nurtured. In its most simple form, when we care for others we feel as if we are cared for. That is why owners are so certain that their pets give them overwhelming love." In my observations, nurturing a significant other can relieve depression and loneliness.

Recommendations

Our knowledge and understanding of the critical importance of the human-animal bond to individuals and to society is steadily increasing. As we become more aware of the importance of this interaction, we must begin to formulate ideas and programs, such as those outlined below, which will serve to promote the human-animal-environment bond. The following are but a few of the programs of service and teaching that we can implement in this regard.

* Increase support of a data-based research effort on human-animal interactions and animal-assisted therapy (Beck and Rowan, 1994). For example, there are studies that suggest a link between closely bonded companion animals and the long-term health and well-being of people. Because of the cost and complexity involved in a long-term definitive study, it is recommended that existing large epidemiological studies be re-examined and follow-up data be obtained pertaining to any linkage of disease incidence (e.g., cardiovascular disease) and the presence or absence of a closely bonded animal. Future national health surveys should include questions related to the presence or absence of closely bonded animals. Longitudinal studies are a must.

* Expand prison programs involving animals. For example, in a program involving selected maximum security prisoners that train animals to assist people who have disabilities, dogs have been trained to alert their seizure-prone owners to an imminent seizure. This remarkable finding needs to be investigated to determine how to pre-select such dogs for training and what type of training methods should be utilized.

* In conjoint efforts with authorities and qualified personnel, establish criteria for certification of all classifications of service animals. This certification should also include animal-assisted therapists and animal trainers.

* Promote programs that train certified service animals. An important new study (Allen and Blascovich, 1996) found substantial economic as well as psychological and social benefits when wheelchair mobile individuals with major disabilities were provided with service dogs. Costs per week for paid assistance decreased by 68%. Allowing for the cost of training and maintaining the dogs, this could result in an estimated net savings of \$55,000 to \$92,000 per person in eight years (estimated service period of a dog). Other researchers have found evidence that people without disabilities react less negatively toward those with disabilities when the latter are accompanied by service dogs (Mader and Hart, 1989; Eddy et al., 1988; Valentine et al., 1993).

* Develop strategies for third-party payments for animal-assisted therapy

* Educate authorities regarding the need many people have for close attachment to an animal. Through information sessions, publication, and consultancy to legislative bodies, make it possible for more people to have legal access to close animal interaction and train animal owners in responsible animal care and obedience training of their dogs (see Hart et al., 1985).

* Encourage the development of bioparks as described and promoted by Dr. Michael Robinson (1988a), director of the Smithsonian Institution's Washington Zoo. These bioparks would serve to educate children and adults, giving them real hands-on experience in converted zoological gardens where visitors would learn about animals not only by sight and sound but also by smell and touch. Such exposure, properly organized and implemented, could fulfill some of our recommendations.

* It is a matter of urgency that the education and training effort be improved and expanded in several areas, including:

1. Education of youth in practical aspects of nurturing one another, animals and our natural environment.
2. Training of veterinarians, animal technicians, social workers, and health care professionals in grief counseling for those who have suffered the loss of closely bonded animals. We should also encourage more groups to form regular grief-counseling sessions.

* There is an increasing need to address the plight of AIDS (acquired immuno-deficiency syndrome) victims, most especially children. Many AIDS patients could benefit by animal association. Authorities should be informed that removing companion animals from these patients would accomplish very little in eliminating disease, and would remove for some the only source of unconditional love, security, acceptance, forgiveness, fun and touch. Well-screened healthy animals should be made available, along with informed, well-trained volunteers committed to helping in this effort. Delta Society has information available on the subject of animals and AIDS.

The consequences of loss of suitable objects of nurture have been inestimable, and to counteract this downward spiral, we must also mobilize our communities to address this situation now and for the future. I naively propose a solution that is unique in today's world in that it will be fun and the cost will be modest.

The solution proposed is to bring nurturing instruction into the elementary and secondary school system. Children should be taught to care for living things including each other, animals, plants, soil and the environment-to become stewards of this planet by "hands-on" experience in tending the earth and its creatures. Involving students in a "big brother" and "big sister" arrangement for care and instruction at all grade levels in nurturing of animals and plants will promote cooperation, compassion and enhance nurturing skills. Group projects in each class should also be promoted, as well as projects which involve animals in their natural habitat. As Konrad Lorenz, to whom we pay tribute at this conference, taught us, we could learn a great deal more about animals by observing them in their natural habitat.

As a result of 10 years experience with our curriculum, *Learning and Living Together-Building the Human Animal Bond* (Vaughan et al., 1986), we have

found it to be helpful in teaching children from preschool to the 6th grade. Additional lessons on Reverence for Life, Behavior of Animals and Tending the Earth are being considered for later inclusion. I also initiated a course entitled "Reverence for Life" which I have taught at the university level for more than fifteen years.

Other beneficial programs have been instituted at Canyon Park Elementary School in Santee, California, at Gullett Elementary School in Austin, Texas, and at the Ott Elementary School in Phoenix, Arizona (Kaye, 1984).

Another outstanding model for children and youth is the one developed by Dr. Sam Ross and his associates at Green Chimneys in Brewster, New York, to address the needs of vulnerable children and teenagers from the inner city. These youngsters have learned the rewards of nurturing, including gaining competence in farm-related tasks, thereby enhancing self-esteem and developing a reverence for all of life. This is a far better choice than dropping out of school for careers in crime, addiction and violence, options which compromise health and lead to an early death. The Green Chimneys experience should have wide appeal and broad application. It could well serve as a national, even a world, model for the general reform of education starting with the very young (Ross 1981; Ross et al, 1984).

Admittedly, there's a big jump from a child learning nurture. of a guinea pig in a classroom to saving the rainforest. However, nurturing one another and animals and plants and practicing conservation is a big first step. Paraphrasing Dr. Katcher, proper care of the family pet is the first lesson in the book of environmental ethics (Katcher, 1988). We must immerse students in living things. The growing interest in nourishing and caring for plants and animals must be encouraged, especially in our children, for we need to preserve and care for the life of the entire planet.

Recently, we have come to realize how fragile our planet is (Robinson, 1989). Children must come to realize that nature is not an enemy to conquer, but an entity in need of tender care and concern. Our future together here on planet Earth depends upon our addressing this need with careful haste. Animal, plant and soil specialists at the local level need to work together with educators, health professionals, lawyers, philosophers, politicians, scientists (including molecular biologists) and theologians to implement such a program (see Wilson, 1989 and other articles in the September, 1989 issue of *Scientific American*).

National and world priorities must be reordered to address a great deficiency on planet Earth (Bustad, 1989). At a time when nations are planning cooperative efforts to place people on Mars, the very future of the health and well-being on our own planet is in jeopardy. We have defined and described probably less than 10% of the species on planet Earth. There are frequent reports that list the number of species on the endangered list or that are now extinct. The truth is that

we really don't know how many species are endangered or lost because we don't know what we have.

We are now at a time where we are experiencing not only an increased cooperation between nations, but also a growing sensitivity and reverence for life and a greater interest in curricular change in our school systems. We must take this opportunity to promote international cooperation in defining our species, and to work together in nurturing people, animals, plants and our environment, thereby contributing to a secure future for this planet. With an emphasis on nurture of people, animals and environment, chances of attaining peace will also be greatly enhanced. Animals and children can help promote a state of peaceful coexistence between people and the rest of this remarkable planet.

I believe, as I conclude, that an interesting area with great potential for benefiting and enriching the lives and conditions of people and animals is opening to us in research, service and teaching. By working with colleagues worldwide in a variety of disciplines, we can develop new and creative ways to realize the great potential inherent in people-animal-environmental interactions properly studied and utilized. On the basis of my experience for the last two decades, I am devoting my remaining days to this adventure—a call for compassion, educated concern, nurturance and its early incorporation into our educational curriculum, and reverence for all of life. My plea is that we heed the words of Alfred Tennyson: "Come, my friends, 'tis not too late to seek a newer world."

References

1. Allen, K, and J. Blascovich. 1996. "The Value of Service Dogs for People with Severe Ambulatory Disabilities: A Randomized Controlled Trial." *JAMA* 275(13): 1001-1006.
2. Allen, K, J. Blascovich, J. Tomaka, and R.M. Kelsey. 1991. "Presence of Human Friends and Pet Dogs as Moderators of Autonomic Response to Stress in Women." *Journal of Personal and Social Psychology* 61:582-589.
3. Anderson, R.K, B.I. Hart, and LA. Hart, eds. 1984. *The Pet Connection: Its Influence on Our Health and Quality of Life*. Minneapolis: CENSHARE, University of Minnesota.
4. Anderson, R.S. 1975. *Pet Animals in Society*. New York: Macmillan.
5. Anderson, WE, CM. Reid, and G.L. Jennings. 1992. "Pet Ownership and Risk Factors for Cardiovascular Disease." *The Medical Journal of Australia*, 157: 298-301.
6. Arkow, P., ed. 1986. *The Loving Bond: Companion Animals in the Helping Professions*. Saratoga, CA: R & E Publishers.

7. Arkow, P. 1989. *Pet Therapy: A Study and Resource Guide for the Use of Companion Animals in Selected Therapies*. Colorado Springs, CO: The Humane Society of the Pikes Peak Region.
8. Ascione, ER. 1992. "Enhancing Children's Attitudes about the Humane Treatment of Animals: Generalization to Human-Directed Empathy." *Anthrozoös*, 5(3): 17-191.
9. Barnes, D.M. 1988. "Need for Mother's Touch is Brain-Based." *Science*, 239: 142.
10. Barrolme, J.V, M.B. Bartolme, E.B. Harris, and SM. Schanberg. 1987. "N Alpha-Acetyl-Beta-Endorphin Stimulates Omithine Decarboxylase Activity in Preweanling Rat Pups: Opioid- and Non-Opioid-Mediated Mechanisms." *Journal of Pharmacology and Experimental Therapeutics*, 240: 895-899.
11. Bartolme, J.V, M.B. Bartolme, E.B. Harris, J.S. Pauk, and SM. Schanberg. 1989.
12. "Regulation of Insulin and Glucose Plasma Levels by Central Nervous System Beta-Endorphin in Preweanling Rats." *Endocrinology*. 124: 2153-2158.
13. Basin, M., N. Bergstrom, N. Langston, and L. Thoma. 1984 "Physiological Effects of Petting Dogs: Influences of Attachment." In *The Pet Connection*, eds. R.K Anderson, B.L.
14. Hart, and L.A. Hart, pp. 162-170. Minneapolis: CENSHARE, University of Minnesota.
15. Beck, AM., and A.N. Rowan. 1994 "The Health Benefits of Human-Animal Interactions." *Anthrozoös*, 7 (2) 85-88.
16. Beck, A.M., L. Seraydarian, and G.E Hunter. 1986. "Use of Animals in the Rehabilitation of Psychiatric In-Patients." *Psychology Reports*, 58: 63-66.
17. Biery, M.J., and N. Kauffman. 1989. "The Effects of Therapeutic Horseback Riding on Balance." *Physical Activity Quarterly*, 6: 221-229.
18. Burke, J., S. Daniel, J. Burke, R. Camplone, and C. Tweedy. 1988. "The Effect of a Residential Pet Therapy Program on Isolated Nursing Home Residents." In *Abstracts of Presentations: People, Animals and the Environment: Exploring Our Interdependence*. Delta Society 7th Annual Conference, Sept. 29-Oct. 1, 1988, Orlando, FL.
19. Bustad, L.K 1987. "Investigator's Interrelationship with Laboratory Animals." In *Effective Animal Care and Use Committees* (special issue of *Laboratory Animal Science*, January 1987) pp. 167-170. Cordova, TN: American Association for Laboratory Animal Science.
20. Davis, J.H., and McCreary Juhasz, A. 1995. "The Preadolescent/Pet Friendship Bond." *Anthrozoös*, 8 (2):78-82.
21. Dismtike, RE 1984 "Rehabilitative Horseback Riding for Children with Language Disorders." In *The Pet Connection*, eds. R.K. Anderson, B.L. Hart, and L.A. Hart, pp. Minneapolis: CENSHARE, University of Minnesota.
22. Eddy, J., L.A. Hart, and R. Boltz. 1988. "The Effects of Service Dogs on Social Acknowledgements of People in Wheelchairs." *Journal of Psychology*, 122: 39-45.
23. Fogle, Bruce, ed. 1981. *Interrelations Between People and Pets*. Springfield, IL: Charles C. Thomas.

24. Fogle, Bruce. 1983. *Pets and Their People*. London: Collins Harvill.
25. Fogle, Bruce. 1986. *Comes Pets Play*. London: Michael Joseph.
26. Friedmann, E., A.H. Katcher, J.J. Lynch, and SA. Thomas. 1980. "Animal Companions and One-Year Survival of Patients After Discharge from a Coronary Care Unit." *Public Health Report*, 95 (4): 307-312.
27. Friedmann, E. and S.A. Thomas. 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.
28. Gross, W.B., and E. B. Siegel. 1982. "Socialization as a Factor in Resistance to Infection, Feed Efficiency and Response to Antigen in Chickens." *American Journal of Veterinary Research*, 43: 2010-2012.
29. Hart, L.A., B. Hart, and B. Bergin. 1987. "Socializing Effects of Service Dogs for People with Disabilities." *Anthrozoös*, 1 (1) 41-44.
30. Hart, L.A., B. Hart, and B. Mader. 1985. "Effects of Pets in California Governmentally-Assisted Housing for the Elderly." *Journal of the Delta Society*, 1: 65-66.
31. Hendy, H.M. 1984. "Effects of Pets on the Sociability and Health Activities of Nursing Home Residents." In *The Pet Connection*, eds. R.K. Anderson, B.L. Hart, and L.A. Hart, pp. 430-437. Minneapolis: CENSHARE, University of Minnesota.
32. Holcomb, R., and M. Meacham. 1989. "Effectiveness of an Animal-Assisted Therapy Program in an Inpatient Psychiatric Unit." *Anthrozoös* 2 (4): 259-264.
33. House, J.S., K.R. Landis, and D. Umberson. 1988. "Social Relationships and Health." *Science*, 241: 540-545.
34. Hunt, S.J., L.A. Hart. and R. Gomulkiewicz. 1992. "The Role of Small Animals in Social Interactions between Strangers." *Journal of Social Psychology*, 132 (2): 245-256.
35. Hutton, J.S. 1985. "A Study of Companion Animals in Foster Families: A Perception of Therapeutic Values in the Human-Pet Relationship." In *The Human-Pet Relationship: International Symposium on the Occasion of the 80th Birthday of Nobel Prize Winner Prof. Dr Konrad Lorenz, Oct. 27-28, 1983*, pp. 64-70. Vienna: Austrian Academy of Sciences, Institute for Interdisciplinary Research on the Human-Pet Relationship.
36. Institute for Interdisciplinary Research on the Human-Pet Relationship (IIRHPR). 1985. *The Human-Pet Relationship: International Symposium on the Occasion of the 80th Birthday of Nobel Prize Winner Prof. Dr Konrad Lorenz, Oct. 27-28, 1983*. Vienna.
37. International Therapeutic Riding Congress (ITRC), 6th, August 23-27 1988, Toronto. 1988. *6th International Therapeutic Riding Congress*. Thornhill, Ontario, Canada:
38. Kase, Colette. 1996. "Pets and Housing-The Benefits and the Need: Update on Current Situation." Report delivered at the Conference on Making Space for Pets: Health and Social Benefits, London, March 27.

39. Katcher, A.H. 1981. "Interactions Between People and Their Pets: Form and Function." In *Interrelations Between People and Pets*, ed. Bruce Fogle. Springfield, IL: Charles C. Thomas.
40. Katcher, A.H. 1987. "Health and Caring for Living Things." *Anthrozoös*, 1 (3): 175-183.
41. Katcher, A.H. 1988. "The Evolution of Human Affection: The Significance of the Living Environment in the Modern World." In *Abstracts of Presentations: People, Animals and the Environment: Exploring Our Interdependence*. Delta Society 7th Annual Conference, Sept. 29-Oct. 1, 1988, Orlando, FL.
42. Katcher, A.H. and A. Beck, eds. 1983. *New Perspectives on Our Lives with Companion Animals*. Philadelphia: University of Pennsylvania Press.
43. Katcher, A.H., A. Beck, E. Friedmann, and J. Lynch. 1983. "Looking, Talking and Blood Pressure: The Physiological Consequences of Interaction with the Living Environment." In *New Perspectives on Our Lives with Companion Animals*, eds. A. Katcher and A. Beck, pp. 351-359. Philadelphia: University of Pennsylvania Press.
44. Katcher, A.H., A. Beck, and D. Levine. 1989. "Evaluation of a Pet Program in Prison." *Anthrozoös*, 2 (3): 175-180.
45. Katcher, A.H., H. Segal, and A.M. Beck. 1984. "Comparison of Contemplation and Hypnosis for the Reduction of Anxiety and Discomfort During Dental Surgery." *American Journal of Clinical Hypnosis*, 27: 14-21.
46. Kaye, D.M. 1984 "Animal Affection and Student Behavior." In *The Pet Connection*, eds. R.K Anderson, B.L. Hart, and L.A. Hart, pp. 101-104. Minneapolis: CENSHARE, University of Minnesota.
47. Kidd, A.H., and R.M. Kidd. 1994. "Benefits and Liabilities of Pets for the Homeless." *Psychological Reports*, 74: 715-722.
48. Levinson, Boris M. 1969. *Pet-Oriented Child Psychology*. Springfield, IL: Charles C. Thomas.
49. Levinson, Boris M. 1972. *Pets and Human Development*. Springfield, IL: Charles C. Thomas.
50. Lynch, J.J. 1977. *The Broken Heart: The Medical Consequences of Loneliness*. New York: Basic Books.
51. Mader, B., and L.A. Hart. 1989. "Social Acknowledgements for Children with Disabilities: Effects of Service Dogs." *Child Development*, 60: 1529-1534
52. Melson, G.E 1990. "Fostering Inter-Connectedness with Animals and Nature: The Developmental Benefits for Children." *People, Animals, Environment*, 8 (4): 15-17.
53. Melson, GE, E.O. Strimple, and L.K Bustad. 1993. "The Benefits of Interactions of Children and Animals." In *Healthy Children 2000: Obstacles and Opportunities: Proceedings of the Fourth National Policy Forum, April 24-25, 1992*, pp.142-147. Washington: National Academies of Practice.
54. Nielsen, J.A., and L. Delude. 1989. "Behavior of Young Children in the Presence of Different Kinds of Animals." *Anthrozoös*, 3 (2): 119-129.
55. Patronek, G.J. 1995. "Development and Validation of an Ecological Model for Describing the Pet Dog Population in the United States and an Epidemiologic

Study of Risk Factors for an Owner's Failure to Retain Their Dog as Pets in the Home." Ph.D. thesis, Purdue University.

56. Patronek G.J., and L.T Glickman. 1994. "Development of a Model for Estimating the Size and Dynamics of the Pet Dog Population." *Anthrozoös*, 7 (1): 25-42.

57. Patronek, G.J., and A.N. Rowan. 1995. "Editorial: Determining Dog and Cat Numbers and Population Dynamics." *Anthrozoös*, 8 (4): 199-205.

58. Pauk, J., C.M. Kuhn, T.M. Field, and S.M. Schanberg. 1986. "Positive Effects of Tactile Versus Kinesthetic or Vestibular Stimulation on Neuroendocrine and ODC Activity in Maternally-Deprived Rat Pups." *Life Sciences*, 39: 2081-2087.

59. Peacock, C.A. 1984. *The Role of the Therapist's Pet in Initial Psychotherapy Sessions with Adolescents: An Exploratory Study*. Ph.D. thesis, Boston College.

60. Robb, S.S. 1987. "Summary of Health Benefits of Pets for Elderly Residents in Health Care Centers." Presentation at National Institutes of Health Technology Assessment Workshop on Health Benefits of Pets, Sept. 10-11, Bethesda, MD.

61. Robinson, Michael H. 1988a. "Bioscience Education Through Bioparks." *BioScience* 38: 630-634.

62. Robinson, Michael H. 1989. "What Are Our Responsibilities to the Natural World: Should We Save the Rain Forests?" *Anthrozoös*, 2: 221-235.

63. Ross, S., M.G. Vigdor, M. Kohnstamm, M. DiPaoli, B. Manley, and L. Ross 1984. "The Effects of Fann Programming with Emotionally Handicapped Children." In *The Pet Connection*, eds. R.K Anderson, B.L. Hart, and L.A. Hart. Minneapolis: CENSHARE, University of Minnesota.

64. Ross, S.B. Jr. 1981. "Children and Companion Animals." *Ross Timesaver: Feelings and Their Medical Significance* 23 (4): 13- 16.

65. Rowan, A.N., ed. 1988. *Animals and People Sharing the World*. Hanover, NH: University Press of New England.

66. Sato, S., K Tarumizu, and K Hatae. 1993. 'The Influence of Social Factors on Allogrooming in Cows." *Applied Animal Behaviour Science*, 38: 235-244

67. Schanberg, S.M. and T.M. Field. 1987. "Sensory Deprivation Stress and Supplemental Stimulation in the Rat Pup and Preterm Human Neonate." *Child Development*, 58: 1431-1447.

68. Serpell, J. 1991. "Beneficial Effects of Pet Ownership on Some Aspects of Human Health and Behaviour." *Journal of the Royal Society of Medicine*, 84: 717-720.

69. 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.

70. Siegel, J.M. 1993. "Companion Animals: In Sickness and in Health." *Journal of Social Issues*, 49:157-167.

71. Siegel, J.M. 1995. "Pet Ownership and the Importance of Pets Among Adolescents." *Anthrozoös*, 8 (4): 217-223.

72. Stallones, L. 1990. "Companion Animals and Health of the Elderly." *People, Animals, Environment* 8 (4): 18-19.
73. Valentine, D.P., M. Kiddoo, and B. LaFleur. 1993. "Psychosocial Implications of Service Dogs for People Who Have Mobility or Hearing Impairments." *Social Work and Health Care*, 19: 109-125.
74. Van de Castle, R.L. 1983. "Animal Figures in Fantasy and Dreams." In *New Perspectives on Our Lives With Companion Animals*, eds. A. Katcher and A. Beck. Philadelphia: University of Pennsylvania Press.
75. Vaughan, S. L. Peterson, L.K. Bustad, T.D. Ryan, and L.M. Hines. 1986. *Learning and Living Together: Building the Human-Animal Bond*. Pullman, WA: People-Pet Partnership, Washington State University College of Veterinary Medicine.
76. Wilson, C.C. 1991. "The Pet as an Anxiolytic Intervention." *Journal of Nervous and Mental Disease*, 179: 482-489.
77. Wilson, E.O. 1989. "Threats to Biodiversity" *Scientific American* 261 (3): 108-116.