

# The Human–Animal Bond

## Health Implications Across the Lifespan

### Sala Horowitz, Ph.D.

According to the American Veterinary Medical Association (AVMA; see Resources box), American households had 81 million cats, 72 million dogs, 11 million birds, and other animals as pets in 2007.<sup>1</sup> These figures represent an increase of 23 million cats, dogs, and birds from 2001.<sup>2</sup> The majority of these households included children, and half of the pet owners surveyed considered their pets to be family members.<sup>1</sup> These trends reflect the growing importance of animal companions in the lives of children and adults. This article examines the growing body of research that provides support for the many anecdotally reported health benefits resulting from the human–animal bond.

### Theories About Pets' Roles in Human Lives

Human beings are genetically predisposed to have an affinity with other organisms, according to the biophilia hypothesis of Edward O. Wilson, Ph.D., a professor and curator of entomology at the Museum of Comparative Zoology at Harvard University, in Boston, Massachusetts.<sup>3</sup>

The key role that pets play in the socioemotional development of children has been attributed to pets serving as “transitional objects” to human relationships, affording opportunities for socialization, emotional support, and security.<sup>4</sup> Particularly for children with disabilities, who may experience social stigma and isolation, companion animals can serve as catalysts for mainstreamed social interactions. For example, children in wheelchairs received more friendly attention from passersby in school playgrounds and shopping malls when the children were accompanied by service dogs.<sup>5</sup>

Theories proposed about the importance of pets in people's lives focus on pets as nonjudgmental members of social networks, as child-substitutes, or as “self-objects” that help people

define themselves. According to attachment theory, pets—like children—elicit an innate nurturing response. This may account for pet owners who treat their pets like children. Social support theory, which views the human–human bond in terms of an affiliative basis for psychologic and physical health, has been expanded to the human–animal bond. Self-object theory emphasizes the function of the pet in defining one's identity (e.g., as a nurturing person).<sup>6</sup> The degree to which a companion animal later influences a person's sense of well-being depends upon the person's relationship with pets earlier in life.<sup>7</sup>

Research on humans and dogs indicates that this interspecies affiliative role involves an increase in the neurophysiologic correlates of oxytocin (a hormone involved in affection, maternal behavior, and empathy); beta-endorphin; prolactin; beta-phenylethylamine; and dopamine in both species, with a concomitant decrease in levels of cortisol in humans after positive interactions with animals.<sup>8</sup>

### Prevention and Treatment of Cardiovascular Disease

Studies show that pet owners—especially dog owners—exercise more and consequently have lower cardiovascular disease (CVD) risk. In a screening of 5741 participants for risk factors for CVD, blood pressure (BP), plasma cholesterol, and triglyceride values tended to be lower in pet owners than non-pet owners. In groups that were comparable in body-mass index (BMI), socioeconomic status, and self-reported smoking habits, pet owners reported getting significantly more exercise.<sup>9</sup> Two other recent surveys (one of more than 41,000 Californians, the other of 1803 Australians) likewise showed dog ownership to be associated with higher levels of physical activity.<sup>10,11</sup>

A 10-year study of 4435 Americans, ages 30–75, associated pet ownership with a 30% reduction in the risk of dying from heart attacks. Data from the National Health and Nutrition Examination Study, 1976–1980, focused on current and previous cat owners (n = 2435), compared with participants who had never owned a cat (n = 2000). The magnitude, though not the direction, of the effect was unexpected. Lead study author Adnan Querishi, M.D., a professor of neurology, neurosurgery,

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and radiology at the University of Minnesota in Minneapolis, and executive director of the Minnesota Stroke Initiative,\* stated that dogs, though not studied for this effect, would be likely to provide the same benefit.<sup>12</sup>

Suggested mechanisms of action for this “pet effect” include evoking a conditioned relaxation response and social support as mediators of autonomic responses to stress<sup>13</sup> and positive touch.<sup>14</sup>

A randomized study compared the effects of pet ownership to angiotensin-converting enzyme (ACE) inhibitor therapy on BP in 48 patients with hypertension. While the groups were comparable at baseline, and lisinopril therapy lowered resting BP in both the experimental and control groups, pet ownership in addition to therapy with lisinopril (20 mg/day) resulted in significantly greater reduction in BP in response to task-induced mental stress than lisinopril alone.<sup>15</sup>

The Cardiac Arrhythmia Suppression Trial found pet ownership to be an independent predictor of 1-year survival of a randomly selected sample of 424 patients after they had myocardial infarction.<sup>16</sup> In 76 patients hospitalized with heart failure, three 12-minute sessions of animal-assisted therapy (AAT) improved cardiopulmonary function, neurohormone level, and anxiety level more than a 12-minute visit from a volunteer alone and more than usual care (the control condition).<sup>17</sup>

In a study of cardiovascular reactivity to a stressful task (mental arithmetic) and a physical stressor (cold) among 240 married couples, participants who had their pets present had significantly lower heart rate and BP levels at resting baseline and faster recovery times from induced stress than subjects who did not have pets present or only had friends or spouses present.<sup>18</sup> One study did not find an association between pet ownership and cardiovascular risk factors in adults 50 years and older, after adjustment for age and other confounding variables.<sup>19</sup>

With respect to high BP as a major cardiovascular risk for stroke, “the role of less dramatic, lifestyle-oriented prevention, including the role of animals, has been underemphasized,” ac-

ording to David Wiebers, M.D., a professor of neurology at the Mayo Clinic, in Rochester, Minnesota, and a former director of the Mayo Clinic Stroke Center (also in Rochester). Dr. Wiebers stated: “Research has shown that interacting with a companion animal can lower blood pressure and heart rate and reduce anxiety. It can also improve mood.”<sup>20</sup> Due to research showing that pets often help patients heal faster and have better overall outcomes, the Mayo Clinic—like many other hospitals and nursing homes—allows pets to visit their ill human companions.<sup>21</sup>

## Treatment of Cancer and Chronic Pain

Edward T. Creagan, M.D., a professor of medical oncology at the Mayo Clinic College of Medicine, considers pets to be so beneficial to patients devastated by the emotional impact of a cancer diagnosis that he “prescribes” pets as part of treatment plans for many of his patients and notes the names of their pets in medical charts. Dr. Creagan said: “I think it creates healing of the soul. Some of the anger and the resentment is channeled in a positive way for caring for the pet.”<sup>20</sup>

Larry Lachman, Psy.D., a psychologist and animal behavior consultant in Carmel, California, who leads cancer therapy groups and is a cancer survivor himself, suggests that animals can help patients who have cancer and other serious conditions by nonjudgmental listening to what he calls their “illness narratives,” which even family and friends may not always wish to hear.<sup>20</sup> An example of animals helping people with life-threatening illness is the finding that pet cats have been shown to be effective additions to the social support systems of men with AIDS.<sup>22</sup>

Oncologist Ann Berger, M.D., chief of the Pain and Palliative Care Service, National Institutes of Health Clinical Center in Bethesda, Maryland, numbers pet therapy among the complementary and alternative modalities that can reduce chronic pain from cancer and other conditions.<sup>20</sup> Based on responses to a patient-symptom questionnaire, she noted that trained dogs in animal-assisted interventions can also improve the quality of life in patients undergoing chemotherapy. According to the survey results, depression was reduced and arterial oxygen saturation increased in a group of respondents who interacted with dogs, compared with the controls.<sup>23</sup>

## Treatment of Pediatric Patients

Service dogs are well-known for serving children who are blind and deaf. Dogs and some other animals are also used in animal-assisted interventions with general or specific physical or mental health goals. Animals in these capacities have been incorporated into health care settings to help children prepare for, or recuperate from, medical procedures or benefit from psychotherapy.

Introducing animals in a children’s hospital was favorably received by 138 patients, their parents, and the medical staff, and the presence of the animals did not result in an increase in the

\* This is a collaborative effort between the State of Minnesota and the University’s Medical Center in Fairview.

infection rate.<sup>24</sup> Observations of 31 pet visits to a pediatric hospital cardiology ward, and interviews with patients and their parents, indicated that these visits helped relieve psychologic distress, facilitate adaptation to the therapeutic milieu, and boost patient and parent morale.<sup>25</sup> Similar results were obtained in a study in a pediatric oncology unit.<sup>26</sup> According to pre and post surveys and postintervention interviews, a one-time canine visit significantly reduced perceived pain in 25 hospitalized children, ages 5–18, who experienced postoperative pain.<sup>27</sup>

The presence of a companion animal (a dog) has reduced physiologic arousal and behavioral distress in young children who underwent routine physical examinations<sup>28</sup> and dental procedures,<sup>29</sup> as well as in children who were placed in an experimental verbalization situation.<sup>30</sup>

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*The presence of an animal facilitated social interaction and reduced agitation and aggression in patients with dementia.*

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In adjunctive hippotherapy programs for children with disabilities, specially trained horses under the guidance of a certified therapeutic riding instructor helped young patients exercise spastic or painful muscles and joints. This therapy produced improvements in the children's mobility, strength, coordination, and other sensory and motor functions. The rhythmic movements involved in riding a horse appear to stimulate a child's nervous system. Consequently, the child will also tend to gain confidence in his or her abilities.<sup>31</sup>

AAT integrated into psychotherapy can help young patients face psychosocial developmental challenges. When used with children who have suffered abuse or neglect, AAT can overcome anxiety, distrust of adults, and maladaptive ideation and behaviors, thereby reducing the risk of these patients continuing the abuse cycle later in their own lives.<sup>32</sup> AAT was also beneficial for children with pervasive developmental disorders (PDDs), which are disorders characterized by lack of social communication. Exposure to a therapy dog increased prosocial interactions more than contact with toys among children with PDDs.<sup>33</sup>

### **Pets and the Hygiene Hypothesis**

Much research supports the hygiene hypothesis that postulates that early exposure to allergens helps strengthen the developing immune system, so that a child who is exposed to microbes associated with pets and farm animals appears to be at reduced risk for developing asthma and allergies later in life.<sup>34†</sup>

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†*EDITOR'S NOTE:* For a more complete treatment of this topic, see Horowitz S. The hygiene hypothesis: The paradox of immunity. *Altern Complement Ther* 2005;11:63-68.



Patient with a Delta Society-trained therapy dog. Photo courtesy of the Delta Society, Bellevue, WA.

### **Treatment of Elderly Patients**

AAT has gained popularity as an adjunctive therapy for seniors in nursing homes. Animals provide needed tactile contact and a sense of identity for elderly people who have suffered losses of family, friends, professional affiliations, and functioning.<sup>7</sup> The presence of an animal facilitated social interaction and reduced agitation and aggression in patients with dementia. Watching fish in an aquarium stimulated residents to eat more and gain weight.<sup>35</sup>

In a study of Medicare enrollees (N = 938), those with pets reported having fewer doctor visits over the course of a year than respondents who did not own pets. The researchers postulated that pet owners were buffered from the impact of stressful life events associated with greater use of health services.<sup>36</sup>

In another study, residents (N = 58) in a long-term care facility reduced their as-needed analgesic medication usage and pulse rate and reported improved overall quality of life as the result of contact with a therapy dog.<sup>37</sup>

### **Biodiagnostics: Early Detection of Medical Conditions**

It has been reported that service animals have alerted patients to the onset of a seizure, migraine, or diabetic hypoglycemic episode.<sup>20</sup> Based on a literature search combined with interviews with 29 dog-owning patients with epilepsy and 15 service dog trainers, a group of researchers concluded that some dogs appear to have an innate ability to detect early warning signs of such impending episodes. The dogs' success, of course, was contingent on the patient's awareness and response to the dog's alerting behavior.<sup>38</sup>

## Resources

### Organizations

#### American Veterinary Medical Association (AVMA)

1931 North Meachem Road, Suite 100  
Schaumburg, IL 60173-4360  
Phone: (847) 925-8070  
Fax: (847) 925-1329  
E-mail: avmaininfo@avma.org  
Website: www.avma.org

Founded in 1863, the mission of the AVMA is to advance the veterinary medical profession, and improve animal and human health by producing scientific information for health professionals, regulatory agencies, and the public. The organization is the accrediting body for schools of veterinary medicine in the United States.

#### Center for Interaction of Animals and Society (CIAS)

University of Pennsylvania School of Veterinary Medicine  
3800 Spruce Street  
Philadelphia, PA 19104  
Phone: (215) 898-5438  
Website: www.vet.upenn.edu  
E-mail: cias@lists.vet.upenn.edu

The multidisciplinary CIAS seeks to further understanding of the effects and ethics of human–animal relationships through research, education, and community outreach.

#### Delta Society

875 124th Avenue NE #101  
Bellevue, WA 98005  
Phone: (425) 679-5500  
Fax: (425) 679-5539  
E-mail: info@deltasociety.org  
Website: www.deltasociety.org

This non-profit organization provides information on the results of research on the human–animal bond, and trains volunteers and their pets (dogs, mainly) for participation in animal-assisted activities and animal-assisted therapy throughout the United States and other countries.

#### Recommended Reading for your patients

*Paws and Effect: The Healing Power of Dogs*  
By Sharon Sakson  
New York: Alyson Books, 2007

Although a study of the seizure-detection ability of such dogs accompanying 2 patients in a continuous electroencephalographic (EEG)–monitoring in-patient unit/facility did not yield definite evidence of such a canine ability, the researchers noted the setting and sample size restrictions of this study.<sup>39</sup>

A prospective study of 10 patients with tonic–clonic seizures suggested that seizure frequency may even be reduced by the presence of such dogs. Seizure frequency was monitored over a 48-week period (12 weeks at baseline, 12 weeks of dog training, and 24 weeks of follow-up). Nine of the 10 patients had a one-third reduction in seizure frequency; 4 of 10 had a 50% or greater reduction. The most significant drop in seizure frequency occurred during the first 4 weeks, but improvement was maintained for the entire follow-up period.<sup>40</sup>

<sup>‡</sup>Washington State University's College of Veterinary Medicine has received funding for a new School for Global Animal Health.

Dogs may be able to detect chemical or electrochemical changes that accompany these conditions, such as particular odors in sweat or the spike in electrical discharges that precede an epileptic seizure. It is also possible that such dogs react to subtle behavioral changes in their owners.<sup>20</sup>

Some evidence supports clinical case reports of dogs, due to their well-known acute sense of smell, being able to detect the chemical changes that accompany cancer. These animals appear to detect the odor of a unique signature of volatile organic compounds (VOCs) exhaled by patients with lung cancer<sup>41</sup> or the VOCs produced by tumors.<sup>42</sup> Two bodies of evidence support this hypothesis. First, human body odor is determined by major histocompatibility genes; these antigen molecules (human leukocyte antigen, HLA) have detectable isoforms that are present in sweat, blood, and urine. Second, there is a strong association between changes in certain classes of HLA expression and tumors.<sup>43</sup> Such detection has been reported for cancers of the lung,<sup>43</sup> breast,<sup>43</sup> and bladder,<sup>44</sup> and for melanomas.<sup>45,46</sup> Although a recent study yielded mixed results of dogs' ability to detect cancer at better than chance odds, the researchers concluded that a more stringent training protocol might produce better outcomes.<sup>47</sup>

## Zoonotic Infections

A negative aspect of companion animals are zoonoses, diseases that are transmissible from lower vertebrates to humans. Consequently, providers of AAT animals, such as the Delta Society (see Resources) adhere to preventative standards for animal–patient contact. According to Elson S. Floyd, Ph.D., president of Washington State University in Richland,<sup>‡</sup> about 70% of diseases that affect humans are caused by zoonotic infectious agents shared by animals and humans.<sup>48</sup>

Because the globalized pet trade has increased the potential for the spread of zoonotic diseases,<sup>49</sup> the Centers for Disease Control and Prevention (CDC) has regulations regarding importation of animals capable of causing human disease.<sup>50</sup> The modes of interspecies transmission include direct contact (e.g., *Microsporium canis* infection, commonly known as ringworm), scratches (cat scratch disease caused by *Bartonella henselae* bacteria),<sup>51</sup> bites (rabies), and inhalation of or contact with animal urine or feces (toxoplasmosis).<sup>52</sup>

Due to immature immune systems and play habits, infants and children younger than 5 are at increased risk of being exposed to, and affected by, these agents. Persons with suppressed immune systems, pregnant women, and elderly people are also at risk. In recent years, *Escherichia coli* (*E. coli*) infections in children have been linked by the CDC to petting zoos. The CDC has also expressed concern about two diseases that children can be exposed to from pet rodents, including hamsters, mice, and rats: Lymphocytic choriomeningitis, a viral disease that is spread by inhalation of airborne particles of rodent droppings or saliva, and rat-bite fever, a bacterial illness spread by a rodent bite, scratch, or ingestion of food or water contaminated with rodent feces.<sup>53</sup> Strains of

*Salmonella* have also been associated with pet rodents<sup>54</sup> and turtles and other reptiles.<sup>55</sup>

*The New England Journal of Medicine* recently featured a case report about the transmission of a particularly virulent strain of methicillin-resistant *Staphylococcus aureus* (MRSA) among a symptomatic woman, her asymptomatic family, and their healthy pet cat.<sup>56</sup> A previous paper focused on the outbreak of *Malassezia pachydermatis*, a yeast infection associated with otitis externa in dogs, in an intensive care nursery. Investigators found that the disease was spread to neonates by health care workers whose hands had been colonized by the organism from contact with their pet dogs.<sup>57</sup>

## Mutual Health Care

Marty Becker, D.V.M., a veterinarian, media consultant, and author based in Bonner's Ferry, Idaho, notes that "the cross-species connection can be emphasized for mutual health. If the owner is a couch potato, so is his pet, and the lifestyle changes necessary to prolong the life of the human are the same for the animal, too."<sup>20</sup> This logic was validated in the People and Pets Exercising Together (PPET) study that addressed the double epidemic of obesity in humans and their pets. After 1 year of exercise and dietary counseling, people with participating pets (n = 36) increased physical activity more than those without pets (n = 56). The dogs, who were on a special diet, also lost weight.<sup>58</sup>

## Conclusion

A growing body of research supports the generally beneficial mind-body health effects of the trans-species bond that many children and adults have with their pets and service animals. Further research could help identify which patients would most benefit from animal-assisted adjunctive therapy. Further investigation of the purported ability of dogs to act as early warning systems to alert patients of impending seizures and detect cancerous tumors is also warranted. ■

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