The Human–Companion Animal Bond: How Humans Benefit

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KEYWORDS

• Animal assisted therapy • Pet therapy
• Animal-assisted activities • Stress reduction • Pets
• Assistance animals • Assistance dogs • Companion animals

The human–animal bond is extremely important to most clients of small animal veterinary practices.[1] Most small animal veterinarians recognize the importance of the bond but may not have had formal training in how to incorporate this recognition into their practices. Evaluation of the bond between the pet and the owner by the veterinarian and the staff during each visit is an important step.[1] Discussing the bond and behavior issues with clients also can identify problems before they become insurmountable. Local resources for addressing bond problems can be provided to clients and posted in the office. When bonding issues are discussed and noted in the record, they can be monitored at subsequent visits. This article provides the research data regarding the human health benefits of companion animals, animal-assisted therapy, animal-assisted activities, and assistance animals; reviews measures that can be taken to enable safe pet ownership for immunocompromised individuals; and discusses the veterinarian's role in supporting immune-compromised clients and clients who have assistance animals.

Pet ownership, or just being in the presence of a companion animal, can have a positive effect on individuals' mental and physiologic health status. Most research addressing health benefits of pet ownership or companion animals focuses on reductions in distress and anxiety, decreases in loneliness and depression, and increases in exercise.[2]

The biopsychosocial model of health provides a theoretic model for understanding the interrelationship of the social, psychologic, and biologic realms of health status. Health is conceptualized as ranging from minimum to maximum in a continuous dynamic process that requires ongoing adaptation to challenges. This model emphasizes the interactive nature of the three realms. Disruptions or enhancements in any realm affect the others, and together these realms comprise health status.[3]

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The physiologic changes that accompany psychologic distress and social isolation diminish a person's health status and enhance the development and progression of chronic diseases such as heart disease and diabetes, increasing morbidity and mortality.[4,5] For example, the physiologic changes that result from depression, anxiety, and social isolation or loneliness include hyperactivity of the sympatho-adrenal-medulla system and the hypothalamic-pituitary-adrenal axis and abnormal platelet reactivity. Sympatho-adrenal-medulla hyperactivity causes increased catecholamine release, reduced heart rate variability, increased sympathetic tone, decreased myocardial perfusion, and ventricular instability. Activation of the hypothalamic-pituitary-adrenal axis causes corticosteroid release into the blood and disruption of the immune system function, enhancing vulnerability to infection and cancer.[3,5] Over the short term, these mechanisms influence responses to stressful situations or environments; over the long term they influence the development and progression of chronic diseases. Positive health outcomes associated with companion animals result from enhancement of psychosocial status and from reduction of psychosocial distress and stress responses.

Pets and companion animals seem to reduce psychosocial distress by altering the owner's perceptions and making situations and people seem more benign. Scenes containing animals are perceived as more friendly, relaxed, cooperative, constructive, safe, and humorous. People in scenes with animals also are perceived as less tense, dangerous, and threatening and as friendlier, happier, healthier, wiser, and richer than people in the same scenes without the animals.[6–8] Companion animals also improve impressions of a potentially stressful environment such as a workplace[8] or a hospital.[9] In contrast, animals culturally associated with fear elicited negative feelings and stress responses.[10]

EFFECT OF ANIMALS ON SOCIAL INTERACTION AND HEALTH

Animal companions facilitate human companionship and decrease loneliness and social isolation (**Table 1**). Dogs act as social lubricants by encouraging strangers to meet and talk[11,12] and providing a neutral topic of conversation for new acquaintances.[13] Pets alleviate loneliness across the human spectrum from homeless children[14] to single women living alone[15]and community-living adults.[12]

The impact of pet ownership on health seems to be most important for highly stressed or socially isolated individuals.[15–17] Among patients who have HIV/AIDS, but not the entire gay-bisexual community, pet owners were less depressed than nonowners.[17] Socially isolated women were lonelier without a pet than with a pet; loneliness did not differ according to pet ownership for married women.[15] Dog ownership moderated the impact of psychologic distress on the frequency of physician contacts, even after accounting for the effects of health status, depressed mood, and demographic factors.[16]

Studies suggesting that pet ownership is associated with health benefits must be interpreted cautiously, because they show associations but not causal relationships (**Table 2**). Differences in outcomes could be related to determinants of pet ownership rather than the effects of the pets. Pet ownership was related to proxies for health status including medical visits, number of health problems, and functional status. Health insurance records of older Americans[16] demonstrated that pet owners made fewer medical visits than nonowners; however, there was no significant difference in the use of health care providers between Australian pet owners and nonowners.[18–20] In a longitudinal study, which provides stronger evidence of causality, Australian and German pet owners made about 15% fewer medical visits than nonowners.[21]

Table 1
Studies of the effects of pets on social interactions published from 1990 to the present

First Author	Participants	Design	Animal-Related Situation	Outcomes	Results
McNicholas[11]	One participant-observer	Ethologic observation	Researcher accompanied by dog during her daily routines	Social interactions	Frequency of social interactions, especially interactions with strangers, was higher when the researcher was accompanied by a dog.
Wood[12]	Random survey of 399 participants; 200 were pet owners	Telephone survey	Not applicable	Social interactions and sense of community	Pet owners were less likely to be lonely, found it easier to get to know people, and were more likely to be civically engaged than pet non-owners.
Rogers[13]	12 elderly persons; 6 were dog owners	Quasi-experimental; repeated measures and qualitative analysis	The dog owners walked with the dog	Focal point of conversation	Dogs were a primary focus of conversation. Dog owners reported less dissatisfaction with their social, physical, and emotional states.
Rew[14]	32 homeless youths	Qualitative study	Not applicable	Strategies for coping with loneliness	Most participants (81%) identified dogs as companions that provided unconditional love, reduced loneliness, and improved their health status.
Zasloff[15]	148 adult female students; 59 were pet owners	Cross-sectional survey	Not applicable	Loneliness scores	No differences between pet owners and pet non-owners. Women living alone were more lonely than those living with pets only, with other people and with pets, and with other people but not with pets.

Table 2
Summary of nonexperimental studies of pet ownership and health outcomes published from 1990 to the present

First Author	Participants	Design	Outcomes	Results
Jorm[18]	Random sample of 594 Australian adults, age $\geq$ 70 years; 169 were pet owners	Cross-sectional survey	Health service use, blood pressure, cognitive status	There were no differences between pet owners and pet non-owners on the physical or mental health measures or in Medicare visits to general practitioners or specialists.
Parslow[19]	Random sample of 5079 Australian adults aged 40–44 and 60–64 years; 2892 were pet owners	Cross-sectional survey	Risk factors for heart disease, health status	Pet owners had higher diastolic blood pressure than pet non-owners; there were no differences in systolic blood pressure. Pet owners also had higher body mass index, were more likely to smoke, and undertook milder physical activity compared than pet non-owners.
Parslow[20]	Random sample of 2551 Australian adults aged 60–64 years; 1240 were pet owners	Cross-sectional survey	Quality of life, personality, medication use, health service use	Pet owners had poorer physical and mental quality of life scores and higher rates of use of pain relief medication compared with pet non-owners. There was no relationship between pet ownership and number of general practitioner visits.
Headey 2007[21]	Data from national surveys in Germany (n = 9723) and Australia (n = 1246)	Longitudinal surveys	Health service use	Pet owners made about 15% fewer annual doctor visits than pet non-owners, even after controlling for gender, age, marital status, income, and other variables related to heath.
Anderson[23]	5641 attendees at a screening clinic; 784 were pet owners	Cross-sectional survey	Heart disease risk factors and physical exercise behavior	Men: pet owners had lower plasma cholesterol, triglycerides, and systolic blood pressure than pet non-owners. Women >40 years old: pet owners had lower systolic blood pressure than pet non-owners. Dog owners exercised more than owners of other pets and pet non-owners.

Bauman[25]	894 adults in New South Wales, Australia	Cross-sectional survey	Dog walking hours per week	Dog owners walked 18 minutes per week more than dog non-owners. More than half of the dog owners did not walk their dogs and were less likely than dog non-owners to meet recommended physical activity levels for health benefits.
Dembicki[22]	127 senior citizens attending a meal program; 44 were pet owners	Cross-sectional survey	Heart disease risk factors and physical exercise behavior	Pet owners had lower serum triglyceride levels than pet non-owners Dog owners walked more than dog non-owners.
Siegel[16]	938 Medicare enrollees in a health maintenance organization; 345 were pet owners	Cross-sectional study	Medical contacts	Pet owners had fewer medical visits and patient-initiated medical contacts than pet non-owners. Psychosocial distress was correlated with number of medical contacts among pet non-owners but not among pet owners.
Friedmann[27]	92 patients in a coronary care unit; 53 were pet owners	Longitudinal cohort	Survival rates	Greater 1-year survival rate for pet-owners than for pet non-owners. Pet ownership was an independent predictor of survival after controlling for disease severity and social support.
Siegel[17]	708 HIV-positive homosexual and bisexual men; 361 were pet owners	Cross-sectional survey	Depression	Pet owners were less depressed than pet non-owners.
Friedmann[28]	369 patients who had ventricular arrhythmias after myocardial infarction; 103 were pet owners	Longitudinal cohort	Survival	Pet ownership and social support were independent predictors of 1-year survival after controlling for disease severity. Dog ownership was a predictor of survival after controlling for disease severity and social support.
Rajack[29]	454 patients admitted to a hospital for a myocardial infarction; 163 were pet owners	Longitudinal observational	6-month survival, hospital readmission	Pet ownership did not predict survival. Cat owners were more likely than pet non-owners to be readmitted for further cardiac problems or angina.
Raina[30]	1054 adults $\geq$ 65 years old; 286 were pet owners	Longitudinal survey	Deterioration in daily activities	Pet owners had smaller decreases in daily living activities than pet non-owners.

One classic earlier article is included because of its importance.

Differences in pet ownership patterns or culture may be responsible for the apparent discrepancies in the results of these surveys.[18–20,22,23] Pet ownership was more common among participants in some of the populations than in others, and the pet species was not always reported.

An important question is whether pet ownership causes better health or better health encourages pet ownership. A landmark study directly demonstrated the positive impact of obtaining a pet on a person's health by comparing the physical and mental health status of people who adopted pets from a shelter and a control group over a 6-month period.[24] Compared with the control group, adopters experienced significantly fewer minor health problems including headaches, hay fever, and painful joints, and decreases in mental health problems associated with ill health after adopting the pets (**Fig. 1**).

Pet ownership may protect people from developing coronary heart disease or slow its progression. Pet owners had lower levels of cardiovascular risk factors such as serum triglyceride and blood pressure than nonowners in two population surveys[22,23] but not in two others.[18–20] Dog owners exercised more than other study participants.[22,23,25] Furthermore, the walking that people do with their dogs may be more stimulating to the cardiovascular system, as indicated by a higher heart rate variability, than walking alone.[26]

Many longitudinal studies have demonstrated the association of pet ownership with cardiovascular health and functional status (**Table 2**). In a groundbreaking study, pet ownership was associated positively with 1-year survival of patients admitted to a coronary care unit (**Fig. 2**).[27] In a larger study, pet ownership, and dog ownership in particular, was associated with increased 1-year survival rates in patients hospitalized for coronary heart disease, even after accounting for disease severity and social support.[28] Dog owners were approximately 7.6 times more likely than those who did not own a dog to be alive at 1 year; cat ownership was not related to survival.[28] Cat owners were more likely than people who did not own pets to be readmitted within 6 months for further cardiac problems or angina, suggesting that cat ownership might have a different health impact than dog ownership.[29] The difference between dog and cat owners is inconclusive; it may be caused by confounding factors[28] or be a spurious statistical association.[29] In a separate longitudinal study, older adults' ability to complete activities of daily living decreased less in 1 year among dog and cat owners than among nonowners.[30]

Dog and cat ownership might have different associations with health status, as evidenced by cross-sectional[22,23,25,31] and longitudinal studies.[16,24,28,29] For example, cats, but not dogs, provided significant social support to their HIV-positive owners.[31] The mechanisms for differences in health status of dog and cat owners, as well as which aspects of health might be affected differentially by these animals, remain to be evaluated. One contributor to enhanced health, exercise, does differ with the pet type. Acquiring a dog led to significant increases in exercise compared with acquiring a cat or not acquiring a pet (**Fig. 3**).[24] As noted previously, several surveys indicate that dog owners exercise more than owners of other pets or pet nonowners.[22,23,25]

It is possible that pet species differ in their contributions to their respective owners' health, and this possibility raises questions about individual differences that may influence a person's choice of a pet. Lifestyles may influence an individual's choice of a pet, rather than result from acquiring a particular type of pet.[24] Differences between dog and cat owners generally were limited to the amount of exercise the individuals engage in.[22,23] There are insufficient data from owners of other species to explore differences in the effects of these pets on human health.

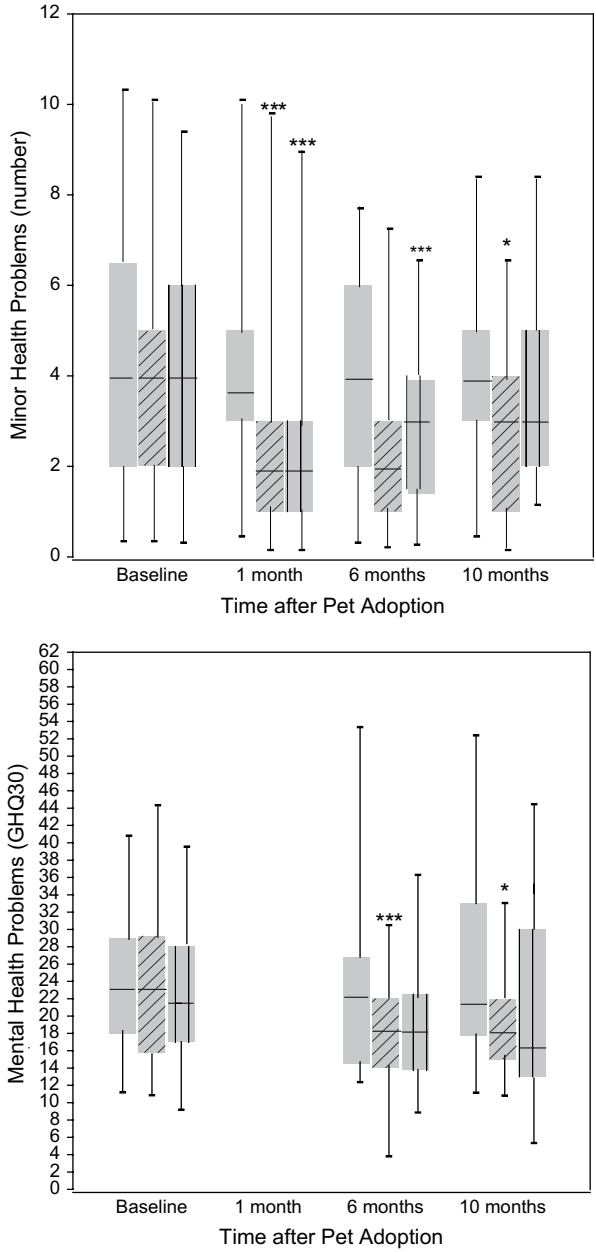

Fig. 1. Changes in reported incidence of minor health problems (*upper graph*) and mental health problems as measured with the General Health Questionnaire 30 (*lower graph*) showing median and upper and lower quartiles and minimum and maximum scores at the time of pet adoption (baseline) and 1, 6, and 10 months after pet adoption. (Significant reductions from baseline values are indicated as ***, $P < .0001$ and *, $P < .05$.) Solid color indicates the comparison group, hatched lines indicate dog adopters, and vertical lines indicate cat adopters. (*Data from* Serpell JA. Beneficial effects of pet ownership on some aspects of human health and behavior. J R Soc Med 1991;84:719.)

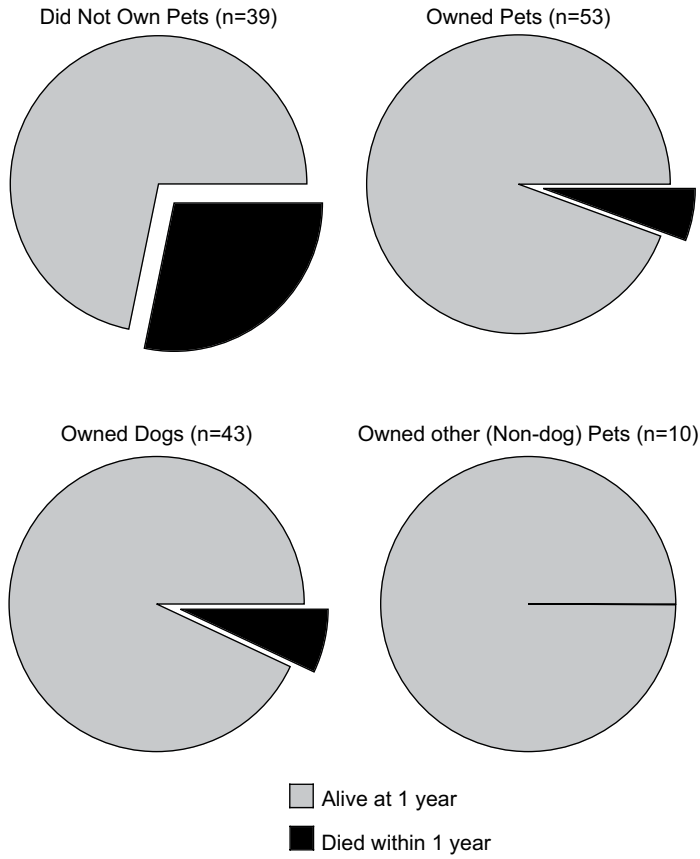

Fig. 2. One-year mortality of patients admitted to a coronary care unit according to pet ownership status at admission. Mortality was significantly lower in pet owners ($P < .01$), dog owners ($P < .05$), and dog non-owners. ($P < .05$) than in pet non-owners. (*Data from* Friedmann E, Katcher AH, Lynch JJ, et al. Animal companions and one-year survival of patients after discharge from a coronary care unit. Public Health Rep 1980;95:307–12.)

Experimental Studies of Companion Animals' Effect on Stress

Experimental studies, which provide the strongest evidence of causality, have been used to demonstrate the effects of the presence of and interaction with companion animals on stress indicators and on stress responses (**Table 3**). Many of these studies compared people's physiologic responses or behaviors when a pet or friendly animal, usually a dog, was or was not present. These studies examined differences over the short term during specific tasks. Only studies published from 1990 to the present are included here; earlier studies are reviewed elsewhere.[2]

Looking at or observing familiar animals or a pet was associated with decreased stress indicators for people who were familiar with the animals. The blood pressure and heart rate of chimpanzee caretakers and a snake owner were lower when watching chimpanzees[32] or a pet snake, respectively, than during periods of relaxation without the animal present.[33] In contrast, heart rate and muscle tension tended to decrease and skin temperature tended to increase among older people watching a videotape of tropical fish swimming in an aquarium compared with watching live

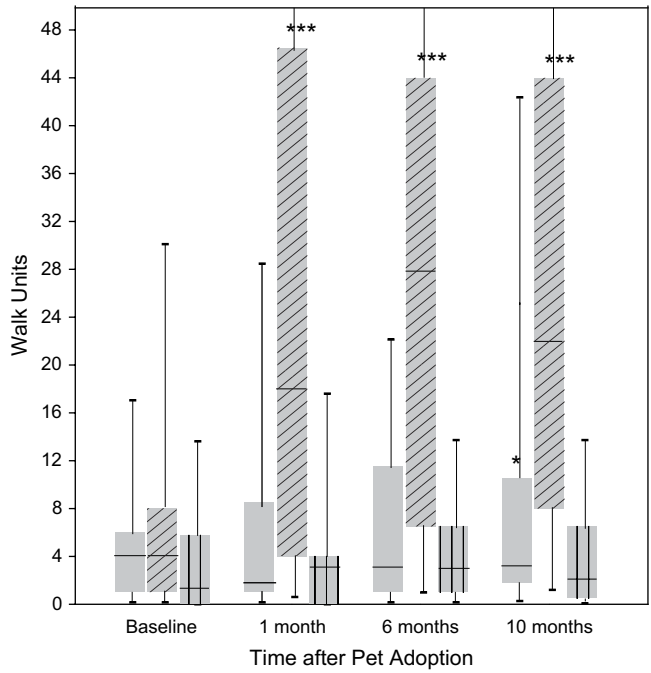

Fig. 3. Changes in reported walking units showing median and upper and lower quartiles and minimum and maximum scores at the time of pet adoption (baseline) and 1, 6, and 10 months after pet adoption. (Significant reductions from baseline values are indicated as ***, $P < .0001$ and *, $P < .05$). Solid color indicates the comparison group, hatched lines indicate dog adopters, and vertical lines indicate cat adopters. (*Data from* Serpell JA. Beneficial effects of pet ownership on some aspects of human health and behavior. J R Soc Med 1991;84:719.)

fish swimming in an aquarium or a placebo videotape. Study participants reported each stimulus as very relaxing.[34]

Touching or interacting with animals did not influence cardiac response uniformly, even with familiar animals. The blood pressure of people who did not own snakes and were not fearful of them did not differ while touching a snake and when relaxing or looking at the snake;[35] the blood pressure of a snake owner was lower when touching the snake than when watching it or during a relaxation period without the animal.[33] Despite their fondness for and lack of fear of the chimpanzees, the blood pressures and heart rates of the chimpanzees' caretakers were higher when touching or tickling the chimps through a barrier than when watching them or relaxing without the animals present.[32]

The presence of a friendly animal can moderate stress responses. Because cardiovascular stress responses vary considerably from person to person, repeated measures studies, which permit comparison of a person's response to multiple conditions, provide the best estimates of the effect of the presence of a pet or any other intervention.[2] Numerous studies indicate that it is not necessary to own a pet to obtain stress-moderating benefits from the presence of a friendly animal. The studies comparing the responses of the same individuals in the presence of friendly animals, pets, and no animals support the benefits of an animal's presence for reducing stress

Table 3
Studies of the impact of companion animals on stress indicators and stress responses published from 1990 to the present

Author	Participants	Design	Animal-Related Situation	Outcomes	Results
Motooka[26]	13 healthy volunteers	Experimental crossover design	Walking for 30 minutes with and without study dog; a subset was monitored at home, including periods of free interaction with the dog	High-frequency power values of heart rate variability	Heart rate variability increased during dog walking and was more pronounced during succeeding dog walks. At home, heart rate variability was 1.87 times greater when the dog was present and was 1.57 times greater than when walking the dog.
Eddy[32]	One chimpanzee caretaker and eight assistants	Experimental design	Touching and watching chimpanzees	Blood pressure, heart rate	Blood pressure and heart rates of a caretaker and research assistants were lower while watching the animals than during a relaxation period without the animal present.
Eddy[33]	One snake owner	Case study	Touching and watching a snake	Blood pressure	Blood pressure of the owner was lower during the snake-touching period than during the relaxation and snake-viewing periods that preceded it.
DeSchriver[34]	27 residents of a publicly subsidized housing unit	Experimental three-group pre- and posttest design	Watching a fish aquarium or a fish videotape or a placebo videotape	Heart rate, skin temperature, and muscle tension	There was a greater decrease in heart rate and muscle tension and an increase in skin temperature in the group watching the aquarium videotape than in the other groups. Participants in each group reported that the experience was relaxing.
Alonso[35]	Five persons who did not fear snakes	One group repeated measures	Holding the snake, watching the snake, or relaxing	Blood pressure, heart rate	Blood pressure and heart rates did not differ when holding snake, watching snake, or relaxing.

Friedmann[36]	11 community-living older adults	Experimental two-group crossover	Resting with dog present or absent and talking about daily activities	Blood pressure	Blood pressure during social stressor was 7 mmHg/2 mmHg lower when the dog was present than when the dog was absent.
DeMello[37]	50 normotensive adults	Experimental three-condition design, repeated measures	Cognitive tasks with friendly dog or goat absent, present with visual interaction, or present with tactual interaction	Blood pressure, heart rate	There was greater decrease in blood pressure and heart rate after the cognitive stressor if animal was present than if absent. There was greater reduction with visual versus tactual interaction.
Friedmann[38]	213 undergraduate students	Experimental two-group design, repeated measures	Dog present while resting and while reading aloud	Blood pressure, heart rate	Cardiovascular stress responses with dog present were lower for people who had a more positive attitude toward dogs than for those who had a more negative attitude.
Havener[39]	40 pediatric dental patients	Experimental design, repeated measures	Petting a dog while awaiting dental surgery	Behavioral distress and skin temperature	Petting dog was associated with higher skin temperature while waiting for surgery among distressed patients but not among those who were not distressed.
Wells[40]	100 volunteers	Experimental, repeated measures	Videotapes of animals were shown to participants	Blood pressure, heart rate	Blood pressure and heart rate were lower during a moderately stressful activity after viewing videos of birds, primates, and fish than after viewing control videos.

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Author	Participants	Design	Animal-Related Situation	Outcomes	Results
Rajack[29]	30 women who owned dogs and 30 women who did not own dogs	Quasi- experimental two-group design, repeated measures	The presence of an animal	Heart rate, blood pressure	The heart rate and blood pressure of dog owners with their dogs present and of dog non-owners did not differ while running up and down stairs or reading aloud. Dog owners had a greater heart rate response to hearing the alarm clock.
Kingwell[41]	35 volunteer dog owners and 37 volunteer dog non-owners	Experimental two-group design, repeated measures	A friendly but unfamiliar dog was assigned randomly to the first or second half of the study	Heart rate, blood pressure, cardiac autonomic function	The presence of the dog did not influence blood pressure or heart rate either at rest or during mild mental stress. Cardiac autonomic profile was best for the dog owners with the dog present and without the dog present for the dog non-owners.
Allen[42]	45 women	Experimental three-group design, repeated measures	The presence of a dog, a friend, or no one	Cardiovascular stress responses (combination of blood pressure, heart rate, skin conductance)	Cardiovascular reactivity was reduced with the dog present versus another person, even when the person was chosen by the subject to provide support.
Allen[43]	240 married couples	Experimental four-group design, repeated measures	Participants were assigned randomly to be alone, with pet or friend (for pet non-owners), with spouse, or with spouse and pet or friend. Participants completed mental arithmetic and cold pressor tests.	Blood pressure, heart rate	Pet owners had lower resting blood pressure and smaller blood pressure increases during cold pressor tests and mental arithmetic than pet non-owners. Among pet owners, the responses to the stressful tasks were smallest when the pet was present.

Straatman[44]	36 male students 18–30 years old	Experimental two-group design, repeated measures	A friendly but unfamiliar dog sat on participants' laps during preparation and delivery of a videotaped and locally televised speech	Blood pressure, heart rate, state of anxiety	Anxiety, blood pressure, and heart rate of those with the dog on their lap and the control group members did not differ during the preparation and the speech periods, even after controlling for the effects of daily stress.
Allen[45]	48 hypertensive patients in high-stress occupations	Experimental pre- and posttest design, repeated measures	One group was assigned to get a pet, the other was not. All participants received angiotensin-converting enzyme inhibitors.	Blood pressure, heart rate, and plasma rennin activity	The groups' cardiovascular responses to mental stress did not differ before intervention; 6 months later, the stress responses were lower in those who received pets than in those who did not. In both groups, resting blood pressure was lower 6 months after the interventio but did not differ between groups.

responses.[2] In a group of 11 community-living older adults who had mild hypertension, blood pressures while talking about their daily lives were 7 mmHg/2 mmHg lower with a companion animal present than without a companion animal present.[36] The blood pressures and heart rates of normotensive adults decreased more after a cognitive stressor if a friendly goat or dog was present than if it was not present.[37] Individuals' stress responses to the presence of animals varied according to attitudes toward animals and the situation. Cardiovascular stress responses with a dog present were significantly lower for people with a more positive attitude toward dogs than for those with a less positive attitude.[38] Among pediatric patients waiting for dental surgery, petting a dog was associated with lower physiologic arousal, as assessed by finger skin temperature, for children who indicated distress but not for children who were not distressed.[39] An elegant study, in which blood pressure and heart rate were lower during a moderately stressful activity after viewing videos of birds, primates, or fish than after control conditions, demonstrated the potential for many species to reduce stress responses.[40]

Evidence for moderation of the stress response by the presence of a friendly companion animal is less consistent when comparing different individuals' responses to the animal's presence. Blood pressure and heart rate responses to a number of everyday mild stressors did not differ between dog owners with their dogs present and nonowners.[29,41] The cardiovascular stress response to a standard laboratory stress task, however, was lower for subjects who had a friendly but unfamiliar dog present than for those who had another person present, even when the person was chosen by the subject to provide support.[42] Extending this study, the cardiovascular stress responses of married pet owners were smaller when only their pet was present than in several other conditions, including the presence of the spouse.[43]

In some instances, interaction with an animal may interfere with task completion and even increase stress rather than moderating it. Placing an unfamiliar small dog in the laps of men preparing for and presenting a 4-minute videotaped and locally televised speech did not lead to lower cardiovascular stress responses than in men without a dog in their lap.[44] The reduction in blood pressure after a cognitive task was greater when the person observed an unfamiliar dog or goat than when the person interacted with the animal.[37]

In a small clinical trial, adding a pet to a nonowner's life improved the new owner's health status. Men in a high-stress occupation who had hypertension and who were willing to keep pets were assigned randomly to obtain dogs or cats (therapy group) or not (control/usual care group). All patients received an angiotensin-converting enzyme inhibitor for hypertension. Resting blood pressures of all participants were lower after 6 months. Although the cardiovascular responses to mental stress did not differ in the groups before intervention, 6 months later the stress responses were lower in pet owners than in nonowners (**Fig. 4**).[45] This study provides the strongest evidence for direct health benefits from acquiring a pet among people who were willing to do so.

THERAPY ANIMALS

People who do not own pets or are temporarily in living situations that preclude them from having pets can still benefit from visits with therapy animals (**Table 4**). Therapy animals usually are personal pets that accompany their owners to provide supervised, goal-directed interventions to clients in hospitals, nursing homes, schools, and other therapeutic sites. Several terms are used to describe these activities including "animal-assisted activities," "animal-assisted therapy," "pet therapy," and "pet

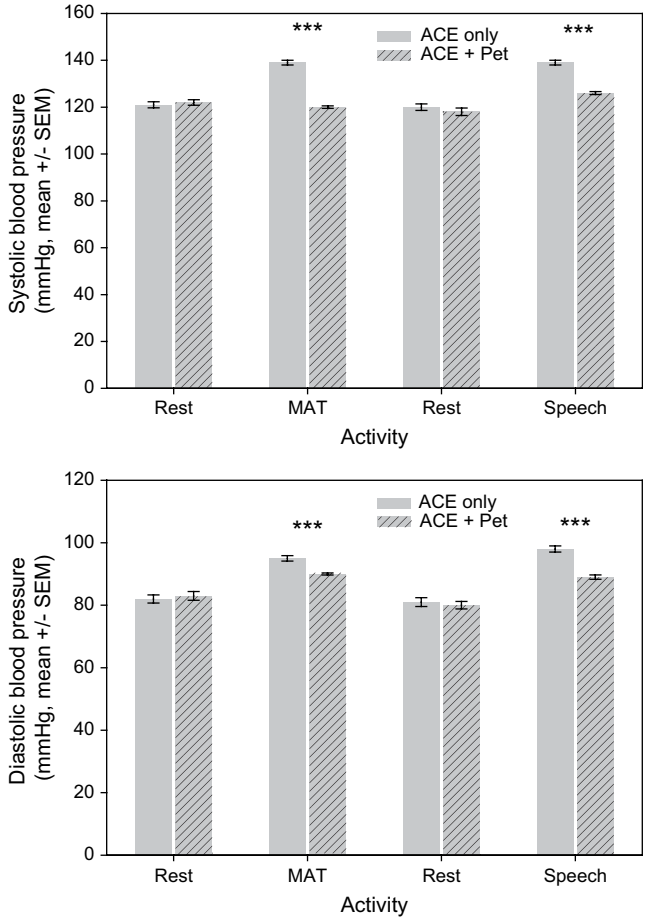

Fig. 4. Systolic and diastolic blood pressure at rest and while performing two stressful tasks, performing mental arithmetic (MAT) and speaking: (Speech), 6 months after the initiation of the angiotensin-converting enzyme inhibitor (ACE) therapy in 48 hypertensive adults; half of whom were assigned randomly to obtain pet dogs or cats in addition to taking ACE inhibitors. ***, $P < .001$. (*Data from* Allen K, Shykoff BE, Izzo JL. Pet ownership, but not ACE inhibitor therapy, blunts home blood pressure responses to mental stress. Hypertension 2001;38:815–20.)

visitation.'' ''Animal-assisted activities'' and ''animal-assisted therapy'' are the preferred terms. These terms have distinct meanings, as described in the following sections.

Animal-Assisted Activities

Animal-assisted activities provide motivational, educational, recreational, and/or therapeutic opportunities to enhance quality of life for groups or individuals.[46] The goals of animal-assisted activities most frequently address enhancing the social interaction or mood of individuals in an institutional setting. The benefits of animal-assisted activities are similar to those of owning a pet: improved mood[47] and decreased physiologic distress,[46,48–50] depression,[46,47] and loneliness.[51,52] The animal-assisted activities

Table 4
Studies of the effects of therapy animals published from 1990 to the present

Author	Participants	Design	Animal-Related Situation	Outcomes	Results
Lutwack-Bloom[47]	68 residents in two long-term care settings	Experimental pre- and posttest design, repeated measures	One group received visits from volunteers with a dog. The control group was visited by a person only.	Mood changes and depression	People receiving visits from volunteers with a dog had improved moods. There were no differences in depression.
Barker[48]	20 health care professionals	Experimental design, repeated measures	Visits with a therapy dog (20- versus 5-minute visits) compared with 20 minutes of rest	Serum cortisol, epinephrine, norepinephrine, salivary cortisol and IgA, and lymphocyte count	There were reductions in serum and salivary cortisol when the dog was present. There was no difference between 5-minute and 20-minute visits.
Cole[49]	76 inpatients who had advanced heart failure	Experimental three-group design, repeated measures	Therapy dog accompanied by a visitor compared with a visitor only or no visitor	Hemodynamic measure, neurohormone levels, and state anxiety	The dog group had greater decreases in systolic pulmonary artery and pulmonary capillary wedge pressures and anxiety levels than the visitor -only group and than the no-visitor group. The dog group had greater decreases in epinephrine and norepinephrine levels than the no-visitor group.
Orlandi[50]	178 oncologic patients	Quasi-experimental pre- and posttest design	Patients chose whether to have chemotherapy in the animal-assisted activities room or in the adjoining room	Anxiety, depression, somatic symptoms, arterial blood pressure, heart rate, and arterial oxygen saturation	Depression improved only in the animal-assisted activities group. Arterial oxygen saturation improved in the animal-assisted activities group but worsened in the control group.

Souter[46]	Five studies	Meta-analysis	Animal-assisted activities and animal-assisted therapy	Depression	Both animal-assisted activities and animal-assisted therapy reduced depression.
Bouchard[51]	27 pediatric oncology patients	1-year pilot project	Animal-assisted therapy with a dog present at the child's bedside for 8 hours	Client's satisfaction	Parents reported that with animal-assisted therapy, their child gained confidence, developed a friendship with the animal, and was happier. Nurses used the children's relationship with the dogs to encourage acceptance of their therapy.
Banks[52]	38 elderly persons in long-term care facilities	Experimental study	Receiving animal-assisted therapy or a robotic dog	Loneliness	Both the animal-assisted therapy and robotic dog groups were less lonely than the control group after therapy.
Banks[54]	45 residents of three long-term care facilities	Experimental three-group design	One or three animal-assisted therapy sessions per week compared with no animal-assisted therapy.	Loneliness (Version 3 of the UCLA Loneliness Scale)	Animal-assisted therapy reduced loneliness. There was no difference between the groups receiving one and three animal-assisted therapy sessions per week.
Sobo[53]	25 children in a tertiary care children's hospital	Pre- and posttest and a descriptive pilot study	Animal-assisted therapy during the child's hospitalization along with standard pharmacologic pain management. The patient decided whether to have an animal visit and the duration of the visit.	Pain perception	Animal-assisted therapy reduced perceived pain. Animal-assisted therapy may distract children from pain-related cognition and activate comforting thoughts related to companionship or home.

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Table 4
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Author	Participants	Design	Animal-Related Situation	Outcomes	Results
Bernstein[55]	33 nursing home patients	Quasi-experimental study	Animal-assisted therapy with shelter animals brought by volunteers to group sessions compared with session of arts and crafts and snack bingo	Frequency and rates of social behaviors including conversation types and touch	During animal-assisted therapy, residents conversed with others, including the animals, as much as or more than residents receiving non–animal-assisted therapy and were more likely to initiate and to participate longer in conversations. Touching animals during animal-assisted therapy added to resident engagement in and initiation of this behavior.
Fick[56]	36 nursing home residents	Experimental study	The presence or absence of a dog during a discussion group	The frequency and types of social interactions	There was a significant increase in verbal interactions among residents when the dog was present.
Kramer[57]	18 female nursing home residents who had dementia	Experimental three-group crossover design, repeated measures	Visitor with a dog, visitor with a robotic dog, and a visitor alone	Social behaviors	Both the dog and robotic dog stimulated resident social interaction beyond that stimulated by the visitor alone.
Richeson[58]	15 nursing home residents who had dementia	Quasi-experimental pre- and postest series design with three phases	Participants interacted with the dog, reminisced about past pets, and talked to the handler and staff	Agitated behaviors and social interactions	Agitated behaviors decreased, and social interaction increased from pretest to posttest
McCabe[59]	22 patients in the Alzheimer unit of an extended health care facility	Within-participants repeated-measures design	The therapy dog was present in common areas and residents' rooms from morning to evening, except for mealtimes.	Agitation behaviors (Nursing Home Behavior Problem Scale)	Participants on the day shift showed fewer problem behaviors than those on the evening shift.

LaFrance[60]	One 61-year-old male patient who had aphasia	Case study, experimental repeated measures	Therapy dog accompanied patient on walk back to the ward after an animal-assisted therapy session	Overt social-verbal and social-nonverbal communication	The presence of the dog increased participant's social-verbal and social-nonverbal behavior.
Anderson[61]	Six children who had severe emotional disorders	Qualitative study, observation	A dog in the self-contained classroom	Emotional stability and learning	The dog contributed to children's overall emotional stability, improved attitudes toward school, and facilitated learning lessons in responsibility, respect, and empathy.
Esteves[62]	Three 5-to 9-year-old children who had developmental disabilities and their teacher	Case studies with repeated measures	Presence of an obedience-trained dog	Categorized social behaviors: positive/ negative, verbal/ non-verbal, and initiations/responses	Increase in overall positive initiated behaviors toward both the teacher and the dog and overall decrease in negative initiated behaviors. Social responsiveness in the classroom improved following the sessions.
Bardill[67]	30 adolescents hospitalized in a psychiatric unit	Ethnographic approach	Spontaneous interactions with a dog that was a 24-hr/d resident of the unit	People's perceptions about a given experience	The dog served as a catalyst for interactions and often was ascribed human qualities by the participants.
Barker[63]	35 adult psychiatric patients scheduled for electroconvulsive therapy	Quasi-experimental two-group design	A 15-minute session with animal-assisted therapy or a magazine before the scheduled electroconvulsive therapy	Anxiety, fear, and depression by using visual analog scales	Animal-assisted therapy reduced fear by 37% and anxiety by 18%. Animal-assisted therapy had no demonstrated effect on depression.
Barak[64]	20 elderly schizophrenic patients	Experimental two-group design	The use of cats and dogs for animal-assisted therapy or a news reading/discussion group without animal-assisted therapy	Mobility, interpersonal contact, communication, and activities of daily living (Scale for Social Adaptive Functioning Evaluation)	Total and social functioning subscale scores on the Scale for Social Adaptive Functioning Evaluation improved in the animal-assisted therapy group but not in the control group.

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Table 4
(*continued*)

Author	Participants	Design	Animal-Related Situation	Outcomes	Results
Sockalingam[65]	Atypical depression in an assault victim with subsequent head injury	Clinical case study	The patient spent several hours each day with a dog over a 3-week period	Psychiatric rehabilitation	Animal-assisted therapy was effective in the psychiatric rehabilitation of an assault victim with a concurrent mood disorder.
Prothmann[68]	100 children and adolescents who had undergone inpatient psychiatric treatment	Quasi -experimental design	Each member of the treatment group had therapy dog for 30 minutes, once a week, for 5 weeks	State of mind, including vitality, intra-emotional balance, social extroversion, and alertness (Basler Befindlichkeits-Skala)	State of mind improved in the animal-assisted therapy group but not in comparison group.
Schultz[69]	63 child victims of intrafamily violence	One group; pre- and posttest design	Equine-assisted psychotherapy; learned horse grooming and practiced over 19 sessions	General level of functioning in a health–illness continuum (Children's Global Assessment of Functioning Scale)	Improvement in level of functioning was correlated with the number of sessions given.
Bizub[70]	Five persons who had longstanding histories of psychiatric disabilities	Qualitative study	Participants in a therapeutic horseback riding program for 10 weeks	The riders' experiences	By the end of the program, the riders reported augmented sense of self-efficacy and self-esteem.
Burgon[71]	Six women who had various mental health problems	Case study	Participants received weekly equine riding therapy	The riders' experiences from the therapy	The participants showed increased confidence and self-concept. The therapy aided social stimulation and led to acquisition of transferable skills.

Limond[72]	Eight children who had Down syndrome	Experimental, counter-balanced, repeated measures design	Two conditions per session per child for 7 minutes: real dog versus imitation dog	General social behaviors (ie, looking at and responding to the adult and initiating social behaviors)	The real dog provided a more sustained focus than the imitation dog for positive and cooperative interactions with the dog and the adult.
Martin[73]	10 children who had pervasive developmental disorders	Experimental repeated-measures design	Presence of a therapy dog, a stuffed dog, or a ball while interacting with a therapist	Behavioral and verbal dimension of prosocial and nonsocial interaction	In the presence of a therapy dog, children showed a more playful mood, were more focused, and were more aware of their social environments.
Gee[74]	14 language-impaired and typical preschool children	Experimental, repeated measures	The presence of a therapy dog or no dog	Gross motor skills tasks	Children completed the tasks faster with the dog present than with the dog absent. The dog served as an effective motivator for the children.
Tissen[75]	230 third-grade children and nine teachers	Experimental three-group design, repeated measures	Three conditions: social training without dogs, social training with dogs, and dog present without social training	Social behavior, empathy, and aggression	Students' social behavior improved in all programs. Relational aggression improved in both dog groups but worsened in the group without the dog. Victim of aggression improved in the social training with dog group only.

also led to reduced perceptions of pain in children after surgery.[53] Animal-assisted activities also affect recipient behaviors by facilitating social interaction.[54–58] Both resident[59] and visiting[58] dogs reduced agitation behavior in a nursing home Alzheimer's unit.[49] Animal-assisted activities with individuals generally were more effective than animal-assisted activities with groups for improving social interaction and mood.[2]

Animal-Assisted Therapy

Animal-assisted therapy involves using animals as an integral part of a therapeutic treatment process.[46] These interventions are effective for adults and children who have psychiatric or developmental disabilities. Animals are used as co-therapists to facilitate psychotherapy or provide specific types of therapeutic interventions such as improving motor skills[60] or behavior.[61,62] Introducing dogs into psychotherapeutic interactions with psychiatric patients was effective in decreasing patient fears[63] and enhancing socialization, activities of daily living, and quality of life of adults.[64,65] Observing how children relate to animals can enrich the understanding of their current stage of development[66] and can be used to advantage in choosing appropriate therapeutic interventions. Animal-assisted therapy has been effective as a catalyst for psychotherapeutic interaction with adolescents.[67] Animal-assisted therapy sessions separate from other therapeutic interventions were effective in improving state of mind among children and adolescent psychiatric patients.[68] Therapeutic interactions with horses that included riding and caring for the animals improved confidence and self-esteem, and these improvements transferred to other areas of abused children's[69] and psychiatric patients' lives.[70,71] Animal-assisted therapy was particularly effective as an adjunctive educational intervention for improving classroom behavior of children who had emotional or developmental disabilities.[61,62,72,73] For children who had disabilities, animal-assisted therapy also was effective as a classroom adjunct for improving motor skills of preschool children[74] and teaching empathy to school-aged children.[75]

Assistance Animals

Assistance animals are trained to perform tasks for the benefit of individuals who have a variety of disabilities[76] including hearing loss,[77–79] physical disabilities,[79–81] emotional disabilities,[82] seizures disorders,[83] and diabetes.[84] Based on their importance in the functional lives of their disabled owners, Title III of the Americans with Disabilities Act of 1990 mandates that assistance or service animals be accepted in public facilities where other animals are forbidden.[79,82]

Assistance animals increase their owners' ability to function in the able-bodied world by facilitating increased exercise and mobility (**Table 5**). In telephone interviews, 81% of 404 blind owners of guide dogs reported improved mobility after obtaining the dog.[85] Adults who had spinal cord injuries who received assistance dogs reported perceptions of increased physical fitness 6 months after obtaining the dog.[81]

In addition to providing the services for which they are trained, assistance animals improve the psychosocial health of their users by decreasing their anxiety,[77,86] depression, and loneliness[78–81] and increasing their social support[78,81,85,86] and self-esteem.[79–81] Assistance dog recipients also experienced enhanced perceptions of health,[86] independence,[77,81,85] and feelings of safety.[78,79]

Special Considerations for Care of Assistance Animals

Assistance animals require special attention from their veterinarians. Although the assistance animal improves the life of the user, this role may impinge upon the animal's welfare. Dogs with hereditary disabilities such as hip dysplasia may not be able to

carry out their functions as the user's mobility increases. The animal's stress level may result in poor health, inability to meet functional expectations, and deterioration of the user–assistance animal relationship. Veterinarians and their staff must be vigilant for signs of stress or overwork in assistance animals and query the user for signs of deterioration in the user–dog relationship. Client education can be effective in reducing stress and enabling a continued working relationship.

If veterinary care requires an assistance dog to be hospitalized or removed from its normal working role, the change will have major impact on the client's function and physiological status. Because the assistance animal reduces or eliminate the user's need for both paid and unpaid assistance,[80] even temporary loss of the assistance animal's role will require changes in the client's self-care. Interim arrangements for the client's well being may require consultation with social service agencies and families and delay both the initial veterinary consultation and the initiation of recommended therapy. The veterinarian's recognition of the client's difficulty in this situation is of utmost importance, because the situation may lead to extreme client distress.

ZOONOSES

Zoonotic diseases from companion animals, such as salmonellosis, giardiasis, cryptosporidiosis, bartonellosis, campylobacteriosis, and toxoplasmosis,[87] are a potential concern for anyone who comes into contact with animals. A thorough discussion of zoonotic diseases is beyond the scope of this article. The readers can refer to **Table 6** for a concise summary of the major zoonoses and to a number of excellent review articles on this subject.[87–92] Health care and long-term care facilities often are reluctant to allow assistance or therapy animals into their facilities because of concerns about infection, injuries, allergies, and other potential risks.[82,93] Addressing these valid concerns will minimize risk to vulnerable individuals while maximizing opportunities for patients to benefit from these animals.

Zoonotic diseases are of particular concern for persons who are immunocompromised. Individuals whose immune systems are compromised because of age, pregnancy, HIV/AIDS, or immunosuppressive therapy are more susceptible to zoonotic infection and are more likely to suffer serious sequelae or death as a result of infection.[87,91,92] Most pets pose little threat of transmission of zoonoses to people, however.[87] In most cases people and animals acquire zoonotic infections from the environment simultaneously and independently, not from each other.[87] Client education is extremely effective in reducing the risk from zoonotic diseases, even for high-risk individuals such as the immunocompromised.

Normal precautionary measures, such as hand washing after contact with any pet (including fish, reptiles, birds, and small rodents) and before handling food and avoiding contact with animal feces, will prevent transmission of most zoonoses. Avoidance of cat scratches or bites can prevent transmission of bartonellosis, which is carried by about 40% of pet cats without any sign of illness.[87] A person who is immunocompromised should have someone else clean litter boxes and cages/habitats.[91,94] Scooping cat litter boxes daily and placing them away from food-preparation areas will minimize household exposure to fecal material. Lining litter boxes and birdcages with disposable liners and discarding the liners weekly also minimizes exposure to feces. Transmission of infections to high-risk individuals from fish can be prevented by wearing gloves while cleaning aquariums or handling fish. Reptiles present a significant risk of zoonotic transmission of *Salmonella* infections. If high-risk individuals must keep reptiles, wearing protective gloves when touching the animals or cleaning their cages reduces the risk of zoonoses.[94,95]

Table 5
Studies of the effects of assistance animals published from 1990 to the present

Author	Participants	Design	Animal-Related Situation	Outcomes	Results
Guest[77]	51 deaf or hard-of-hearing persons	One group, longitudinal	A hearing dog trained for a number of sounds was placed with each of the participants	Tension, depression, aggression, vigor, fatigue, confusion, and overall mood disturbance	Participants reported reductions in hearing-related problems such as improved response to environmental sounds; reduced tension, anxiety, and depression; and improved social involvement and independence.
Hart[78]	39 deaf persons with hearing dogs and 15 prospective owners	Cross-sectional survey	Participants were asked to answer the outcome variables regarding a hearing dog	Loneliness, changes in social interactions, and life stress	Owners felt safer and were less lonely after obtaining their dog. Owners also felt the dogs changed their interactions with the hearing community and neighbors; few prospective owners foresaw these effects.
Valentine[79]	24 owners of service dogs and seven trainers	Cross-sectional survey	Questionnaires and interviews about a service dog	Psychosocial benefits a nd liabilities of service dog ownership	Respondents reported feeling less lonely, less depressed, more capable, safer, more assertive, more content, more independent, and having increased self-esteem.
Allen[80]	48 persons who had severe and chronic ambulatory disability requiring wheelchairs	Randomized clinical trial	Experimental group members received trained service dogs 1 month after the study began	Physiologic, social, demographical, and economical improvement	Dog recipients had increases in self-esteem, internal locus of control, and physiologic well being within 6 months of receiving dogs. School attendance and employment increased, and the amount of assistance needed decreased.

Rintala[81]	22 adults who had spinal cord injuries	Qualitative and quantitative methods: one group pre- and posttest compared with a retrospective group	The placement of a service dog with individuals who had mobility impairments	Expectations, perceived benefits and negative aspects, and satisfaction with service dogs	Participants with dogs reported perceptions of increased physical fitness 6 months after obtaining dogs. Self-esteem, mobility, safety, frequency of public outings, contacts with others in public, and feeling needed and independent also increased.
Strong[83]	10 patients who had epilepsy with tonic-clonic seizures	One group longitudinal	The placement of seizure-alert dogs	Seizure frequency	There was a reduction in seizure frequency 12–24 weeks after receiving a dog compared with the 12 weeks before receiving the dog. Only one patient showed no improvement.
Whitmarsh[85]	404 visually impaired owners of guide dogs and 427 visually impaired non-owners of guide dogs	Cross-sectional survey	Quantitative and qualitative questions about guide dogs	Perceptions of guide dog ownership among owners and non-owners	Guide dog owners reported increased mobility, independence, walking, security, companionship, friendliness from others, and offers of help after obtaining dog. They also reported increased responsibility, inconvenience, and unwanted attention from people.
Lane[86]	57 recipients of a dog for the disabled	Cross-sectional survey	Participants completed a questionnaire regarding their dog	Satisfaction with their dog, commitment to the dog's welfare, and other life changes	Participants reported an increased sense of social integration, enhancement to self-perceived health, and an affectionate, often supportive, relationship with their dog.

Table 6
Zoonoses potentially transmitted by pets and petting/farm animals

Disease	Animal Species	Organism	Category	Transmission	Signs and Symptoms
Arthropod infections (skin mites and ticks)	Rabbits, rodents	*Sarcoptes mange mite* *Cheyletidae* *Dermanyssidae* *Macronyssidae* *Trixacarus caviae*	Parasite	Direct contact with infected animals	Temporary dermatitis Human infestation is transitory because mites do not reproduce on human skin.
Ascaridiasis (Roundworm infection)	Dogs Cats	*Toxicara canis* *Toxicara catis* *Toxascaris leonina*	Parasite	Ingestion of infective eggs in environment	Dependent on organ damaged during larval migration: visual, neurologic, or tissue damage
Bartonellosis ("cat scratch disease")	Cats	*Bartonella henselae*	Bacteria	Cat scratch, bite	Skin lesions, infection at point of injury, lymphadenopathy
Campylobacteriosis	Cats, dogs, ferrets, farm animals, horses	*Campylobacter*	Bacteria	Generally spread by eating or drinking contaminated food or water or unpasteurized milk and by direct or indirect contact with fecal material from an infected person, animal, or pet (especially puppies and kittens)	Mild to severe infection of the gastrointestinal system, watery or bloody diarrhea, fever, abdominal cramps, nausea and vomiting; a rare complication of *Campylobacter* infection is Guillain-Barre syndrome.
Cryptococcosis	Wild birds (pigeons)	*Cryptococcus neoformans*	Mycotic	Isolated from the soil, usually in association with bird droppings Inhalation of airborne yeast cells and/or basidiospores	Initial pulmonary infection usually is asymptomatic. Most patients present with disseminated infection, especially meningoencephalitis.

Cryptosporidiosis	Cats, dogs, farm animals, ferrets, horses	*Cryptosporidium*	Parasite	Fecal–oral route	Watery diarrhea, accompanied by abdominal cramps; nausea, vomiting, fever, headache, and loss of appetite also may occur. Rarely, the parasite can cause an inflammation of the gall bladder or infect the lining of the respiratory tract causing pneumonia.
Dermatophytosis (ringworm)	Cats, cows, dogs, goats, horses, pigs, rabbits, rodents	*Microsporum cani* *Trichophyton mentagrophytes*	Mycotic	Direct or indirect contact with asymptomatic animals or with skin lesions of infected animals, contaminated bedding	Often mild, self-limiting scaling, redness, and occasionally vesicles or fissures
Escherichia coli	Cows	*Escherichia coli 0157*	Bacteria	Ingestion of contaminated food, fecal–oral route	Severe, bloody diarrhea; kidney failure
Giardiasis	Dogs, ferrets	*Giardia intestinalis (Giardia lambia)*	Parasite	Ingestion of contaminated water or food, fecal–oral route	Diarrhea, fever, severe abdominal cramps
Hookworm	Cats, dogs	*Ancylostoma canium* *Ancylostoma brasiliense* *Ancylostoma tubaeform* *Uncinaria stenocephala*	Parasite	Ingestion of infective eggs or contact with contaminated soil	Pruritic skin lesions; intestinal bleeding; swelling and pain
Influenza	Ferret	*Influenza virus*	Viral	Via aerosol from infected ferret	Fever, muscle aches, headache
Mycobacteriosis	Fish	*Mycobacterium marinum*	Bacteria	Aquarium water: localized infections following access through broken skin	Skin lesions, disseminated disease in immunocompromised patients
Pasteurellosis	Rabbit rodents	*Pasteurella multocida*	Bacterial	Bites/scratches (bacteria found in mouth of animals)	Cutaneous infections, bacteremia

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Table 6
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Disease	Animal Species	Organism	Category	Transmission	Signs and Symptoms
Psittacosis	Birds	*Chlamydophila psittaci* (formerly *Chlamydia psittaci*)	Bacteria	Inhalation of dried secretions from infected birds	Fever, headache, muscle aches, and a dry cough pneumonia
Rhodococcus equi	Horses	*Rhodococcus* spp	Bacteria	*R. equi* is found readily in soil, especially where domesticated livestock graze. Infection in humans derives from environmental exposure.	Pneumonia, pulmonary abscesses
Salmonellosis	Reptiles, birds, cats, chicks, dogs, ducklings, ferrets, fish, horses, rabbits	*Salmonella*	Bacteria	Ingestion of foods contaminated with animal feces. Fecal–oral route	Acute gastroenteritis with sudden onset of abdominal pain, diarrhea, nausea, and fever. May lead to septicemia.
Tapeworm	Cats, dogs, rabbits, rodents	*Dipylidium*	Parasite	Ingestion of infected flea	Proglottids are passed in feces or are found around the anus, causing itching
Toxoplasmosis	Cats	*Toxoplasma gondii*	Parasite	Ingestion of raw or undercooked infected meat, especially pork, lamb, or raw milk containing the parasite. The parasite is shed primarily in the feces of infected cats. Humans can become infected by the ingestion of food, water, or dirt contaminated with cat feces. Toxoplasmosis also can be acquired through a transplacental infection, when an infected mother passes the infection to her fetus	Flulike symptoms, lymphadenopathy

From Hemsworth S, Pizer B. Pet ownership in immunocompromised children—a review of the literature and survey of existing guidelines. Eur J Oncol Nurs 2006;10:120–2; with permission.

The potential for transmission of food-borne or environmental zoonotic agents also should be minimized. Feeding pets only high-quality commercial pet food or fully cooked and/or pasteurized food will avoid exposure to food-borne diseases. Pets must be prevented from drinking from toilets and eating out of garbage cans or unknown locations. Keeping pets in private outdoor areas prevents them from carrying feces from other animals and environments back to their human families.[91,94]

Preventing pet diseases prevents the transmission of diseases from pets to their owners.[91,94] Enhanced preventive care is essential for pets of immunocompromised clients. This care includes annual veterinary checkups, controlling fleas and ticks aggressively, keeping vaccinations current, neutering the pet, and planning for the pet's future care.[92,94] It is essential to emphasize to the client the importance of isolating themselves immediately from pets with diarrhea and of bringing a pet to the veterinarian at the first sign of any illness. Additionally, fecal diagnostic testing for *Salmonella* spp, *Campylobacter* spp, *Giardia intestinalis*, and *Cryptosporidium* spp is indicated during routine visits and whenever a pet experiences diarrhea.[91]

CLIENT EDUCATION

Physicians have begun to recognize the importance of the human–animal bond and to understand patients' reluctance to remove pets from their homes. Physicians often are not very familiar or comfortable with discussing zoonoses, but most patients do not seek information from veterinarians about their own health.[96] Veterinarians are valuable resources to physicians who treat immunocompromised individuals. Thus collaboration between veterinarians and physicians is crucial to enable clients/patients to keep their pets and obtain the benefits pets provide while minimizing any risks to their health.[91,94]

Providing pamphlets about appropriate veterinary and human health precautions to minimize zoonotic disease transmission in physician as well as veterinary waiting rooms is an appropriate collaborative effort between veterinarians and physicians. Veterinarians must provide information about zoonosis prevention to all clients as part of routine veterinary care. Clients who are at high risk might not identify themselves. Clients who are at not at high risk may expose high-risk individuals to their pets and their homes. Veterinarians also might want to post information about national and or local organizations that help immunocompromised individuals keep their pets. A list of agencies as well as other resources can be obtained from the Healthy Pets Healthy People website at http://www.lgvma.org/hphp/hphp_text.html. The Center for Disease Control and Prevention has a free brochure, ''Preventing Infections from Pets,'' at http://www.cdc.gov/hiv/resources/brochures/print/pets.htm; it is available in Spanish at http://www.cdc.gov/hiv/spanish/resources/brochures/print/pets.htm.

SUMMARY

Research documents the positive impact of pets and animal companions on the health of their owners and of people participating in animal-assisted therapy or animal-assisted activities. In the short term, companion animals improve people's perceptions of situations and the people in them; over the longer term, pets can influence the development or progression of chronic diseases. Research demonstrates that companion animals reduce individuals' stress responses to stressful situations or environments. The support people feel from pets can be of particular value to socially isolated individuals. The veterinarian and staff play an important role in helping evaluate and maintain the health of the bond between the pet and the owner. Individuals at risk for zoonoses generally want to keep their pets and are not willing to give

them up. Communication between physicians and veterinarians, appropriate handling of pets, and extra attention to the animals' veterinary care enable continued pet ownership.

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