

Animal-Assisted Activity Among Patients With Cancer: Effects on Mood, Fatigue, Self-Perceived Health, and Sense of Coherence

Rebecca A. Johnson, PhD, RN, FAAN, Richard L. Meadows, DVM, DABVP, Jennifer S. Haubner, RN, BSN, and Kathleen Sevedge, RN, MA, AOCN®, CNS

Purpose/Objectives: To identify to what extent an animal-assisted activity (i.e., visits with a dog) affects the mood, self-perceived health, and sense of coherence among patients undergoing radiation therapy.

Design: Pretest/post-test between and within groups.

Setting: Radiation oncology units of two hospitals in a mid-sized, midwestern city.

Sample: 30 adult patients undergoing nonpalliative radiation therapy.

Methods: After giving informed consent, participants were randomly assigned to receive 12 dog visits, 12 human visits, or 12 quiet reading sessions over a four-week period.

Findings: No statistically significant differences were found; however, compared with others their age, patients receiving dog visits viewed their health as improved over the four-week period. Participants described each of the three activities as beneficial. The study is primarily useful as a basis for planning additional research.

Conclusions: The study warrants replication with a larger sample to determine applicability of animal-assisted activity in patients with cancer who are undergoing radiation therapy.

Implications for Nursing: Patients may want and express benefit from animal-assisted activity dog visits, but the outcomes of the visits may not be measurable. Nurses should assess to what extent patients believe that such visits are beneficial by asking them. The visits may be valued by patients as helping to relieve their anxiety and as distractions from their disease and therapy.

Key Points . . .

- ▶ No statistically significant association was found between dog visits and mood, sense of coherence, or self-perceived health.
- ▶ Participants perceived visit and reading sessions as helping to decrease their anxiety and to provide distractions.
- ▶ Participants recommended visits or reading sessions to other patients early in the radiation therapy process.

pate in their treatment as much as they can in the context of advanced technology (Jordan & Delunas, 2001). That need has stimulated interest in and use of a wide array of complementary therapies. For example, in a sample of 453 patients with cancer, 83% had used at least one complementary therapy (Richardson, Sanders, Palmer, Greisinger, & Singletary, 2000). In a classic study, the therapies were found to help patients participate in their care (Coss, McGrath & Caggiano, 1998).

Animal-Assisted Activity

Johnson, Meadows, Haubner, and Sevedge (2003) argued that animal-assisted activity (AAA) (i.e., pet visitation) meets

Nurses consistently seek intervention strategies to reduce cancer symptoms and treatment-associated stress and to facilitate healing and feelings of wellness. Interventions often are considered complementary to traditional cancer treatment. Cancer remains the cause of one in four deaths in the United States and is the second-leading cause of death. Estimates indicate that about 1.4 million people are newly diagnosed with cancer and 560,000 die from the disease annually (American Cancer Society, 2007). Despite those statistics, patients with cancer are living longer and may undergo multiple rounds of therapy during treatment of their initial episode and later recurrences, making a wide range of interventions potentially beneficial.

Literature Review

Complementary Therapy

To reduce stress and anxiety associated with cancer, patients need to retain a sense of control over their bodies and partici-

Rebecca A. Johnson, PhD, RN, FAAN, is the Millsap Professor of Gerontological Nursing in the Sinclair School of Nursing and director of the Research Center for Human Animal Interaction in the College of Veterinary Medicine, and Richard L. Meadows, DVM, DABVP, is a teaching associate professor in the College of Veterinary Medicine, both at the University of Missouri–Columbia; and Jennifer S. Haubner, RN, BSN, is a nurse clinician in surgical oncology breast cancer research and, at the time of the study, Kathleen Sevedge, RN, MA, AOCN®, CNS, was a clinical support coordinator, both in the Ellis Fischel Cancer Center at the University of Missouri Health Care in Columbia. Sevedge now is director of cancer support services in the John and Dorothy Morgan Cancer Center at Lehigh Valley Hospital and Health Network in Allentown, PA. The authors received financial support from a University of Missouri–Columbia Comprehensive Cancer Center seed grant fund. (Submitted November 2006. Accepted for publication August 9, 2007.)

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the National Institutes of Health definition of mind-body intervention complementary therapy as a process that may facilitate the mind's capacity to affect bodily function and symptoms. Those effects may occur as a result of positive alterations in neurochemical levels. Quiet human-dog interaction has been found to positively influence dopamine, cortisol, oxytocin, prolactin, endorphin, and phenylethylamine levels in humans and dogs (Odendaal, 1999).

Only four studies have investigated AAA among patients with cancer. One demonstrated beneficial effects on anxiety and despair in patients with cancer (Muschel, 1984). Another found that AAA could be implemented successfully among pediatric inpatients with cancer to alleviate distress (Gagnon et al., 2004). AAA was associated with less fear and pain among pediatric patients with cancer undergoing venous port access procedures (Wells, 1998). Anecdotal and case study reports have indicated that patients with cancer benefited from AAA (Schnipper, 2005; Weber, 2004).

Findings outside of a cancer context showed improvements among nursing home residents' social interaction and self-concept after AAA (Fick, 1993; Taylor, Maser, Yee, & Gonzalez, 1993). In addition, loneliness decreased in nursing home residents who interacted with visiting animals (Banks & Banks, 2002). In a laboratory study, anxiety decreased in participants who interacted with dogs (Allen, Blascovich, & Mendes, 2002), and blood pressure and stress reduction have been reported (Baun, Oetting, & Bergstrom, 1991; Riddick, 1985). Another study found that dogs showed unconditional positive regard to patients with Alzheimer disease during visits (Batson, McCabe, Baun, & Wilson, 1998).

Patients with cancer may experience the same loss of control, anxiety, depression, and social isolation as do nursing home residents and those with the debilitating effects of Alzheimer disease. The incidence of psychological distress in patients with cancer has been reported as high as 70% (Khatib, Salhi, & Awad, 2004). Thus, AAA was applied and tested for effectiveness in helping to relieve distress among patients with cancer. In the present study, distress included mood and fatigue, as well as declining self-perceived health and sense of coherence.

Mood

The psychological distress that patients with cancer experience has been found to encompass a range of mood disturbances, including fear, anxiety, and hopelessness (Coss et al., 1998). Depression has been reported to be four times as common among patients with cancer as in the general population (Blake-Mortimer, Gore-Felton, Kimerling, Turner-Cobb, & Spiegel, 1999). Perhaps most disconcerting are the findings that the disturbances persist six months after diagnosis (Nordin, Berglund, Glimelius, & Sjoden, 2001). In addition, mood disturbances have been found to occur in tandem; for example, patients with anxiety also are likely to experience depression (Robinson, Boshier, Dansak, & Peterson, 1985). Given that mood disturbance may negatively affect healing, patients with cancer should undergo interventions that might minimize mood disturbance and enable healing.

Self-Perceived Health

Self-perceived health is the extent to which people believe they are healthy in relation to the past or to others their own age and in a similar situation. Self-perceived health should be studied among patients with cancer because cancer has come to be

considered more of a chronic illness. Given the waxing and waning of cancer symptoms, patients may feel and view themselves as healthy despite their cancer; however, if symptoms persist for lengthy periods and are coupled with debilitating treatment, in the long-term, disequilibrium may result in which patients may not view themselves as healthy. That long-term perception may influence their ability to accommodate acute exacerbations of their cancer, affecting their sense of coherence.

Sense of Coherence

According to Antonovsky (1988), sense of coherence is an innate characteristic that enables people to successfully endure stressful life events such as illness. Sense of coherence is believed to be a "dispositional orientation" that is developed and solidified by the time of adulthood. It is comprised of the extent to which one has a feeling of manageability, meaningfulness, and comprehensibility in encountering life events. A strong sense of coherence is believed to help people put a more positive interpretation on life events. Antonovsky noted that people with cancer who have a strong sense of coherence believe that they can cope with their symptoms and treatments, gain perspective on what having cancer means to them, and have a solid understanding of their disease.

Literature Synthesis

Little is known about the benefits of AAA on mood, self-perceived health, and sense of coherence. Although research has demonstrated that AAA may positively affect mood in other populations, research has been limited among patients with cancer. That may be particularly important given that cancer has become more of a chronic illness, where depression and anxiety could impede healing and self-perceived health, leading to more depression and anxiety. Furthermore, it is unclear to what extent a strong sense of coherence may help to create an internal environment in people with cancer that could maximize the positive impact of AAA on mood and self-perceived health. Complementary therapies that facilitate healing and, thus, improvement in mood and self-perceived health—such as AAA—must be tested among patients with cancer.

Purpose

The purpose of the current study was to identify the extent to which an AAA affected mood (including anxiety, depression, fatigue, tension, and vigor), self-perceived health, and sense of coherence among patients with cancer undergoing radiation therapy. One hypothesis suggested that those randomly assigned to the AAA group would have better mood, self-perceived health, and sense of coherence, and less fatigue after experiencing the AAA intervention. Another hypothesis posited that those randomly assigned to the AAA group would have better mood, self-perceived health, and sense of coherence, and less fatigue than patients assigned to the friendly human visitor group or the quiet reading group. A research question asked, "What were participants' perspectives of the intervention and what recommendations would they make for similar, future interventions?"

Methods

Design and Sample

A longitudinal, randomized pretest/post-test design studied 28 Caucasian and 2 African American adults. Inclusion criteria

were English-speaking, literate adults (aged 18 years or older) with no known pet allergies who were beginning nonpalliative (first-line) radiation therapy for cancer for a period of at least four weeks following initial diagnosis. Newly diagnosed patients who were receiving radiation therapy were selected for inclusion because they did not have acute symptoms that would cause difficulty while sitting during a visit and they would be at the hospital frequently; as a result, they were readily accessible for the intervention period. Patients who were receiving radiation therapy for metastases were excluded. After giving informed consent, participants were randomly assigned (via a computer-generated random-numbering system in which 30 numbers were randomly assigned to one of three groups) to participate in one of three groups: the dog visit group (treatment group) ($n = 10$), friendly human visit group ($n = 10$), or quiet reading group ($n = 10$).

Instruments

Demographic questionnaire: The research team developed a demographic questionnaire to examine age, race, marital status, education level, number of children, living arrangement, pet allergies, pet ownership, recent pet loss, previous cancer and type of treatment, cancer site, treatments other than radiation, and current medications. Data were measured on a nominal scale, except age. Data from the instrument helped the investigators to describe the sample.

Profile of Mood States (POMS): This 65-item instrument consists of adjective words or phrases describing various moods. It measures the dimensions of tension/anxiety, vigor, fatigue, anger/hostility, depression/dejection, and confusion (McNair, Lorr, & Droppleman, 1981). It uses a five-point Likert-type scale deriving ordinal level data with options ranging from 1 (not at all) to 5 (extremely). Participants record the extent to which they have felt the way the adjective describes during that day and that week. POMS previously was used among patients with cancer and is sensitive to changes over short time periods (Braslis, Santa-Cruz, Brickman, & Soloway, 1995; Cunningham, Edmonds, & Williams, 1999; Guadagnoli & Mor, 1989; McQuellon et al., 1998). Total instrument scores were not used in the analysis. The POMS subscales were used to measure the dependent variable of mood.

Self-perceived health questionnaire: This tool, consisting of six multiple-choice items, assesses present physical and emotional health in relation to the previous year and to others of the same age. Response options are “excellent, good, fair, or poor” for present and previous physical and emotional health and “about the same, better, or worse” for physical and emotional health in relation to others of the same age. In a classic study in which age, gender, healthcare practices, social network, and a host of other variables were controlled, self-perceived health was significantly related to mortality, thus interpreted as reliable (Kaplan & Camacho, 1983).

Orientation to Life Questionnaire (OTLQ): The OTLQ measures sense of coherence using 29 items on a seven-point analog scale with anchor phrases at each end of the scale for each item (Antonovsky, 1988). Items correspond to the three components of sense of coherence: manageability, meaningfulness, and comprehensibility. Total scores are used; higher scores indicate stronger sense of coherence. Testing with older adults revealed Cronbach alpha ratings ranging from

0.63–0.88 (Antonovsky & Sagy, 1986, 1990) and 0.90 more recently in a relocation context with older adults (Johnson, 1992).

Exit questionnaire: Participants completed this five-item tool that was developed by the research team. It consists of closed-ended and open-ended items asking whether participants viewed their sessions as helpful and, if so, how; and whether they would recommend such sessions to others and, if so, when would be the best timing in the course of treatment (early, middle, or late). The exit questionnaire was pilot-tested among hospitalized patients with cancer who received dog visits. The tool elicited valuable information that helped the investigators forge the intervention for the present study. The exit questionnaire was used to address the research question, “What were participants’ perspectives of the intervention, and what recommendations would they make for similar, future interventions?”

Procedure

The relevant health sciences institutional review boards approved the project. The study was conducted in the outpatient radiation therapy units of two hospitals in a midsized midwestern city. Study staff contacted prospective participants at simulation visits (where skin is marked for treatments and patients are taught what to expect of their treatments), explained the project, and identified patients’ interest in participating. Those interested gave their consent, received an identification number, and were randomly assigned to one of the three study groups; data collection then ensued.

Patients randomly assigned to the experimental group participated in 15-minute sessions three times per week for four weeks with one or two visitor dogs and their handlers ($n = 10$). Those randomly assigned to the human visit group met individually with the same adult for 15 minutes three times per week for four weeks ($n = 10$). Participants randomly assigned to the silent reading group read researcher-provided magazines for 15 minutes three times per week for four weeks ($n = 10$).

Data collection and visits or reading sessions occurred just before participants’ radiation treatments in the study rooms adjacent to the radiation therapy departments. Rooms were carpeted and comfortably furnished with a sofa, table, lamp, and chair. Although no formal steps were taken to prevent cross-group contamination, the physical layout of the facility helped because the study rooms were removed from the patient waiting area and participants were ushered by study staff directly to their radiation treatments after each study session. Their appointments occurred at the same time each day, so they did not have extensive contact with each other.

In keeping with the pretest/post-test design, mood, sense of coherence, and self-perceived health were assessed at two points: before receiving the AAA, friendly visits, or quiet reading intervention, and at the close of the last four-week intervention session. Participants completed the exit questionnaire at the end of their last session. Data collection took approximately 20 minutes each time.

Dog visit group: Two female visitor dogs—a long-haired dachshund and a whippet—used in the study were certified by the College of Veterinary Medicine at the University of Missouri Pet-Assisted Love and Support (PALS) program. For dogs and their handlers to qualify for certification, the

dogs first must pass the American Kennel Club Canine Good Citizenship test for basic obedience. Next, the dogs are evaluated and tested via the PALS protocol, identifying their health history, temperament, tolerance for distraction, and obedience. To participate in the program, dogs and their handlers must complete a training session regarding proper behavior during visits and activities to sensitize the animals to the sights and sounds common to healthcare settings. Dogs who are PALS-certified have current immunizations, annual physical examinations by a veterinarian, and more frequent parasite prophylaxis, and are bathed and groomed before each visitation.

The research team met with dogs and handlers before selecting them for the study. Dogs were selected for quiet temperaments, friendliness with strangers, and length of visitation experience (both had been making visits for more than a year). The research team developed a dog visit protocol in collaboration with a veterinarian who was board-certified in animal behavior. The protocol ensured that each dog participated in no more than six visits per day, was taken outside before and after each visit, and rested between visits in a different room equipped with a comfortable resting area as well as food and water. Dogs and handlers visited the study room and dog-resting room a week before the study began so that the rooms would not be unfamiliar. The protocol attempted to standardize dog visits by ensuring that the dogs did not become tired, thus affecting the quality and similarity of the visits.

In the dog visit sessions, the dogs sat on the sofa with the participant. During the sessions, participants combed, petted, played, and talked with the dog. The dog handler's role was to introduce the dog to the participant during the first session. For subsequent sessions, the dog handlers were instructed to avoid conversation with the participants. The handlers were trained to ensure the participant's and dog's safety and to observe and record the dog's behavior and nature of the interaction during the sessions.

Friendly human visit group: Friendly human visitors were volunteer nursing students, emeritus nursing faculty, hospital administrative staff from other departments, and community members. All were instructed that visits were to contain no discussion of the participants' or visitors' health. Nor were the participants' treatment, cancer in general or its treatment, family members, family issues, religion, politics, health, fitness, or pets to be discussed. The visitors were instructed to engage the participant in a superficial "park bench" type of conversation, such as talk about the weather, movies, books, and national and local current events.

Reading group: Before each reading group participant entered the study room, a selection of magazines were placed in the room. Magazines were selected based on lack of content related to health and fitness, cancer and treatments, self-help, counseling, pets, AAA, and animal-assisted therapy. If magazines contained that content, study staff removed the particular articles before the magazines were used in the study. Examples of magazines included *Newsweek*, *U.S. News & World Report*, *Birds and Blooms*, *Car and Driver*, and *Smithsonian*. Participants were met by the same study staff member at each appointment, shown to the study room, and instructed to read the magazines provided. At the end of the 15-minute session, the staff person entered the study room and escorted the participant to the radiation treatment area.

Data Analysis

Difference scores were calculated for mood (including anxiety, depression, fatigue, tension, and vigor), sense of coherence, and self-perceived health by subtracting the pretest scores from the post-test scores. The Wilcoxon sum rank test was used for variables measured on an ordinal scale to compare group median difference score values and identify whether the dog or human visits or reading sessions affected mood, self-perceived health, and sense of coherence. Chi-square comparisons and Fisher's exact test with categorical variables from demographic data were used to identify whether age, marital status, education level, and cancer site were significantly related to changes in the same dependent variables. A significance level of $p < 0.05$ was set for determining significance.

Data from the exit questionnaire were tabulated to address the study's research question regarding participants' perspectives of the interventions, including helpfulness, and whether participants would recommend an intervention. Comments were analyzed by two coauthors via thematic analysis using categories that emerged from the data. Each investigator identified themes. They were discussed, and raw data were revisited continuously until consensus was reached, making every attempt to maintain the context of the participants' comments.

Findings

Demographics

No statistically significant differences existed between groups for age, gender, race, education, or cancer site (see Table 1).

Table 1. Demographic Characteristics by Group

Characteristic	Dog Visits (N = 10)	Human Visits (N = 10)	Reading (N = 10)
Age (years)			
X	61	59	58
Range	39–77	40–77	43–71
Characteristic	n	n	n
Ethnicity			
Caucasian	10	8	10
African American	–	2	–
Gender			
Female	8	7	6
Male	2	3	4
Education			
Less than high school diploma	3	2	–
Some college	7	8	10
Marital status			
Married	7	4	8
Unmarried	3	6	2
Pet owner			
Yes	8	3	6
No	2	7	4
Cancer site			
Breast	4	5	4
Head and neck	3	2	3
Prostate	1	1	1
Lymphoma	1	–	1
Other	1	2	1

Table 2. Profile of Mood States Difference Scores

Variable	Dog Visits		Human Visits		Reading	
	Score	p	Score	p	Score	p
Tension	-0.25	0.90	-2.60	0.22	-1.71	0.56
Anger	2.30	0.60	0.22	0.81	-0.42	1.0
Fatigue	-0.20	0.74	-1.20	0.21	-0.50	1.0
Depression	0.70	0.82	-4.50	0.54	-2.30	0.45
Vigor	-0.12	1.0	0.50	0.93	-2.71	0.56
Confusion	0.44	0.67	-2.10	0.26	-1.33	0.62

Note. The p values were calculated based on the Wilcoxon rank sign test.

Note. Negative difference means at pretest were higher than at post-test.

Mood and Sense of Coherence

Table 2 depicts the difference scores on the POMS, and Table 3 shows the difference scores on the OTLQ. No statistically significant differences were found between or within groups in mood or sense of coherence. However, with such a small sample, the patterns in the data should be considered.

No statistically significant differences existed within or between groups for mood, but patterns showed negative mean difference scores for the tension/anxiety subscale in all three groups. The dog visit group had numeric increases in their anger/hostility scores, slight increases in the depression/dejection subscale, decreased fatigue scores, decreased vigor scores, and increased confusion scores post-test, compared with pretest scores. The difference scores for the dog visit group were generally smaller than in the other two groups. The human visitor group showed no change in anger scores, decreased fatigue scores, lower depression/dejection scores, higher vigor scores, and lower confusion scores. The reading group had decreased anger/hostility, depression/dejection, vigor, and confusion scores, and experienced no change in fatigue.

OTLQ scores decreased from the pretest to the post-test in all groups. The mean decrease was greatest in the dog visitor group, which also had lower pretest scores than the other two groups. Antonovsky (1988) used the “cut-score” of 145 or greater to indicate a strong sense of coherence. With that guideline, all participants began with a strong sense of coherence, and only those in the dog visit group dropped below the threshold in their post-tests.

Self-Perceived Health

Difference scores were calculated by subtracting the pretest scores from the post-test scores. For physical health, all groups had negative difference scores (although not statistically significant), indicating that they believed their physical health had declined during the prior year (dog visit = -0.40, human visit = -0.33, reading = -0.12). For health compared with others, negative difference scores indicated improvement. Table 4 shows that, based on the Kruskal-Wallis test and post-hoc comparisons, the human visitor group rated their physical health compared with others their age as significantly better in the post-test than in the pretest. The dog visit group rated their health better than those their own age, although it was not statistically significant ($p = 1.00$); the reading group had no difference.

For emotional health, those in the human visitor and reading groups believed that their emotional health declined during the study, whereas the dog group believed it improved. Compared with one year earlier, all groups believed that their emotional health had improved. The human visitor and reading group participants believed that their emotional health compared with others their age had improved during the study, whereas those in the dog group indicated no change.

Perceived Helpfulness of Interventions

Table 5 shows findings from the exit questionnaire that was completed by 19 participants. The comments written by participants were categorized into the two main themes of decreasing anxiety and promoting distraction.

Decreasing anxiety: Among those who visited with a dog, one participant wrote, “I would recommend it for someone who really liked pet dogs and had one of their own, [it] relieves anxiety, for some, it depends on the patient and the dog. It is very relaxing.” Regarding the human visits, one participant wrote,

I enjoyed visiting, it helped me open up and talk about everything, makes me feel relaxed—I wasn’t scared of things in treatment, getting things off my mind, kept me from being bored with the treatment.

A participant in the reading group wrote, “It kept me busy, allowed me to relax and accept the treatment, brought my attention to things that I would not normally focus on.”

Distraction: Those who said they would recommend visits to another patient expressed the benefit of the sessions in distracting them. A participant receiving dog visits wrote that they were helpful to “relieve anxiety. It helped take your mind off what you need to do next.” A participant visited by a human wrote,

I think that if a patient were scared or frightened about treatments, it could help, help you get your mind off your problems, helpful to have someone to talk to and know where you come from, would keep them from getting depressed through their treatment.

A reading group participant wrote, “It helps the stress of the situation, gives them something to look forward [sic] to. It was a definite upper.”

In response to a question about when the sessions would be most helpful, 15 participants (six in the dog visit group,

Table 3. Sense of Coherence Difference Scores^a

Variable	Dog Visits		Human Visits		Reading	
	Score	p	Score	p	Score	p
Difference	-7.00	0.09	-1.14	1.0	-5.00	0.12
Pretest mean	147.00		154.00		161.00	
Post-test mean	138.00		153.00		157.00	

^a Differences among means (computed for those observations for which pre- and post-test scores are available) were compared via the Wilcoxon rank sign test for paired observations.

Note. Negative difference mean pretest scores were higher than at post-test.

Table 4. Self-Perceived Health Difference Scores

Variable	Dog Visits		Human Visits		Reading	
	Score	p	Score	p	Score	p
Physical health^a	0.40	0.12	-0.33	0.45	-0.12	1.0
A year ago ^a	-	-	0.11	1.0	0.25	0.62
Others ^b	-0.20	1.0	-0.22	0.62	0.62	0.12
Emotional health^a	0.30	0.37	-0.22	0.62	-0.12	1.0
A year ago ^a	0.20	0.75	0.50	0.25	0.37	0.50
Others ^b	-	-	-2.10	0.5	0.42	0.50

^b Negative difference scores denote declining health.

^c Negative difference scores denote improving health.

Note. The p values were calculated based on the Wilcoxon rank sign test.

six in the human visit group, and three in the reading group) indicated that early in the treatment phase is best and I indicated that late in the treatment would be better (a reading group member). A dog visit group member wrote, "To become acquainted with the dog, to help patients cope with the unknown, I was too tired to do it later on." A human visitor group member wrote,

You need to talk more and get questions out of your system at first, time needed to build a relationship, it gives you a reason to keep going. If I had any apprehension about radiation, it was the first couple of visits, because in the end you are so tired.

A reading group member believed that the session is most beneficial early in treatment "because you don't know what's going on, the fear of the unknown is there."

Discussion

The present study found no statistically significant differences within or between groups in mood, sense of coherence, or two facets of self-perceived health when patients with cancer had a series of visits with a trained visitor dog. Within-group tension scores (mood) were numerically lower across all groups, raising the question for future study of whether the decrease might be significant with a larger sample. The dog visit group had numeric increases in anger/hostility, confusion, and depression scores (although not statistically significant), leading to a question of whether something about the intervention was related to these changes that cannot be determined without a larger sample. However, participants in all groups viewed their experiences positively and the majority would recommend the interventions to another patient. That finding contradicts the numeric findings and therefore warrants further exploration in a larger replication of the study. More in-depth investigation is needed into the actual benefits that the participants believed they experienced from the sessions. The sessions may have had less of an effect on mood than as pleasant distractions during a period of waiting for treatment.

Similar questions arise for sense of coherence, where the dog visitor group experienced the largest decrease in post-test scores. Whether participants in the dog group had a poorer clinical outcome from their treatments or experienced side effects that could negatively affect mood or sense of coherence is impossible to discern, but it will be an important variable to monitor in future studies. In addition, perhaps the sense

of coherence, believed to be more of a "trait" than a "state," is not amenable to this type of intervention, or perhaps the short intervention period (four weeks) was not sufficient to significantly improve or maintain scores.

For self-perceived physical health, no between-group findings reached statistical significance. With such a small sample, significant variations could not be detected. The human visitor within-group post-test scores increased (although not significantly) on the facet of "physical health compared with others my age" and should be investigated further in a larger replication study. Within-group post-test scores improved significantly for self-perceived emotional health ("emotional health compared with others my age") in the human visitor group. The findings about this facet of self-perceived health (both physical and emotional) bear further investigation. A replication or expansion study should examine the extent of the support given by the human visitor because it may have facilitated participants' perception of their own health. Perhaps that differs from the dog visitor support in that the dogs' inability to provide verbal support may not be associated with improvements in self-perceived health because of the passive nature of the interaction. Clearly, more must be learned about the nature and extent of patient support that is possible via dog visits, how patients perceive this support, and how and under what circumstances the visits may be helpful. In addition, the positive participant comments about the dog visits, which contradict numeric findings, support the need for a larger replication of the present study.

The current study's findings generally correspond with those of Kaiser, Spence, McGavin, Struble, and Keilman (2002) who found that a "happy person" visiting residents in a nursing home was as likely to stimulate prosocial behavior (moving closer, patting, and smiling) as a dog visitor. Most of the participants in the study stated that they liked the dog visit as much as the human visit. Similarly, in the pilot test for the present study, Johnson et al. (2003) found that a dog visit was viewed as equally beneficial to a human visit among patients with cancer. Given that studies systematically comparing dog visits with human visits are limited in number, research on a larger scale may help to resolve some of the issues resulting from the findings.

Limitations and Implications for Further Research

One issue that may have affected the findings of the present study is that disease progression during the time of the

Table 5. Participant Responses to Exit Questionnaire

Variable	Dog Visits (N = 10)	Human Visits (N = 10)	Reading (N = 8)
Were sessions helpful?			
Yes	5	9	6
No	5	1	1
No response	-	-	1
Would you recommend the intervention to another patient?			
Yes	7	8	8
No	3	1	-
Unsure	-	1	-

intervention was not measured. Thus, whether participants' cancer worsened and the accompanying symptoms affected responses to any of the three study conditions is impossible to discern. This may have been particularly relevant for increases in fatigue, depression, anger, and hostility, and for decreases in vigor and sense of coherence. Similarly, side effects of radiation therapy were not assessed, but they may have been more severe in one or more of the study groups than in the others. Contamination across groups may have occurred if patients discussed their study participation in the department waiting room. For future studies, that potential confounder could be controlled by scheduling radiation therapy appointments for the groups on different time schedules.

The present study's findings were not statistically significant, so although conclusions about the dependent variables cannot be drawn, numerous findings can provide guidelines for those designing similar research. A larger sample size clearly is warranted to detect statistically significant changes in the dependent variables and enable generalization of findings. Ethnic diversity in the sample population also is warranted. In addition, future investigators should control for stage and type of cancer as well as differences in radiation therapy because these variables may affect participants' responses to AAA.

Measuring other dependent variables, such as neurochemical changes in response to AAA, and using more sensitive or neurochemical measures of mood (e.g., serotonin) would make an important contribution to the question of whether patients with cancer benefit from AAA. That coupled with more in-depth descriptions of participants' experiences with AAA would make a major contribution to the AAA literature.

Given the length of the radiation therapy courses, future investigators should administer the AAA intervention over a longer period of time. The present study used a four-week period, which may not have been long enough for changes to occur in the dependent variables.

This study was one of few involving AAA among patients with cancer in a randomized design. The main challenge of conducting the research rests with identifying the most appropriate control for AAA. In essence, the present study tested three interventions because the quiet reading (commonly used as a control in similar studies) was found to be beneficial for participants. The human visit also was beneficial and was included in the present study to attempt to isolate the dog's contribution. (During the dog visits, a dog handler was present, but that person was instructed not to interact with the participants.) In retrospect, the study should have included a no-intervention control group that completed study instruments at two time points. That consideration is important for future studies and would be central to a replication of the present study with a larger sample. Replication is warranted given that participants in each condition stated that the intervention was beneficial.

More research is needed to identify whether AAA might assist patients in feeling more participative in their treatment. Research also should evaluate the optimal dosage (e.g., length and number of visits), the best timing of the visits in the disease trajectory, and the extent of disease severity on the effectiveness of AAA. The findings of the current study imply that all three interventions were, to some extent, beneficial.

Further research is needed with larger samples to identify whether the effects are statistically recognizable.

Implications for Healthcare Professionals

Healthcare professionals should be aware that patients may want and benefit from dog visits but that positive outcomes may not be measurable for patients with cancer. Beyond identifying whether patients have an affinity for dogs, healthcare professionals should ascertain patients' physical and emotional responses to their disease and treatments because those responses may decrease the potential benefits of the intervention. However, for patients who feel well enough with an affinity for dogs, dog visits may be as beneficial as human visits. Dog visits are no more costly than human visits because all organizations provide dog visits on a volunteer basis. Other investigators found that when dogs were present in nursing homes, more positive communication was reported among staff and between staff and residents (Kongable, Buckwalter, & Stolley, 1989). No reports of zoonotic transmission of disease from dogs to patients have been documented. Of course, if patients are allergic to dogs, they are not good candidates for dog visits. From a management point of view, in outpatient units, space is needed for the dog and its handler to move between patients or interact with patients privately. A procedure needs to be developed to guide handlers on such matters as how patients wanting AAA are identified and whether dogs are allowed on patients' beds (if in an inpatient unit) and, if they are, what barriers are needed (e.g., a sheet covering the bed linens). In all settings, the nursing staff needs to be receptive to having dogs present and willing to identify to the dog handler which patients are to be visited. A consistent pattern of visits from the same dog and handler may be more beneficial than sporadic, unpredictable visits that may be disruptive to patients, staff, and overall flow of activities in the unit.

Conclusion

The present study contributes to the literature on AAA by identifying potential patient outcome trends. However, its strongest contribution lies with the design and methodologic issues that it uncovered. They may serve as guides for others planning such studies—particularly among patients with cancer. Identifying outcome measures that are most likely to respond to AAA given a patient's disease and treatment trajectory, attending to key confounding variables relative to the population, recruiting a sample large enough to detect variation in the dependent variables, and identifying a true control intervention are key lessons to be learned. If AAA can benefit patients with cancer, attending to these issues in a larger replication study is warranted.

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Author Contact: Rebecca A. Johnson, PhD, RN, FAAN, can be reached at rajohnson@missouri.edu, with copy to editor at ONF Editor@ons.org.

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