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A Study of the Effects of Pet Ownership on Mental Health among Community-dwelling
Senior Citizens in Northeast Tennessee

A thesis
presented to
the faculty of the Department of Public and Allied Health
East Tennessee State University

In partial fulfillment
of the requirements for the degree
Master of Public Health

by
E. Marie Southerland
May 2007

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Dr. Tiejian Wu
Dr. Brunhilde Tober-Meyer

Keywords: Depression, Human-animal bond, Human-animal interaction, Pets, Pet attachment,
Pet therapy, Senior citizens, Social support

ABSTRACT

A Study of the Effects of Pet Ownership on Mental Health among Community-dwelling Senior Citizens in Northeast Tennessee

by

E. Marie Southerland

This cross-sectional study explored the relationship between pet ownership, attachment, and psychological health among community-dwelling senior citizens and evaluated the impact of the placement of an aquarium into a regional senior center. General health, depression, social support, pet attitudes, pet attachment, pet relationships, and attitudes about the aquarium were assessed among 104 members of a senior center.

Symptoms of depression were identified in 17.3% of the participants. Pets were a significant form of social support and attachment to pet owners. No significant relationship was observed between pet ownership, pet attachment, and psychological health. Positive health effects were reported among participants who observed the fish aquarium.

While the relationship between pet ownership, human-animal interactions, and psychological well-being remains unclear, it appears that older adults can benefit from animal-assisted activities and therapy programs. Animal-assisted activities and therapy programs may be useful adjunctive therapies for depression in community-dwelling senior citizens.

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CHAPTER 1

INTRODUCTION

Mental illness affects approximately 20% of the United States population every year. Of the mental illnesses, depression is the most common, affecting more than 19 million adults in the U.S., and costing over \$40 billion annually in diminished productivity and use of health care resources (Office of Disease Prevention and Health Promotion, 2000). The highest rates of depression occur among adults. Among persons 65 years of age and older, prevalence rates of 13-20% were reported in 2002. Older women were more likely to report depressive symptoms than older men, with the highest prevalence among women 85 years of age and older (Federal Interagency Forum on Aging Related Statistics, 2004). In 1998, 13.8% of persons 65 years of age and over residing in Northeast Tennessee reported symptoms of depression, compared to 11.3% in Tennessee (Tennessee Department of Health, 2003).

Depression can have significant effects on an individual's physical and mental health and may interfere with the fulfillment of daily responsibilities. Higher levels of depressive symptoms are associated with higher rates of physical illness, disability, and health care use (Federal Interagency Forum on Aging Related Statistics, 2004), and it can result in suicidal tendencies. In 2001, 5393 Americans over age 65, 85% males and 15% females, committed suicide (National Center for Injury Prevention and Control, 2004).

Numerous factors contribute to the risk of depression in the elderly. The increased prevalence of depression with age has been attributed to the combined effects of chronic medical conditions and functional limitations (Roberts, Kaplan, Shema, & Strawbridge, 1997). The majority of older Americans are afflicted with at least one chronic medical condition

(Administration on Aging, 2004), and these conditions tend to be more disabling among older age groups (National Academy on an Aging Society, 1999). In 2000, 41.9% of civilian, non-institutionalized Americans 65 years of age and older reported a disability (Administration on Aging, n.d.), with Tennessee and Northeast Tennessee reporting an incidence of 44.0% and 46.0% respectively (Health Information Tennessee, 2003). The loss or reduction in social support systems is another important factor responsible for depression in the elderly (Newsom & Schulz, 1996). In several community-based studies, the loss of a spouse was the strongest predictor of depression in older adults (Schoevers et al. 2000).

Since the 1900s, the number of persons 65 years of age and older has grown significantly. By 2030, it is estimated that people 65 years of age and over will represent 20% of the United States population compared to 12.4% in 2000 (Administration on Aging, 2004). As people age, they are at an elevated risk for developing physical problems such as chronic illnesses and disabilities and emotional problems as a result of negative life events. Consequently, they may be at a heightened risk for developing symptoms of depression because of these age-related changes.

Numerous treatments are available for depression including antidepressant medications and psychotherapy. Alternative therapies may also be used singly or in conjunction with traditional forms of therapy. Improvements in mental health disorders have been reported with animal-assisted therapy (Antonioli & Reveley, 2005; Brickel, 1983; Holcomb, Jendro, Weber, & Nahan, 1997), and, therefore, animal-assisted activities or pet therapy may be of value in alleviating some of the symptoms of depression. The health benefits of human-animal interactions are well-documented in the literature and include increases in physical activity, social support, and self-esteem, as well as reductions in stress levels and loneliness. Furthermore,

as a stimulus of conversation, animals may help to facilitate social interactions thereby lessening the social isolation that often accompanies aging (Jennings, 1997).

Several studies have documented the usefulness of animal-assisted therapy in the treatment of depression. In a study by Holcomb et al. (1997), increased social interaction secondary to the use of an aviary was significantly associated with reduced depression levels among elderly men. Pet-facilitated psychotherapy was shown to be effective as an adjunctive treatment for depression among elderly male residents of a nursing home (Brickel, 1983). Significant reductions in depression were observed among subjects given access to a pet during therapy sessions, compared to therapy sessions with no pet. During the session, pets served as a social catalyst facilitating conversations between the subject and the therapist. In a study by Antonioli and Reveley (2005), animal facilitated therapy with dolphins was more effective than water therapy in the treatment of patients with mild to moderate depression. In this randomized, single blind, controlled trial of 25 patients with mild to moderate depression, the treatment group played, swam, and took care of the dolphins, while the control group participated in an outdoor nature program that used the same water activities as the treatment group but in the absence of the dolphins. After two weeks of treatment, improvements in depressive symptoms were significantly greater in the treatment group than the control group. The authors hypothesized the echolocation system, the aesthetic value, and the emotions produced by the interactions with the dolphins were responsible for the health improvements observed in the treatment group. Although this was a small study, it provided additional evidence for the efficacy of animal-assisted therapy in the treatment of depression.

Statement of the Problem

Depression is a potentially treatable disease; however, depression in the elderly often goes unrecognized by health care professionals. Symptoms of depression may not be detected in older adults because of the presence of other medical conditions, or are attributed to the consequences of negative life events and illnesses associated with aging. In addition, older adults may be less inclined to report their symptoms to their physician (Stek, Gussekloo, Beekman, van Tilburg, & Westendorp, 2004). According to Healthy People 2010, only 23% of adults diagnosed with depression received medical treatment in 1997 (Office of Disease Prevention and Health Promotion, 2000). Because of this lack of recognition and/or treatment of depression among older adults, additional research is needed to develop programs that recognize and target depression in this population.

Because of the various health benefits resulting from human-animal interactions, animal-assisted activities or pet therapy may be beneficial in the treatment of depression in the elderly (Antonioli & Reveley, 2005; Friedmann, 2000; Jennings, 1997). Much of the research on the health benefits of interactions of animals with older adults has been conducted in nursing homes; however, only 1.1% of adults aged 65 to 74, 4.7% of adults aged 75 to 84, and 18.2% of adults aged 85 and older live in nursing homes (Administration on Aging, 2004). In addition, the health effects produced by human-animal interactions may vary considerably between individuals because of personal attitudes, experiences, and the degree of attachment to an animal (Friedmann). Because of this lack of studies among community-dwelling older adults and the variability in responses to human-animal interactions, additional research is needed to determine the health effects of interactions with animals among community-dwelling older adults and to address factors that influence their responses to animals.

Depression was identified as a problem among a sample of senior citizens participating in an assessment conducted in April 2004 at a regional senior center (Southerland, 2004). This study evaluated five indicators of depression, i.e. worrying, boredom, helplessness, sadness, and emptiness. It also explored senior citizens' perceptions of the health benefits of animals, and what effect, if any, human-animal interactions had on their health. Among this sample, 31.8%, 28.9%, and 27.3% reported sometimes feeling helpless, sad, and worried, respectively. The majority of the respondents believed animals had beneficial effects on health. Ninety-three percent believed watching animals was relaxing, and 88.1% thought petting or playing with animals could reduce stress, a known risk factor for depression. Pets were a significant part of the social support system of pet owners, and pet owners were more likely to interact with their pet to cope with stress. In order to stimulate interest in human-animal interactions and to determine the effect of watching fish on stress and depression among members of the senior center, a 10-gallon freshwater aquarium was donated to the senior center. Further research is needed to determine what effect, if any, watching fish had on the psychological health of the members of the senior center and to examine the relationship between depression and the human-animal bond among larger, representative samples of community-dwelling senior citizens.

Based upon the reasons outlined above, the purpose of this study was to examine the relationship between pet ownership, pet attachment, and psychological health among community-dwelling older adults, and to evaluate the impact of the placement of an aquarium on the psychological health of community-dwelling older adults.

Significance of the Study

The results of this study may: a) indicate a need exists for programs to target depression among community-dwelling senior citizens; b) provide additional evidence for the positive health benefits of interactions between people and animals; and c) facilitate the development of community-based animal-assisted activities or therapy programs for community-dwelling senior citizens. Knowledge of pet attitudes and pet relationships may help to identify the receptiveness of older adults to animal therapy programs and the types of programs most appropriate for this population.

Objectives of the Study

The objectives of this cross-sectional study were (1) to explore the relationship between pet ownership, pet attachment, and psychological health among community-dwelling older adults; and (2) to evaluate the impact of the placement of an aquarium, an environmental change, on the psychological health of community-dwelling older adults.

Statement of the Hypotheses

In order to address the problem, the following null hypotheses were established:

1. There is no statistically significant difference in the level of depressive symptoms between pet owners and non-owners among a sample of community-dwelling senior citizens in Northeast Tennessee.
2. There is no statistically significant difference in the level of social support between pet owners and non-owners among a sample of community-dwelling senior citizens in Northeast Tennessee.

3. There is no statistically significant difference in the level of depressive symptoms between pet owners who are strongly attached to their pet compared to pet owners who are weakly attached to their pet among a sample of community-dwelling senior citizens in Northeast Tennessee.
4. There is no statistically significant difference in the level of social support between pet owners who are strongly attached to their pet compared to pet owners who are weakly attached to their pet among a sample of community-dwelling senior citizens in Northeast Tennessee.
5. There is no statistically significant difference in pet attitudes between pet owners and non-owners among a sample of community-dwelling senior citizens in Northeast Tennessee.
6. Placement of the aquarium in a senior center will have no significant effect on the psychological health of its members among a sample of community-dwelling senior citizens in Northeast Tennessee.
7. There is no statistically significant difference in the level of depressive symptoms between those senior citizens who look at the aquarium over a 10-12 month period of time compared to those senior citizens who do not look at the aquarium among a sample of community-dwelling senior citizens in Northeast Tennessee.
8. There is no statistically significant difference in the level of depressive symptoms between pet owners who observe the aquarium over a 10-12 month period of time compared to non-owners who observe the aquarium over a 10-12 month period among a sample of community-dwelling senior citizens in Northeast Tennessee.

Statement of the Subhypotheses

Based upon the hypotheses, the following subhypotheses were established:

1. There is no statistically significant difference in the level of depressive symptoms between men and women among a sample of community-dwelling senior citizens in Northeast Tennessee.
2. There is no statistically significant difference in the level of social support between men and women among a sample of community-dwelling senior citizens in Northeast Tennessee.
3. There is no statistically significant difference in the degree of pet attachment between men and women among a sample of community-dwelling senior citizens in Northeast Tennessee.
4. There is no statistically significant difference in pet attitudes between men and women among a sample of community-dwelling senior citizens in Northeast Tennessee.

Definition of Terms

For the purpose of this study, the following definitions of terms were used:

Human-animal bond is defined by the American Veterinary Medical Association as “a mutually beneficial and dynamic relationship between people and other animals that is influenced by behaviors that are essential to the health and well being of both. This includes, but is not limited to, emotional, psychological, and physical interactions of people, other animals, and the environment” (Wollrab, 1998, p. 1675). The human-animal bond can have positive or negative effects on the emotional, psychological, physical health, and well-being of both humans

and animals. Many factors can influence this bond, including human and animal behaviors, the animals' health status, and circumstances in a person's life (Argus Institute for Families and Veterinary Medicine, 2002a).

Animal-assisted activities are defined by the Delta Society as goal-directed activities that use the human-animal bond to improve an individual's quality of life via motivational, informational, and/or recreational benefits. They are not under the direction of health providers nor tailored to a specific individual or medical condition (Granger & Kogan, 2000; Hines & Fredrickson, 1998).

Animal-assisted therapy or pet therapy uses the human-animal bond to help people with special needs. Characteristics of animal-assisted therapy as defined by the Delta Society are the following:

1. It is a goal-directed intervention that uses animals meeting specific criteria in the treatment process.
2. It is directed or guided by health or human service providers who establish therapeutic goals tailored to an individual and monitor the individual's progress in meeting these goals.
3. Activities may be individual or group in nature and are designed to promote improvement in physical, social, emotional, and/or cognitive functioning (Granger & Kogan, 2000; Hines & Fredrickson, 1998).

Companion animals or pets are domesticated animals kept for enjoyment rather than for specific uses (Merriam-Webster Online Dictionary, 2005).

Pet attachment refers to the emotional bond between pet and owner (Budge, Spicer, Jones, & St. George 1998).

Depression is a mental illness that is characterized by symptoms of depressed mood, loss of interest, feelings of guilt, low self-esteem, disturbances in sleep patterns or eating habits, lack of energy, and poor concentration (World Health Organization, 2003).

Mental health is “a state of successful mental functioning, resulting in productive activities, fulfilling relationships, and the ability to adapt to change and cope with adversity” (Office of Disease Prevention and Health Promotion, 2000). It is vital to an individual’s psychological and emotional well-being and his/her ability to maintain relationships and function in society (Office of Disease Prevention and Health Promotion).

Social support is “the availability of people whom the individual trusts, on whom he can rely, and who make him feel cared for and valued as a person” (McDowell & Newell, 1996a, p. 125). Measures of social support include a structural and functional component.

Structural support refers to the size of the social network and the closeness within the support group (Sherbourne & Stewart, 1991).

Functional support refers to the perception of support. It includes:

1. Emotional support such as caring, love, and empathy;
2. Tangible or instrumental support;
3. Information, guidance, or feedback;
4. Appraisal support that allows for self-evaluation; and
5. Social companionship for leisure and recreational activities (Sherbourne & Stewart, 1991).

Social network are “the roles and ties that link individuals along definable paths of kinship, friendship, or acquaintance” (McDowell & Newell, 1996a, p. 125).

Social functioning is used synonymously with social health and includes understanding, communicating, getting along with other people, and participating in society (PROMIS, n.d.).

Social health is the “perceived well-being regarding social activities and relationships, including the ability to relate to individuals, groups, communities, and society as a whole” (PROMIS, n.d., Section III).

Community-dwelling refers to people who are not living under formally authorized, supervised care or in institutions (American FactFinder, n.d.)

Relationship maintenance refers to behaviors maintaining the quality of the relationship, such as interaction, communication, time, and financial investments (Holcomb, Williams, & Richards, 1985).

Intimacy refers to the close feeling that results from an individual’s interactions with a pet (The Merck Manual of Health and Aging, 2004).

CHAPTER 2

LITERATURE REVIEW

Depression

Depression is a serious illness that affects the well-being and functioning of older adults. Numerous factors increase the risks of developing depression and include nonbehavioral, behavioral, and behavioral-related factors. The nonbehavioral risk factors that have been reported in the literature include: acute or chronic diseases (American Federation for Aging Research, 2003), declining physical health (Beekman et al., 1997; Roberts et al., 1997), disabilities and/or functional limitations, gender (American Federation for Aging Research; Health and Age, 2003; Roberts et al.), family history (Schoevers et al., 2000), previous depressive history (Health and Age; Schoevers et al.), and medications (American Federation for Aging Research; Health and Age). In addition, environmental influences such as institutionalization are included in this category (American Federation for Aging Research). The increased prevalence of depression in the elderly has been attributed to the combined effects of chronic medical conditions and functional limitations, with higher levels of depressive symptoms reported among women (Roberts et al.). Some of the medical conditions that have been associated with depression include cardiovascular disease, Alzheimer's disease, Parkinson's disease, diabetes, dementia, cancer, electrolyte disorders, renal disease, and liver disease (American Federation for Aging Research).

Behavioral risk factors for depression include social behavior that can lead to loneliness and isolation (Alexopoulos et al., 2002), physical inactivity (Health and Age, 2003), substance abuse, including alcohol and drug usage (American Federation for Aging Research, 2003; Health

and Age), smoking (Health and Age), and diet (American Federation for Aging Research). Stress has been identified as a behavioral-related risk factor and has been associated with negative life events (Alexopoulos et al.; Roberts et al., 1997; Schoevers et al. 2000), financial problems (Alexopoulos et al.; Health and Age; Roberts et al.), loss of independence (American Federation for Aging Research), and care-giving demands (Alexopoulos et al.).

Various community-based studies have shown the loss of a spouse to be the strongest predictor of depression. In the Amsterdam Study of the Elderly (AMSTEL), 1940 non-depressed community-living elderly, 65 to 84 years of age, were interviewed at baseline and 3 years later (Schoevers et al., 2000). The incidence rate for depression in this study was 15.9%; however, previous studies of depression in the elderly reported incidence rates of 7.1% to 12.0%. The authors attributed the discrepancies to different study intervals, assessment methods, and sample characteristics. Loss of a spouse, decreases in activities in daily living, and chronic disease were significant risk factors for the development of depression in this study, with loss of a spouse being the strongest predictor of incident depression. Furthermore, in the presence of changes that led to greater dependency on others, being married or if unmarried having social support, served as a buffer against depression.

An association between physical health and depression in later life was demonstrated in the Longitudinal Aging Study Amsterdam (Beekman et al., 1997). In this longitudinal study, functional limitations and self-perceived health were found to be more strongly associated with depression rather than specific diseases. Major depression was associated with loss of a partner, family history, and personal history of depression, whereas minor depression was associated with deteriorating physical health. Furthermore, the stress-buffering effects of social support were limited to subjects with minor depression in this study.

In the Leiden 85-plus study, problems with cognition and daily functioning were found to be the major factors associated with depression in this age group (Stek et al., 2004). The prevalence rate for depression in this study was 15.4%, which was comparable to other population studies of the oldest old. Other major correlates of depression identified in this population included perceived health, loneliness, and impaired mobility. Consistent with other studies involving younger subjects, the majority of depressed subjects in this study were not recognized as depressed by their physicians.

Various studies have shown that lower social support can lead to a reduction in life satisfaction and an increase in depressive symptoms among older adults (Harris et al., 2003; Newsom & Schulz, 1996; Roberts et al., 1997; Vanderhorst & McLaren, 2005). In addition, when there is a sudden depletion in the social network, either through the loss or change in the network, lower social support may be the most important contributor to late-life depression (Blazer & Hybels, 2005). Older adults experience loss of social support through the death of family and friends, debilitating diseases, retirement, and forced relocation to retirement or nursing homes. They may withdraw from human contact. Companion animals are capable of providing assistance with these age-related changes.

History of the Human-Animal Bond

Modern interest in human-animal interactions can be dated to 1944 when James H.S. Bossard described the therapeutic value of dog ownership in the journal *Mental Hygiene*. According to Bossard, pets play several roles in the family including: a source of unconditional love, an outlet for people to express love, a teacher of children, social lubricants, and companions. He considered household pets as a basic instrument in mental health because of

their integral role in the family. In 1962, Levinson promoted pet therapy by extending the health value of animals from households to therapeutic settings (Fine, 2000). In 1977, the Delta Society, the first professional, interdisciplinary organization focusing on the human-animal bond, was founded. In 1979, the relationship between humans and companion animals was determined to have intrinsic value. In 1987, the National Institutes of Health (NIH) examined the health benefits of human-animal interactions. During that workshop, experts in various fields agreed that relationships with animals can have human health advantages (Argus Institute for Families and Veterinary Medicine, 2002b)

Theories on Human-Companion Animal Interactions

Numerous theories have been proposed to explain human-animal interactions. In 1982, Brickel proposed that pets shifted attention away from anxiety-generating stimuli and in so doing, they reduced emotional discomfort. In 1987, Kidd and Kidd proposed that human-animal interactions are analogous to human-human or animal-animal relationships under some circumstances. In 1988, Bergler suggested that pets provide psychological benefits including affection, socialibility, closeness to nature, and security. Well-being and quality of life are enhanced through human-animal interactions when the psychological benefits exceed the psychological costs of pets. In 1988, Odendaal concluded people are involved with companion animals for psychological reasons, primarily attention needs, and utility reasons, such as the basic care of animals. In 1993, Hills developed a model based upon motivational attitudes toward animals. Contact with animals depended on three motivational bases: 1) the usefulness of animals for self-interest, 2) empathy or identification with animals, and 3) beliefs and values about the nature and status of animals. In 1996, Costall defined the positive interaction between

the owner and the pet as a mutual relationship. In 1997, Cameron suggested that attention is a basic need for humans and animals, with pets having an inherent need for individual recognition. In 1994, Wilson used the social exchange theory to suggest that the relationships between humans and animals involve positive and negative exchanges. Animals can have a positive or negative impact on the person who is caring for them (Odendaal, 2002).

Lasher (1998) used the relational theory to explain the human-animal bond. According to the relational model, connections to others are a source of mental and emotional strength and are the primary means of human growth throughout life. The author proposed that humans and companion animals are in continual mutual connection with each other, communicating primarily via attunement. Companion animals encourage humans to reconnect with their sense of self and sense of trust and to see things from different perspectives. In so doing, these human-animal relationships provide opportunities for inner growth.

Attachment to a pet has also been used to explain the human-animal bond. In several studies, attachment to a pet was discovered to be more important than pet ownership in conferring health benefits from human-animal interactions. The benefits from attachment to pets included reduced anxiety and aggression, possibly by buffering stress, providing social support, providing a sense of control, or facilitating social contacts (Staats, Pierfelice, Kim, & Crandell, 1999). Higher levels of pet attachment have also been associated with increased happiness and decreased depression (Garrity, Stallones, Marx, & Johnson, 1989). Effects resulting from pet attachment have been shown to vary, particularly between older and younger individuals. Strong pet attachment has been associated with beneficial health effects among the elderly; however, among young adults, it has been associated with emotional distress, possibly from a lack of human social support (Staats et al.).

A model using multiple pathways by which human-animal interactions can lead to positive health effects has also been proposed. This model proposes that pet commitment, defined as a cognitive intent to act in ways to promote the well-being of the pet, pet attachment, pet care, and human self-care behaviors contribute to the positive effects (Staats et al., 1999). In conclusion, multiple theories have been used to explain the human-animal bond; however, because of the complexity of human-animal interactions, the theoretical basis for the human-animal bond is still not completely understood.

Health Benefits of Human-Animal Interactions

Various health benefits from human-animal interactions have been reported. Physical benefits of pet ownership are related to increases in physical activity and decreases in sympathetic nervous system arousal. Mental health benefits have been attributed to increased social support, self-esteem, and exercise, and reductions in loneliness and stress levels (Jennings, 1997). Friedmann, Katcher, Thomas, Lynch, and Messent (1983) demonstrated a decrease in blood pressure among subjects exposed to an unknown dog in a mildly stressful situation. Results of a study by Allen, Blascovich, Tomaka, and Kelsey (1991) demonstrated that autonomic reactivity was diminished by the presence of a companion animal. In the presence of their pets, female subjects showed lower blood pressure and heart rate reactivity during a stressful task; however, in the presence of their closest friends, subjects showed greater reactivity. The authors concluded that the pets provided nonjudgmental social support that buffered acute responses to stress. The authors also speculated that pets induce positive feelings that enhance an individual's capacity to adapt to stress. Allen, Blascovich, and Mendes (2002) also demonstrated that pets buffer reactivity to acute stress and diminish perceptions of acute

stress. In their study, pet owners had the lowest cardiovascular reactivity to mental tasks and the quickest recovery in the presence of their pets, while in the presence of their spouse, they had the highest reactivity. The positive feelings elicited by pets were thought to be responsible for the calming responses observed among pet owners.

Pets may also help reduce feelings of loneliness. In a study by Zasloff and Kidd (1994), women living entirely alone were significantly lonelier than women living with pets only, women living with people but no pets, and women living with people and pets. Additional psychological benefits of pet ownership that have been reported include nonjudgmental companionship, intimacy, constancy, availability, facilitation of human social interactions, and lessening of social isolation (Jennings, 1997).

Looking at animals or animal pictures, being in the presence of animals, and touching or interacting with animals have all been shown to have specific effects on human health. Looking at animals may positively influence some people's perceptions and moods. Pictorial scenes and the people within the scenes are perceived as friendlier, happier, and less threatening when animals are included in the scenes (Friedmann, 2000). In addition, several studies have observed an association between observing animals and relaxation (Hart, 2000). Looking at fish in an aquarium has been shown to relax and relieve anxiety among dental patients (Katcher, Segal, & Beck, 1983). Katcher et al. observed an increase in comfort and a reduction in anxiety among subjects who explicitly looked at an aquarium prior to oral surgery, while no increases in comfort and reductions in anxiety were observed among patients who rested undisturbed in a chair or in patients who looked at a poster of a mountain waterfall. DeSchrive and Riddick (1990) observed a reduction in stress, as indicated by a reduction in pulse rate, a reduction in muscle tension, and an increase in skin temperature, among elderly aquarium observers 62 years

of age and older. Surprisingly, watching a videotape of a live fish aquarium had a greater impact on their physiological stress than did watching a live fish aquarium, possibly because watching the videotape was similar to watching television, an activity often enjoyed among the elderly. The authors also noted that the live fish acted as a social lubricant, facilitating conversations among the study participants. In a 1983 study by Katcher, Friedmann, Beck, and Lynch, blood pressures gradually dropped among normotensive and hypertensive subjects while watching fish swim in an aquarium, and the reductions lasted longer in those watching an aquarium with fish compared to those watching fishless aquariums. Similar reductions in blood pressure were also observed among subjects observing chimpanzees from safe distances (Friedmann). The constant movement of the animals which attracted the observer's attention, rather than the serenity associated with the animal itself, was thought to be responsible for the decreased physiologic arousal and subsequent relaxation experienced while watching animals (Friedmann).

In situations where an animal, even an unknown animal, is present but the subject is instructed to not focus on the animal, short-term decreases in physiologic arousal, anxiety, and depression have been observed (Friedmann, 2000). During an experiment conducted in a home setting, lower blood pressures were observed among children when a dog accompanied the researcher to the home (Friedmann et al., 1983). In another study, less anxiety was reported among subjects in a high-stress environment when the investigator's dog attended the session compared to when the dog did not attend (Friedmann). Lower depression levels were also observed in an adult day care program when an aviary was present, with the magnitude of the decreases correlating with the amount of attention given to the aviary (Holcomb et al., 1997).

Interacting with an animal, not necessarily one's own pet, is also associated with decreased physiologic arousal. For example, talking to and touching a pet has been shown to be

less stress inducing than interacting with people, possibly because of the nonjudgmental aspect of interacting with an animal (Friedmann, 2000). Blood pressures of 35 dog owners in a veterinary clinic waiting room were examined under three conditions: 1) resting without their pet in a consultation room, 2) reading a standardized verbal communication task aloud without their pets in the same room; and 3) interacting with their pet. The subjects' blood pressures increased significantly while reading aloud, but no increases occurred while talking to and interacting with their pet (Katcher, 1981). In a similar study of 92 undergraduate students who read aloud, read quietly, or interacted with a friendly unfamiliar dog, blood pressures and anxiety levels increased significantly while reading aloud, but no increases were observed while interacting with the dog (Wilson, 1987). Interacting with animals has also been associated with decreases in depression. Greater reductions in depression were observed among elderly male residents of a nursing home given access to a pet during therapy sessions, compared to therapy sessions with no pet (Brickel, 1983).

Much of the research linking animals with human health benefits has involved dogs (Friedmann, 2000; Friedmann et al., 1983; Raina, Waltner-Toews, Bonnett, Woodward, & Abernathy, 1999; Zasloff & Kidd, 1994). Positive benefits have also been observed when other species, including cats (Raina et al.; Zasloff & Kidd), fish (DeSchrive & Riddick, 1990; Katcher, Friedmann, Beck, & Lynch, 1983; Katcher et al., 1983), and birds (Baun & McCabe, 2000; Holcomb et al., 1997), have been used. Numerous factors, including ethnicity, personal attitudes toward an animal, the degree of attachment to an animal, the animal species, and the breed, may all have an impact on the effectiveness of human-animal interactions on human health (Friedmann; Risley-Curtiss, Holley, & Wolf, 2006).

The Importance of Pets to the Elderly

Various studies have found that pets enhance the lives of the elderly. In 1975, Mugford and M'Comisky demonstrated the therapeutic value of pets in the elderly. In this study, a budgerigar or a begonia was placed in the homes of free-living elderly for 5 months, and a control group received no intervention. After 5 months, participants who had received budgerigars were happier with improved social attitudes and mental health compared to participants receiving a begonia or no treatment (Baun & McCabe, 2000).

Holcomb et al. (1997) examined the effects of an aviary at a Veterans Administration Medical Center on depression levels in 38 elderly men. In this study, participants were exposed to an aviary for a 2-week treatment period, followed by removal of the aviary for 2 weeks. Each 2-week phase was then repeated. No association was observed between the presence of the aviary and depression levels. However, use of the aviary was significantly associated with reduced depression levels, and the magnitude of the decrease in depression was directly related to the amount of attention given to the aviary.

In a study by Raina et al. (1999), pet ownership had a significant effect on the physical health of older people. Both cat and dog owners had higher activities of daily living (ADL) scores compared to non-pet owners; however, there were no differences in scores between dog and cat owners. Although dog ownership is often an impetus for participation in physical activity, care-taking was proposed as an explanation for the higher, but equal, ADL scores among cat and dog owners. Caring for a pet may provide older people with a sense of responsibility and purpose, and, therefore, a stimulus to remain active in daily activities. Additionally, pet owners with lower social support were less likely to experience a decline in psychological health compared to non-pet owners with lower social support.

The relationship between health effects and human-animal interactions is complex, and some studies have failed to report positive health benefits associated with pet ownership. In a study by Parslow, Jorm, Christensen, Rodgers, and Jacomb (2005), neither pet ownership nor caring for a pet provided health benefits for community-based Australians aged 60 to 64. Pet owners reported poorer physical and mental health compared to non-pet owners. Symptoms of depression were significantly higher among pet owners and those who cared for pets. Pet ownership and caring for a pet were not associated with any reductions in health services, as has been previously described in the literature.

In a study by Garrity et al. (1989), no associations were observed among pet ownership and health status among a national probability sample of persons aged 65 years and older in the United States. However, strong attachment to a pet was associated with fewer symptoms of depression in this sample. Furthermore, among the recently bereaved elderly with minimal social support, pet ownership and strong attachment to a pet were significantly associated with fewer symptoms of depression.

CHAPTER 3

METHODOLOGY

Setting and Study Subjects

The project used a sample of senior citizens 55 years of age and older who attended a regional senior center. Participants were recruited on a volunteer basis to participate in the project. Participants were recruited during group activities, such as monthly meetings and luncheons, and through one-on-one invitations as they entered the senior center. No inducements were provided to participants. In 2005, the senior center had 3,300 members with over 160,000 service contacts. Participants ranged in age from 55 to over 95 years of age, with a mean of 71.8 years. A greater proportion of the participants were female (73.9%) than male (26.1%), and the majority were Caucasian (96%). Members were more likely to be widowed (42.6%) or married (36.2%), with 16.3% and 4.3% of the members reporting they were divorced or never married, respectively.

Data Collection and Management

Approval of the ETSU Institutional Review Board was obtained prior to data collection. Written informed consent was obtained from all participants. Data collection took place from August 2005 to November 2005.

A four-page self-administered questionnaire was given to a convenience sample of senior citizens, 55 years of age and older, who attended a regional senior center or its sponsored events. To avoid duplication of surveys, subjects were advised to complete only one survey. Completed surveys were collected and transported to ETSU where data collected was coded and entered into

SPSS statistical software. Unique identifiers, void of personal markers, were recorded on each survey for data entry. Of the 200 questionnaires that were distributed, 104 (52%) were returned. Incomplete questionnaires were included in the data analysis. Questions were analyzed based upon the number of responses received for each question.

Survey Instrument

The survey instrument was designed to assess the following measurements: 1) general health, 2) depression, 3) perceived social support, 4) attitudes about pets, 5) attitudes about the subjects' relationship with and attachment to their pets, 6) attitudes about the aquarium, and 7) demographic profile (Appendix A). Questionnaires were written on a sixth-grade level in size 14 font.

Measures – Objective 1

General Health

General health was assessed by determining: 1) the number and type of chronic medical conditions affecting subjects, 2) self-perceived health, and 3) the effects of physical and emotional health on social functioning. One question was used for subjects to indicate chronic medical conditions. They were asked to identify medical conditions from a list of 13 chronic diseases including: heart disease, stroke, high blood pressure, high cholesterol, circulation problems, eye problems like cataracts or glaucoma, arthritis, hearing problems, diabetes, lung disease, kidney disease, liver disease, cancer, and other. Self-perceived health and social functioning were assessed using two questions extracted from the Short-Form-36-Health Survey (Rand Corporation & Ware, 1990). To assess self-perceived health, subjects were instructed to

indicate whether their health was: 1) poor, 2) fair, 3) good, 4) very good, and 5) excellent. As a measure of social functioning, subjects were asked how often, on a four-point scale ranging from 1 (never) to 4 (often), their physical or emotional health interfered with their normal social activities during the past 4 weeks. General health was assessed because physical health problems and related disabilities have been associated with depression in the elderly (Roberts et al., 1997). Self-rated health is a strong predictor of decline in functional status (Janevic, 2004) and is strongly associated with depression (Beekman et al., 1997).

Depression

The Center for Epidemiologic Studies Depression Scale (CES-D) developed by the National Institute of Mental Health Center for Epidemiologic Studies (Radloff, 1977) is one of the best screening instruments for symptoms of depressed mood in older adults (Andresen, Malmgren, Carter, & Patrick, 1994). It is a 20-item, self-report depression scale that is widely used in community and population-based studies and is applicable across diverse age, socioeconomic, and ethnic groups (McDowell & Newell, 1996b; Nguyen, Kitner-Triolo, Evans, & Zonderman, 2004). Responses to questions measuring the frequency of depressive symptoms during the past week are scored on a scale of 0 to 3 and then summed to give an overall score. A cutoff score of 16 or greater is indicative of symptoms of depressed mood. Many researchers have objected to the length of the CES-D as a general screening tool (Andresen et al.). As a result, several shortened versions of the CES-D have been developed without loss of reliability (McDowell & Newell, 1996b).

The CESD-10, a 10-item version of the CES-D that was developed by Andresen et al. (1994), was used to detect the presence of depressive symptoms among subjects in this study.

Subjects were instructed to indicate how frequently, using a four-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time), they felt or behaved during the past week in response to the following statements: 1) I was bothered by things that usually don't bother me, 2) I had trouble keeping my mind on what I was doing, 3) I felt depressed, 4) I felt that everything that I did was an effort, 5) I felt hopeful about the future, 6) I felt fearful, 7) My sleep was restless, 8) I was happy, 9) I felt lonely, and 10) I could not get going. A depression score was calculated by summing item scores after reversing the coding for the positive mood items, questions 5 and 8. The range of scores for the CESD-10 is 0 to 30, with higher scores representing a greater degree of depressed mood. A cutoff score of 10 or greater in the CESD-10 is indicative of depressive symptoms and has been shown to have good predictive accuracy ($\kappa = 0.97$) and comparable test-retest reliabilities when compared to the 20-item version CES-D (Andresen et al.). As shown in Table 21, the CESD-10 was reliable ($\alpha = 0.811$) for this sample of community-dwelling senior citizens in Northeast Tennessee.

Social Support

The impact of social support on depressive symptoms was assessed using eight questions from the Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991). This instrument evaluates the availability of 4 categories of functional (i.e. perceived) support: tangible support, affectionate support, emotional or informational support, and positive social interaction. The overall scale and developed subscales have been shown to be internally consistent ($\alpha = 0.97$ and $\alpha = 0.91-0.96$, respectively), with high test-retest reliability after one year (McDowell & Newell, 1996a). As shown in Table 22, the overall scale and subscale items

were reliable ($\alpha = 0.936$ and $\alpha = 0.798-0.953$, respectively) among this sample of community-dwelling senior citizens.

Using a five-point scale ranging from 1 (none of the time) to 5 (all of the time), each respondent was instructed to indicate how often support is available if you need: 1) Someone you can count on to listen to you when you need to talk, 2) Someone to take you to the doctor if you needed it, 3) Someone who shows you love or affection, 4) Someone to confide in or talk to about yourself or your problems, 5) Someone to get together with for relaxation, 6) Someone to do things with to help you get your mind off things, 7) Someone to help with daily chores if you were sick, and 8) Someone to turn to for suggestions about how to deal with a personal problem. Questions 1, 4, and 8 assessed emotional or informational support, questions 2 and 7 assessed tangible support, question 3 assessed affectionate support, and questions 5 and 6 assessed positive social interaction. Responses to questions within each category of functional support were summed to calculate a score for subscale items. A total score was calculated from the sum of the subscale items, with higher scores indicative of greater functional support.

Pet Attitudes

The Revised Pet Attitude Scale developed by Lago, Kafer, Delaney, and Connell (1988) measures the response to 10 questions that are based upon a “generalized affection for pets” subscale and a “dislike of pet keeping” subscale. The scale has been shown to be internally consistent ($\alpha = 0.88$) among a sample of community-dwelling elderly volunteers (Lago et al.). As displayed in Table 23, the Revised Pet Attitude Scale was reliable ($\alpha = 0.931$) for this sample of community-dwelling senior citizens in Northeast Tennessee.

For this study, seven items displaying the highest item to total correlation in the study by Lago et al. (1988) were used to measure attitudes toward pets. A 5-point Likert scale was used to measure attitudes toward animals rather than the 4-point Likert scale that was used in the scale's development. Subjects were instructed to indicate agreement with 7 statements using a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree): 1) House pets add happiness to my life (or would if I had one), 2) I love pets, 3) I frequently talk to pets, 4) I like house pets, 5) I would like a pet in my home, 6) Animals belong in the wild or in zoos but not in the home, and 7) Having pets is a waste of money. Affection for pets was assessed in items 1 through 5, and dislike of pets was assessed in items 6 and 7. Responses were summed to produce a total attitude score after reversing the coding for the negative attitudinal items, questions 6 and 7. Higher scores represented more favorable attitudes toward pets.

Pet Attachment

The degree to which individuals are attached to their pet was assessed using seven questions from the Center to Study Human-Animal Relationships and Environments (CENSHARE) Pet Attachment Survey (Holcomb et al., 1985). This 27-item survey measures both behavioral and emotional aspects of pet attachment with two subscales, relationship maintenance and intimacy. Based upon prior studies, the survey has been shown to be internally consistent with Cronbach's alpha coefficients of 0.83 and 0.74 for relationship maintenance and intimacy, respectively (Holcomb et al.). As shown in Table 24, the (CENSHARE) Pet Attachment Survey was reliable ($\alpha=0.860$) for this sample of community-dwelling senior citizens in Northeast Tennessee.

Subjects were instructed to rate an aspect of their relationship with their pet on a 4-point scale ranging from 1 (almost never) to 4 (almost always). Questionnaires instructed subjects to “Check the box for each question which best describes your relationship with your current pet” using the following seven items from the Pet Attachment Survey: 1) You talk to your pet as a friend, 2) Your pet is aware of your different moods, 3) You play with your pet when he/she approaches, 4) You talk to others about your pet, 5) You prefer to be with your pet more than with most people you know, 6) When you feel bad, you seek your pet for comfort, and 7) You feel sad when you are separated from your pet. Responses were summed to produce a single attachment score, with higher scores indicating stronger pet attachment.

Attitude about Relationships with Pets

The Pet Relationship Scale (PRS) was used to assess participants’ attitudes about their relationship with their pets. The PRS consists of 22 self-reported items organized into three subscales: affectionate companionship, equal family member status, and mutual physical activity. The overall scale and subscales have been shown to be internally consistent among community-based elderly volunteers (Lago et al., 1988). As shown in Table 25, the overall scale and subscale items were reliable ($\alpha = 0.866$ and $\alpha = 0.509-0.817$, respectively) among this sample of community-dwelling senior citizens in Northeast Tennessee.

Eleven items from the PRS that displayed the highest item to total correlation were used. Subjects were instructed to indicate agreement with 11 statements that best described the relationship with their current pet(s). Subjects used a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree) to indicate their agreement with the following statements: 1) There are times I’d be lonely except for my pet, 2) I talk to my pet about things

that bother me, 3) I miss my pet when I am away, 4) Making me laugh is part of my pet's job, 5) My pet gives me a reason for getting up in the morning, 6) My pet is a member of the family, 7) My pet is constantly at my side, 8) My pet is an equal in this family, 9) In many ways my pet is the best friend I have, 10) My pet helps me to be more physically active, and 11) My pet and I often take walks together. Items 1 to 5 assessed affectionate companionship, items 6 to 9 assessed equal family member status, and items 10 and 11 assessed mutual physical activity. Responses were summed to generate scores from subscale items which measured the strength of affection, the extent to which people see pets as equal members of the family, and the frequency of physical contact and interaction. Scores from subscale items were then summed to produce a total score. Higher scores represented more favorable attitudes about the subjects' relationships with their pets.

Measures – Objective 2

Effect of Aquarium

A 10-gallon freshwater aquarium with a power filter was donated to a regional senior center in October 2004 in order to promote human-animal interactions. The aquarium contained 2 brightly colored goldfish, 8 guppies, and 5 small snails. As a source of environmental enrichment for the fish, artificial seaweed, brightly colored gravels, and a castle were placed in the aquarium. These objects within the aquarium provided diversity in order for the fish to interact with their environment and use their natural behaviors.

To evaluate the impact of the aquarium on the psychological health of members of senior center, questions assessing the attendance rate, the frequency of observing the fish, and the psychological effects of observing the fish were developed. A five-point scale ranging from 1)

special occasions only, 2) once a month, 3) 1-2 times per week, 4) 3-5 times per week, and 5) 6 or more times per week, was used to ask subjects: “How frequently do you attend activities or visit the senior center.” A two-point scale, 1 (no) and 2 (yes), was used to ask subjects: “Have you seen the aquarium at the senior center.” Using a five-point scale ranging from 1 (never) to 5 (always), subjects were asked: “How often do you look at the fish when you come to the center.” A 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to indicate the subjects’ agreement with the statement: Looking at the fish makes me feel better. If subjects agreed with the previous statement, they were asked to identify: In what ways does looking at the fish make you feel better.

Measures – General

Demographic Information

Questions designed to ascertain demographic characteristics of participants included: age, gender, ethnicity, marital status, employment status, pet ownership, and type of pet.

Data Analysis

Descriptive statistics such as mean, range, and frequency were used to describe characteristics of the study participants including age, gender, ethnicity, marital status, employment status, and pet ownership. Chi-square tests or the Fisher’s exact test were used to determine if differences exist between different groups of nominal data such as pet ownership and depression status. The Mann-Whitney U test and t-tests were used to determine if differences in ordinal data exist between different groups. For example, t-tests were used to compare mean differences between groups such as mean attitude scores between pet owners and

non-owners. Pearson's correlation coefficient was used to determine the relationships between continuous independent and dependent variables. Multiple logistic regression techniques were used to evaluate the relationship of depression with the various independent variables simultaneously while controlling for other variables such as gender and age. For example, the relationship between type of pet, attachment to a pet, and depression status was analyzed. For all tests, $p < 0.05$ was considered statistically significant. SPSS (version 12) was used to perform the statistical procedures outlined above.

CHAPTER 4

RESULTS

General Overview

This chapter presents results for objective 1 that examined the relationship between pet ownership, pet attachment, and psychological health among community-dwelling older adults and objective 2 that evaluated the impact of the placement of an aquarium on the psychological health of community-dwelling older adults. Descriptive information for the sample is summarized under demographic information.

Demographic Information

A summary of the demographic and health status characteristics of the sample is presented in Tables 1 and 2. Participants ($n = 96$) ranged in age from 55 to 87 years of age, with a mean of 69.61 (± 7.95) years. A greater proportion of the sample was female (76.7%) than male (23.3%), and the majority were Caucasian (96.1%). The respondents were primarily retired (73.2%), and over half (52.9%) were married. Only 31.4% of the respondents were widowed. Pet owners accounted for 53.9% of the sample.

Objective 1

Health Status

The majority of the participants (78.9%) perceived their health as good or better. Only 3.2% and 17.9% of the participants perceived their health as poor or fair, respectively. Within the past month, 44 participants (53.0%) reported their physical or emotional health had never interfered with their normal social activities while 6 participants (7.2%) reported it had often interfered with their normal social activities. There was a significant negative correlation between perceived health and social functioning. Participants who reported that their health had more frequently interfered with their social activities were significantly more likely to have poorer perceptions of their health ($p < 0.01$).

The mean number of chronic diseases affecting participants in this sample ($n=101$) was 2.98 (± 1.93), with a range of 0 to 9 disorders. Over one third of the participants (35.7%) had four or more chronic disorders. Participants with 4 or more chronic diseases had significantly poorer perceptions of their health ($p < 0.01$), while those with one or fewer diseases had significantly more favorable perceptions of their health ($p < 0.01$). As shown in Figure 1, the major diseases afflicting this sample of senior citizens were arthritis ($n=55$), high cholesterol ($n=54$), hypertension ($n=50$), and eye disorders ($n=30$).

Table 1

Demographic and Health Characteristics of a Sample of Community-dwelling Senior Citizens in Northeast Tennessee (n=104)

| Variable | n | % |
|--|----|------|
| Gender (n=103) | | |
| Male | 24 | 23.3 |
| Female | 79 | 76.7 |
| Age (n=96) | | |
| 55 to 64 | 27 | 28.2 |
| 65 to 74 | 44 | 45.8 |
| 75+ | 25 | 26.0 |
| Ethnicity (n=102) | | |
| Caucasian | 98 | 96.1 |
| African-American | 4 | 3.9 |
| Marital status (n=102) | | |
| Married | 54 | 52.9 |
| Widowed | 32 | 31.4 |
| Divorced | 14 | 13.7 |
| Separated | 1 | 1.0 |
| Never married | 1 | 1.0 |
| Employment status (n=97) | | |
| Retired | 71 | 73.2 |
| Employed (full-time, part-time, self-employed) | 20 | 20.6 |
| Unable to work | 6 | 6.2 |
| Pet ownership (n=102) | | |
| Pet in household | 55 | 53.9 |
| No pet in household | 47 | 46.1 |
| Self-perceived health (n=95) | | |
| Excellent | 8 | 8.4 |
| Very good | 30 | 31.6 |
| Good | 37 | 38.9 |
| Fair | 17 | 17.9 |
| Poor | 3 | 3.2 |
| Chronic health conditions (n=101) | | |
| None | 9 | 8.9 |
| One | 16 | 15.8 |
| Two | 16 | 15.8 |
| Three | 24 | 23.8 |
| Four | 36 | 35.7 |
| Social functioning (n=83) | | |
| Often | 6 | 7.2 |
| Sometimes | 19 | 22.9 |
| Rarely | 14 | 16.9 |
| Never | 44 | 53.0 |

Table 2

Pearson Correlation of Health Characteristics Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Variable (n) ^a | Perceived health | 0 Disease | 1 Disease | 2 Disease | 3 Disease | ≥ 4 Disease | Social functioning | Depression |
|--|------------------|----------------|----------------|----------------|----------------|---------------|--------------------|---------------|
| Perceived health ^b (n) | 1.00 (95) | | | | | | | |
| 0 Disease ^c (n) | .27** (94) | 1.00 (101) | | | | | | |
| 1 Disease ^c (n) | .39** (94) | -.14 (101) | 1.00 (101) | | | | | |
| 2 Disease ^c (n) | .06 (94) | -.14 (101) | -.19 (101) | 1.00 (101) | | | | |
| 3 Disease ^c (n) | -.05 (94) | -.18 (101) | -.24* (101) | -.24* (101) | 1.00 (101) | | | |
| ≥ 4 Disease ^c (n) | -.46** (94) | -.23* (101) | -.32* (101) | -.32* (101) | -.42* (101) | 1.00 (101) | | |
| Social functioning ^d (n) | -.51** (79) | -.10 (84) | -.20 (84) | .05 (84) | .09 (84) | .01 (84) | 1.00 (84) | |
| Depression ^e (n) | -.33** (93) | -.04 (99) | -.05 (99) | -.05 (99) | .06 (99) | .06 (99) | .50 ** (83) | 1.00 (101) |

*p<0.05, **p<0.01

^a n = number of respondents for each variable^b Perceived health = a self-report measure of general health (poor, fair, good, very good, excellent); higher scores represent better health^c Chronic disease = a self-report measure of the chronic medical conditions afflicting each respondent divided into 5 categories: 1) 0 disease; 2) 1 disease; 3) 2 diseases; 4) 3 diseases; 5) 4 or more diseases^d Social functioning = a self-report measure of how often (often, sometimes, rarely, never) the respondents' physical and mental health interfered with their social activities within the past 4 weeks; higher scores represent poorer health^e Depression = a score of ≥ 10 on CESD-10 scale indicating depressed mood

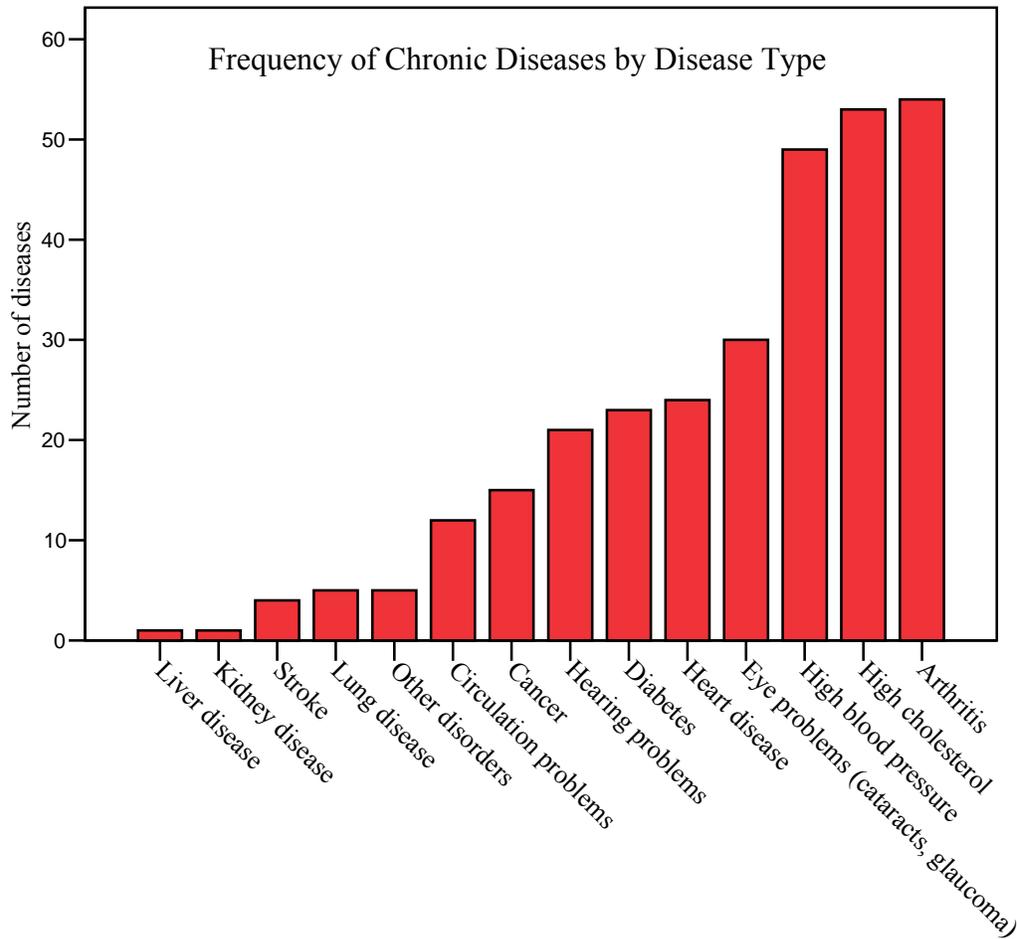


Figure 1. *Frequency Distribution: Self-reported Diseases Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee (n=101)*

Depression

Eighteen participants, representing 17.3% of the sample, and consisting of 15 females and 3 males, were identified as depressed. They ranged in age from 56 to 85 years of age, with a mean age of 72.24 (± 9.55) years. The majority of individuals identified as depressed were either married (44.4%) or widowed (38.9%). They were predominantly Caucasian (94.4%), and the majority of depressed individuals (94.4%) were retired or unable to work. Fifty percent of those

with symptoms of depression were current pet owners. No statistically significant difference was observed between the proportion of pet owners with depression and the proportion of non-pet owners with depression ($p>0.05$). In addition, no statistically significant differences in age, gender, ethnicity, marital status, and employment status were observed between depressed and non-depressed participants ($p>0.05$).

Participants with symptoms of depression had poorer perceptions of their health ($p<0.01$) and reported that their health had interfered more often with their social activities within the past month ($p<0.001$) than those without depressive symptoms. Among individuals identified as depressed, 43.7% perceived their health as fair or poor, compared to 16.9% of those identified as non-depressed. Over two thirds (68.8%) of individuals with depressive symptoms reported their health had sometimes or often interfered with their social activities within the past month, compared to 21.2% of individuals identified as non-depressed. No statistically significant difference in the number of chronic diseases was observed between depressed and non-depressed individuals ($p>0.05$). A summary of the results is shown in Tables 3 and 4.

Table 3

Demographic and Health Characteristics of Depressed Subjects (n=18) and Non-depressed Subjects (n=82) from a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Variable | Depressed | Non-depressed | t | χ^2 | p-value |
|---|------------------------------|------------------------------|-------|----------|----------------------|
| Age - Mean \pm SD (yrs) | 72.24 \pm (9.55) (n=17) | 69.11 \pm (7.63) (n=42) | 1.458 | | 0.148 |
| Age – Range (yrs) | n (%) | n (%) | | 3.126 | 0.209 |
| 55 – 64 | 4 (23.5) | 22 (28.9) | | | |
| 65 – 74 | 6 (35.3) | 37 (48.7) | | | |
| 75 > | 7 (41.2) | 17 (22.4) | | | |
| Gender | | | | | 0.757 ^a |
| Male | 3 (16.7) | 20 (24.4) | | | |
| Female | 15 (83.3) | 62 (75.6) | | | |
| Ethnicity | | | | | 0.558 ^a |
| Caucasian | 17 (94.4) | 78 (96.3) | | | |
| African-American | 1 (5.6) | 3 (3.7) | | | |
| Marital Status | | | | | 0.720 ^a |
| Married | 8 (44.4) | 44 (54.3) | | | |
| Widowed | 7 (38.9) | 25 (30.9) | | | |
| Single (never married, separated, divorced) | 3 (16.7) | 12 (14.8) | | | |
| Employment status | | | | | 0.107 ^a |
| Retired/unable to work | 17 (94.4) | 57 (75.0) | | | |
| Employed | 1 (5.6) | 19 (25.0) | | | |
| Self-perceived health | | | | | 0.002 ^{**a} |
| Very good - Excellent | 1 (6.3) | 37 (48.1) | | | |
| Good | 8 (50.0) | 27 (35.1) | | | |
| Fair - Poor | 7 (43.7) | 13 (16.9) | | | |
| Chronic health conditions | | | | | 0.747 ^a |
| 0 – 1 | 3 (17.6) | 22 (26.8) | | | |
| 2 – 3 | 8 (47.1) | 32 (39.0) | | | |
| 4 or more | 6 (35.3) | 28 (34.1) | | | |
| Social functioning | | | | | 0.001 ^{***} |
| Never - rarely | 5 (31.3) | 52 (78.8) | | | |
| Sometimes - often | 11 (68.8) | 14 (21.2) | | | |
| Pet ownership | | | | 0.275 | 0.600 |
| Pet in household | 9 (50.0) | 46 (56.8) | | | |
| No pet in household | 9 (50.0) | 35 (43.2) | | | |

** p<0.01, ***p<0.001, ^aFisher's exact test (2-sided), n = number of respondents for each variable, SD = standard deviation, t = test statistic for Student's t-test, χ^2 = Chi-square test statistic

Table 4

Student's t-test Analysis of Depression and Health Variables Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item | Depression | n ^a | Mean (\pm SD ^b) | t ^c | p-value |
|---|------------|----------------|--------------------------------|----------------|----------|
| Self-perceived health ^d | No | 77 | 3.39 (\pm 0.95) | 3.289 | 0.001** |
| | Yes | 16 | 2.56 (\pm 0.73) | | |
| Number of chronic diseases ^e | No | 82 | 2.95 (\pm 1.96) | 0.326 | 0.745 |
| | Yes | 17 | 3.12 (\pm 1.65) | | |
| Social functioning ^f | No | 67 | 1.58 (\pm 0.84) | 5.146 | 0.000*** |
| | Yes | 16 | 2.88 (\pm 1.15) | | |

p<0.01, *p<0.001

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Self-perceived health = a self-report measure of general health (poor, fair, good, very good, excellent); higher scores represent better health

^e Number of chronic diseases = a self-report measure of the number of chronic medical conditions afflicting each respondent; higher scores represent more conditions

^f Social functioning = a self-report measure of how often (often, sometimes, rarely, never) the respondents' physical and mental health interfered with their social activities within the past 4 weeks; higher scores represent poorer health

The mean depression score on the CESD-10 for females (n=77) was 6.21 ± 5.54 (range 0-23) and for males (n=23) was 4.30 ± 4.53 (range 0-16). The Student's t-test was used to test whether there was a statistically significant difference in the item and overall mean depression score among males and females. A statistically significant difference between males and females was observed in the mean score for the depression item "I had trouble keeping my mind on what I was doing." Females were more likely to respond having "trouble staying focused" compared to males, as evidenced by a p-value of 0.01. Another item which was approaching significance (p=0.071) in this sample was the item "I felt lonely." Females were more likely to report feeling lonely than males. The results are displayed in Table 5.

Table 5

Student's t-test Analysis of Mean Levels of Depression Based upon Gender Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item | Gender | n ^a | Mean (\pm SD ^b) | t ^c | p-value |
|---|--------|----------------|--------------------------------|----------------|---------|
| Depression Score ^d | Female | 77 | 6.21 \pm (5.54) | 1.502 | 0.136 |
| | Male | 23 | 4.30 \pm (4.53) | | |
| 1. I was bothered by things that usually don't bother me. | Female | 69 | 0.57 \pm (0.78) | 1.077 | 0.285 |
| | Male | 22 | 0.36 \pm (0.73) | | |
| 2. I had trouble keeping my mind on what I was doing. | Female | 71 | 0.87 \pm (1.03) | 2.621 | 0.010** |
| | Male | 22 | 0.27 \pm (0.55) | | |
| 3. I felt depressed. | Female | 68 | 0.41 \pm (0.78) | 0.867 | 0.388 |
| | Male | 20 | 0.25 \pm (0.55) | | |
| 4. I felt that everything that I did was an effort. | Female | 68 | 0.72 \pm (1.08) | 0.578 | 0.564 |
| | Male | 21 | 0.57 \pm (0.87) | | |
| 5. I felt hopeful about the future. | Female | 71 | 1.04 \pm (1.29) | 0.188 | 0.852 |
| | Male | 19 | 1.11 \pm (1.33) | | |
| 6. I felt fearful. | Female | 66 | 0.36 \pm (0.82) | 0.560 | 0.577 |
| | Male | 20 | 0.25 \pm (0.72) | | |
| 7. My sleep was restless. | Female | 67 | 0.90 \pm (1.00) | 1.332 | 0.186 |
| | Male | 21 | 0.57 \pm (0.87) | | |
| 8. I was happy. | Female | 73 | 0.82 \pm (1.14) | 0.731 | 0.467 |
| | Male | 21 | 0.62 \pm (1.07) | | |
| 9. I felt lonely. | Female | 65 | 0.57 \pm (0.92) | 1.829 | 0.071 |
| | Male | 21 | 0.19 \pm (0.40) | | |
| 10. I could not get "going." | Female | 65 | 0.69 \pm (0.97) | 0.327 | 0.744 |
| | Male | 21 | 0.62 \pm (0.59) | | |

**p = 0.01

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Depression score (the sum of the 10-items in the CESD-10) is a self-report measure of how frequently on a scale of 0 (rarely or none of the time) to 3 (most or all of the time) subjects felt or behaved during the past week. A depression score was calculated by summing item scores after reversing the coding for the positive mood items, questions 5 and 8. Higher scores represent a greater degree of depressed mood.

Social Support

The mean social support score for the study group (n=101) was 32.14 ± 8.32 , with a range of 8 to 40. The mean score for the social support items was as follows: a) emotional or informational support items (12.19 ± 3.28 , range 3-15), b) tangible support items (7.50 ± 2.91 , range 0-10), c) affectionate support item (4.45 ± 0.96 , range 1-5), and d) positive social interaction items (8.01 ± 2.26 , range 0-10). The mean social support score for females (n=76) was 32.25 ± 7.78 (range 8-40) and males (n=24) was 31.46 ± 10.03 (range 8-40). Using the Student's t-test, no statistically significant differences were observed in the mean item and overall social support scores between males and females ($p > 0.05$).

The mean social support score for depressed participants was 28.59 ± 11.25 (range 8-40), while the mean social support score for non-depressed participants was 33.21 ± 7.27 (range 8-40). Using the Student's t-test, a statistically significant difference was observed in the overall mean social support score between depressed and non-depressed individuals ($p < 0.05$).

Statistically significant differences were also observed in the following emotional or informational support items and the positive social interaction items:

- a) Depressed individuals were less likely to have someone they could count on to listen when they needed to talk ($p < 0.05$).
- b) Depressed individuals were less likely to have someone to confide in or to talk to about themselves or their problems ($p < 0.01$).
- c) Depressed individuals were less likely to have someone to relax with ($p < 0.05$).
- d) Depressed individuals were less likely to have someone to do things with to help them keep their mind off things ($p < 0.05$).

- e) Depressed individuals were less likely to have someone to turn to for suggestions on dealing with personal problems ($p < 0.01$).

No statistically significant differences in the affectionate support item and the tangible support items were observed between individuals with depressive symptoms compared to those without depressive symptoms ($p > 0.05$). A summary of the results is shown in Tables 6 and 7.

Table 6

Student's t-test Analysis of Mean Social Support Items Based upon Depression Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item | Depression | n ^a | Mean \pm (SD ^b) | t ^c | p-value |
|--|------------|----------------|-------------------------------|----------------|---------|
| Social Support Score ^d | No | 81 | 33.21 \pm (7.27) | 2.147 | 0.034* |
| | Yes | 17 | 28.59 \pm (11.25) | | |
| 1. Emotional or informational support items ^e | No | 81 | 12.65 \pm (2.86) | 2.725 | 0.008** |
| | Yes | 17 | 10.35 \pm (4.40) | | |
| 2. Tangible support items ^f | No | 81 | 7.70 \pm (2.83) | 0.911 | 0.365 |
| | Yes | 17 | 7.00 \pm (3.20) | | |
| 3. Affectionate support item ^g | No | 81 | 4.57 \pm (0.77) | 1.645 | 0.103 |
| | Yes | 17 | 4.18 \pm (1.33) | | |
| 4. Positive social interaction items ^h | No | 81 | 8.28 \pm (2.00) | 2.081 | 0.040* |
| | Yes | 17 | 7.06 \pm (3.03) | | |

*p<0.05, **p<0.01

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Social support score = the sum of items 1- 4; higher scores are indicative of greater functional support

^e Emotional or informational support items = expressions of positive affect, empathy, encouragement, and the offering of advice, information, or feedback

^f Tangible support items = the provision of material or behavioral assistance

^g Affectionate support item = expressions of love and affection

^h Positive social interaction items = the availability of other persons with which to do enjoyable activities

Table 7

Student's t-test Analysis of Mean Social Support Variables Based upon Depression Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item | Depression | n ^a | Mean \pm (SD) ^b | t ^c | p-value |
|---|------------|----------------|------------------------------|----------------|---------|
| Social Support Score ^d | No | 81 | 33.21 \pm (7.27) | 2.147 | 0.034* |
| | Yes | 17 | 28.59 \pm (11.25) | | |
| 1. Someone you can count on to listen to you when you need to talk | No | 78 | 4.35 \pm (0.85) | 2.142 | 0.035* |
| | Yes | 16 | 3.75 \pm (1.61) | | |
| 2. Someone to take you to the doctor if you needed it | No | 78 | 4.15 \pm (1.48) | 0.824 | 0.412 |
| | Yes | 17 | 3.82 \pm (1.59) | | |
| 3. Someone who shows you love or affection | No | 81 | 4.57 \pm (0.77) | 1.645 | 0.103 |
| | Yes | 17 | 4.18 \pm (1.33) | | |
| 4. Someone to confide in or talk to about yourself or your problems | No | 80 | 4.39 \pm (0.92) | 2.691 | 0.008** |
| | Yes | 17 | 3.65 \pm (1.46) | | |
| 5. Someone to get together with for relaxation | No | 81 | 4.22 \pm (0.99) | 2.360 | 0.020* |
| | Yes | 17 | 3.53 \pm (1.55) | | |
| 6. Someone to do things with to help you get your mind off things | No | 79 | 4.16 \pm (1.02) | 2.128 | 0.036* |
| | Yes | 17 | 3.53 \pm (1.51) | | |
| 7. Someone to help with daily chores if you were sick | No | 80 | 3.75 \pm (1.56) | 1.353 | 0.179 |
| | Yes | 17 | 3.18 \pm (1.74) | | |
| 8. Someone to turn to for suggestions about how to deal with a personal problem | No | 80 | 4.19 \pm (1.14) | 3.180 | 0.002** |
| | Yes | 17 | 3.18 \pm (1.43) | | |

*p<0.05, **p<0.01

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Social support score (the sum of items 1- 8) is a self-report measure of the availability (none to all of the time) of perceived support, with higher scores representing greater functional support. Items 1, 4 and 8 are emotional or informational support items. Items 2 and 7 are tangible support items. Item 3 represents affectionate support. Items 5 and 6 are positive social interaction items.

Pet Ownership

Table 8 displays the distribution of demographic and health variables by current pet ownership among participants. Fifty-five participants (53.9%) were current pet owners, whereas 47 (46.1%) did not currently own a pet. Pet owners consisted of 43 females and 12 males and ranged in age from 55 to 85 years of age, with a mean of 68.20 ± 7.81 years. The majority of pet owners were married (57.4%), and over half of the respondents were retired or unable to work (69.4%). The number of pets owned by respondents ranged from 1 to 13, with a mean of 2.31 ± 2.11 . Among pet owners, 27 participants (50.0%) currently owned 1 pet, 11 (20.4%) owned 2 pets, 5 (9.3%) owned 3 pets, and 11 (20.6%) owned 4 or more pets. Pet owners were most likely to report they had a pet dog (n=44), while a smaller proportion had a pet cat (n=23). A statistically significant difference in employment status was observed between pet owners and non-owners ($p < 0.05$). No statistically significant differences were observed between pet owners and non-owners based upon age, gender, ethnicity, marital status, self-perceived health, health effects on social functioning, and type and number of chronic diseases ($p > 0.05$).

Table 8

Demographic and Health Characteristics of a Sample of Community-dwelling Senior Citizens in Northeast Tennessee Based upon Pet Ownership (n=102)

| Variable | Pet Owner | Non-Owner | t | χ^2 | p-value |
|--|------------------------------|------------------------------|-------|----------|--------------------|
| Age - Mean \pm SD (yrs) | 68.20 \pm (7.81) (n=50) | 71.22 \pm (7.96) (n=45) | 1.866 | | 0.065 |
| Age – Range (yrs) | n (%) | n (%) | | 3.126 | 0.209 |
| 55 – 64 | 18 (36.0) | 10 (22.2) | | | |
| 65 – 74 | 22 (44.0) | 20 (44.4) | | | |
| 75 > | 10 (20.0) | 15 (33.3) | | | |
| Gender | | | | 0.037 | 0.848 |
| Male | 12 (21.8) | 11 (23.4) | | | |
| Female | 43 (78.2) | 36 (76.6) | | | |
| Ethnicity | | | | | 0.624 ^a |
| Caucasian | 52 (94.5) | 45 (97.8) | | | |
| African-American | 3 (5.5) | 1 (2.2) | | | |
| Marital Status | | | | 1.802 | 0.406 |
| Married | 31 (57.4) | 22 (46.8) | | | |
| Widowed | 14 (25.9) | 18 (38.3) | | | |
| Single (never married, separated, divorced) | 9 (16.7) | 7 (14.9) | | | |
| Employment status | | | | 5.803 | 0.016* |
| Retired/unable to work | 34 (69.4) | 42 (89.4) | | | |
| Employed | 15 (30.6) | 5 (10.6) | | | |
| Self-perceived health | | | | 0.531 | 0.767 |
| Very good - Excellent | 22 (42.3) | 15 (36.6) | | | |
| Good | 19 (36.5) | 18 (43.9) | | | |
| Fair - Poor | 11 (21.2) | 8 (19.5) | | | |
| Chronic health conditions | | | | 0.284 | 0.868 |
| 0 – 1 | 14 (25.9) | 11 (24.4) | | | |
| 2 – 3 | 20 (37.0) | 19 (42.2) | | | |
| 4 or more | 20 (37.0) | 15 (33.3) | | | |
| Social functioning | | | | 0.001 | 0.976 |
| Never - rarely | 33 (71.7) | 25 (71.4) | | | |
| Sometimes - often | 13 (28.3) | 10 (28.6) | | | |
| Pet type | | | | | |
| Dog only | 25 (46.3) | | | | |
| Cat only | 8 (14.8) | | | | |
| Dog & Cat | 15 (27.8) | | | | |
| Dog & other | 6 (11.1) | | | | |

*p<0.05, ^aFisher's exact test (2-sided), n = number of respondents for each variable, SD = standard deviation, t = test statistic for Student's t-test, χ^2 = Chi-square test statistic

Depression. As shown in Table 9, nine pet owners, all Caucasian females, were identified as depressed. The mean age for pet owners with depressive symptoms was 67.13 ± 8.63 years, with a range of 56 to 81 years. The majority (n=4) were married, while three were widowed and two were divorced. The majority of the depressed pet owners were retired (n=6), with two unable to work and one still working full-time. They were more likely to own a dog (n=8), with lower proportions owning a cat (n=6), a bird (n=1) and a rabbit (n=1). On average, they owned 3 ± 1.58 pets.

Depressed pet owners had significantly poorer perceptions of their health and were more likely to report that their health had interfered with their social activities than non-depressed pet owners ($p < 0.01$). The majority of depressed pet owners (55.6%) perceived their health as good, while 51.1% of non-depressed pet owners perceived their health as very good to excellent. In addition, two thirds of depressed pet owners reported their health had sometimes or often interfered with their normal social activities within the past month, compared to 18.9% of non-depressed pet owners.

Table 9

Demographic and Health Characteristics of Depressed Pet Owners (n=9) and Non-depressed Pet Owners (n=46) from a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Variable | Depressed Pet Owner | Non-depressed Pet Owner | t | p-value |
|---|-----------------------------|------------------------------|-------|---------------------|
| Age - Mean \pm SD (yrs) | 67.13 \pm (8.63) (n=8) | 68.40 \pm (7.74) (n=42) | 0.421 | 0.676 |
| Age – Range (yrs) | n (%) | n (%) | | 1.000 ^a |
| 55 – 64 | 3 (37.5) | 14 (33.4) | | |
| 65 – 74 | 4 (50.0) | 19 (45.2) | | |
| 75 > | 1 (12.5) | 9 (21.4) | | |
| Gender | | | | 0.181 ^a |
| Male | 0 (0.0) | 12 (26.1) | | |
| Female | 9 (100.0) | 34 (73.9) | | |
| Ethnicity | | | | 1.000 ^a |
| Caucasian | 9 (100.0) | 43 (93.5) | | |
| African-American | 0 (0.0) | 3 (6.5) | | |
| Marital Status | | | | 0.677 ^a |
| Married | 4 (44.4) | 27 (60.0) | | |
| Widowed | 3 (33.3) | 11 (24.4) | | |
| Single (never married, separated, divorced) | 2 (22.2) | 7 (15.6) | | |
| Employment status | | | | 0.242 ^a |
| Retired/unable to work | 8 (88.9) | 26 (65.0) | | |
| Employed | 1 (11.1) | 14 (35.0) | | |
| Self-perceived health | | | | 0.006* ^a |
| Very good - Excellent | 0 (0.0) | 22 (51.1) | | |
| Good | 5 (55.6) | 14 (32.6) | | |
| Fair - Poor | 4 (44.4) | 7 (16.3) | | |
| Chronic health conditions | | | | 0.216 ^a |
| 0 - 1 | 1 (11.1) | 13 (28.9) | | |
| 2 - 3 | 2 (22.2) | 18 (40.0) | | |
| 4 or more | 6 (66.7) | 14 (31.1) | | |
| Social functioning | | | | 0.009* ^a |
| Never - rarely | 3 (33.3) | 30 (81.1) | | |
| Sometimes - often | 6 (66.7) | 7 (18.9) | | |
| Pet number - Mean \pm SD | 3.00 \pm (1.58) (n=9) | 2.18 \pm (2.19) (n=44) | 1.069 | 0.290 |
| Pet type | | | | 0.165 ^a |
| Dog only | 2 (22.2) | 23 (51.1) | | |
| Cat only | 1 (11.1) | 7 (15.6) | | |
| Dog & Cat | 5 (55.6) | 10 (22.2) | | |
| Other (fish, horse, rodent, bird) | 1 (11.1) | 4 (11.1) | | |

*p<0.01, ^aFisher's exact test (2-sided), n = number of respondents for each variable, SD = standard deviation, t = test statistic for Student's t-test

Social Support. Pet owners (n=53) had a mean social support score of 32.87 ± 7.93 (range 8-40), and non-owners (n=46) had a mean score of 30.96 ± 8.74 (range 8-40). No statistically significant differences in the item and overall mean level of social support were observed between pet owners and non-owners ($p>0.05$). To determine whether there was a difference in depression levels between pet owners lacking social support and non-owners lacking social support, social support scores were divided into 2 groups that ranged from a low level of social support (0-20) to a high level of social support (21-40). Non-owners lacking in social support did not have a higher prevalence of depressive symptoms compared to pet owners lacking social support ($p=1.000$, Fisher's exact test).

Pet Attitudes. Statistically significant differences in the item and overall mean pet attitude score were observed among pet owners and non-owners ($p<0.001$). As shown in Table 10, pet owners had significantly more favorable attitudes toward pets, as demonstrated by a mean pet attitude score of 29.11 ± 5.86 (range 8-35) among pet owners compared to 18.18 ± 9.08 (range 0-35) from non-owners. No statistically significant differences were observed in the item and overall mean pet attitude score among male and female pet owners ($p>0.05$). However, among non-owners, a statistically significant difference between genders was observed in the pet attitude item, "Having pets are a waste of money." Men who did not own pets were more likely to believe that having a pet was a waste of money compared to women who did not own pets ($p<0.01$). The results are displayed in Table 11.

Table 10

Student's t-test Analysis of Pet Attitudes Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee Based upon Pet Ownership

| Item | Pet Owner | n ^a | Mean \pm (SD) ^b | t ^c | p-value |
|---|-----------|----------------|------------------------------|----------------|----------|
| Attitude Score ^d | Yes | 53 | 29.11 \pm (5.86) | 7.185 | 0.000*** |
| | No | 45 | 18.18 \pm (9.08) | | |
| 1. House pets add happiness to my life (or would if I had one). | Yes | 52 | 4.50 \pm (0.61) | 6.627 | 0.000*** |
| | No | 45 | 2.78 \pm (1.76) | | |
| 2. I love pets. | Yes | 53 | 4.49 \pm (0.54) | 5.947 | 0.000*** |
| | No | 44 | 3.14 \pm (1.55) | | |
| 3. I frequently talk to pets. | Yes | 53 | 4.38 \pm (0.84) | 6.976 | 0.000*** |
| | No | 40 | 2.45 \pm (1.77) | | |
| 4. I like house pets. | Yes | 51 | 4.31 \pm (1.03) | 6.521 | 0.000*** |
| | No | 43 | 2.56 \pm (1.56) | | |
| 5. I would like a pet in my home. | Yes | 49 | 3.61 \pm (1.85) | 4.871 | 0.000*** |
| | No | 40 | 1.85 \pm (1.49) | | |
| 6. Animals belong in the wild or in zoos, but not in the home. | Yes | 52 | 4.19 \pm (1.19) | 3.669 | 0.000*** |
| | No | 43 | 3.07 \pm (1.78) | | |
| 7. Having pets is a waste of money. | Yes | 52 | 4.31 \pm (1.13) | 3.630 | 0.000*** |
| | No | 43 | 3.28 \pm (1.62) | | |

***p<0.001

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Attitude Score = the sum of items 1-7. Items 1-5 are an attitudinal measure of a generalized affection for pets which uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items 6 and 7 are an attitudinal measure of a dislike of pet keeping which uses a 5-point reverse coded Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Higher scores indicate favorable attitudes toward pets.

Table 11

Student's t-test Analysis of Pet Attitudes Among Male and Female Non-pet Owners from a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item | Gender | n ^a | Mean \pm (SD ^b) | t ^c | p-value |
|---|--------|----------------|-------------------------------|----------------|---------|
| Attitude Score ^d | Female | 33 | 18.70 \pm (8.66) | 0.816 | 0.419 |
| | Male | 11 | 16.09 \pm (10.64) | | |
| 1. House pets add happiness to my life (or would if I had one). | Female | 33 | 2.88 \pm (1.76) | 0.834 | 0.409 |
| | Male | 11 | 2.36 \pm (1.80) | | |
| 2. I love pets. | Female | 32 | 3.22 \pm (1.43) | 0.730 | 0.470 |
| | Male | 11 | 2.82 \pm (1.94) | | |
| 3. I frequently talk to pets. | Female | 29 | 2.41 \pm (1.74) | 0.208 | 0.837 |
| | Male | 11 | 2.55 \pm (1.92) | | |
| 4. I like house pets. | Female | 31 | 2.65 \pm (1.54) | 0.840 | 0.406 |
| | Male | 11 | 2.18 \pm (1.66) | | |
| 5. I would like a pet in my home. | Female | 28 | 1.82 \pm (1.44) | 0.177 | 0.860 |
| | Male | 11 | 1.73 \pm (1.62) | | |
| 6. Animals belong in the wild or in zoos, but not in the home. | Female | 31 | 3.29 \pm (1.64) | 1.494 | 0.143 |
| | Male | 11 | 2.36 \pm (2.11) | | |
| 7. Having pets is a waste of money. | Female | 31 | 3.68 \pm (1.30) | 3.019 | 0.004** |
| | Male | 11 | 2.09 \pm (1.97) | | |

**p<0.01

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Attitude Score = the sum of items 1-7. Items 1-5 are an attitudinal measure of a generalized affection for pets which uses a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Items 6 and 7 are an attitudinal measure of a dislike of pet keeping which uses a 5-point reverse coded Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). Higher scores indicate favorable attitudes toward pets.

Pet Attachment. The pet attachment score for current pet owners (n=51) ranged from 7 to 28, with a mean of 20.26 ± 4.70 . The mean pet attachment score for female pet owners (n=39) was 20.72 ± 4.84 (range 7-28) and male pet owners (n=12) was 18.75 ± 4.05 (range 11-28). No statistically significant difference was observed in the overall mean pet attachment score between female and male pet owners ($p > 0.05$); however, female pet owners were significantly more likely to talk to others about their pets than were male pet owners. The results are displayed in Table 12.

Table 12

Student's t-test Analysis of Pet Attachment Among Current Pet Owners Based upon Gender (n=51)

| Item | Gender | n ^a | Mean \pm (SD) ^b | t ^c | p-value |
|--|--------|----------------|------------------------------|----------------|---------|
| Pet Attachment Score ^d | Female | 39 | 20.72 \pm (4.84) | 1.276 | 0.208 |
| | Male | 12 | 18.75 \pm (4.05) | | |
| 1. You talk to your pet as a friend. | Female | 39 | 3.46 \pm (0.79) | 1.154 | 0.254 |
| | Male | 12 | 3.17 \pm (0.72) | | |
| 2. Your pet is aware of your different moods. | Female | 38 | 3.29 \pm (0.96) | 0.144 | 0.886 |
| | Male | 12 | 3.33 \pm (0.78) | | |
| 3. You play with your pet when he/she approaches. | Female | 38 | 3.63 \pm (0.71) | 0.564 | 0.576 |
| | Male | 12 | 3.50 \pm (0.67) | | |
| 4. You talk to others about your pet. | Female | 39 | 3.54 \pm (0.68) | 2.253 | 0.029* |
| | Male | 12 | 3.00 \pm (0.85) | | |
| 5. You prefer to be with your pet more than with most people you know. | Female | 39 | 2.15 \pm (1.16) | 1.112 | 0.272 |
| | Male | 12 | 1.75 \pm (0.87) | | |
| 6. When you feel bad, you seek your pet for comfort. | Female | 39 | 2.56 \pm (1.07) | 1.665 | 0.102 |
| | Male | 12 | 2.00 \pm (0.85) | | |
| 7. You feel sad when you are separated from your pet. | Female | 38 | 2.32 \pm (1.07) | 0.380 | 0.706 |
| | Male | 11 | 2.18 \pm (0.87) | | |

*p<0.05

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Pet attachment score (the sum of items 1-7) is a measure of the strength of the subjects' relationship with their pets using a 4-point scale ranging from 1 (almost never) to 4 (almost always). Higher scores represent a stronger degree of attachment.

The mean pet attachment score for depressed pet owners (n=9) was 21.78 \pm 4.94 (range 14-28) and for non-depressed pet owners (n=42) was 19.93 \pm 4.65 (range 7-28). No statistically

significant differences in the overall mean pet attachment score was observed between pet owners who were depressed compared to pet owners who were not depressed ($p>0.05$); however, as shown in Table 13, pet owners who were depressed were significantly more likely to talk to their pet as a friend than pet owners who were not depressed ($p<0.05$).

Table 13

Student's t-test Analysis of Pet Attachment Among Current Pet Owners Based upon Depression (n=51)

| Item | Depression | n ^a | Mean \pm (SD ^b) | t ^c | p-value |
|--|------------|----------------|-------------------------------|----------------|---------|
| Pet Attachment Score ^d | No | 42 | 19.93 \pm (4.65) | 1.072 | 0.289 |
| | Yes | 9 | 21.78 \pm (4.94) | | |
| 1. You talk to your pet as a friend. | No | 42 | 3.29 \pm (0.81) | 2.194 | 0.033* |
| | Yes | 9 | 3.89 \pm (0.33) | | |
| 2. Your pet is aware of your different moods. | No | 42 | 3.29 \pm (0.92) | 0.252 | 0.802 |
| | Yes | 8 | 3.38 \pm (0.92) | | |
| 3. You play with your pet when he/she approaches. | No | 41 | 3.54 \pm (0.75) | 1.380 | 0.174 |
| | Yes | 9 | 3.89 \pm (0.33) | | |
| 4. You talk to others about your pet. | No | 42 | 3.33 \pm (0.79) | 1.633 | 0.109 |
| | Yes | 9 | 3.78 \pm (0.44) | | |
| 5. You prefer to be with your pet more than with most people you know. | No | 42 | 1.95 \pm (1.04) | 1.508 | 0.138 |
| | Yes | 9 | 2.56 \pm (1.33) | | |
| 6. When you feel bad, you seek your pet for comfort. | No | 42 | 2.43 \pm (0.99) | 0.041 | 0.967 |
| | Yes | 9 | 2.44 \pm (1.33) | | |
| 7. You feel sad when you are separated from your pet. | No | 40 | 2.30 \pm (1.02) | 0.204 | 0.839 |
| | Yes | 9 | 2.22 \pm (1.09) | | |

*p<0.05

^a n = number of respondents for each variable

^b SD = standard deviation

^c t = test statistic for the Student's t-test

^d Pet attachment score (the sum of items 1-7) is a measure of the strength of the subjects' relationship with their pets using a 4-point scale ranging from 1 (almost never) to 4 (almost always). Higher scores represent a stronger degree of attachment.

To further determine if there were differences among pet owners based upon the degree of pet attachment, pet attachment scores were divided into 2 groups. Weak attachment was defined as a score of 0 to 14, and strong attachment was defined as a score of 15 to 28. No statistically significant difference was observed between depressed pet owners and non-depressed pet owners based upon the degree of attachment to their pet ($p=0.552$, Fisher's exact test). Furthermore, there were no statistically significant differences in the level of social support among current pet owners based upon the degree of pet attachment ($p=1.000$, Fisher's exact test). Pet owners with low levels of social support were not observed to be more attached to their pets compared to pet owners who had high levels of social support.

Attitude about Relationships with Pets. The mean score for pet owners ($n=51$) on the Pet Relationship scale was 32 ± 6.76 , with a range of 17 to 44. The mean pet relationship score for female pet owners ($n=39$) was 32.44 ± 6.89 (range 17-44) and male pet owners ($n=12$) was 30.58 ± 6.37 (range 22-44). No statistically significant differences were observed in the item and overall mean pet relationship score among female and male pet owners ($p>0.05$).

A statistically significant difference in the overall mean pet relationship score was observed among pet owners who were strongly or weakly attached to their pet ($p<0.05$). Four affectionate companionship items contributed largely to this difference, although single items representing equal family member status and mutual physical activity were also statistically significant. Pet owners who were strongly attached to their pet, i.e. pet attachment score = 15 to 28, were more likely to: a) talk to their pets about things that bothered them ($p<0.05$); b) miss their pet when they were apart from their pet ($p<0.05$); c) think their pet's job was to make them laugh ($p<0.01$); d) think their pet gave them a reason to get up in the morning ($p<0.01$); e) see

their pet as an equal in their family ($p < 0.05$); and f) take walks with their pet ($p < 0.05$). The results are shown in Table 14.

Table 14

Mann-Whitney U Test of Pet Relationship Among Current Pet Owners Based upon Degree of Pet Attachment (n=51)

| Item | Attachment | n ^a | Mean Rank | Mann-Whitney U | p-value |
|--|------------|----------------|-----------|----------------|---------|
| Pet Relationship Score ^b | Strong | 47 | 27.55 | 21.000 | 0.010* |
| | Weak | 4 | 7.75 | | |
| 1. There are times I'd be lonely except for my pet. | Strong | 47 | 26.96 | 49.000 | 0.090 |
| | Weak | 4 | 14.75 | | |
| 2. I talk to my pet about things that bother me. | Strong | 46 | 26.67 | 38.000 | 0.047* |
| | Weak | 4 | 12.00 | | |
| 3. I miss my pet when I am away. | Strong | 47 | 27.15 | 40.000 | 0.033* |
| | Weak | 4 | 12.50 | | |
| 4. Making me laugh is part of my pet's job. | Strong | 45 | 26.42 | 26.000 | 0.010** |
| | Weak | 4 | 9.00 | | |
| 5. My pet gives me a reason for getting up in the morning. | Strong | 47 | 27.51 | 23.000 | 0.009** |
| | Weak | 4 | 8.25 | | |
| 6. My pet is a member of the family. | Strong | 47 | 26.65 | 63.500 | 0.215 |
| | Weak | 4 | 18.38 | | |
| 7. My pet is constantly at my side. | Strong | 46 | 25.12 | 74.500 | 0.508 |
| | Weak | 4 | 29.88 | | |
| 8. My pet is an equal in this family. | Strong | 47 | 27.29 | 33.500 | 0.023* |
| | Weak | 4 | 10.88 | | |
| 9. In many ways, my pet is the best friend I have. | Strong | 47 | 26.55 | 68.000 | 0.341 |
| | Weak | 4 | 19.50 | | |
| 10. My pet helps me to be more physically active. | Strong | 47 | 26.61 | 65.500 | 0.276 |
| | Weak | 4 | 18.88 | | |
| 11. My pet and I often take walks together. | Strong | 47 | 27.13 | 41.000 | 0.051* |
| | Weak | 4 | 12.75 | | |

*p<0.05, **p<0.01

^a n = number of respondents for each variable

^b Pet relationship score = the sum of items 1-11. A higher pet relationship score represents more favorable attitudes about the subjects' relationships with their pet. Items 1-5 are an attitudinal measure of affectionate companionship using a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), with higher scores indicating a greater strength of affection. Items 6-9 assess equal family member status with a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), where higher scores represent a greater extent to which people see pets as equal members of their family. Items 10 and 11 assess mutual physical activity with a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), where higher scores represent more frequent physical contact and interaction with the pet.

The mean pet relationship score among depressed and non-depressed pet owners was 33.33 ± 6.87 (range 24-44) and 31.71 ± 6.78 (range 17-44) respectively. No statistically significant difference in the mean pet relationship score was observed between depressed and non-depressed pet owners ($p > 0.05$); however, a significant difference was observed in one item on the pet relationship scale. Depressed pet owners were more likely to report that their pet was their best friend ($p < 0.05$). In addition, pet owners with low levels of social support, i.e. social support score 0 to 20, were more likely to report: a) their pet kept them from being lonely at times ($p < 0.05$), and b) their pet was the best friend they had, as evidenced by a p-value < 0.01 . The results are displayed in Tables 15 and 16.

Table 15

Student's t-test Analysis of Pet Relationship Among Current Pet Owners Based upon Depression (n=51)

| Item | Depression | n ^a | Mean \pm (SD) ^b | t ^c | p-value |
|--|------------|----------------|------------------------------|----------------|---------|
| Pet Relationship Score ^d | No | 42 | 31.71 \pm (6.78) | 0.648 | 0.520 |
| | Yes | 9 | 33.33 \pm (6.87) | | |
| 1. There are times I'd be lonely except for my pet. | No | 42 | 2.90 \pm (0.88) | 1.768 | 0.083 |
| | Yes | 9 | 3.44 \pm (0.53) | | |
| 2. I talk to my pet about things that bother me. | No | 41 | 2.34 \pm (1.26) | 0.688 | 0.495 |
| | Yes | 9 | 2.67 \pm (1.41) | | |
| 3. I miss my pet when I am away. | No | 42 | 3.21 \pm (0.61) | 0.850 | 0.399 |
| | Yes | 9 | 3.00 \pm (1.00) | | |
| 4. Making me laugh is part of my pet's job. | No | 40 | 3.08 \pm (0.73) | 0.260 | 0.796 |
| | Yes | 9 | 3.00 \pm (1.00) | | |
| 5. My pet gives me a reason for getting up in the morning. | No | 42 | 2.76 \pm (1.01) | 0.042 | 0.966 |
| | Yes | 9 | 2.78 \pm (1.09) | | |
| 6. My pet is a member of the family. | No | 42 | 3.52 \pm (0.51) | 0.771 | 0.445 |
| | Yes | 9 | 3.67 \pm (0.50) | | |
| 7. My pet is constantly at my side. | No | 42 | 3.02 \pm (0.78) | 0.838 | 0.406 |
| | Yes | 8 | 2.75 \pm (1.17) | | |
| 8. My pet is an equal in this family. | No | 42 | 3.12 \pm (0.83) | 0.659 | 0.513 |
| | Yes | 9 | 3.33 \pm (1.12) | | |
| 9. In many ways, my pet is the best friend I have. | No | 42 | 2.29 \pm (1.09) | 2.112 | 0.040* |
| | Yes | 9 | 3.11 \pm (0.93) | | |
| 10. My pet helps me to be more physically active. | No | 42 | 3.02 \pm (0.84) | 0.684 | 0.497 |
| | Yes | 9 | 3.22 \pm (0.44) | | |
| 11. My pet and I often take walks together. | No | 42 | 2.64 \pm (1.14) | 0.058 | 0.954 |
| | Yes | 9 | 2.67 \pm (1.00) | | |

*p<0.05

^a n = number of respondents for each variable^b SD = standard deviation^c t = test statistic for the Student's t-test

^d Pet relationship score = the sum of items 1-11. Higher scores represent more favorable attitudes about the subjects' relationships with their pet. Items 1-5 are an attitudinal measure of affectionate companionship using a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), with higher scores indicating a greater strength of affection. Items 6-9 assess equal family member status with a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), where higher scores represent a greater extent to which people see pets as equal members of their family. Items 10 and 11 assess mutual physical activity with a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), where higher scores represent more frequent physical contact and interaction with the pet.

Table 16

Mann-Whitney U Test of Pet Relationship Among Current Pet Owners Based upon Social Support

| Item | Social Support | n ^a | Mean Rank | Mann-Whitney U | p-value |
|--|----------------|----------------|-----------|----------------|---------|
| Pet Relationship Score ^b | High | 45 | 23.92 | 41.500 | 0.076 |
| | Low | 4 | 37.13 | | |
| 1. There are times I'd be lonely except for my pet. | High | 45 | 23.86 | 38.500 | 0.043* |
| | Low | 4 | 37.88 | | |
| 2. I talk to my pet about things that bother me. | High | 44 | 23.91 | 62.000 | 0.319 |
| | Low | 4 | 31.00 | | |
| 3. I miss my pet when I am away. | High | 45 | 24.47 | 66.000 | 0.316 |
| | Low | 4 | 31.00 | | |
| 4. Making me laugh is part of my pet's job. | High | 43 | 24.20 | 77.500 | 0.720 |
| | Low | 4 | 21.88 | | |
| 5. My pet gives me a reason for getting up in the morning. | High | 45 | 24.46 | 65.500 | 0.349 |
| | Low | 4 | 31.13 | | |
| 6. My pet is a member of the family. | High | 45 | 24.52 | 68.500 | 0.364 |
| | Low | 4 | 30.38 | | |
| 7. My pet is constantly at my side. | High | 45 | 23.80 | 36.000 | 0.155 |
| | Low | 3 | 35.00 | | |
| 8. My pet is an equal in this family. | High | 45 | 24.12 | 50.500 | 0.125 |
| | Low | 4 | 34.88 | | |
| 9. In many ways, my pet is the best friend I have. | High | 45 | 23.46 | 20.500 | 0.008** |
| | Low | 4 | 42.38 | | |
| 10. My pet helps me to be more physically active. | High | 45 | 24.38 | 62.000 | 0.263 |
| | Low | 4 | 32.00 | | |
| 11. My pet and I often take walks together. | High | 45 | 24.02 | 46.000 | 0.089 |
| | Low | 4 | 36.00 | | |

*p<0.05, **p<0.01

^a n = number of respondents for each variable

^b Pet relationship score = the sum of items 1-11. A higher pet relationship score represents more favorable attitudes about the subjects' relationships with their pet. Items 1-5 are an attitudinal measure of affectionate companionship using a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), with higher scores indicating a greater strength of affection. Items 6-9 assess equal family member status with a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), where higher scores represent a greater extent to which people see pets as equal members of their family. Items 10 and 11 assess mutual physical activity with a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree), where higher scores represent more frequent physical contact and interaction with the pet.

Objective 2

Effect of Aquarium

A statistically significant difference between how frequently participants attended the senior center and whether they had seen the aquarium was observed in this study. Frequent attendance was defined as attending the senior center at least once a week, whereas infrequent attendance was defined as attending once a month or on special occasions only. More frequent attendance was associated with a greater likelihood of seeing the aquarium ($\chi^2=17.674$, $df=1$, $p<0.001$). As shown in Table 17, forty-two out of 57 persons attending the senior center at least once a week had seen the aquarium, compared to 6 out of 25 whom only attended once a month or on special occasions only.

Table 17

Chi-square Analysis of the Likelihood of Seeing the Aquarium Based upon the Frequency of Attendance at the Senior Center (n=82)

| Seen Aquarium | Frequency of Attendance | |
|---------------|-------------------------|----------|
| | Infrequent | Frequent |
| Yes | 6 | 42 |
| No | 19 | 15 |

$\chi^2 = 17.674$, $df = 1$, $p<0.001$ ***

Fifty-six percent (n=47) of the participants in the study reported they rarely or never looked at the fish when they attended the senior center, compared to 44% (n=37) who reported they sometimes, often, or always looked at the fish. After looking at the fish, 27 respondents (33.4%) reported they felt better. Watching the fish was described as “relaxing, “calming,” and “soothing.” The results are displayed in Table 18.

Table 18

Effect of Watching Fish Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee (n=81)

| Feel better after watching fish | n | Percentage (%) |
|---------------------------------|----|----------------|
| Strongly agree | 5 | 6.2 |
| Agree | 22 | 27.2 |
| Neutral | 20 | 24.7 |
| Disagree | 2 | 2.5 |
| Strongly disagree | 2 | 2.5 |
| Skip question | 30 | 37.0 |

As shown in Table 19, those who reported that they sometimes, often, or always looked at the fish were significantly more likely to report that they felt better after looking at the fish than those who rarely or never looked at the fish ($p=0.006$, Fisher’s exact test).

Table 19

Fisher’s Exact Test of the Likelihood of Feeling Better After Watching the Fish Based upon the Frequency of Watching the Fish (n=51)

| Feel Better after Watching Fish | Frequency of Watching the Fish | |
|---------------------------------|--------------------------------|-----------------|
| | Sometimes, often, or always | Rarely or never |
| Yes | 23 | 4 |
| No/Neutral | 11 | 13 |

$p=0.006$, Fisher’s exact test (2-sided)

Depression. To determine whether there was a difference in the level of depression between respondents who frequently and infrequently attended the senior center, a chi-square test was done. No statistically significant differences were observed in the level of depression

between respondents who frequently and infrequently attended the senior center ($\chi^2=0.218$, $df=1$, $p=0.641$).

Among 52 participants who had seen the aquarium, 10 (19.2%) were positive for depression. Among 41 participants who had not seen the aquarium, 7 (17.1%) were positive for depression. No statistically significant difference in depression was observed between the proportion of respondents who had seen the aquarium compared to the proportion who had not seen the aquarium ($\chi^2=0.071$, $df=1$, $p=0.789$). In addition, there was no statistically significant difference in depression among pet owners who had seen the aquarium compared to non-owners who had seen the aquarium ($p=0.492$, Fisher's exact test).

Multivariate Analysis

Logistic regression was performed to determine the effect of risk factors on depression, while adjusting for gender and age. As shown in Table 20, social functioning was found to be a significant risk factor for depression in the study population of community-dwelling senior citizens (OR=3.74, 95% CI=1.48, 9.41, $p=0.005$). Gender, age, marital status, social support, and perceived health were not found to be associated with depression in the multiple logistic regression analysis ($p>0.05$). Logistic regression was performed in another model to examine the relationship between the number of pets owned, type of pet, degree of pet attachment, relationship with pet, and depression status. No significant risk factors for depression were observed ($p>0.05$).

Table 20

Summary of Logistic Regression Analysis of Risk Factors for Depression Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee (n=68)

| Predictor | B ^a | SE ^b | OR ^c | 95% CI ^d for OR | | p-value |
|--------------------|----------------|-----------------|-----------------|----------------------------|-------|---------|
| | | | | Lower | Upper | |
| Gender | | | | | | |
| Male | Ref | | | | | |
| Female | -0.92 | 1.14 | 0.40 | 0.04 | 3.74 | 0.420 |
| Age Group | 0.67 | 0.58 | 1.95 | 0.63 | 6.06 | 0.248 |
| Marital Status | | | | | | |
| Married | Ref | | | | | |
| Single | -0.04 | 0.89 | 0.96 | 0.17 | 5.51 | 0.961 |
| Social Support | 0.02 | 0.06 | 1.02 | 0.91 | 1.15 | 0.729 |
| Perceived health | -0.10 | 0.51 | 0.90 | 0.33 | 2.24 | 0.843 |
| Social functioning | 1.32 | 0.47 | 3.74 | 1.48 | 9.41 | 0.005** |
| Constant | -5.72 | 3.43 | 0.00 | | | |

**p<0.01

^aB = regression coefficient

^bSE = standard error of B

^cOR = odds ratio

^dCI = confidence interval

n = number of respondents for each variable

Depression: coded 0 = no, 1 = yes

Gender: coded 0 = male (reference category), 1 = female

Marital status: coded = 0 for married (reference category), 1 = single, widowed, or separated

Age group: coded 0 = 55 - 64 years, 1 = 65 - 74 years, 2 = 75+ years

Social support: a self-report measure of the availability (none to all of the time) of perceived support.

Perceived health: a self-report measure of general health (poor, fair, good, very good, excellent)

Social functioning: a self-report measure of how often (often, sometimes, rarely, never) the respondents' physical and mental health interfered with their social activities within the past 4 weeks

CHAPTER 5

DISCUSSION

Description of the Study

The purpose of this study was to examine the relationship between pet ownership, pet attachment, and psychological health among community-dwelling older adults, and to evaluate the impact of the placement of an aquarium on the psychological health of community-dwelling older adults. A self-administered questionnaire was given to a convenience sample of senior citizens, 55 years of age and older, who attended a regional senior center or its sponsored events. The questionnaire assessed general health, depression, social support, pet attitudes, pet attachment, pet relationships, attitudes about the aquarium, and demographic characteristics. One hundred four subjects participated in the study.

Hypotheses Findings

Based upon the statistical analysis of the data for each hypothesis, the results can be summarized as follows:

- 1) No statistically significant differences were observed between the proportion of pet owners with depressive symptoms and the proportion of non-pet owners with depressive symptoms among a sample of community-dwelling senior citizens in Northeast Tennessee.

- 2) No statistically significant differences in the overall level of social support were observed between pet owners and non-owners among a sample of community-dwelling senior citizens in Northeast Tennessee.
- 3) No statistically significant differences in the overall level of depressive symptoms were observed between current pet owners who were strongly attached to their pet compared to current pet owners who were weakly attached to their pet among this sample of community-dwelling senior citizens in Northeast Tennessee.
- 4) No statistically significant differences in the overall level of social support were observed between current pet owners who were strongly attached to their pet compared to current pet owners who were weakly attached to their pet among this sample of community-dwelling senior citizens in Northeast Tennessee.
- 5) Pet owners had significantly more favorable attitudes toward pets than non-owners among this sample of community-dwelling senior citizens in Northeast Tennessee.
- 6) Positive health effects were reported by those who observed the aquarium.
- 7) No statistically significant differences in the level of depressive symptoms were observed between respondents who had seen the aquarium compared to respondents who had not seen the aquarium.
- 8) No statistically significant differences in the level of depressive symptoms were observed among pet owners who had seen the aquarium compared to non-owners who had seen the aquarium.

Subhypotheses Findings

Based upon the statistical analysis of the data for each subhypothesis, the results can be summarized as follows:

- 1) No statistically significant differences in the overall level of depression, level of social support, and degree of pet attachment were observed between men and women among this sample of community-dwelling senior citizens in Northeast Tennessee. However, statistically significant gender differences were observed in the following items:
 - a) Among all participants, females were significantly more likely to respond that they had trouble keeping their mind on what they were doing compared to males.
 - b) Among non-pet owners, men were more likely than women to respond that having pets was a waste of money.
 - c) Female pet owners were significantly more likely than male pet owners to respond that they talk to others about their pet.

General Findings

Other statistically significant findings observed in this study were as follows:

- 1) Participants with depressive symptoms had poorer perceptions of their health and reported that their health had more often interfered with their social activities within the past month than participants without depressive symptoms.
- 2) Respondents with depressive symptoms had significantly lower levels of social support, specifically lower levels of emotional or informational support and positive social interaction, compared to respondents without depressive symptoms.

- 3) Pet owners with depressive symptoms had poorer perceptions of their health and reported that their health had more often interfered with their social activities within the past month than pet owners without depressive symptoms.
- 4) Pet owners with symptoms of depression were more likely to talk to their pet as a friend and report that their pet was their best friend compared to pet owners without depressive symptoms.
- 5) Pet owners with low levels of social support were more likely to report their pet was the best friend they had and their pet kept them from being lonely at times compared to pet owners with high levels of social support.
- 6) Pet owners who were strongly attached to their pet were more likely to talk to their pets about things that bothered them, miss their pet when they were separated from their pet, think their pet's job was to make them laugh, think their pet gave them a reason to get up in the morning, see their pet as an equal in their family, and take walks with their pet than pet owners who were weakly attached to their pet.
- 7) More frequent attendance at the senior center was significantly associated with a greater likelihood of seeing the aquarium among a sample of community-dwelling senior citizens in Northeast Tennessee. Participants who sometimes, often, or always looked at the fish were significantly more likely to report they felt better after looking at the fish than those who rarely or never looked at the fish.

Limitations

The study was subject to the following limitations:

- 1) The study population may not be representative of community-dwelling senior citizens residing in Northeast Tennessee. Only one senior center was examined in the study, and

because of the small sample size, the sample may not even be representative of the membership of the senior center. In addition, senior citizens who attend the senior center may differ substantially in personality traits or other factors, such as socioeconomic status, from those who do not attend this senior center.

- 2) Self-selection bias was present in this study. Participants were self-selected and not a randomly selected sample of the population. They were only a sub-sample of the senior citizens at the senior center.
- 3) The results may not be generalized to community-dwelling senior citizens because the study did not take into account other senior citizen centers or senior citizens who do not attend senior citizen centers. Senior citizens who prefer solitary rather than social activities and who may be at a greater risk for developing depressive symptoms were not included in the study and, therefore, the results may underestimate the prevalence of depression in this population.
- 4) The sample size in this study was small primarily because of the choice of data collection. Data collection was restricted to special events, meetings, and one-on-one invitations.
- 5) The small sample size contributed to the lack of significant differences due to the lack of statistical power.
- 6) The cross-sectional design of the survey prohibited the determination of cause-effect relationships from the data.
- 7) The use of self-report measures of physical and mental health as well as perceptions of social support may be subject to bias. Some questions, especially those related to depression, may have been underreported significantly more than other conditions. This

may be because of recall difficulties, response bias because of concerns about stigmas associated with emotional problems, and reluctance to give out personal information.

- 8) Placement of the aquarium in a low traffic area at the senior center may have substantially affected the results. Respondents did not have easy access to the aquarium, and, therefore, were not able to obtain potential health benefits of viewing the aquarium.
- 9) The ambiguity of some scales, such as the definition of sometimes, rarely, or a little of the time, may have affected the results. Without a clear definition, respondents may have interpreted the questions differently, and it could lead to an underestimation of the importance of factors such as social support and physical health in the symptomatology of depression in older adults.

Discussion of Study Findings

Objective 1

Depression

The results from this study suggest that depression was a problem among this sample of senior citizens. Symptoms of depression were identified in 17.3% of the study population, with a higher prevalence among women than men. Studies have shown that the prevalence of depression is usually 1.5 to 3 times higher in women than men (Brommelhoff, Conway, Merikangas, & Levy, 2004); however, in this study, the prevalence of depression was 5 times higher in women, with a prevalence of 14.6% among women and 2.9% among men. The higher prevalence of depression among women in this study may be attributed to the greater proportion of women in the study. Alternatively, it may be explained by the artifact hypothesis that suggests

that women are more likely to report depressive symptoms than men (Brommelhoff et al.).

Among respondents 65 years of age and older, depression was identified in 19.4% of the respondents, which is consistent with current national estimates of 13-20% (Federal Interagency Forum on Aging Related Statistics, 2004).

Social Support

Significant differences in perceived social support scores, specifically emotional or informational support items and positive social interaction items, were observed among participants with depressive symptoms compared to participants without depressive symptoms. Lower levels of emotional or informational support and positive social interaction were observed among individuals with symptoms of depression. These results are similar to a study by Janevic et al. (2004) in which women with low positive social interaction had 1.23 times more depressive symptomatology over time than women with high positive social interaction. Women with low emotional support were also less likely to report better self-rated health than were women with high emotional support.

Lower levels of emotional or informational support and positive social interaction among participants with depressive symptoms may have been related to the lack of close friends. Studies have shown that older adults benefit from friendships, and that friendships provide a sense of continuity during various stages of life, validate events that form one's identity, and ease the transition into old age. Among older women's support groups, friends were more beneficial than family members possibly because of the similarities in age, experiences, lifestyles, and attitudes (Aday et al., 2006). Lower levels of emotional or informational support and positive social interaction among participants with depressive symptoms may have also been related to their lack of involvement in the senior center. Senior centers provide opportunities for

social interaction. An examination of how long and how frequently members attend the senior center, as well as their involvement in sponsored activities, is vital to understanding what effect senior centers have on social support among community-dwelling senior citizens.

Tangible support and affectionate support items were not found to be significant in this study. In a model by Newsom and Schulz (1996), decreased functioning was associated with lower perceived support, and physical impairments were associated with fewer family contacts, fewer contacts with friends, and less tangible support. In this study, participants may have perceived they had adequate levels of tangible support because of their better functional health. Over two thirds of the sample perceived their health as good or very good, and over 50% reported that their health had never interfered with their social activities within the past month. Second, based upon results from a 2004 assessment conducted at the senior center (Southerland, 2004), finances were not identified as a stressor among the participants in that assessment, and, therefore, participants in this study may have been more financially secure and able to meet their material needs. Third, participants may have believed individuals within their social network would provide tangible support. For example, programs offered through the senior center may provide members with transportation, nutritional support, and medical or legal needs. Affectionate support was also not found to be significantly different between the two groups, possibly because over half of the participants in the study were married.

Pet Ownership and Pet Attachment

Results from this study indicated pet ownership had no effect on symptoms of depression. Other studies have also demonstrated a lack of mental health benefits from pet ownership (Miller and Lago, 1990; Parslow, Jorm, Christensen, Rodgers, & Jacomb, 2005). In a study by Parslow et al. (2005), no health benefits of pet ownership were observed among

community-dwelling Australians aged 60 to 64. Pet owners had poorer mental and physical health compared to non-owners. Significantly more depressive symptoms were also observed among pet owners and pet care-givers in their study. According to the authors, the responsibility of caring for the pet was perceived as a negative experience and resulted in more depressive symptoms among pet owners and care-givers.

Other studies have suggested that the degree of pet attachment may be responsible for the health benefits of pet ownership (Miller & Lago, 1990). Garrity, Stallones, Marx, and Johnson (1989) observed fewer depressive symptoms among older adults who were strongly attached to their pet. However, in this study, no association was observed between pet attachment and depression among pet owners. Pet owners who were strongly attached to their pet were just as likely to experience symptoms of depression as were pet owners who were weakly attached to their pet. One explanation for the inconsistent findings is the high level of social support reported among pet owners in this study, which may, in part, be due to their participation in the senior center. In a study by Goldmeir (1986), pet attachment was associated with less loneliness, a risk factor for depression, only in the absence of human companions. Garrity et al. (1989) observed that strong pet attachment was linked to improved health only in the presence of low social support. They also reported that pet ownership and strong pet attachment were significantly associated with less depression in the bereaved with minimal confidants. By serving as emotional substitutes and being in constant proximity to their owner, pets may reduce the aloneness associated with the loss of a close companion (Sable, 1995). Another explanation for the inconsistent findings is the homogeneity of the sample because of the restriction of data collection to the senior center. Miller and Lago attributed the lack of a significant relationship between pet attachment and depression in their study of 53 elderly women to the homogeneity of

their sample. Another explanation for the inconsistent findings may be attributed to the differences in the type of study design and outcome measures. For example, Raina et al. (1999) found no association between pet ownership, pet attachment, duration of pet ownership, and type of pet owned with changes in psychological health in their longitudinal study. They used cognitive and life satisfaction measures to examine changes in activities of daily living and psychological well-being, while other studies with different findings used symptom-based depression scales and moral-based scales.

Pets were shown to be significant attachment figures in this study. Strongly attached pet owners were more likely to talk to their pets about things that bothered them, miss their pet when they were away from their pet, think their pet's job was to make them laugh, think their pet gave them a reason to get up in the morning, see their pet as an equal in their family, and take walks with their pet. Attachment to a pet has been shown to provide closeness, companionship, security, and a sense of feeling worthwhile and needed (Sable, 1995). As the social network of family and friends decline with aging, the social role and status of the pet in the family may increase thereby strengthening the human-animal bond.

Siegel (1990) observed that elderly pet owners were more attached to their dogs than other types of pets. Dogs provided more companionship, possibly because of the greater affection by dogs and the greater interaction between dogs and their owners. Although marginally insignificant, pet owners were more strongly attached to their dogs than to other pets in this study.

Although individuals with fewer close human ties (i.e., divorced, widowed, single, childless couples) tend to have stronger attachments to their pets (Archer, 1997; Sable), the results from this study do not support these findings. No difference in pet attachment was

observed between single (widowed, divorced, separated, and never married) and married subjects in this study. This lack of significant findings is most likely because of the small sample size and the resulting lack of statistical power to detect significant differences. Another possible explanation for the lack of differences is the high level of social support reported among pet owners and the impact of the senior center on their social support system. No significant differences in social support were observed between single and married subjects in this study. Additionally, although this study did not look at living arrangements, subjects living alone might be more strongly attached to their pet than subjects living with other people. Zasloff and Kidd (1994) found that women living alone were significantly lonelier than those living with pets and/or people.

Pets as a Source of Social Support

Pets were found to be a significant source of social support for pet owners. As a source of social support, pets provided emotional support such as friendship, companionship, and affection. These effects were most significant among individuals identified as depressed or individuals with low levels of social support. Pet owners with symptoms of depression were more likely to talk to their pet as a friend and view their pet as their best friend than pet owners without depressive symptoms. Pet owners may feel they can talk to their pet about anything because the pet is accepting and nonjudgmental. And, because of their constant availability, the presence of pets also provides their owners with a sense of security (Sable, 1995). Likewise, pet owners with low levels of social support were more likely to report that their pet was the best friend they had and that their pet kept them from being lonely, possibly because of their constant proximity and companionship. Female pet owners were more likely to talk to others about their pets, which is most likely consistent with the more social nature of women. And, because people

often treat their pets like children and view their pet as a member of their family, it seems logical that they would talk to others about their pets, just as they would talk to others about their family.

Pet Attitudes

Current pet owners had significantly more favorable attitudes toward pets than non-owners. Although this finding is not surprising, the negative attitude about pets reported by non-owners does not necessarily imply that non-owners dislike animals. The questions in the pet attitude scale were based upon attitudes toward pets rather than attitudes toward animals; therefore, non-owners may simply dislike owning a pet. In an assessment conducted in 2004 at the senior center, major barriers to pet ownership identified were no time for a pet (n=5), no need for a pet (n=4), never owned a pet (n=2), deceased pets (n=2), the responsibility of pet ownership (n=1), lack of appropriate housing (n=1), expenses of pet ownership (n=1), and dislike pets (n=1) (Southerland, 2004). Second, this attitude survey did not explore the reason for negative attitudes. Previous experiences, such as allergies, animal bites, lack of resources, family conflicts, traveling, and safety issues such as tripping, may explain the negative attitudes observed among non-owners, and, consequently, it may not be indicative of a dislike of animals. The patterns of pet keeping, such as health care, housing, and feeding, may explain why males in particular were more likely to report that having pets was a waste of money. Therefore, non-owners with negative attitudes toward pet ownership may still be receptive to animal-therapy programs as long as they are not directed at animal ownership in the home.

Objective 2

Aquarium Intervention

Several studies have demonstrated a reduction in anxiety and stress among aquarium observers (DeSchrive & Riddick, 1990; Katcher, Friedmann, Beck, & Lynch, 1983; Katcher, Segal, & Beck, 1983). In this study, it was hypothesized that a reduction in stress may subsequently lead to a reduction in depression. Although 33.4% of the participants reported they felt better after looking at the live fish in the aquarium, the overall results of this study indicate watching fish had no significant effect on depressive symptomatology among study participants. This lack of an effect may be explained by a dose-response relationship. It is possible that participants simply did not watch the fish long enough for a noticeable change in depressive symptoms to occur. While the length of time respondents watched the fish is unknown in this study, reductions in anxiety and stress have been observed after subjects watched a fish aquarium for as little as 8 minutes once a week (DeSchrive & Riddick). It is also possible that watching fish only produces short-term reductions in stress that may not be sufficient to counter the effects of depression. Another possible explanation for the lack of a significant effect of watching fish on the psychological health of the study participants was the aquarium's location in the senior center. The aquarium was placed in a low traffic area in the senior center because of the lack of available space elsewhere. This choice of locations may have prevented many participants from seeing the aquarium when they attended the senior center, as evidenced by 56% of the participants reporting they rarely or never looked at the fish when they went to the center. In addition, the study did not take into account the participants' attitudes and feelings about this activity. It is possible that participants had no interest in the fish. Participants may

have received more psychological benefits had they been given an opportunity to decide on tank decorations, fish type, and name selection and taken more responsibility in the care of the fish.

CHAPTER 6

CONCLUSIONS

Study findings indicate that pet ownership was not significantly related to depression, and placement of a fish aquarium in the senior center was not significantly related to depression in the study sample. Study limitations, particularly the use of a sub-population of active senior citizens and the small sample size, may have contributed to the inability of this study to replicate findings from other studies. However, study findings do suggest community-dwelling senior citizens do receive some benefits from human-animal interactions. Pets were a significant source of social support in individuals identified as depressed and individuals with low levels of social support. Pet ownership also contributed significantly to favorable attitudes and attachment to companion animals. Watching the fish was reported to have relaxing and calming effects, and individuals who looked at the fish more frequently were significantly more likely to report that they felt better after looking at the fish aquarium compared to those who looked at the fish infrequently. Recommendations for future research include using large longitudinal studies with senior citizens from more diverse backgrounds to study the long-term health benefits of pet ownership and to discern how human-animal interactions affect the psychological health of community-dwelling senior citizens. To promote increased interest in animal-assisted activities, program developers should encourage involvement of senior citizens in program planning and development, such as program type and animal selection. While the relationship between pet ownership, human-animal interactions, and psychological well-being remains unclear, it appears that older adults can benefit from animal-assisted activities and animal therapy programs.

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APPENDICES

APPENDIX A

Survey

Please take your time to fill out the following questionnaire. If you would rather not answer a question, choose SKIP or simply skip the question.

YOUR HEALTH

1. In general, would you say your health is? (Circle one answer)

Excellent *Very Good* *Good* *Fair* *Poor* *Skip*

2. Have you ever had any of the following? (Check all that apply)

- | | | |
|---|---|--------------------------------|
| <input type="checkbox"/> Heart Disease | <input type="checkbox"/> Arthritis | <input type="checkbox"/> Other |
| <input type="checkbox"/> Stroke | <input type="checkbox"/> Hearing problems | |
| <input type="checkbox"/> High blood pressure | <input type="checkbox"/> Diabetes | |
| <input type="checkbox"/> High cholesterol | <input type="checkbox"/> Lung disease | |
| <input type="checkbox"/> Circulation problems | <input type="checkbox"/> Kidney disease | |
| <input type="checkbox"/> Eye problems like | <input type="checkbox"/> Liver disease | |
| cataracts or glaucoma | <input type="checkbox"/> Cancer | |

3. During the **past 4 weeks**, how often did your physical or emotional health interfere with your normal social activities with family, friends, groups or neighbors? (Circle one answer)

Often *Sometimes* *Rarely* *Never* *Skip*

| <i>Check the box for each statement which best describes how you felt or behaved <u>DURING THE PAST WEEK.</u></i> | <i>Rarely or none of the time (Less than 1 Day)</i> | <i>Some or a little of the time (1-2 Days)</i> | <i>Occasionally or a moderate amount of the time (3-4 Days)</i> | <i>Most or all of the time (5-7 Days)</i> | <i>Skip</i> |
|---|---|--|---|---|-------------|
| I was bothered by things that usually don't bother me. | | | | | |
| I had trouble keeping my mind on what I was doing. | | | | | |
| I felt depressed. | | | | | |
| I felt that everything that I did was an effort. | | | | | |
| I felt hopeful about the future. | | | | | |
| I felt fearful. | | | | | |
| My sleep was restless. | | | | | |
| I was happy. | | | | | |
| I felt lonely. | | | | | |
| I could not get "going." | | | | | |

SOCIAL SUPPORT

Check the box that goes with how OFTEN support is available to you if you need it. Check SKIP if you would like to skip the question.

| <i>How often is each of the following kinds of support available to you if you need it?</i> | <i>None of the time</i> | <i>A little of the time</i> | <i>Some of the time</i> | <i>Most of the time</i> | <i>All of the time</i> | <i>Skip</i> |
|---|-------------------------|-----------------------------|-------------------------|-------------------------|------------------------|-------------|
| Someone you can count on to listen to you when you need to talk | | | | | | |
| Someone to take you to the doctor if you needed it | | | | | | |
| Someone who shows you love or affection | | | | | | |
| Someone to confide in or talk to about yourself or your problems | | | | | | |
| Someone to get together with for relaxation | | | | | | |
| Someone to do things with to help you get your mind off things | | | | | | |
| Someone to help with daily chores if you were sick | | | | | | |
| Someone to turn to for suggestions about how to deal with a personal problem | | | | | | |

ATTITUDE ABOUT PETS

Circle the response which best reflects your opinion. Circle SKIP if you would like to skip the question.

1. House pets add happiness to my life (or would if I had one).
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*
2. I love pets.
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*
3. I frequently talk to pets.
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*
4. I like house pets.
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*
5. I would like a pet in my home.
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*
6. Animals belong in the wild or in zoos, but not in the home.
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*
7. Having pets is a waste of money.
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*

RELATIONSHIPS WITH PETS- Section 1 and 2

If you do NOT have a pet, skip this page and go to page 4. If you have a pet(s), check the box for each statement which best describes your relationship with your current pet(s).

| <i>Section 1 - Check the box for each question which best describes your relationship with your CURRENT pet(s).</i> | <i>Almost Always</i> | <i>Often</i> | <i>Sometimes</i> | <i>Almost Never</i> | <i>Skip</i> |
|---|----------------------|--------------|------------------|---------------------|-------------|
| You talk to your pet as a friend. | | | | | |
| Your pet is aware of your different moods. | | | | | |
| You play with your pet when he/she approaches. | | | | | |
| You talk to others about your pet. | | | | | |
| You prefer to be with your pet more than with most people you know. | | | | | |
| When you feel bad, you seek your pet for comfort. | | | | | |
| You feel sad when you are separated from your pet. | | | | | |

| <i>Section 2 - Check the box for each question which best describes your relationship with your CURRENT pet(s).</i> | <i>Strongly Agree</i> | <i>Agree</i> | <i>Disagree</i> | <i>Strongly disagree</i> | <i>Skip</i> |
|---|-----------------------|--------------|-----------------|--------------------------|-------------|
| There are times I'd be lonely except for my pet. | | | | | |
| I talk to my pet about things that bother me. | | | | | |
| I miss my pet when I am away. | | | | | |
| Making me laugh is part of my pet's job. | | | | | |
| My pet gives me a reason for getting up in the morning. | | | | | |
| My pet is a member of the family. | | | | | |
| My pet is constantly at my side. | | | | | |
| My pet is an equal in this family. | | | | | |
| In many ways my pet is the best friend I have. | | | | | |
| My pet helps me to be more physically active. | | | | | |
| My pet and I often take walks together. | | | | | |

SENIOR CENTER

1. How frequently do you attend activities or visit the senior center? (Circle one answer)
A. 1-2 times per week
B. 3-5 times per week
C. 6 or more times per week
D. Once a month
E. Special occasions only
2. Have you seen the aquarium at the senior center? (Circle one answer)
Yes *No* *Skip*
3. How often do you look at the fish when you come to the center? (Circle one answer)
Always *Often* *Sometimes* *Rarely* *Never*
4. Looking at the fish makes me feel better. (Circle one answer)
Strongly agree *Agree* *Neutral* *Disagree* *Strongly disagree* *Skip*
5. If you agreed with question 4, in what ways does looking at the fish make you feel better?

PERSONAL INFORMATION

1. Your gender: Male _____ Female _____
2. Your age: _____ years old
3. Are you: (Circle one answer)
Married *Widowed* *Divorced* *Separated* *Never Married* *Skip*
4. What is your race?
 - 1.....White
 - 2.....Black/African American
 - 3.....Asian, Pacific Islander
 - 4.....American Indian
 - 5.....Other: _____
 - 6.....Skip
5. Are you currently? (Circle one answer)
Retired *Employed full-time* *Employed part-time* *Self-employed* *Unable to work* *Skip*
6. Do you currently have a pet? (Circle one answer)
Yes *No*
7. If you answered yes to question 6:
 - a) How many pets do you have? _____
 - b) What type of pet(s) do you have? _____

THANK YOU FOR YOUR HELP WITH THIS SURVEY

APPENDIX B

Reliability Estimate Tables

Table 21

Reliability Estimate of the CESD-10 in a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item Content | Item-Total Correlation |
|--|------------------------|
| I was bothered by things that usually don't bother me. | 0.650 |
| I had trouble keeping my mind on what I was doing. | 0.660 |
| I felt depressed. | 0.615 |
| I felt that everything that I did was an effort. | 0.728 |
| I felt hopeful about the future. | 0.172 |
| I felt fearful. | 0.661 |
| My sleep was restless. | 0.397 |
| I was happy. | 0.230 |
| I felt lonely. | 0.623 |
| I could not get "going." | 0.587 |

Cronbach's alpha = 0.811

Table 22

Reliability Estimate of the Medical Outcomes Study (MOS) Social Support Survey in a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item Content | Item-Total Correlation |
|--|--------------------------|
| Tangible Support Items | |
| Someone to take you to the doctor if you needed it | 0.651 |
| Someone to help with daily chores if you were sick | 0.778 |
| | Cronbach's alpha = 0.798 |
| Affectionate Support Item | |
| Someone who shows you love or affection | 0.814 |
| Emotional or Informational Support Items | |
| Someone you can count on to listen to you when you need to talk | 0.796 |
| Someone to confide in or talk to about yourself or your problems | 0.877 |
| Someone to turn to for suggestions about how to deal with a personal problem | 0.787 |
| | Cronbach's alpha = 0.911 |
| Positive Social Interaction Items | |
| Someone to get together with for relaxation | 0.821 |
| Someone to do things with to help you get your mind off things | 0.835 |
| | Cronbach's alpha = 0.953 |
| | Cronbach's alpha = 0.936 |

Table 23

Reliability Estimate of the Revised Pet Attitude Scale in a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item Content | Item-Total Correlation |
|--|--------------------------|
| Generalized Affection for Pets Items | |
| House pets add happiness to my life (or would if I had one). | 0.831 |
| I love pets. | 0.807 |
| I frequently talk to pets. | 0.832 |
| I like house pets. | 0.853 |
| I would like a pet in my home. | 0.741 |
| | Cronbach's alpha = 0.931 |
| Dislike of Pet Keeping Items | |
| Animals belong in the wild or in zoos, but not in the home. | 0.696 |
| Having pets is a waste of money. | 0.734 |
| | Cronbach's alpha = 0.921 |
| | Cronbach's alpha = 0.931 |

Table 24

Reliability Estimate of the Center to Study Human-Animal Relationships and Environments (CENSHARE) Pet Attachment Survey Among a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item Content | Item-Total Correlation |
|---|------------------------|
| You talk to your pet as a friend. | 0.639 |
| Your pet is aware of your different moods. | 0.578 |
| You play with your pet when he/she approaches. | 0.582 |
| You talk to others about your pet. | 0.543 |
| You prefer to be with your pet more than with most people you know. | 0.668 |
| When you feel bad, you seek your pet for comfort. | 0.788 |
| You feel sad when you are separated from your pet. | 0.620 |
| Cronbach's alpha = 0.860 | |

Table 25

Reliability Estimate of the Pet Relationship Scale in a Sample of Community-dwelling Senior Citizens in Northeast Tennessee

| Item Content | Item-Total Correlation |
|---|--------------------------|
| Affectionate Companionship Items | |
| There are times I'd be lonely except for my pet. | 0.727 |
| I talk to my pet about things that bother me. | 0.626 |
| I miss my pet when I am away. | 0.615 |
| Making me laugh is part of my pet's job. | 0.646 |
| My pet gives me a reason for getting up in the morning. | 0.645 |
| | Cronbach's alpha = 0.817 |
| Equal Family Member Status Items | |
| My pet is a member of the family. | 0.578 |
| My pet is constantly at my side. | 0.598 |
| My pet is an equal in this family. | 0.671 |
| In many ways, my pet is the best friend I have. | 0.477 |
| | Cronbach's alpha = 0.747 |
| Mutual Physical Activity Items | |
| My pet helps me to be more physically active. | 0.629 |
| My pet and I often take walks together. | 0.279 |
| | Cronbach's alpha = 0.509 |
| | Cronbach's alpha = 0.866 |

VITA

E. MARIE SOUTHERLAND

- Personal Data: Date of Birth: December 19, 1962
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- Education: East Tennessee State University, Johnson City, Tennessee;
Community Health, M.P.H., 2007
University of Tennessee, Knoxville, Tennessee;
Veterinary Medicine, D.V.M., 1987
University of Tennessee, Knoxville, Tennessee;
Agriculture, B.S., 1984
Public Schools, Johnson City, Tennessee
- Professional
Experience: Laboratory Manager, East Tennessee State University, Department of
Pharmacology, 1998 to present
Relief Veterinarian, Northeast Tennessee, 1994-1998
Associate Veterinarian, South Florida, 1988-1993
Small Animal Medicine & Surgery Internship, North Carolina State University
College of Veterinary Medicine, 1987-1988
- Publications: Southerland EM, Milhorn DM, Foreman RD, Linderoth B, DeJongste MJ,
Armour JA, Subramanian V, Singh M, Singh K, Ardell JL. "Preemptive, but
not reactive, spinal cord stimulation mitigates transient ischemia-induced
myocardial infarction via cardiac adrenergic neurons." *American Journal of
Physiology Heart and Circulatory Physiology* 2007 Jan; 292(1):H311-7.
Southerland EM, Miller RT, Jones CL. "Primary right atrial chondrosarcoma in
a dog." *Journal of the American Veterinary Medical Association* 1993 Dec
15:203(12):1697-8.

Honors and

| | | |
|---------|---------|--|
| Awards: | 2005 | Master of Public Health Outstanding Student Award |
| | 1987 | Phi Zeta |
| | 1986 | Armistead Award |
| | 1985 | Top Graduate – College of Agriculture |
| | 1984 | Gamma Sigma Delta |
| | 1984 | Alpha Zeta |
| | 1984 | Senior Scholastic Honors |
| | 1984 | American Society of Animal Science Scholarship |
| | 1983 | First Scholastic Honors |
| | 1982-85 | National Alumni Association Upperclassmen Scholarships |
| | 1983 | Phi Kappa Phi |
| | 1983 | Golden Key National Honor Society |
| | 1982 | Phi Eta Sigma |
| | 1981-82 | National Alumni Association Valedictorian Scholarship |