

THE PHYSICAL AND EMOTIONAL BENEFITS OF COMPANION ANIMALS

A Thesis

by

HOLLI MARIE TIETJEN

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

August 2005

Major Subject: Epidemiology

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Approved by:

Chair of Committee, Geoffrey Fosgate

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ABSTRACT

The Physical and Emotional Benefits of Companion Animals. (August 2005)

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Chair of Advisory Committee: Dr. Geoffrey Fosgate

Elderly people are at high risk for conditions associated with inactivity, and lack of motivation is an important factor contributing to this inactivity. It is believed that a dog can provide the necessary motivation to get a senior citizen up and moving because it needs attention as well as someone to feed it and take it for walks. The objective of this five-week prospective cohort study was to determine if registered therapy dogs made available for informal visits to a cohort of retirement community elderly would motivate the subjects to increase their activity levels by comparing the number of steps taken in the presence of the exposure (opportunity to visit with dog) versus steps taken when unexposed (no opportunity to visit with dog). A secondary objective was to measure possible improvements in mental and physical health scores over the course of the study. The steps were measured each week with a pedometer and the happiness and depression scores were obtained through a questionnaire given at the beginning and at the end of the study. Twenty subjects agreed to participate, and there was an increasing trend in the number of steps over calendar weeks, but not an increase with exposure level (number of dog-visits). Happiness ($p = .53$) and depression ($p = .083$) scores did not significantly change during the study. Increased step counts each week may have been associated with

other motivating factors such as competition among residents and individual desire to achieve higher counts each week.

DEDICATION

I would like to dedicate this thesis to my dogs, Boomer and Diva. They came into my life about half way through the research process and have since made this work so much more meaningful to me. They have greatly contributed to my happiness and well-being. I would also like to dedicate this work to my boyfriend, Chris, as he has been a source of strength for me when I needed that extra push. He was also a big help when it came to taking measurements and preparing for the research. Also, I wouldn't have been able to do any of this as easily without the help of my parents. It has been their 7-year sacrifice putting me through school and their constant belief in me that has enabled me to pursue my dreams. I will always be extremely grateful to them.

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I would like to thank my advisor, Dr. Geoff Fosgate, for being one of the best examples of someone who is an intellectual and quite humorous. It is through his method of teaching that I have been able to understand abstract concepts and learn the truly important aspects of epidemiology. I would like to thank him for being a great mentor, encouraging me to do things right because that was the only way, but I would also like to thank him for being a great friend. I would also like to thank Dr. Margaret Slater and Dr. Alex McIntosh for being available for help any time as well as being consistently pleasant and enthusiastic. This research would still be just an idea if it wasn't for the generosity of Crestview Retirement Community allowing me to conduct my research at their facility and for Aggieland Pets with a Purpose for providing volunteers and their four-legged friends to come for visits. I am immensely grateful to anyone who has helped me along the way in any shape or form as it has all been important to me.

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INTRODUCTION

Background

Over the years animals have played many roles in our lives. Some of these roles included working animal, guardian and even friend. History provides many examples of relationships between humans and animals. A well know relationship is that of the ancient Egyptians and their cats. Cats were allowed to eat at the same table as humans and were deified [1]. Thousands of years before the ancient Egyptians domesticated cats, wolves were being domesticated by prehistoric settlers in the Near East. Sheep and goat domestication followed closely and some time later cattle and pigs were farmed in parts of Asia. Around 3,000, to 4,000 years ago the horse found its way into human society, and these events marked the beginnings of animal husbandry [2]. At this time animals were used mainly for food or work purposes.

More recent history provides insight into the strong feelings people have towards animals. These strong feelings helped spark progress towards the humane treatment of animals and demonstrated that some people believed animals to be equal to humans. There were attempts made in England in 1800 to get humane laws passed that would protect animals from cruelty. In 1837, the Society for the Prevention of Cruelty to Animals (RSPCA) was born under the influence of Queen Victoria. During this time period other cruelty laws, consolidated under the “Protection of Animals Act”, were passed and dog fighting and cock fighting were outlawed [1].

This thesis follows the style of *Journal of Preventive Medicine*.

Today, animals fit into many niches of society. They are involved in everything from entertainment and companionship to being service providers as well as therapy assistants. Animals have not only become companions, but they have become members of the family. The growing practice of social celebrations such as birthdays for pets, gifts at Christmas and even graduation from obedience school is evidence that the human-animal bond is growing in strength. A few other examples of this increase in love for animals are dressing pets in clothing, traveling with pets and allowing pets to sleep in the bed [3]. These are all strong examples of people treating animals as if they were a human equal which reinforces the bond.

Animals are known to provide many positive elements to peoples' lives. They can have socializing effects such as getting people out and talking to others. People, especially children, can learn responsibility and nurturance when caring for a pet. Companion animals can also serve to buffer difficult situations by being a source of comfort. Companion animals also provide a source of entertainment by making people laugh when they are comical. A very important aspect of dogs in particular is that they have the potential to be motivators in getting people active by taking them for walks [4]. Companion animals can also reduce anxiety, loneliness, and depression. They serve as a source of tactile comfort by increasing sensory stimulation while decreasing blood pressure and heart rate [5].

Research on the specific benefits of human-animal interactions (HAI) began appearing in the literature about 20 years ago. The cardiovascular benefit of pet ownership is one aspect that has been studied. One study found that pet ownership, dog

ownership in particular, promoted cardiovascular health independent of social support and physiologic severity of the illness by assessing the effect of dog and cat ownership on 1-year survival after myocardial infarction [6]. One study provided evidence that people who owned dogs walked twice as much as people who did not own dogs [7], and another study found that a group of elderly walked their dog on a routine basis often encountering friends encouraging socialization [8]. Other aspects of health such as emotional well-being and its association with pet ownership are also widely studied. One study found that pet ownership showed a significant effect on the well-being of adolescents because pet-owning adolescents reported a higher level of well-being and more familial resources than non-owning adolescents [9]. Another study investigating pet ownership as a supportive factor in the health of the elderly, found that there was a significant relationship between pet ownership and lower depression. This same study found that strongly attached pet owners were significantly less depressed than less strongly attached pet owners [10].

Research concerning the strong associations between HAI and health benefits in people can provide the necessary scientific evidence for companion animals to be viewed as a source of therapy. More research needs to be conducted and replicated to make the connection between HAI and health benefits a stronger one.

Forward

As the population of senior citizens continues to grow so will its impact on society, especially with respect to healthcare. With people living longer more health issues will arise, meaning more people will require the help of the healthcare system.

With almost 90% of people over 65 years of age having at least one chronic health condition, a major public health concern exists [11]. One study estimated the direct cost of physical inactivity in a health plan population to be \$83.6 million [12], which is a major imposition on taxpayers and employers because of higher taxes for public insurance programs and increased health insurance premiums. More importantly than the monetary cost is the decreased quality of life for older citizens living with chronic health conditions.

The benefits of being physically active are well known, and although many of these health problems seem inevitable, they can be slowed or completely avoided through healthy lifestyle practices as the benefits of being physically active are well documented. Older adults who practice regular physical activity tend to have improved cardiovascular health, better balance, and increased joint mobility [13]. This is important because elderly people are at high risk for conditions associated with inactivity such as heart disease, colon cancer, hypertension, and diabetes [14]. Inactivity, or a sedentary lifestyle, can lead to decreased balance and strength, increased stiffness, depression, and loneliness all of which have the potential to contribute to the previously mentioned conditions for which elderly people are at risk. Approximately 34% of the population age 50 and older is sedentary, while 33% of men and 50% of women age 75 and older engage in no leisure time physical activity, according to the CDC [15]. Not only does maintaining or adopting a physically active lifestyle help to alleviate or prevent negative conditions, it also helps older people retain the ability to do tasks they once took for granted. Similarly, people who remain physically active or

people who become physically active have better balance, are safer in their homes, and remain independent longer [13]. For older people who may be unsure of their ability to engage in certain exercises, walking is a great alternative. Walking is considered a cardio respiratory endurance activity that increases heart rate and breathing for extended periods of time. The goal should be 30 minutes of endurance exercise on most or all days of the week [13]. This improves the health of the heart, lungs, and circulatory system, while increasing strength in the leg muscles and improving balance helping to prevent falls. Walking is also ideal because it is low impact, very safe, inexpensive and can be relaxing. It can be a chance to visit with others or have time alone while improving health. It is so undemanding that it can be employed by people who are dependent on walking devices such as canes and walkers.

Several factors can contribute to a lifestyle void of activity. A big factor is lack of motivation [16]. Many people, not only the elderly, have a hard time getting motivated to become active. Elderly people may lack the balance, strength or flexibility to become active. It is this lack of balance and strength that contributes to falls each year in the U.S. among 30% of the 65 and older population [14]. Fear of falling may reduce the motivation to engage in activities. Older adults may not have a place to engage in activities, they may not be interested in most activities, or they may not be educated and aware of the importance of staying active.

Because lack of motivation is such an important factor contributing to inactivity, a strong influence in getting the elderly motivated is needed. A dog needs attention as well as someone to feed and take it for walks. It is believed that a dog can provide the

necessary motivation to get a senior citizen up and moving. One study showed that a cohort of dog owners engaged in considerably more physical exercise while walking their dogs than did the cat-owning group and the non-pet owning group [7]. In another study, dog owners reported taking twice as many daily walks as non-owners and dog owners also reported significantly less dissatisfaction with their social, physical and emotional states [8]. Emotional state is another aspect greatly influenced by relationships with companion animals. Research has been done [5] and continues to be done on the benefits of relationships with companion animals because this type of relationship is becoming very popular.

Objective

The objective of this five-week prospective cohort study was to determine if registered therapy dogs made available for informal visits to a cohort of retirement community elderly would motivate the subjects to increase their activity levels by comparing the number of steps taken in the presence of the exposure (opportunity to visit with dog) versus steps taken when unexposed (no opportunity to visit with dog). A secondary objective was to measure possible improvements in mental and physical health scores over the course of the study.

MATERIALS AND METHODS

Study Population

The population of interest was a local retirement community, in Bryan, Texas. It houses 251 residents with 94% of them being Caucasian females. The average age of the residents at this facility is 85 years. There are three multi-story independent living units that offer housing to individuals 62 years of age and older. The facility offers intermediate help with daily tasks and minimal nursing assistance as well as intensive care for those with disabilities. The facility offers round-the-clock security personnel so that the residents can pursue an active lifestyle in a secure environment. There is a 1-mile wooded nature trail for residents to exercise and the community operates a state recognized Garden Club. There are two cafeterias, an activity room, and a fitness room that has stationary bikes, treadmills, and stair climbers. Residents are also allowed to have a pet if they pay a deposit fee.

Sample Size

The sample size was calculated for the comparison of the mean number of steps between exposed and unexposed time periods. Based on a previous study comparing the Longitudinal Aging Study Amsterdam (LASA) physical activity questionnaire to a 7-day diary and pedometer among a group of older adults, a mean of $3,577 \pm 2,235$ steps per day was obtained [17]. The standard deviation of 2,235 steps was used, and an increase of 2,000 steps per day was considered to be a biologically meaningful difference between exposure categories. The desired level of significance was set at $\alpha = .05$ with a power of 80%. Calculations were made using standard formulas [18] and a value of 19.6

was obtained for each group which was rounded up to 20, then multiplied by two to get a value of 40. The calculation assumed that this was two independent groups, but because this study was a paired comparison, a sample size of 40 was considered a conservative estimate. Subjects were recruited on a voluntary basis through a flyer enquiring of interest in a study on the health benefits of companion animals.

Data Collection

The steps were counted using a measuring device called a pedometer. A pedometer counts the number of steps with an internal mechanism that measures vertical accelerations of the hip. An electronic pedometer (DIGI-walker Yamax, Optimal Health Products, San Antonio, TX) that was considered the most accurate device for the elderly [19] was chosen for this study group.

The possible emotional and psychological benefits of companion animals were another aspect of this study and were evaluated through use of a composite questionnaire having five sections. The 119-item questionnaire was self-administered at the start of the study and again at the end. It was designed to evaluate the subjects' happiness and depression levels as well as serving to confirm or contradict the physical activity measurements attained by the pedometer. It included a section inquiring about general health complaints and demographic variables such as age, gender, self-rated health, life-events in the past year, and medical history. It also involved a section on pet ownership status including reasons for having a pet and reasons for wanting or not wanting a pet for current non-pet owners. Another section concerned attitudes towards pets employing the Pet Attitude Scale (PAS) [20]. This scale evaluated aspects of pet ownership such as

love and interaction, pets in the home, and the joy of pet ownership for pet-owners and non pet-owners alike. The total is an indication of the subject's affinity for pets, and scores range from 18 to 126 with higher scores indicating a greater affinity for pets. The section involving questions about physical activity was based on the LASA Physical Activity Questionnaire [17] and included outdoor activities, sports, and hobbies as well as indoor household chores.

The section evaluating happiness incorporated the Oxford Happiness Inventory (OHI) which was chosen for its internal reliability and validity among students in the U.K., U.S.A., Australia, and Canada [21]. The Center for Epidemiologic Studies Depression Scale (CES-D) was used to measure depression and was chosen for its reliability and validity in screening for depression in a hepatitis C population, a population in which depression is reported as a serious adverse event of antiviral therapy used to treat these patients [22]. The OHI has 29 items, each being scored on a four point scale from 'I do not feel happy' through to 'I feel fairly happy' and 'I am very happy' to 'I am incredibly happy'. Higher scores indicate greater levels of happiness and total scores range from 29 to 116. The CES-D is a self-reported measure of depressive symptoms. It is composed of 20 items based on a four point Likert scale (responses range from 0-3) and assesses the frequency and duration of depressive symptoms over the past week. Total scores range from 0 to 60 and higher scores indicate greater distress.

Ten questions concerning pet ownership status were written and added to the pet attitude section of the questionnaire. A medical history check list was obtained from

a client health questionnaire [23], and the list of life events was modified based on a previously published report [24].

Study Protocol

Pedometers were distributed on the first day of the study to those participating and step-counting began. Each pedometer was numbered and subjects were identified by these numbers for the entire study. Study participants were instructed concerning pedometer use and that they measured number of steps. A schedule of activities was given so that participants knew ahead of time which days the dogs would be available for visits. They read and completed an Institutional Review Board approved informed consent document that explained to wear the pedometer every day and to check in once a week to record their step counts. The only other requirement was that they fill out the questionnaire at the beginning and at the end of the study. At the start of the study they were given the questionnaire and told to complete and return it in one week at the first check-in. The total duration of the study was five weeks, and participants received a \$1 scratch off lottery ticket at each check-in period

The first week measured the steps taken by the group when there was no potential for interaction with the dog or researcher. This provided a measure of the group's baseline activity level. The subjects were instructed to attach the pedometers to their waist upon waking and detach them when going to bed and to remove them when swimming or showering. Any questions they had concerning the use of the pedometers were addressed. The number of steps taken each day was cumulative, so at check-in the pedometer reading provided the number of steps taken during that week. At each check-

in, the number of steps was recorded and the pedometer was reset by the researcher for the ensuing week.

The therapy dog (or dogs) was introduced during the second, third and fourth weeks. The subjects continued to use the pedometer in the same manner as the first week. Within the three weeks there were different levels of exposure based on the number of days the dog was made available for visits. Monday, Wednesday, and Friday were chosen as activity days to conform to the schedules of the participants and researcher. The amount of dog-exposure was randomly assigned for each of the three weeks and within each week. Week 2, or the first week of exposure, was assigned to have 2 days (Wednesday and Friday) during the week in which the dog was made available for visits. Petting, walking, brushing or talking to the dog were all possible activities for the study subjects. The dog was made available for only 1 day (Friday) during the third week, and for 3 days (Monday, Wednesday and Friday) during the fourth week. The researcher was present on the activity days even when the dog was not made available. During the 3 exposure weeks on Monday, Wednesday and Friday, whether or not the dog was present, an outdoor activity bocce ball or indoor Nerf basketball hoops was provided to mask the hypothesis that the dog may be the motivating factor for getting the residents out of their apartments. During each session the subjects were free to play bocce ball or basketball, pet or take walks with the dog (if available) or both. These sessions were held from 12 noon until 2 pm on these days in a courtyard on the premises or in small activity room on bad weather days. The subjects were free to choose if they came to the activity area on any given day, how long they

stayed, and how they spent their time. It was up to the subjects to choose their level of interaction with the dog or dogs. Books and literature concerning human-animal interactions and physical activity were available at each activity session for interested subjects. The researcher recorded which subjects came to each visit and the activities they participated in as well as the weather. The purpose of these recordings was to determine how many subjects came to each visit, which interactions and activities they chose to participate in if any, and if the weather was a possible contributing factor to how many people showed. Week five was conducted the same as week one, and the purpose of this was to measure post-exposure baseline activity level. The study was concluded at the end of week five. The study was conducted from the end of February through the beginning of April because of the mild weather that time of year. Weather was considered an important factor contributing to the residents' activity levels. Summer would be too hot and winter too cold potentially influencing residents to stay at home. Rain was considered a potential threat to outdoor activities, but because the indoor activity room was available as a secondary meeting area, this was not a major issue.

Statistical Analysis

Step Count Measures

Availability of the therapy dogs for visits was considered the exposure and the mean number of steps taken per week was a measured outcome. Subjects 20, 21, and 22 did not enter the study until after the end of the first week, so they did not have a step count to contribute to week 1, which was the baseline week. Subject 17 did not have a

step count to contribute to week 2 because of an expired pedometer battery. Subjects 4 and 14 did not have step counts for week 5 because they accidentally cleared the pedometer. These missing data were interpolated for use in the statistical analysis. The interpolation was done by taking the average difference of adjacent weeks for which there were data and adding that difference to the closest adjacent measured value. A histogram was plotted to graphically evaluate distribution of step differences, and the Anderson-Darling test for normality was performed. Bar graphs were constructed that plotted the mean weekly step counts for study subjects excluding the interpolated values.

Repeated measures analyses were conducted using commercially available software (SPSS, Version 11.5, Chicago, IL). The significance level was set at $\alpha = .05$ for all tests. Data were transformed using simple contrasts, which compare week 1 (baseline) to each of the other weeks for a total of four contrasts. Post hoc comparisons were performed using Bonferroni's adjustment, and based on four comparisons, yielded a new cutoff p-value of .0125. Analyses were repeated using polynomial contrasts to describe the trend in step counts over time. The same was done for the sub group of individuals that actually attended the sessions.

Questionnaire Measures

Measures of life satisfaction based on happiness and depression status using the two validated questionnaires were used to investigate possible psychological and emotional benefits of exposure to dogs. Both the happiness and depression scale provided a measure of these life-states. The happiness scale was formatted so that each question had answer options ranging from "less true" (1) to "more true" (4). The

depression scale had four answer options (0 to 3) ranging from “rarely or none of the time” to “most or all of the time”. A high score for each scale was indicative of a high level of that particular life-state. The subject answered each question based on how the particular statement applied to them. All answers were totaled at the end of the questionnaire section to get an overall score of happiness and an overall score of depression. Self-reported health from the beginning of the study was compared to the end of the study to see if there were any changes in perceived personal health. The options for self-reported health were “poor”, “fair”, “good”, and “excellent”, corresponding to values 1, 2, 3, and 4 respectively. To determine if the subjects’ attitudes about pets changed after completion of the study, pet attitude scores from the beginning were compared to the scores from the end. The number of health complaints, which were obtained from the medical history section, was compared from the beginning to the end to determine if the subjects would report fewer health complaints at the end of the study. These same comparisons were performed for the sub group of individuals that actually attended the sessions. All comparisons were made using a Wilcoxon signed ranks test with significance level set at $\alpha = .05$. A Chronbach’s alpha was obtained for the OHI, CES-D, and the PAS to evaluate reliability.

A Pearson’s correlation coefficient was obtained to determine if there was a correlation between the mean step counts and the activity scores obtained through the LASA Physical Activity Questionnaire. Activity scores from the beginning questionnaire were compared to week 1 step counts and activity scores from the ending questionnaire were compared to week 5 step counts.

Additional analyses were performed to investigate the possible differences in step counts based on subjects' happiness level, depression level, pet-ownership status, and self-reported health. To test these comparisons, repeated measures analyses were performed again including "happy" as a factor. The same was done for "depressed", "pet-lover", and "healthy". The significance level was set at $\alpha = .05$.

The median score for the happiness scale based on the average of the first questionnaire score and the last questionnaire score was used as a cutoff point dichotomizing subjects as "happy" or "not happy". The same was done for the depression scale. The median score for the PAS was also used to dichotomize subjects as pet lovers or not. Based on the pet ownership status questions, subjects were dichotomized as "pet lovers" or not. If a subject owned a pet or would have liked to own a pet, they were considered a pet lover. If a subject did not want a pet, they were not considered a pet lover. A kappa value was obtained for the PAS and pet ownership status to determine if the subjects that had or wanted a pet also scored above the median on the PAS. Step counts for subjects scoring higher on self-reported health to those scoring lower were compared. Subjects were dichotomized as "healthy" if they had an average score above 2.5 and "not healthy" if they had an average score equal to or below 2.5. Self-reported health scores of 1, 2, 3, and 4 corresponded to "poor", "fair", "good" and "excellent", respectively.

RESULTS

Descriptive Statistics

Twenty people agreed to participate in the study with 19 women and 1 man. The average age of the sample was 72.7 years. People who owned pets made up 16% (3/19) of the sample population. Two of the pets owned were dogs, and one person owned a cat. All three pet owners chose “to have a friend” as the most important reason for having their pet. Other answer options included “to have something to motivate me to get out and walk”, “to feel safer or for protection”, “to help meet new people”, “to have something to take care of”, and “other”. Four out of sixteen subjects reported that they would like to have a pet with half saying they would like a dog and half saying they would like a cat. Of the people who said they would like a pet, one said they would like the pet so as “to have something to take care of” and one person wanted a pet so as “to have a friend”. Two people stated the reason they wanted a pet was “to have something to motivate them to get out and walk”. Twelve people answered that they would not want to have a pet. Two of the 12 answered because it would be “too hard to care for” and nine people would not want a pet because their “living arrangement did not suit a pet”.

The same two subjects came to all nine sessions whether or not the dog was visiting. Two subjects came to all but two sessions and one came to most sessions, but only stayed for a few minutes because she took a late lunch and was unable to stay long enough to see the dog. On days that the dog was visiting, the participants that showed played the game until the dog arrived and then they visited with the dog. During the

dog-present sessions, some of the subjects asked to hold the dog if it was a small one, brush the dog, and even walk the dog which was accomplished with the help of the volunteer and the use of a dummy leash. Participants talked to the dog, talked to the volunteer and researcher as well as each other. The conversations were mostly about animals and pets and the sessions were always in a positive tone. On days that the dog did not visit, either bocce ball or basketball hoops were played because the subjects elected to do those activities. The feeling at these sessions was also positive.

Step Count Measures

A histogram was plotted to graphically depict distribution of step differences. The graph displayed a distribution that did not appear normal because of two extreme values. These values were the result of two differences in weekly step counts that were highly unexpected and contributed by the same individual. These were large increases in steps from week 1 to week 3 and week 1 to week 4. Once this individual was removed, the data appeared normally distributed, and the Anderson-Darling test did not reject the normality hypothesis ($p = 0.174$). Mauchly's test, which tests if the variances of the differences for all pairs of repeated measures are equal, was evaluated. The assumption of sphericity was not rejected ($p = .172$).

Figure 1 shows an increasing linear trend over time in the mean number of steps. Figure 2 shows no obvious trend in the mean number of steps as a function of increasing number of dog-visits.

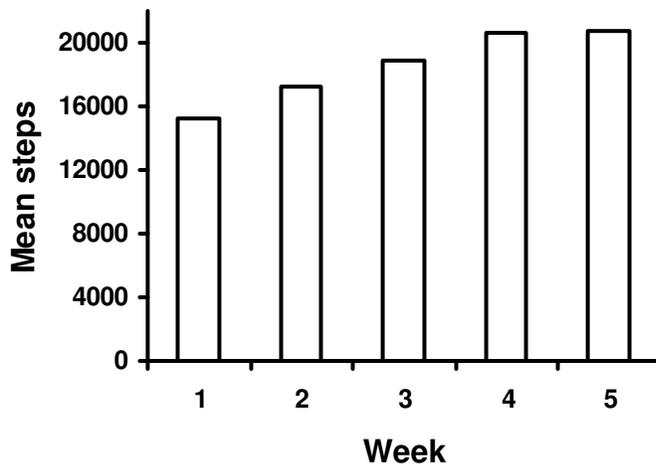


Figure 1. Mean step counts per calendar week for a cohort of 20 participants measuring changes in step counts after exposure to dog-visits.

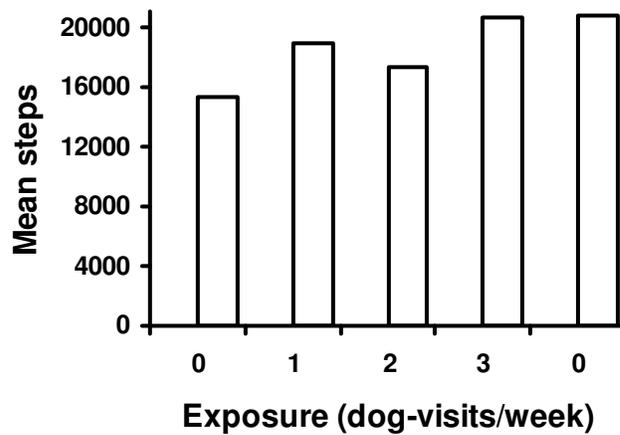


Figure 2. Mean step counts per exposure level for a cohort of 20 participants measuring changes in step counts after exposure to dog-visits.

When the repeated measures analysis excluding the interpolated data and including the extreme data ($n = 14$) was performed, an overall statistically significant week effect was not detected ($p = .058$). When repeated measures analyses were performed without the interpolated data and without the extreme data ($n = 13$), an overall statistically significant week effect was not found ($p = .142$). Repeated measures analyses including the interpolated data but excluding the extreme data ($n = 19$) demonstrated a statistically significant overall week effect ($p = .007$). When the repeated measures analysis was performed using the interpolated data and the extreme data ($n = 20$), a statistically significant overall week effect was detected ($p = .003$). Polynomial contrasts showed a significant linear trend in all analyses ($p < .05$). When the repeated measures analysis was performed for the sub group of 5 individuals that attended the sessions, a statistically significant overall week effect was not detected ($p = .083$), but there was an increasing trend in steps over time. This increase in steps started to decrease during week 5.

The results from Bonferroni's adjustment (Table 1) showed that when using the full data set including the interpolated data and the extreme data, week 1 was significantly different from week 5 ($p = .006$). Using the subset of data that included the interpolated values but excluded the extreme values, there was a significant difference between week 1 and week 5 after Bonferroni's adjustment ($p = .011$). After Bonferroni's adjustment, neither the subset that excluded the interpolated values but included the extreme values ($p = .016$) nor the subset that excluded both the interpolated and the extreme values ($p = .025$) showed a significant difference between week 1 and week 5.

Table 1. Average step counts per calendar week for 20 participants in a cohort study investigating the possible changes in activity levels after exposure to dog-visits.

| Data Subset | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 |
|-------------|--------------------|----------------------|----------------------|----------------------|--------------------|
| I/E | 14115 ^a | 15334 ^{a,b} | 17144 ^{a,b} | 19419 ^{a,b} | 19282 ^b |
| I | 14327 ^a | 14766 ^{a,b} | 16087 ^{a,b} | 17796 ^{a,b} | 18641 ^b |
| E | 15253 ^a | 17273 ^a | 18886 ^a | 20664 ^a | 20715 ^a |
| ∅ | 15651 ^a | 16592 ^a | 17474 ^a | 18387 ^a | 19889 ^a |

I/E = subset base data and including both interpolated and extreme data

I = subset including base data and interpolated data only

E = subset including base data and extreme data only

∅ = subset including base data without interpolated or extreme data

*Means with superscripts in common on the same line are not statistically different at $\alpha = .05$ after Bonerroni adjustment

Questionnaire Measures

Descriptive statistics for questionnaire responses are presented in Table 2.

Thirteen subjects completed both the beginning and ending happiness scales, 12 subjects completed both depression scales, 6 subjects completed both PAS scales, 14 subjects completed both self-reported health questions, and 15 subjects completed both beginning and ending health complaints inquiries. These subjects contributed to each paired comparison. The median happiness score was 89.0 at the beginning of the study and 87.0 at the end, and these scores were not significantly different ($p = .53$). The median depression score was 22.0 at the beginning of the study and 20.0 at the end, and these scores were not significantly different ($p = .083$). For self-reported health, the median

response at the beginning of the study was 2.0, and the median response at the end of the study was 2.5. There was no significant difference between the beginning health scores compared to the ending health scores ($p = .125$). The median number of health complaints at the beginning of the study was 6 and the median number at the end was 4. There was also no significant difference between the number of health complaints ($p = .125$). The median PAS score was 84.0 at the beginning and 101.5 at the end, and there was no statistically significant difference between these scores ($p = .463$). None of the score comparisons for the sub group of 5 individuals that attended the visits were significantly different ($p < .05$). The Chronbach's alpha values for the OHI, CES-D, and PAS were .9809, .9596, and .8030 respectively.

Table 2. Questionnaire results for a cohort study investigating possible changes in happiness and depression scores after exposure to dog-visits.

| Variable | Beginning Questionnaire | | | | | Ending Questionnaire | | | |
|------------|-------------------------|--------------|------------|--------|----|----------------------|--------------|------------|--------|
| | # scales completed | Median score | Mean score | Range | n | # scales completed | Median score | Mean score | Range |
| Happiness | 17 | 89.0 | 81.6 | 30,114 | 13 | 15 | 87.0 | 76.7 | 36,115 |
| Depression | 16 | 22.0 | 23.0 | 6,44 | 12 | 15 | 20.0 | 19.5 | 3,33 |
| PAS | 11 | 84.0 | 88.5 | 45,126 | 6 | 9 | 101.5 | 92.7 | 60,123 |
| SRH | 17 | 2.0 | 2.5 | 1,4 | 14 | 16 | 2.5 | 2.6 | 1,4 |
| HC | 17 | 6.0 | 6.0 | 0,14 | 15 | 18 | 4.0 | 6.0 | 0,18 |

n = number of subjects completing both beginning and ending scales or inquiries that contributed to the paired comparisons

SRH = self-reported health score

HC = reported number of health complaints

The correlation between the step counts for week 1 and the beginning activity scores was .271 and was not considered significant ($p = .393$). The correlation between week 5 and the activity score from the end of the study was .528 and was not significant ($p = .064$). The correlation between high scores on the PAS and those who owned a pet or wanted to own a pet was .714 and was significant ($p = .008$).

Results of the repeated measures analyses including the newly-created dichotomous variables are presented in Table 3. When comparing subjects having or wanting a pet to those not having or wanting a pet, a statistically significant difference in steps was observed ($p = .042$). No other comparison was statistically significant at the 5% level.

Table 3. Mean step counts per calendar week for each group in a cohort study investigating the possible changes in activity levels (steps) after exposure to dog-visits.

| Variable | n | p-value | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 |
|----------------|----|---------|--------|--------|--------|--------|--------|
| Happy | 11 | .818 | 17434 | 16856 | 16827 | 19715 | 20086 |
| Non-happy | 8 | | 10444 | 14263 | 18585 | 20336 | 19615 |
| Depressed | 10 | .541 | 15584 | 16260 | 19756 | 22632 | 22986 |
| Non-Depressed | 9 | | 13276 | 15214 | 15136 | 17026 | 16445 |
| Have/want pet* | 7 | .042 | 22834 | 22367 | 23152 | 27825 | 30440 |
| Non-have/want* | 13 | | 9419 | 11547 | 13909 | 14892 | 13273 |
| Healthy | 10 | .574 | 16982 | 17166 | 17914 | 22571 | 21828 |
| Non-healthy | 9 | | 11722 | 14207 | 17183 | 17093 | 17732 |
| Have pet | 3 | .340 | 16088 | 16053 | 17026 | 21574 | 25225 |
| Want pet | 4 | | 27893 | 27103 | 27746 | 32514 | 34351 |

* Significantly different at the 5% level
n = sample number of individuals

DISCUSSION

The observed trend in the current study was an increase in steps over calendar week passing, rather than an increase in steps over increasing levels of dog visits as hypothesized. This suggests that dog visits were not motivational in respect to increasing step counts. It is unknown however, what motivational factors may have caused the increase in steps seen over calendar weeks. Competition among residents to see who could walk more each week may have contributed to the overall measured effect. Subjects could have also been trying to please the researcher by increasing their steps each week. Another possible motivator was the pedometer. Because the subjects knew they were being measured, there was the possibility that they naturally tried harder. Based on the number of subjects that came to the visits (4/20), it was not surprising that exposure level did not appear to be associated with the number of steps. The dog visits may have been motivational for the few people attending because of the important, although not statistically significant increase in step counts. Because only 5 people contributed to the repeated measures analysis for the sub group of session attendees, a significant week effect was not expected, but there seemed to be an important trend of increasing steps for this small group that actually decreased during week five when the sessions were no longer held. This increase and then decrease when the sessions were over suggests that the sessions were a motivation for this sub group. Not enough participants came to the visits though to indicate that these visits would benefit the population as a whole.

The week and increased steps association demonstrated similar results of non-significance when ignoring the interpolated data whether or not the extreme data were used. When the interpolated data were used irrespective of extreme data use, similar results were observed; therefore, the data subset involving both interpolated and extreme values was used to increase the power of the study. The interpolated data seemed to have the most influence on whether or not the association was significant, because when taken out of the analysis, the results appeared non-significant. The interpolated values increased the power of the study because when they were not included the sample size was only 14 subjects as opposed to 20 when the interpolated values were used. This is because subjects with missing values are excluded from analysis. By not using any of the weekly counts for the six individuals who contributed interpolated data, there was a loss of 30 data values. For such a small sample size, 30 values out of 100 are very influential. Not including the interpolated data could also have influenced the statistical significance because the interpolated data were calculated based on an assumption of a true linear trend. The interpolated data may have biased the results because they reinforced the linear trend, which may have contributed to significance.

It was believed that as the subjects either became happier or less depressed, or became more active, that they would rate themselves higher in self-reported health and that they may report fewer health complaints. There appeared to be no statistical difference, from beginning to end, in self-reported health nor in number of health complaints. Again, only 14 (self-reported health) and 15 (health complaints) people contributed to these before and after comparisons. It is believed that there was an

important change in self-reported health because more people (4) increased their score than decreased (2). Small sample size most likely contributed to this lack of significantly different scores. The change in happiness and depression scores did not appear to be very important. Each changed by only 2 points, and with a range of 29 to 116 and 0 to 60 on the happiness and depression scales, respectively, 2 points may not be biologically meaningful. This group did begin with median scores which are considered indicative of depression [25], which could have contributed to the small change seen. Because the subjects were considered depressed to begin with, maybe more time or another intervention would be needed to see important changes in their scores. It would be expected that PAS scores would improve more for subjects that actually visited with the dogs, but because so few came to the visits (4 to 5 each time), and because only 6 people contributed to the score comparisons, any conclusion based on these data would be suspect. With this sample size of 6, it was expected that there would be no statistical difference in beginning and ending PAS scores. It did appear important that of the 4 to 5 subjects that regularly visited with the dogs, 3 of them had increases in PAS scores, while the others did not complete the ending PAS. It is believed that had there been more subjects contributing to the comparisons (i.e. completing both beginning and ending scales); there still would not have been a significant increase in the PAS scores, because the subject would have to visit with the dogs to have any possible changes in their attitude about companion animals.

Non-significant correlations between step counts and activity scores could be due to the fact that the LASA physical activity questionnaire was developed as an interview-

based instrument. The subjects could have had difficulty understanding the nature of the questions which may have led to incomplete or inappropriate answers. The strong correlation between pet ownership or potential pet ownership and high scores on the PAS was the result of 12 people who were concordant in their classification as pet lovers and only 2 people who were discordant. This result helps to further validate the PAS because those recognized as owning or wanting to own a pet also had the greatest affinity towards pets.

There was no pattern for who walked more each week when comparing happy people to non-happy people. It varied from week to week, and the differences were not large enough to constitute a significant difference between the groups. Depressed subjects actually walked more each week than non-depressive subjects which was surprising, and even though the differences were not large or statistically significant, they were consistent. It should be noted that the CES-D is a measure of depressive symptomatology without diagnosing depression; therefore, dichotomizing subjects as depressed or not depressed did not truly identify subjects as depressed or not. The goal was not to label subjects as depressed, but to get a comparison of step counts for high and low levels of depressiveness. The differences in step counts between healthy and non-healthy subjects were even less than those for other groups, so a statistical difference was not expected. When comparing the step counts for those owning pets and those wanting to own pets, the subjects wanting to own pets actually walked more each week. Only 3 people contributed to the pet-owning step counts; likewise, only 4 people contributed to the pet-wanting step counts. Based on this small number of subjects, it is

difficult to say if having a pet or wanting a pet is associated with more steps. The differences seem to be important even though they were not statistically significant. Perhaps most people who own pets, dogs in particular, are more active to begin with and obtaining a dog does not necessarily cause them to walk more. Subjects who had or wanted pets did walk more than non-owning or non-wanting subjects, and this was significant. This could be because owners and potential owners are more capable of taking care of a pet, and they may be more capable because they are more active or more motivated. Another consideration is this age groups' attitudes towards house pets. Seven of the 9 people who answered that they did not want a pet because their living arrangement did not suit a pet, also strongly disagreed that they would like a pet in their home and 6 of them agreed that pets should always be kept outside. This provides some evidence that perhaps this age group does not believe as strongly about the benefits of having a pet in the house or that it is unacceptable to have a pet in the house. Having a pet in the house reinforces the human-animal bond because the animal is considered a family member. If a pet is only kept outside, there may be less of a relationship with that pet, and the benefits of companionship and nurturing may be less pronounced. Also, if a dog is kept outside the attitude may be that it gets enough exercise and that it does not need to be walked. Therefore, the subjects not wanting to own a pet because they would not want one in their apartment, most likely would not benefit from any animal intervention program be it pet visits or adoption of pets into elderly homes. Basically, a person would need to have a favorable attitude toward house pets in order to gain any benefit from them. Due to the fact that the visiting dog was considered a strange dog,

participants may have felt less inclined to go visit with a dog for which they had no attachment. This may also contribute to the lack of significant changes in happiness and depression scores. More time may have been needed for bonds and attachments to be made. The subjects may have benefited more given they had time to develop a relationship with the visiting dog.

This study suffered from low statistical precision because of the small sample size. Other ways of recruiting volunteers such as going door to door explaining the study should be considered for future studies. This could contribute to a larger sample size because the residents may be more inclined to participate if asked in person, and they may be able to make a better decision, because they better understand what is involved. Another limitation could be the nature of the population of interest. Because this group is older, there may have been issues with comprehension. They may not have understood that they could come to the dog visits. Subjects at this age may be less likely to try new things which could account for the low turnout at the dog-visits and for the small sample size. The whole questionnaire may have been a little too long, thus losing the interest of some. They may have had questionnaire burnout compromising some results, thus leading to inaccurate or incomplete answers. However, based on the reliability coefficients for the OHI, CES-D, and PAS there was no reason to believe that there were any internal consistency problems with these scales.

Results of the study may have been affected by selection bias because recruitment was on a volunteer basis and more motivated people may have elected to participate. Younger people would be more likely to participate which was evident in

the difference between the population average age and the sample average age. This may contribute to a biased number of steps because younger residents potentially are more active than the older subjects. This should not affect any associations because a change in step counts was the interest and not necessarily the baseline activity levels of this population.

A potential confounder in investigating the benefits of dog-visits could have been researcher presence because having a new person around alone can motivate people to come out and visit. This problem was prevented by having the researcher available on days when the dog did not visit. Subjects would have only come on those days if they were only interested in visiting with the researcher.

CONCLUSION

Based on the current study, there was not enough evidence to suggest that dog visits as an intervention would benefit a large enough portion of this type of population. A few individuals may benefit from regular visits, but for the whole, a more efficient method should be investigated. This is not to say that residents already owning pets do not gain benefits from those pets or that other residents would not benefit from having in-house pets nearby. Some of the residents in this population had pets that their neighbors and friends talked about and enjoyed visiting. Also, because a considerable portion of this population has the attitude that pets should be kept outside, the residents that would benefit the most, probably already have a pet or have access to one through family members. Those that think pets should be kept outside would probably never come to the visits. Because having the pedometer was a potential motivator, this type of intervention should be considered for future research. Research could be conducted in this age group to determine if pedometers are motivational and for how long they remain a motivation. Other forms of motivation such as encouraging the start of a walking group should also be considered as an intervention. During the course of this study, a few subjects started a small walking group to help motivate each other to get out and walk. If future studies are to be done in this type of population, they should be done on the benefits gained from owning a pet and not from the benefits of dog-visit interventions, because efforts would be better spent to find an activity that motivated more people to participate and that could potentially cost less. This study does not discount any of the previously established benefits of human-animal interactions, but it

does provide some evidence that not many people would benefit motivationally in terms of increasing steps from dog visits.

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APPENDIX

Pedometer number _____

Date _____

This is the first section of the questionnaire.

Please answer by circling one of the following numbers for each question.

1. Do you currently own a pet?

1. No (**If no, skip to question 7**)
2. Yes (**If yes, please answer the following questions**)

2. What kind of animal do you have?

1. Dog
2. Cat
3. Fish
4. Bird
5. Other.....

3. What is the biggest reason for why you have this pet?

1. To have a friend
2. To have something to motivate me to get out and walk
3. To feel safer or for protection
4. To help me meet new people
5. To have someone to take care of
6. Other.....

4. Is there some other pet that you would rather have?

1. No (**If no, skip to question 11**)
2. Yes (**If yes, answer the next questions**)

5. Which pet would you rather have?

1. Dog
2. Cat
3. Fish
4. Bird
5. Other.....

6. What is the biggest reason why you would like to have this pet?

We realize that there may be more than one answer, but choose the most important reason why you would want this pet.

1. To have a friend

2. To have something to motivate me to get out and walk
3. To feel safer
4. To help me meet new people (something to talk about)
5. To have someone to take care of
6. Other.....

Please skip to question 11.

7. If you do not have a pet, would you like to have one?

1. No (**If no, skip to question 10**)
2. Yes (**If yes, continue with next question**)

8. What pet would you like to have?

1. Dog
2. Cat
3. Fish
4. Bird
5. Other.....

9. Which is the biggest reason why you would like to have this pet?

We realize that there may be more than one answer, but choose the most important reason why you would want a pet.

1. To have a friend
2. To have something to motivate me to get out and walk
3. To feel safer
4. To help me meet new people
5. To have someone to take care of
6. Other.....

Skip to question 11.

10. Why would you not want to have a pet?

1. Living arrangement does not suit a pet
2. Too hard to care for
3. Don't like them
4. Other.....

Continue with question 11.

| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------------|------------------------|----------------------|--------|-------------------|---------------------|-------------------|
| strongly disagree | moderately disagree | slightly disagree | unsure | slightly agree | moderately agree | strongly agree |

| | | | | | | |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <input type="checkbox"/> |
|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|

28. You should treat
your
housepets with as
much
respect as you would
a human member of
your family.

LASA Physical Activity Questionnaire

We are now changing sections. Please answer by circling the number that describes your physical activity habits and filling in the lines for how long you participate in these activities

29. Do you walk outside?

Explanation: with walking outside we mean walking to go shopping or doing other daily activities, like visiting someone. We do not mean: a walking tour.

1. no (**go to question 33**)
2. yes

30. Did you walk during the **past two weeks**?

1. no (**go to question 33**)
2. yes

31. How many times did you walk during the **past two weeks**?

.....times

32. How long did you usually walk each time during the **past two weeks**?

.....hours

.....minutes

33. Do you cycle?

Explanation: with cycling we mean cycling to go shopping or doing other daily activities, like visiting someone. With cycling we do not mean: a cycling tour.

1. no (**go to question 37**)
2. yes

34. Did you cycle during the **past two weeks**?

1. no (**go to question 37**)
2. yes

35. How many times did you cycle the **past two weeks**?

.....times

36. How long did you usually cycle each time during the **past two weeks**?

.....hours

.....minutes

37. Do you have a garden (including allotment)?

1. no (**go to question 43**)
2. yes

38. During how many months per year do you work regularly in your garden?

Explanation: by regularly we mean at least once a week.

.....months

39. Did you work in the garden during the **past two weeks**?

1. no (**go to question 43**)
2. yes

40. How many times did you work in the garden during the **past two weeks**?

.....times

41. How long did you usually work in your garden each time during the **past two weeks**?

.....hours

.....minutes

42. Did you dig in the earth in your garden during the **past two weeks**?

1. no
2. yes

43. Do you do sports?

Explanation: with sports we mean the activities on the list (see question 44).

1. no (**go to question 52**)
2. yes

44. Which sports did you do most of the time during the **past two weeks**?

- | | |
|----------------------------|--------------------------------------|
| 1. Distance walking | 10. Rowing |
| 2. Distance cycling | 11. Sailing |
| 3. Gymnastics | 12. Playing billiards |
| 4. Cycling on home trainer | 13. Fishing |
| 5. Swimming | 14. Playing soccer/basketball/hockey |
| 6. Dancing | 15. Playing volleyball/baseball |
| 7. Bowling | 16. Skiing |
| 8. Tennis, badminton | 17. Else,..... |
| 9. Running, fast walking | |

45. How many times did you do this sport during the **past two weeks**?

.....times

46. How long did you usually do this sport each time during the **past two weeks**?

.....hours

.....minutes

47. Do you do another sport?

1. no (**go to question 51**)
2. yes

48. Which other sport did you do during the **past two weeks**?

- | | |
|----------------------------|--------------------------------------|
| 1. Distance walking | 10. Rowing |
| 2. Distance cycling | 11. Sailing |
| 3. Gymnastics | 12. Playing billiards |
| 4. Cycling on home trainer | 13. Fishing |
| 5. Swimming | 14. Playing soccer/basketball/hockey |
| 6. Dancing | 15. Playing volleyball/baseball |

7. Bowling
 8. Tennis, badminton
 9. Running, fast walking
16. Skiing
 17. Else,.....

49. How many times did you do this sport during the **past two weeks**?
times

50. How long did you usually do this sport each time during the **past two weeks**?
hours
minutes

51. How many times did you perspire while sporting during the **past two weeks**?
times

52. Do you do light household tasks?

Explanation: with light household tasks we mean washing the dishes, dusting, making the bed, doing the laundry, hanging out the laundry, ironing, tidying up, and cooking meals.

1. no (**go to question 55**)
2. yes

53. How many days did you do light household tasks during the **past two weeks**?
days

54. How long per day did you usually do light household tasks during the **past two weeks**?
hours
minutes

55. Do you do heavy household tasks?

Explanation: with heavy household tasks we mean window cleaning, changing the bed, beating the mat, vacuuming, washing or scrubbing the floor, and chores with sawing, carpeting, repairing, or painting.

1. no (**go to question 58**)
2. yes

56. How many days did you do heavy household tasks during the **past two weeks**?
days

57. How long per day did you usually do heavy household tasks during the **past two weeks**?
hours
minutes

58. You just reported your usual activities for the **past two weeks**?

Were the past two weeks normal as compared to the rest of the past year?

1. no (**continue with next question**)
2. yes

59. Why were the **past two weeks** not normal?

1. disease
2. depression
3. bad weather
4. family occasion
5. holiday
6. else,.....

Oxford Happiness Inventory
 How often have you felt this way during the past week? Please check the appropriate box for each statement.

| | 1- Less True | 2 | 3 | 4- More True |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 60. I am incredibly happy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. I feel that the future is overflowing with hope and promise. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. I am completely satisfied about everything in my life. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. I feel that I am in total control of all aspects of my life. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64. I feel that life is overflowing with rewards. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65. I am delighted with the way I am. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. I always have a good influence on events. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. I love life. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68. I am very interested in other people. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. I can make all decisions very easily. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 70. I feel able to take on anything. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | 1- Less True | 2 | 3 | 4- More True |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 71. I always wake up feeling rested. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 72. I feel I have boundless energy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 73. The whole world looks beautiful to me. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 74. I feel fully mentally alert. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 75. I feel on top of the world. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 76. I love everybody. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 77. All past events seem extremely happy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 78. I am constantly in a state of joy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 79. I have done everything I have ever wanted. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 80. I can fit in everything I want to do. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 81. I always have fun with other people. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 82. I always have a cheerful effect on others. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | 1- Less True | 2 | 3 | 4- More True |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 83. My life is totally meaningful. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 84. I am always committed and involved. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 85. I think the world is an excellent place. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 86. I am always laughing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 87. I think I look attractive. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 88. I am amused by everything. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Centers for Epidemiologic Studies Depression Scale
 How often have you felt this way during the past week? Please check the appropriate box for each statement.

| | Rarely or none of the time (less than 1 day) | Some or a little of the time (1-2 days) | Occasionally or a moderate amount of time (3-4 days) | Most or all of the time (5-7 days) |
|--|---|--|---|--|
| 89. You were bothered by things that usually don't bother you. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 90. You did not feel like eating; your appetite was poor. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 91. You felt that you could not shake off the blues even with help from your family and friends. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 92. You felt that you were just as good as other people. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 93. You had trouble keeping your mind on what you were doing. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 94. You felt depressed. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 95. You felt that everything you did was an effort. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 96. You felt hopeful about the future. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 97. You felt fearful. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 98. Your sleep was restless. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| | Rarely or none of the time (less than 1 day) | Some or a little of the time (1-2 days) | Occasionally or a moderate amount of time (3-4 days) | Most or all of the time (5-7 days) |
|---|---|--|---|--|
| 99. You were happy. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 100. You talked less than usual. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 101. You felt lonely. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 102. People were unfriendly. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 103. You enjoyed life. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 104. You had crying spells. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 105. You felt sad. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 106. You felt that people disliked you. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 107. You could not get “going” | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

| |
|---|
| Check all those that apply to you now or in the past. |
|---|

108. Medical History

- | | |
|--|--|
| <input type="checkbox"/> Asthma/Allergies | <input type="checkbox"/> Hearing Disorders |
| <input type="checkbox"/> Allergies to dogs | <input type="checkbox"/> Kidney Problems |
| <input type="checkbox"/> Emphysema/C.O.P.D. | <input type="checkbox"/> Urinary/Bladder Control |
| <input type="checkbox"/> Other Lung Problems | <input type="checkbox"/> Digestive Disorders |
| <input type="checkbox"/> Heart Problems | <input type="checkbox"/> GERD |
| <input type="checkbox"/> High Blood Pressure | <input type="checkbox"/> Ulcers |
| <input type="checkbox"/> Angina | <input type="checkbox"/> Bowel Problems |
| <input type="checkbox"/> Heart Murmurs | <input type="checkbox"/> Infectious Diseases |
| <input type="checkbox"/> Mitral Valve Prolapse | <input type="checkbox"/> TB |
| <input type="checkbox"/> Blood Clots/Phlebitis | <input type="checkbox"/> Hepatitis |
| <input type="checkbox"/> Other Circulation Disorders | <input type="checkbox"/> HIV/AIDS |
| <input type="checkbox"/> Stroke/TIA | <input type="checkbox"/> Other |
| <input type="checkbox"/> Diabetes | <input type="checkbox"/> Thyroid Problems |
| <input type="checkbox"/> Cancer | <input type="checkbox"/> Skin Problems |
| Type _____ | <input type="checkbox"/> Arthritis |
| <input type="checkbox"/> Seizures/Epilepsy | <input type="checkbox"/> Tendonitis |
| <input type="checkbox"/> Head Injury | <input type="checkbox"/> Bursitis |
| <input type="checkbox"/> Multiple Sclerosis | <input type="checkbox"/> Back Problems |
| <input type="checkbox"/> Parkinson's | <input type="checkbox"/> Scoliosis |
| <input type="checkbox"/> Essential Tremor | <input type="checkbox"/> Knee Problems |
| <input type="checkbox"/> Headaches/Migraines | <input type="checkbox"/> Hip Problems |
| <input type="checkbox"/> Other Neurological | <input type="checkbox"/> Hernia |
| Problems | <input type="checkbox"/> Broken Bone(s) |
| <input type="checkbox"/> Depression | <input type="checkbox"/> Fibromyalgia |
| <input type="checkbox"/> Anxiety | <input type="checkbox"/> Osteopenia |
| <input type="checkbox"/> Psychiatric Disorders | <input type="checkbox"/> Osteoporosis |
| <input type="checkbox"/> Vision Disorders | |

109. What is your sex? Male Female

110. What is your date of birth? _____ / _____ / _____

111. What is your age? _____

112. What is your height? _____

113. What is your weight? _____

114. What is the highest level of education you completed?

- High School/GED
- Associates degree
- Bachelor's degree
- Master's degree
- Doctorate/PhD

115. How would you rate your overall physical condition?

Poor ____ Fair ____ Good ____ Excellent ____

116. Are you a smoker? Yes No

117. If no, were you ever a smoker? Yes No

118. How often do you consume alcohol?

- Never
- Occasionally
- Daily

| |
|-----------------------------------|
| Check all those that apply to you |
|-----------------------------------|

119. During the **past year**, have any of the following events happened to you?

- You had a serious illness
 - You had a serious accident or injury
 - You had frequent minor illness
 - One of your children died
 - Your husband (wife) died
 - A close family member or friend died
 - Your pet died
 - You had problems with mental illness
 - A close family member had a serious illness
 - You have had financial worry
 - Something you valued was stolen,
damaged, or lost
 - You had to give up your driver's license
 - You were separated or divorced from
your spouse
 - You became concerned about the physical or
psychological health of a family member (s)
 - Other, explain.....
- None of the above have happened to me

VITA

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PUBLICATIONS

Tietjen, H. M., Fosgate, G., Slater, M., McIntosh, A. The Physical and Emotional Benefits of Companion Animals (in preparation).