2007

PET OWNERSHIP TO WEIGHT STATUS: A PATH ANALYSIS

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ABSTRACT OF THESIS

PET OWNERSHIP TO WEIGHT STATUS: A PATH ANALYSIS

Research suggests that a multidimensional approach to obesity that addresses physiological, psychological, social, and environmental factors is optimal. Stress and self-esteem, as well as eating and exercise behaviors have been named as important factors in obesity. Curiously, although pets have been shown to reduce stress and are associated with higher self-esteem and cardiovascular health, the relationship between pet ownership and weight status has not been explored. A path analysis of the direct and indirect effects of pet ownership on stress, self-esteem, physical activity, eating behavior, and Body Mass Index failed to reveal a clear path linking pet ownership to weight status.

KEYWORDS: Pets, Obesity, Weight Status, Path Analysis, Health

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October 17, 2007

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THESIS

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The Graduate School

University of Kentucky

2007

PET OWNERSHIP TO WEIGHT STATUS: A PATH ANALYSIS

THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in the
College of Agriculture
at the University of Kentucky

By

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2007

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Chapter One: Introduction and Literature Review

Obesity is a pervasive problem in the United States, and its prevalence has been steadily increasing over the past 20 years (Cheskin & Donze, 2001). Health problems associated with obesity include diabetes, coronary heart disease, hypertension, arthritis, birth defects, cancer, carpal tunnel syndrome, gallbladder disease, gout, impaired immune response, infections following wounds, infertility, liver disease, obstetric and gynecologic complications, pancreatitis, sleep apnea, stroke, and urinary stress incontinence (American Obesity Association, 2006a). Despite these health risks, along with cultural norms that promote thinness as the ideal (Melcher & Bostwick, 1998), about 30% of adults in the U.S. age 20 and over are obese and an additional 35% are overweight (American Obesity Association, 2006b). Overweight is defined as a Body Mass Index (BMI) of 25 or higher, and obese as a BMI of 30 or higher. BMI is a measure of body weight adjusted for height (U.S. Department of Health and Human Services, 2005).

Despite countless weight management programs, weight status is a complex issue and no panacea has been developed. Medical treatments for obesity are increasingly sought but, interestingly, people tend to believe that obesity results from behavioral flaws rather than medical or genetic conditions. For example, obesity is often attributed to gluttonous, self-indulgent, lazy behavior stemming from a lack of self-discipline (Peralta, 2003). This belief, while probably true for some but not all obese individuals, serves to validate the stigma and discrimination directed toward obese individuals that often leads to depression, social withdrawal, comfort eating, and inactivity (Bidgood & Buckroyd, 2005). Even obese individuals themselves are prejudiced against other obese people (Wang, Brownell, & Wadden, 2004) and tend to view their own obesity as a result of

personal shortcomings (Melcher & Bostwick, 1998). Their self-esteem is further damaged when they repeatedly but unsuccessfully attempt to lose weight (Melcher & Bostwick).

The effects of and responses to obesity vary according to environmental contexts within which one has been socialized and lives, such as family of origin, current household, ethnic culture, and the larger society. The messages regarding obesity within these environmental contexts interact with and influence perceptions, values, beliefs, attitudes, and experiences with regard to weight status (Halliwell & Harvey, 2006). Indeed, Peralta (2003) stressed that obesity must not be considered solely a medical issue; research suggests that a multidimensional approach that addresses physiological, psychological, social, and environmental factors is optimal. Parker and Keim (2004) advocated interventions that (a) provide strategies for coping with daily life stressors, (b) offer social support, (c) emphasize the immediate psychological rewards of weight loss over the physical benefits that come with time, and (d) improve self-esteem. Curiously, although pets reduce stress, provide emotional and physical companionship, and are associated with higher self-esteem, the relationship between pet ownership and weight status has not been explored.

There may never be universal agreement on whether pets are legitimate family members. Nevertheless, family members do commonly perceive pets as members of their families (Albert & Bulcroft, 1988; Cohen, 2002). In fact, some evidence suggests that dog owners may feel as close to their dogs as to their closest family member, regardless of gender, age, or family size (Barker, Barker, Dawson, & Knisely, 1997). Moreover, pets clearly play an important role in family systems. According to Cohen (2002), people

tend to anthropomorphize their pets according to the way pets function in the household structure. For example, Hirschman (1994) found that single young adults most commonly describe their pets as siblings, and that both childfree couples and those without residential children (e.g., empty-nesters) describe their pets as children or babies.

Aside from roles pets are assigned within families, pets also play an important role in weight management via their positive effect on emotional health. Interestingly, both pets and obesity are associated with many of the same psychosocial factors, but in inverse directions. For example, overeating and lethargic behavior are associated with stress, grief, depression, and low self-esteem (Parker & Keim, 2004), yet pets are a source of comfort during difficult times (Sable, 1995) and are associated with higher levels of self-esteem (Strimple, 2003). Some researchers have postulated that this may function through distraction, the rhythmic motion of petting, and the nonjudgmental, unconditional, non-stigmatizing nature of animals (Bidgood & Buckroyd, 2005; Sharkin & Knox, 2003; Spence & Kaiser, 2002). Pets also provide an outlet for nurturance (Marks, Koepke, & Bradley, 1994), and they facilitate social interaction by providing a topic for conversation (Spence & Kaiser).

In addition to the psychosocial benefits of pet ownership, dogs may provide an additional buffer against obesity for some owners through the increased physical activity of multiple daily walks, a desire to nurture the dog's health, and provision of an exercise companion for the owner. Lack of a companion is a reason often given for not exercising (Nies, Vollman, & Cook, 1999; Schnirring, 2002). Pets have also been shown to have a positive impact on cardiovascular health, such as heart disease and blood pressure (Marks et al., 1994), both of which are tied to obesity.

Thus, the extant literature and anecdotal evidence suggests that pet ownership is associated with mental and physical health, and that mental and physical health is associated with lower BMI. Therefore, the hypothesized model (see Figure 1) predicted the direct and indirect effects of pet ownership (as moderated by pet attachment), stress, self-esteem, physical activity, and eating behavior on BMI. Specifically, the model was constructed based on the following hypotheses:

H1: Pet ownership is positively associated with self-esteem and physical activity, but negatively associated with stress, and these relationships are moderated by pet attachment;

H2: Stress is negatively associated with physical activity and healthy eating behavior;

H3: Self-esteem is positively associated with physical activity and healthy eating behavior;

H4: Physical activity is negatively associated with BMI; and

H5: Healthy eating behavior is negatively associated with BMI.

The combination of these hypotheses alludes to the overarching hypothesis that pet ownership is associated with lower BMI scores.

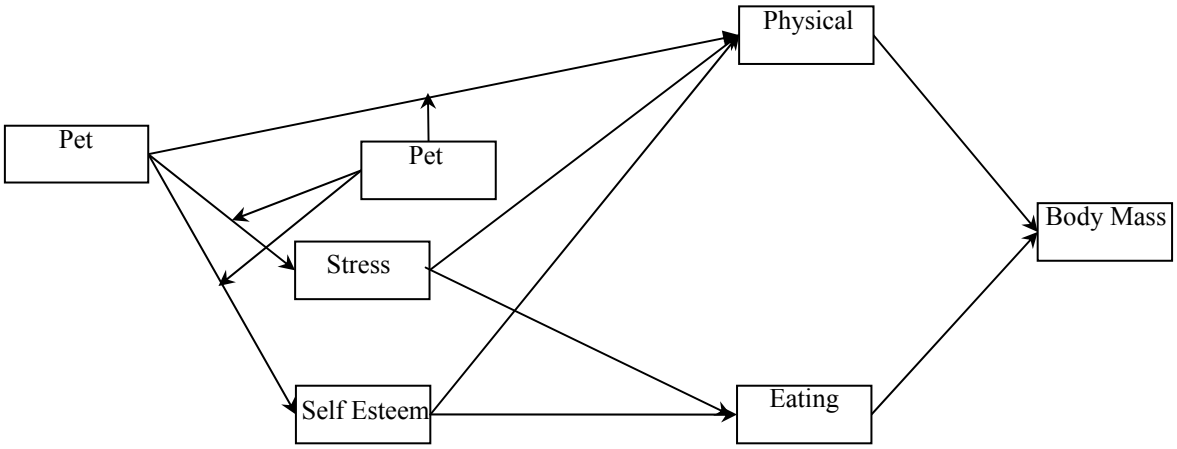

Figure 1. Initial path model: Influence of pet ownership, stress, self-esteem, physical activity, and eating behavior on body mass index.

Chapter Two: Method

Participants

A random sample of 322 Kentuckians was obtained using random-digit dialing procedures that gave each household telephone in Kentucky an equal probability of being called. The respondent within each household was randomly selected according to the youngest or oldest adult (18 years of age or older) of a given sex living in the household to reduce within-household sampling bias.

The sample was comprised of 105 males (33.2%) and 211 females (66.8%), ranging in age from 18 to 89 (M = 50.62; SD = 16.42). Respondents were primarily White (91.6%), 61.8% were married, and 80.1% had children (M number of children = 2.15). U.S. Census Bureau (2000) estimates indicate that 50.9% of Kentucky residents are female, 90.4% are White, and 57.3% are married. Respondents' BMI scores ranged from 14.0 to 48.8 (M = 26.8; SD = 5.5). According to U.S. Department of Health and Human Services (2007) classifications, 2.3% were underweight, 38.3% were a healthy weight, 34.4% were overweight, and 25.1% were obese. Thus, 59.5% of the sample was classified as overweight or obese, which matches estimates for Kentucky (U.S. Department of Health and Human Services, 2005). The majority of respondents were pet owners (70%), compared to 59.7% of all Kentucky households (American Veterinary Medical Association, 2001). Overall, although females and pet owners were overrepresented, the sample was representative of the Kentucky adult population on most demographic measures. See Table 1 for a detailed summary of sample characteristics.

Table 1
Sample Characteristics

Age		BMI	
Range	18-89	Range	14.0-48.8
Mean	50.62	Mean	26.76
S.D.	16.42	S.D.	5.49
Marital Status		Race/Ethnicity	
Not Married	33.3%	White	91.6%
Cohabiting	3.1%	African American	3.4%
Married	61.8%	Other	3.0%
Children		Household Income	
None	19.9%	Less than $20,000	14.2%
1 or more	80.1%	$20,000 – $49,999	23.8%
Mean	2.15	$50,000 and above	47.3%
Sex		Education	
Male	32.6%	No High School Diploma	12.7%
Female	65.5%	High School Diploma	33.6%
		Some College	26.1%
Pet Ownership		Bachelor's Degree	14.3%
Dog(s)	31%	Some Graduate Work	1.9%
Cat(s)	15%	Graduate Degree	9.9%
Both	24%		
None	30%		

Measures

A questionnaire was administered to measure pet ownership and attachment, BMI, stress, eating attitudes, self-esteem, exercise, and respondent demographics (see Appendix). The following instruments were included in the questionnaire: the *Companion Animal Bonding Scale* (Poresky, Hendrix, Mosier, & Samuelson, 1987), the *Rosenberg Self-Esteem Scale* (Rosenberg, 1965), the *Perceived Stress Scale* (Cohen, Kamarck, & Mermelstein, 1983), two items from the *Baecke Questionnaire of Habitual Physical Activity* (Baecke, Burema, & Frijters, 1982) along with two author-developed questions regarding physical activity, and the *Dutch Eating Behavior Questionnaire - Restrained Eating Scale* (Van Strien, Frijters, Bergers, & Defares, 1986).

The *Companion Animal Bonding Scale* (CABS; Poresky et al., 1987) is an 8-item instrument designed to assess attachment to one's pet based on self-reported behavior. Each item is measured on a 5-point ordinal scale, ranging from *never* to *always*. Sample items include "How often do you hold, stroke, or pet your pet?" and "How often do you feel that you have a close relationship with your pet?" The CABS has a Cronbach alpha of .77 (Poresky et al.) and has demonstrated strong construct validity based on a correlation of .40 with the *Pet Attitude Scale* (Templer, Salter, Dickey, Baldwin, & Veleber, 1981). One item that assesses travel with pets was omitted for this survey to enhance the instrument's face validity. Cronbach's alpha for the 7-item scale in this study was .98.

The original *Rosenberg Self-Esteem Scale* (RSES; Rosenberg, 1965) has 10 Likert items with 4 response options each, ranging from *strongly agree* to *strongly disagree*. The RSES is a widely popular scale, considered to be a standard for comparison of other

measures, and its reliability and validity are high (Adler & Stewart, 2004). The instrument was modified for this survey due to the awkwardness of asking reverse-scaled self-esteem items over the telephone. Thus, only the 5 items that assess high self-esteem (e.g., "I feel that I have a number of good qualities" and "I take a positive attitude toward myself") were used. Cronbach's alpha for the 5-item scale in this study was .84.

The short version of the *Perceived Stress Scale* (PSS; Cohen et al., 1983) is a 4-item instrument designed as a more suitable alternative for telephone administration than the longer 14-item version and assesses stress on a continuum of 5 response options ranging from *never* to *very often*. Questions include "In the last month, how often have you felt that you were unable to control the important things in your life?" and "In the last month, how often have you felt that things were going your way?" Cohen found a coefficient alpha reliability estimate of .72, and 2-month test-retest reliability of .55. Cronbach's alpha for the 4-item scale in this study was .60.

Physical activity was assessed using two items from the *Baecke Questionnaire of Habitual Physical Activity* (BQHPA; Baecke et al., 1982) designed to measure habitual levels of work and leisure activity. Additionally, respondents were asked questions regarding how much they walked or participated in moderate or vigorous physical activity during the past week and whether that was typical for them. Cronbach's alpha for the BQHPA was .32.

Five items were selected from the 10-item *Dutch Eating Behavior Questionnaire – Restrained Eating Scale* (DEBQ-R; Van Strien et al., 1986), with 5 response categories each, ranging from *never* to *very often,* concerning deliberate weight control behavior. Items include "Do you try to eat less at mealtimes than you would like to eat?" and "How

often do you try not to eat between meals because you are watching your weight?" On the original questionnaire, the internal consistency is quite high (Cronbach's alpha of at least .90), and test-retest reliability was .92 over a two-week period (Allison, 1995). Cronbach's alpha for the 5-item scale in the study was .79.

Demographic information collected included respondents' age, height, weight, marital status, number of children, race or ethnicity, education level, and annual household income. BMI was calculated based on respondents' self-reported height and weight, using the formula: *weight (lb) / [height (in)]^2 x 703* (U.S. Department of Health and Human Services, 2007).

Procedure

A pre-screened bank of Kentucky household telephone numbers was purchased and uploaded to RDD Survey Pro software, which was used for call and survey management. Telephone surveying was primarily conducted on Saturdays and Sundays, 10:00 AM – 9:00 PM, and on a few occasions calls were made on weekday evenings, 6:00 PM – 9:00 PM. Up to 10 attempts were made to each telephone number in the sampling frame, and a conversion attempt was made for each initial refusal. Survey administration took approximately 10 minutes and was conducted according to the survey protocol (see Appendix).

Analytical Approach

Initially, descriptive statistics and chi-square analyses are presented to provide an overview of the data. Next, analysis of variance tests were performed to explore differences among pet ownership groups on the survey measures. Then a regression analysis was run on BMI using respondents' demographic characteristics to determine

whether separate models were needed for different demographic segments of the sample (e.g., males and females). Finally, three path analysis models were tested using Amos 7.0 to examine the hypothesized relationship between pet ownership and BMI: pet owners vs. non-pet owners, dog owners vs. non-pet owners, and cat owners vs. non-pet owners.

Chapter Three: Results

Descriptive Statistics

Over half (55%) of respondents were dog owners and 39% were cat owners, including 24% who had at least one of each. Among cat owners, 65% kept their cat(s) indoors, and 70% of dog owners kept their dog(s) indoors the majority of the time. About 70% of dog owners indicated that they never walked their dogs, and about 12% said they walked their dogs every day, most (85%) for fewer than 30 minutes per walk.

The other physical activity questions concerned how many times in the past week respondents walked and participated in moderate or vigorous physical activity, and for how many minutes each time. Number of walks reported ranged from 0 to 14 ($M = 3.53$; $SD = 3.57$), with 15% of respondents indicating that the past week's walking was not typical. The length of walks ranged from 0 to 59 minutes ($M = 23.96$; $SD = 14.87$). The number of moderate or vigorous physical activity sessions ranged from 0 to 14 ($M = 1.94$; $SD = 2.57$), with 11% indicating that the past week was not typical. Reported session length ranged from 0 to 90 minutes ($M = 31.30$; $SD = 23.67$).

Chi-Square Analysis

Chi-square tests were performed to explore variations in pet ownership according to demographic characteristics. Younger respondents were more likely to be pet owners, χ^2 (6, $N = 314$) = 17.06, $p < .01$, and higher income respondents were less likely to be pet

owners χ^2 (9, N = 228) = 26.33, p < .01. However, there were no statistically significant differences in pet ownership according to parental status, race or ethnicity, level of education, marital status, or sex (results not shown).

Analysis of Variance

One-way analysis of variance (ANOVA) tests were conducted for each of the five measures (i.e., CABS, RSES, PSS, DEBQ, Physical Activity) and BMI to assess differences among the four pet ownership groups (i.e., non-pet owners, dog owners, cat owners, and owners of both dogs and cats). Self-esteem, measured by the RSES, was the only factor found to have a statistically significant difference among the groups, F (3, 318) = 3.21, p < .05, η^2 = .03. A Tukey post-hoc test indicated that dog owners had higher self-esteem than those who did not own a pet. However, the effect size of .03 indicated that this difference was small (Cohen, 1988). Descriptive statistics and ANOVA results for all of the tests are presented in Table 2.

Regression Analysis

A regression on BMI using respondents' sex, income, number of children, age, education, and marital status indicated that these demographic characteristics were poor predictors of BMI, R^2 = .03, F(6, 219) = 1.09, p = .37. Age (β = .09, p = .22) made the largest contribution to prediction of BMI, but no predictors reached significance in the model (see Table 3). Race and ethnicity was not included in the analysis due to the lack of variation in the sample on this characteristic. These findings indicated that separate path analysis models were not necessary to account for demographic characteristics.

Table 2

Analysis of Variance for Each Measure by Pet Ownership Group

	CABS	RSES	PSS	BQHPA	DEBQ	BMI
Group	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)	*M* (*SD*)
Overall	28.29 (9.65)	17.15 (2.28)	8.45 (2.92)	6.13 (1.57)	14.83 (5.30)	26.76 (5.61)
Dog(s) Only	28.33 (9.65)	17.64 (2.36)	8.29 (3.02)	6.23 (1.73)	14.53 (5.40)	27.17 (5.11)
Cat(s) Only	28.04 (10.76)	17.24 (1.98)	8.84 (3.23)	5.98 (1.59)	15.16 (6.08)	27.35 (5.67)
Cat(s) and Dog(s)	28.42 (8.98)	17.12 (2.44)	8.43 (2.90)	6.04 (1.50)	14.56 (5.08)	26.26 (5.74)
No Cat or Dog	–	16.64 (2.13)	8.42 (2.68)	6.18 (1.44)	15.17 (4.99)	26.43 (5.61)
ANOVA						
F	0.02	3.21	0.40	0.38	0.36	0.68
df	2/221	3/318	3/316	3/309	3/314	3/307
p	.98	.02*	.75	.77	.78	.57
η^2	.00	.03	.00	.00	.00	.01

* $p < .05$.

Table 3

Summary of Regression Analysis for Demographic Variables Predicting BMI (N = 227)

Variable	*B*	*SE B*	*β*	*p*
Age	0.03	0.03	.09	.22
Sex	-0.53	0.78	.05	.50
Children	0.18	0.24	.05	.46
Education	-0.12	0.13	-.07	.35
Income	-0.11	0.11	-.07	.33
Marital Status	-0.22	0.34	-.05	.52

Note. $R^2 = .03$

Path Analysis

A path analysis was conducted to determine the effect of pet ownership on physical activity, stress, and self-esteem; the effects of stress and self-esteem on physical activity and eating behavior; and the effects of physical activity and eating behavior on BMI (see Figure 2). Two more path analyses were conducted: one using dog-only ownership (see Figure 3) and one using cat-only ownership (see Figure 4) in place of pet ownership.

Hypothesis 1 predicted that pet ownership is positively associated with self-esteem and physical activity and negatively associated with stress. Path analysis found that pet ownership and self-esteem were positively associated ($p = .01$), but there was not a statistically significant relationship between pet ownership and stress or between pet ownership and physical activity. Although not central to the model, stress and self-esteem were negatively correlated ($r = -.42$; $p < .001$). Although the first hypothesis also predicted that pet attachment would strengthen the effects of pet ownership, pet attachment did not have a meaningful effect on any of the relationships so it was removed from the final model. The dog-only model found a significant positive association between dog ownership and self-esteem ($p = .01$), but not between dog ownership and stress or physical activity. The cat-only model also found a significant positive association between cat ownership and self-esteem ($p = .04$), but not between cat ownership and stress or physical activity.

Hypothesis 2 predicted that stress is negatively associated with physical activity and healthy eating behavior. The path analysis found no significant association between

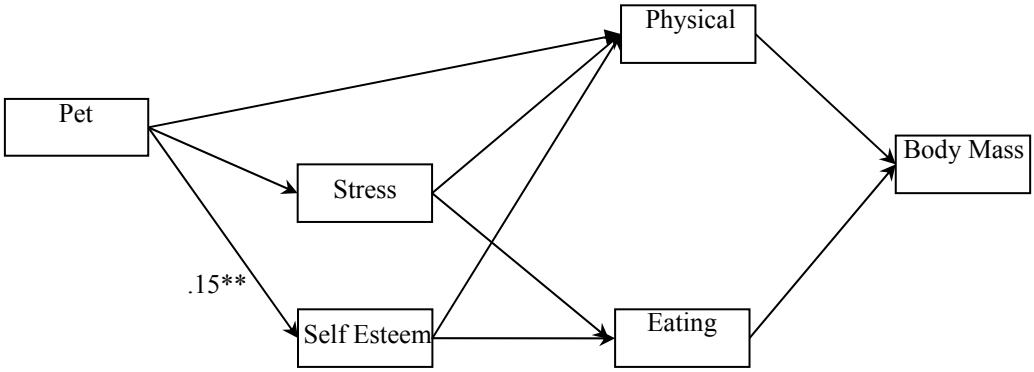

Figure 2. Path model of all respondents with correlations. ** $p < .01$.

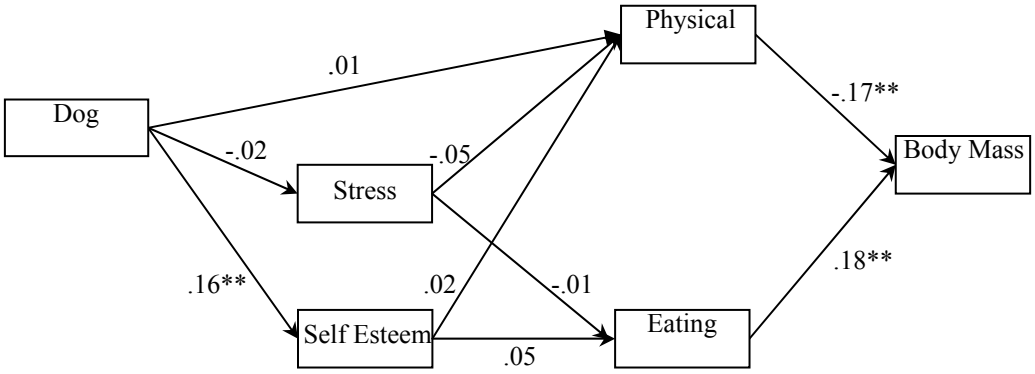

Figure 3. Path model of dog owners with correlations. ** $p < .01$.

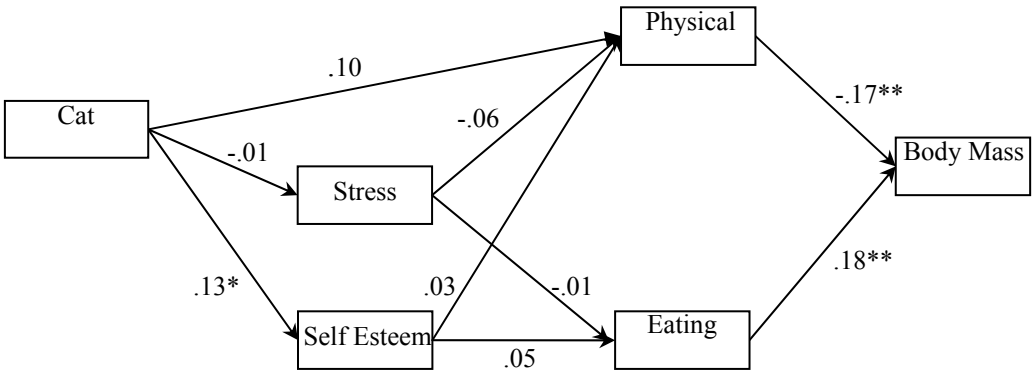

Figure 4. Path model of cat owners with correlations. * $p < .05$. ** $p < .01$.

stress and either variable in the pet ownership model. Likewise, in the dog-only and cat-only models, no significant associations were found.

Hypothesis 3 predicted that self-esteem is positively associated with physical activity and healthy eating behavior. The path analysis found no significant relationship between self-esteem and either variable in the pet ownership model, nor in the cat owners or dog owners models.

Hypothesis 4 predicted that physical activity is negatively associated with BMI. The path analysis found this relationship to be significant ($p = .002$) for all three models.

Hypothesis 5 predicted that healthy eating behavior is negatively associated with BMI. Curiously, however, healthy eating behavior and BMI were positively associated in all models ($p = .001$).

The fit of the overall model was tested using three fit indices, as suggested by Kline (2005). The chi-square likelihood ratio statistic is an absolute index that addresses the residual or unexplained variance remaining after a model fitting (Marsh, Balla, & McDonald, 1988). The null hypothesis was that the hypothesized model fits the data, so failure to reject the null hypothesis, as indicated by a nonsignificant chi-square, χ^2 (5, N = 322) = 4.05; *ns*, supported the hypothesized model (Kline, 2005). The root mean square error of approximation (RMSEA) is a measure of discrepancy between the reproduced and observed covariances per degree of freedom (Tate, 1998). An RMSEA value of 0 indicated that the model was an acceptable fit to the data (Kline). The comparative fit index (CFI) is based on relative comparisons between the proposed model and other possible models (Bentler, 1990). A CFI value of 1 indicated that the model was an acceptable fit to the data (Kline).

A univariate ANOVA was conducted to determine the likelihood of finding an existing relationship between BMI and pet ownership. The observed power, computed using an alpha level of .05 and a medium effect size (R^2 = .075), indicated only a 23% chance of detecting an existing relationship between pet ownership and BMI. Thus, given that the hypothesized model could not be rejected, the failure to find significant relationships associated with pet ownership may be due to a Type II error.

Chapter Four: Discussion

Introduction

Although the model was a good fit to the data and some of the findings were expected, no clear path linking pet ownership to BMI was observed and so the relationships between the variables mutually associated with pet ownership and obesity remain largely unexplained. Because data was not collected regarding length of pet ownership, it is unknown whether participants may have just acquired a pet for the first time or just lost one after a long period of ownership. Further research would be necessary to determine how quickly any potential effects of pet ownership may occur after acquiring a pet and how long those effects remain upon the loss of a pet. Data regarding family history of pet ownership was not collected, but such information could be helpful in understanding current pet ownership and attitudes toward pets. Possibly some people who had never considered owning a pet might gain some health benefits from a pet if education on the topic were provided.

Although the majority of Americans are both overweight and pet owners (American Veterinary Medical Association, 2001), some potential for pets to contribute to healthier weight status may still exist. These findings suggest that pet owners have

higher self-esteem than non-pet owners, and that higher self-esteem is associated with lower stress levels. Surprisingly, however, stress was not associated with pet ownership. Numerous studies have suggested that animals temper common physical responses to stressful stimuli and have a calming effect on the nervous system (Robinson, 1995). Respondents were asked questions concerning their perceived level of stress in general during the last month, rather than measurements of specific physical indicators of stress (e.g., pulse rate, blood pressure, sweating). Perhaps perceptions of stress do not coincide with physical responses to stress.

The study suggests that, as expected, physical activity is associated with lower BMI. The reliability of the physical activity section was weak, however (Cronbach's alpha of .32). This could be due to several factors. One question concerned the strenuousness of the respondent's work, and some respondents are not employed. Therefore, they decided what they would consider to be their work. Respondents were asked to consider the strenuousness of their work and their leisure time compared to others their own age. Subjective comparisons may sometimes be inaccurate. Additionally, respondents were asked how many times they took a walk during the past week. Dog owners had previously been asked how many times they walked their dog during the past week, which may have prompted them to only consider their dog walks for this question. Some gave responses like "I walk all day long at work." This might have caused some confusion in scoring, if the respondent was unable or unwilling to provide a precise number of times they walked for at least 10 minutes at a time.

Surprisingly, participants who reported less-healthy eating behaviors also had lower BMIs. Because most participants were overweight, possibly many of them are

trying to lose weight but have been unsuccessful so far, which would support previous obesity research findings regarding attempted weight loss. Research has also shown that many people, especially women, report they are eating less or eating a healthier diet than they really are (Maurer et al., 2006). Some people may be embarrassed or ashamed to admit that they do not watch what or how much they eat, even in an anonymous telephone survey. Additionally, the BMI calculation might not be completely accurate; that is to say, some people who are very fit and have more muscle and less fat than average may have BMIs in the overweight range due to muscle density when they are actually not overweight. The DEBQ questions center around the extent to which the respondent is conscious of weight concerns while eating. It seems plausible that those who are overweight and fighting it would be more weight-conscious while eating than those for whom weight is not an issue. Another possible explanation for the unexpected relationship between eating behavior and BMI is that some people may be normal weight or underweight without making any deliberate attempts to keep their weight down. A number of participants responded that they do not have to watch what or how much they eat because they never gain weight. Finally, the eating behavior questions may have been confusing to some people, leading to inaccurate responses. The first question ("When you have put on weight, how often do you eat less than you usually do?") seemed to be especially confusing for many respondents, and often had to be rephrased or repeated by the interviewer.

Type of residential area was not assessed but may have been helpful. Rural residents may tend to keep pets outside and urban residents tend to keep pets inside the home, and this may have an effect on attachment to the pet, frequency of walks with the

pet, and the effects on stress, self-esteem, and other health issues related to ownership of the pet.

Limitations of the Study

In this survey, all respondents were Kentucky residents, and therefore results may not be generalizable to the whole nation. The length of the survey may have discouraged some potential participants, as might have the nature of some questions (e.g., those regarding self-esteem and stress levels). Additionally, the subject matter of the survey may have been more appealing to pet owners than to non-pet owners, thereby not revealing as good a comparison between the two groups as desired.

The power to detect a relationship between pet ownership and BMI was quite small, which inflated the risk of a Type II error beyond acceptable levels. Specifically, if a relationship actually exists between pet ownership and BMI, this study had less than a 25% chance of detecting that relationship. Thus, future studies attempting to model the complex relationship between pet ownership and BMI will need much larger sample sizes.

Suggestions for Future Research

History of pet ownership could be examined in future research. Because some research has suggested that pets are associated with increased self-esteem and reduced stress, and obesity is associated with lower self-esteem and higher stress levels, possibly those obese individuals or families who have been identified with low self-esteem and/or high stress could benefit from owning a pet. A suggestion for future research could be an experimental-design longitudinal study to measure the BMI of obese, low self-esteem, high stress individuals before and after being assigned a pet.

Because obesity is a problematic and growing health concern, and 56.1% of U.S. households own a pet (American Veterinary Medical Association, 2001), further exploration into the relationships between variables associated with both pets and obesity is warranted. Previous studies have shown significant beneficial effects of animals on human stress responses and anxiety levels, indicating a potential for cardiovascular health improvement. Because stress has been closely linked with eating behaviors, researchers should not give up hope that animals can aid in weight control for some people. Possibly a better goal is improved overall health, rather than weight. Because research has shown that most people who diet to lose weight do not maintain weight loss, current trends seem to be moving toward a focus on health, with the idea that a healthier weight will follow. Permanent lifestyle change is needed to improve health and maintain a healthy weight, and most weight-loss diet plans are temporary. Pets could be one part of a permanent lifestyle change. Although pets may aid in increasing self-esteem and lowering stress, possibly people suffering from low self-esteem or high stress do not tend to own pets. Factors such as economic hardship, poor health, domestic disputes, and others may contribute to these two variables as well as discourage pet ownership.

Appendix

Hi, my name is [*name*]. I'm with the University of Kentucky and we are conducting a study of both pet owners and non-pet owners to better understand the health-related benefits associated with pet ownership. The survey should only take about 10 minutes to complete and your phone number was randomly selected from all Kentucky households. My instructions are to speak with the [*oldest/youngest]* [*male/female*] over the age of 18 living in the household. [Would that be you? – or – Would you call that person to the phone please?]

SECTION 1: Pet Demographics
1. ___ How many cats do you have? [If 0, skip to #3, else continue]
2. Does your cat primarily live inside your house or outside? [repeat if multiple cats] ___ 1) Inside ___ 2) Outside
3. How many dogs do you have? ___ [If 0, skip to #9, else continue]
4. Does your dog primarily live inside your house or outside? [repeat if multiple dogs] ____ 1) Inside ____ 2) Outside
5. ____ In the past 7 days, how many times have you walked or run with your dog?
6. Is that typical for a 7-day period? ____ 1)Yes [skip to #8] [If 0 and Yes, skip to #9] ____ 2) No
7. ____ In a typical week, how many times do you walk or run with your dog? [If 0, skip to #9]
8. ____ On average, how many minutes do your walks or runs with your dog last?
9. _____[If more than one pet] Which pet do you feel closest to? [If no pets, skip to 17, else continue]

SECTION 2: Companion Animal Bonding Scale					
The next few questions have to do with your level of attachment to your pet [OR to [insert name of pet from #9].					
Always	**Often**	**Occasionally**	**Rarely**	**Never**	
A	Of	Oc	R	N	10. How often are you responsible for [your pet's] care?
A	Of	Oc	R	N	11. How often do you clean up after [your pet]?
A	Of	Oc	R	N	12. How often do you hold, stroke, or pet [your pet]?
A	Of	Oc	R	N	13. How often does [your pet] sleep in your room?
A	Of	Oc	R	N	14. How often do you feel that [your pet] is responsive to you?
A	Of	Oc	R	N	15. How often do you feel that you have a close relationship with [your pet]?
A	Of	Oc	R	N	16. How often does [your pet] sleep on your bed with you?

SECTION 4: Rosenberg Self-Esteem Scale				
Now I am going to read you some statements dealing with your general feelings about yourself. There are no right or wrong answers, we just want your honest opinions.				
Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**	
SA	A	D	SD	17. On the whole, I am satisfied with myself.
SA	A	D	SD	18. I feel that I have a number of good qualities.
SA	A	D	SD	19. I am able to do things as well as most other people.
SA	A	D	SD	20. I feel that I'm a person of worth, at least on an equal plane with others.
SA	A	D	SD	21. I take a positive attitude toward myself.

SECTION 5: Perceived Stress Scale					
These next questions ask about your feelings and thoughts during the last month.					
Never	**Almost Never**	**Sometimes**	**Fairly Often**	**Very Often**	
N	AN	S	FO	VO	22. In the last month, how often have you felt that you were unable to control the important things in your life?
N	AN	S	FO	VO	23. In the last month, how often have you felt confident about your ability to handle your personal problems?
N	AN	S	FO	VO	24. In the last month, how often have you felt that things were going your way?
N	AN	S	FO	VO	25. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

SECTION 6: Physical Activity

The next few questions concern your level of physical activity.

26. In comparison with others your own age, do you think your work is physically

____ 1) much more strenuous

____ 2) more strenuous

____ 3) about average

____ 4) less strenuous

____ 5) much less strenuous

27. In comparison with others your own age, do you think your physical activity during leisure time is

____ 1) much more strenuous

____ 2) more strenuous

____ 3) about average

____ 4) less strenuous

____ 5) much less strenuous

28. ____ During the past 7 days, how many times did you take a walk that lasted at least 10 minutes?

29. ____ Is that typical for a 7-day period? [If yes, skip to #36, if 0 and yes, skip to #37, else continue]

30. ____ In a typical week, how many times do you walk for at least 10 minutes at a time?

31. ____ On average, how many minutes do your walks last?

32. ____ Not including those walks, during the past 7 days, how many times did you participate in moderate or vigorous physical activity in your leisure time for at least 10 minutes, such as running, aerobics, bicycling, swimming, dancing, or gardening?

33. ____ Is that typical for a 7-day period? [If yes, skip to #40, if 0 and yes, skip to #41, else continue]

34. ____ In a typical week, how many times do you participate in moderate or vigorous physical activity for at least 10 minutes at a time?

35. ____ On average, how many minutes at a time do you participate in moderate or vigorous physical activity?

SECTION 7: Dutch Eating Behavior Questionnaire of Restrained Eating Behavior					
The next group of questions concerns your eating behavior. Please indicate how often each of the following is true for you.					
Never	**Seldom**	**Sometimes**	**Often**	**Very Often**	
N	Se	So	O	VO	36. When you have put on weight, how often do you eat less than you usually do?
N	Se	So	O	VO	37. How often do you try to eat less at mealtimes than you would like to eat?
N	Se	So	O	VO	38. How often do you deliberately eat foods that are low-fat or low-calorie?
N	Se	So	O	VO	39. How often do you try not to eat between meals because you are watching your weight?
N	Se	So	O	VO	40. How often do you take your weight into account when you eat?

SECTION 8: Respondent Demographics

Okay, we're almost done. Now I am going to ask a few questions that will help us understand the results of this study.

41. ____ How old were you on your last birthday?

42. Are you

____ 1) Single

____ 2) Single but cohabiting

____ 3) Married

____ 4) Separated

____ 5) Divorced

____ 6) Widowed

43. Which of the following best describes your racial or ethnic group?

____ 1) White

____ 2) Latino or Hispanic

____ 3) African American

____ 4) Asian American

____ 5) American Indian

____ 6) Something Else

44. What is the last grade in school that you completed?

____ 1) Less than High School

____ 2) Graduated High School or GED

____ 3) Some College, but no Degree

____ 4) Bachelor's Degree

____ 5) Graduate or Professional Degree

45. What is your height? ____ feet ____ inches

46. What is your weight? ____ pounds

47. Finally, in 2006, what was your total household income from all sources before taxes?

____ 1) Under $5,000	____ 6) $15,000-19,999	____ 11) $50,000-69,999
____ 2) $5,000-7,499	____ 7) $20,000-24,999	____ 12) $70,000-89,999
____ 3) $7,500-9,999	____ 8) $25,000-29,999	____ 13) $90,000-119,999
____ 4) $10,000-12,499	____ 9) $30,000-39,999	____ 14) $120,000-149,999
____ 5) $12,500-14,999	____10) $40,000-49,999	____ 15) Over $150,000

48. Sex (Don't Ask)

___ Male

___ Female

49. Assess the respondent's understanding of the survey. (Don't Ask)

___ Excellent

___ Good

___ Fair

___ Poor

Those are all the questions I have for you. Thank you for your time and help!

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