

DOES DOG OWNERSHIP AFFECT THE OWNERS' QUALITY OF MOTIVATION TO ENGAGE IN PHYSICAL ACTIVITY?

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Abstract

Using the framework of the self-determination theory (SDT), the current study compared men and women dog owners' and non-dog owners' a) physical activity levels, b) perceived competence, autonomy, and relatedness during physical activity, tested c) the correlations between dog ownership and self-determined motivation to engage in physical activity, and d) the roles of age, gender, and marital status on the relationship between dog ownership and self-determined motivation to be active. 223 volunteers participated in a cross sectional internet survey inquiring about physical activity, self-determined motivation, competence, autonomy, and relatedness, and activity completed with a pet dog(s). Results obtained using t tests revealed that dog owners have higher perceived relatedness during physical activity than non-dog owners ($p < 0.001$). The relationship between dog walking and self-determined motivation of dog owners was assessed by conducting a correlation analysis. Total dog walking completed by dog owners was negatively correlated with amotivation, $r = -0.188$, $n = 113$, $p < 0.05$, positively correlated with identified regulation, $r = 0.384$, $n = 113$, $p < 0.01$, intrinsic motivation, $r = 0.302$, $n = 113$, $p < 0.01$, and competence. This suggests an increase in dog walking leads to a decrease in amotivation but leads to an increase in identified regulation motivation; higher quality self-determined motivation. The more competent owners feel about walking and/or walking with a dog, the

more likely they are to increase dog walking time. Enhancing perceived competence about physical activity and proper dog ownership may promote more dog walking in communities and more physical activity overall.

DOES DOG OWNERSHIP AFFECT THE OWNER'S QUALITY OF MOTIVATION TO
ENGAGE IN PHYSICAL ACTIVITY?

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CHAPTER I. INTRODUCTION

Sedentary lifestyles have been linked to increased risk of many chronic diseases (WHO, 2010) and are estimated to cause 2 million deaths worldwide annually (WHO, 2010). Physical inactivity is widely responsible for an enormous amount of chronic disease, impaired physical function, and a minimum of 300,000 premature deaths per year (Manson, 2004). For health related benefits, the American College of Sports Medicine (ACSM) recommends engaging in moderate intensity aerobic activity for a minimum of 30 minutes five days per week or vigorous aerobic activity for a minimum of 20 minutes three days per week (ACSM, 2010). At least 60% of the global population fails to achieve these recommendations (AHA, 2009). It is critical to further understand the determinants of physical activity participation given the burden of sedentary lifestyles on global health and health care costs. Motivation may be a determinant that can help explain physical activity participation.

Needs Satisfaction and Motivational Continuum

SDT states that three key psychosocial needs improve quality of motivation. Individuals seek tasks that indirectly satisfy one or more of these needs (Deci & Ryan, 2000, 2001). The first need, autonomy, is the need to feel in control of a situation or need for self-determination (Deci & Ryan, 2000, 2001). The second need, competence, is the need to feel knowledgeable or capable of completing a task or challenge and to interact effectively with the environment while producing desired outcomes in certain situations (Deci & Ryan, 2000, 2001). The final need, relatedness, is the need of belonging and to experience social interactions (Deci & Ryan, 2000, 2001). Satisfying these needs within the exercise domain will enhance the individual's quality of motivation to engage in physical activity (Buckworth, 2007; Dacey, 2008; Edmunds, 2006, 2008; Frederick-Recascino, 2002; Gagne, 2003).

SDT also positions three types of motivation: amotivation, several types of extrinsic motivation and intrinsic motivation. There is a critical distinction concerning motivation in physical activity between amotivation, extrinsic motivation (made up of four types of behavioral regulation: external regulation, introjected regulation, identified regulation, and integrated regulation) and intrinsic motivation. One who experiences external regulation motivation engages in a behavior due to motives such as gaining a reward or avoiding punishment (Deci & Ryan, 2000, 2001). An individual who experiences introjected regulation motivation engages in a behavior due to a sense of obligation while those who experience identified regulation motivation engage in a behavior to achieve personal goals or to reap certain benefits (i.e. health benefits due to physical activity) (Deci & Ryan, 2000, 2001). When a person experiences integrated regulation motivation, he or she engages in a behavior to confirm a sense of self (Deci & Ryan, 2000, 2001).

Each type of motivation differs with regard to the amount of autonomy associated with it and lies along a continuum ranging from amotivation (low self-determination motivation) to intrinsic motivation (high self-determined motivation or high quality motivation) (Deci & Ryan, 2000, 2001) (appendix I). Amotivated individuals have no desire or incentive to participate or take part in the activity. On the opposing end of the continuum, those who are intrinsically motivated participate in an activity or behavior for the enjoyment and satisfaction of the activity itself. Those who are extrinsically motivated (between amotivation and intrinsic motivation) participate in an activity due more to beneficial or integrated reasons. The quality of motivation greatly affects how action-oriented one will be when it comes to increasing activity levels. As quality of motivation improves, self-determination is also enhanced (appendix I).

Research has investigated what enhances quality of motivation to increase activity levels (Buckworth, Lee, Regan, Schneider, & DiClemente, 2007). Research shows that improving the psychological needs of relatedness, autonomy and competence in the exercise domain enhance motivation to partake in activity (Deci & Ryan, 2000, 2001). Motivation comes from many influences and is different for everyone. It can range from extrinsic factors such as goals to meet, health benefits, guilt to more intrinsic factors such as enjoyment (Deci & Ryan, 2000, 2001). However, the more self-determined one is, the greater the chance of physical activity adherence (Deci & Ryan, 2000, 2001). According to the SDT (Deci & Ryan, 2000, 2001), the main fulfillments associated with intrinsically motivated actions are experiences of enjoyment and the psychological components competence, autonomy and relatedness. These factors greatly enhance motivation to be active (Deci, & Ryan, 2000, 2001). Studies have shown that these factors can come from environmental factors such as autonomous exercise instructors, exercise buddies/support system, athletic teams, family, friends, coaches, and significant others (Edmunds, 2006, 2008; Gagne, 2003; Wing, 1999) can influence psychological need fulfillment. Exercise buddies and autonomy-creating support systems have shown to be critical for enhancing physical activity motivation (Edmunds, 2006, 2008; Gagne, 2003; Wing, 1999). Many individuals may not have exercise buddies or proper support systems, but do rely on pet dogs for support. The impact pet dogs have on the owner's feelings of autonomy, competence and relatedness in relation to exercise has not been investigated.

Researchers have explored the impact of dog ownership on physical activity levels, physical and psychological health but have not evaluated the impact pet dogs have on overall motivation to engage in physical activity. SDT (Deci, & Ryan, 2000, 2001) is the theoretical guide for this research and suggests that dog ownership may enhance quality of physical activity.

Previous research insinuates that companion dogs fulfill the needs of competence, relatedness and autonomy in everyday life, which are shown to heighten motivation quality (Triebenbacher, 2000).

Effect of Dog Ownership on Need Fulfillment and Motivation

There are no known studies regarding whether dog owners have better quality physical activity motivation. Those who have enhanced quality motivation to be active and have a positive outlook on physical activity are more likely to adopt a healthy lifestyle (Buckworth, 2007; Deci, & Ryan, 2000, 2001). The social support and relatedness a dog provides the owner may improve physical activity motivation quality. Pet dogs are viewed by owners as a support system or companion (Headey, 1998; Roberts, 1996; Guest, 2006) thus meeting the need for relatedness. The needs fulfillment provided by a pet dog in everyday life may translate to enhanced motivation to participate in physical activity.

Dogs like people require exercise. In most cases the owner must walk the dog for the dog to get the necessary amount of exercise. The owner reaping the psychosocial benefits experienced during activity may experience enhanced self-determination motivation to exercise (Deci, & Ryan, 2000, 2001). In short, pet dogs may potentially turn peoples' negative feelings toward physical activity into positive feelings leading to exercise enjoyment thus increasing physical activity levels.

Effect of Dog Ownership on Well-Being

Companion dogs have a constructive effect on owners' physical health and mental well-being (Katcher, 1981). In recent years, there has been growing interest in the effects companion animals have on the health of their owners. Generally dog owners are psychologically healthier than non-dog owners (Katcher, 1981, 1982; Albert, 1988; Garrity, 1999; Anderson, 1992;

Friedmann, 1980, 1983 Allen, 1991) and have been shown to have reduced stress and anxiety when compared to non-dog owners in both everyday circumstances and also high anxiety situations (Katcher, 1981, 1982, Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). Those who are psychologically healthy are more likely to have higher self-esteem and self-efficacy (Katcher, 1981, 1982, Albert, 1988; Garrity, 1989).

In the case of dog owners, improved well-being, self-esteem and self-efficacy may be due to the feelings of competence, autonomy and relatedness provided by a companion dog. Few studies have shown that the mental and physical health of elderly individuals may not benefit from pet dogs and may even deteriorate due to the responsibility of a pet (Parslow, Jorm, Christensen, Rodgers, & Jacomb, 2005) displaying that age may moderate the relationship between the health of the person and pet ownership (Cline, 2010). It can also be argued that those who are healthier to begin with may be more likely to buy a pet than those who are not as healthy. Alternatively owning pets could be related causally to health and well-being benefits (Headey, 1995). Nevertheless companionship, competence, autonomy and improved health give individuals a more positive attitude and outlook universally (Deci, 1985; Albert, 1988; Garrity, 1989).

Problem Statement

Motivation is helpful to understanding why people are inactive and what will motivate them to become more active. A companion dog may enrich quality of motivation thus increasing physical activity levels of dog owners. Health and wellness professionals have been educating the public on the importance of physical activity for many years. However motivation rather than education is what needs to be targeted in interventions in order to increase the activity levels of the public. Many factors motivate people to become active. Researchers have investigated

multiple components which enhance motivation and have been able to explain some variance (Buckworth, Lee, Regan, Schneider, & DiClemente, 2007), yet it is impossible to conclusively answer the question as to what motivates people to be active.

Dog ownership may explain some variance in the physical activity motivation. Research shows that dog owners have higher levels of activity when compared to non-owners (Oka, 2009; Ham, 2006; Cutt, Wood, 2008; Cutt, Knuiman, 2008; Yabroff, 2008) but it has not been determined what about dog ownership causes this increase in activity. Whether the increase in activity is due to obligation to walk the dog or the enjoyment of being active with the dog is undetermined.

Those who have met their needs for competence, autonomy, and relatedness, and have higher quality motivation are more likely to participate in activity (Frederick-Recascino, 2002; Dacey, 2008). The theoretical framework that guides this study can be used to suggest that there are factors that may moderate the relationship between dog ownership, amount of physical activity obtained and enjoyment of physical activity. Based on previous research, the variables that are examined in this study are levels of physical activity, levels of physical activity completed with a companion dog, feelings of competence, autonomy and relatedness, and quality of self-determination motivation to engage in activity. Dogs may enhance enjoyment of activity and thus improve motivation to be physically active. Likewise pet dogs are contributors to an increase in physical activity levels, and are also shown to improve physical and psychological health therefore it is important to compare dog owners' quality of motivation compared to non-dog owners' quality of motivation to engage in physical activity.

Purpose

The purpose of this study is to:

- a) Compare the physical activity levels of dog owners and non-dog owners
- b) Compare the psychosocial needs competence, autonomy, and relatedness of dog owners to non-dog owners experienced during physical activity and exercise
- c) Examine the correlations between dog ownership and self-determined motivation to engage in physical activity of dog owners to non-dog owners based on the hypothesized increased competence, autonomy, relatedness reaped from dog ownership.
- d) Test the roles of age, gender, and marital status on the relationship between dog ownership and quality of self-determination motivation to be physically active.

For the purpose of this study, dog ownership is defined as owning at least one companion dog at home for one year or more.

Research Hypotheses

- a) Dog owners will have higher levels of physical activity than non-dog owners.
- b) Dog owners will have enhanced feelings of competence, autonomy, and relatedness than non-dog owners.
- c) Dog owners will have higher quality self-determined motivation to engage in physical activity than non-dog owners.
 - 1) Dog owners will have higher self-determined motivation: intrinsic motivation, integrated regulation motivation and identified regulation motivation due to dog ownership.
 - 2) Non-dog owners will have lower self-determined motivation: amotivation, external regulation, introjected regulation.

- d) Gender, marital status, and age will moderate the relationship between dog ownership and self-determined motivation of dog owners to be physically active.

Null Hypotheses

- a) There will be no difference in physical activity levels of dog owners and non-dog owners
- b) There will be no difference in competence, autonomy, and relatedness experienced by dog owners and non-dog owners.
- c) There will be no difference between the quality of self-determined motivation to engage in physical activity of dog owners and non-dog owners.
- d) Gender, marital status, and age will make no difference in the relationship between dog ownership and self-determined motivation of dog owners to be physically active.

Limitations

There are limitations to this study. Firstly, it is a cross sectional study and therefore impossible to ascertain the causal ordering of the relationships among the variables. Dog ownership may lead to the owners' viewing physical activity in a more positive manner, but the reverse may also stand. People may buy a companion dog as motivation to be more physically active. On the other hand, healthy individuals who are active and enjoy physical activity may seek out a pet dog as a walking buddy. Untrained dogs may be unruly and therefore negatively affect the owner's experiences related to walking and physical activity. Alternatively a trained dog that is well-behaved and commendable on a leash makes exercise much more enjoyable and relaxing.

Definitions of Terms

Dog Ownership operational definition: currently owning a dog for one year or more

Amotivation: complete lack of motivation without intent to engage in a behavior (Deci & Ryan, 2000, 2001).

Extrinsic motivation: engaging in a behavior due to factors other than enjoyment. There are four types of extrinsic motivation consisting of external regulation motivation, introjected regulation motivation, identified regulation motivation and integrated regulation motivation (Deci & Ryan, 2000, 2001).

External regulation motivation: engaging in a behavior due to motives such as gaining a reward or avoiding punishment (Deci & Ryan, 2000, 2001).

Introjected regulation motivation: engaging in a behavior due to an internal-sense of obligation (Deci & Ryan, 2000, 2001).

Identified regulation motivation: engaging in a behavior to achieve personal goals to reap certain benefits (i.e. health benefits due to physical activity) (Deci & Ryan, 2000, 2001).

Integrated regulation motivation: engaging in a behavior to confirm a sense of self (Deci & Ryan, 2000, 2001).

Intrinsic Motivation: drives the individual to engage in a task, challenge, or behavior due to pure enjoyment of the behavior (Deci & Ryan, 2000, 2001).

CHAPTER II. REVIEW OF LITERATURE

Overview

Enhancing motivation is crucial in increasing physical activity levels of people (Ryan & Deci, 2000, 2001). Research shows that dog owners have higher levels of activity than non-owners. The following literature will examine the physical and psychological health benefits of dog ownership in attempt to examine why dog ownership potentially influences physical activity levels of dog owners. Pet dogs may enhance motivation of owners to engage in physical activity due to enhanced feelings of competence, autonomy, and relatedness. For instance, companion animals have the potential to buffer peoples' stress, reduce heart rate and blood pressure, and also act as considerable social support. There have only been suggestions as to why dog owners are more active and have better overall health. It is undetermined whether the increase in physical activity of dog owners is due to an increase in enjoyment of physical activity or an increase in obligation to be more physically active.

Research shows that physical activity prevents and manages many chronic diseases (Manson, 2004). ACSM recommends engaging in moderate intensity aerobic activity for a minimum of 30 minutes five days per week or vigorous aerobic activity for a minimum of 20 minutes three days per week (ACSM, 2010). At least 60% of the global population fails to achieve these recommendations (AHA, 2009). Leading a sedentary lifestyle has been linked to increased risk of many chronic diseases (WHO, 2010) and is estimated to cause 2 million deaths worldwide annually (WHO, 2010). Globally, it is estimated to cause about 10-16% of cases each of breast cancer, colon cancers, and diabetes, and about 22% of ischemic heart disease (WHO, 2010; Joyner, 2009). Increased levels of physical activity helps reduce and prevent these issues.

Improved motivation can prompt individuals to engage in higher levels of physical activity (Ryan & Deci, 2000; 2002).

Dogs as pets can potentially increase activity levels (Ham, 2006; Cutt & Wood, 2008; Cutt & Knuiman, 2008) and improve physical and mental health of owners (Yabroff, 2008; Katcher, 1981, 1982; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 2002) due to the potentially experienced competence, autonomy and relatedness provided by a companion. Pet dogs promote people to engage in physical activity (Cutt & Wood, 2008) and also have a positive effect on mental well-being (Katcher, 1981; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 2002). Therefore pet dogs may give owners a more positive perception of exercise, increase exercise efficacy, and increase enjoyment and motivation of physical activity.

Forty percent of U.S. households own a dog (Cutt & Wood, 2008) which can potentially affect physical activity levels of the population. This review will detail physical activity levels and adherence of dog owners compared to non-owners. Completing physical activity or walking with a companion dog may increase competence and autonomy and feelings of relatedness. These factors are essential to enhancing self-determination motivation to partake in a behavior, in this case physical activity (Ryan & Deci, 1985). Studied health benefits, both physical and psychological, of dog ownership along with opposing studies will also be discussed. In succession people who have a support system, are physically and mentally healthy, and are confident in their abilities are more likely to enjoy physical activity (Ryan & Deci, 1985). Based on the psychological need fulfillment and the motivation continuum of the SDT, the following literature suggests that dog owners experience fulfillment of competence, autonomy

and relatedness due to a companion dog, may have a more positive perception of physical activity and higher levels of motivation due to dog ownership.

Basic Need Satisfaction and Behavioral Regulation Continuum

According to the SDT, individuals possess three key psychosocial needs and seek tasks that satisfy one or more of these needs (Ryan & Deci, 1985). The first need, autonomy, is the need to feel in control (independent) of a situation or need for self-determination (Ryan & Deci, 1985). Current research suggests that higher levels of autonomy are correlated with higher levels of motivation; identified and intrinsic motivation. For instance, Gagne et al (2003) examined the effects of 33 female gymnasts' perceptions of support from coaches and parents on their need satisfaction and motivation. The study showed that perceived parent autonomy support was positively related to identified and intrinsic motivation to participate in gymnastics (Gagne, Ryan, Bargmann, 2003). In other words, the gymnasts who felt they took part in decision making when it came to their athletics, had higher quality motivation than those who perceived less autonomy from parents. Competence is the need to feel knowledgeable or capable of completing a task or challenge and being effective or beneficial within one's environment (Ryan & Deci, 2000, 2001). The final need, relatedness, is the need of belonging and to experience social interactions (Ryan & Deci, 2000, 2001).

Activity contexts that fulfill these three needs improve motivation. There are three types of motivation within the SDT which determine physical activity behavior (Ryan & Deci, 2000, 2001). Intrinsic motivation and amotivation are on opposing ends of the self-determination continuum (see appendix A). Intrinsic motivation drives the individual to engage in a task, challenge, or behavior due to pure enjoyment of the activity (Ryan & Deci, 2000, 2001). Contrastingly amotivation is the complete lack of motivation without intent to engage in a

behavior (Ryan & Deci, 2000, 2001). For instance, those who are amotivated to be active do not intend to exercise and see no reason to engage in physical activity whatsoever. Extrinsic motivation lies in-between intrinsic and amotivation and consists of factors other than pure enjoyment that drive individuals (Ryan & Deci, 2000, 2001).

There are four types of extrinsic motivation. External regulation is motivation to engage in a behavior due to motives that include gaining rewards or avoiding punishments (Ryan & Deci, 2000, 2001). For instance, exercising because one will receive a discount on health insurance is an external regulation motive. Introjected regulation motivation is engaging in a behavior due to an internal sense of obligation (Ryan & Deci, 2000, 2001). A basketball player who plays on the basketball team because he does not want to let his parents down is due to introjected regulation motivation. Identified regulation motivation is engaging in a behavior to achieve personal goals or obtain benefits such as weight maintenance or lower blood pressure through exercise (Ryan & Deci, 2000, 2001). Integrated regulation motivation includes confirming a sense of self (Ryan & Deci, 2000, 2001). For instance being physically active because it is how one perceives his or her self is integrated regulation motivation.

Quality of motivation follows the self-determination continuum (Ryan & Deci, 2000, 2001). One who is more intrinsically motivated has higher self-determination compared to an individual who is more externally motivated (Ryan & Deci, 2000, 2001). Contrastingly one who is more amotivated has the lowest level of self-determination (Ryan & Deci, 2000, 2001). As motivation increases (towards intrinsic motivation) along the continuum, self-determination also increases (Ryan & Deci, 2000, 2001). Based on the SDT, we can assume that individuals are more likely to engage in physical activity and adhere to an exercise program if he or she has high self-determination (Ryan & Deci, 2000, 2001). Fulfilling the three psychological needs,

competence, autonomy and relatedness, leads to higher quality motivation and self-determined motivation.

Facilitating Need Satisfaction in the Exercise Domain

SDT research has been conducted in political domains, educational fields, physical education areas and health and fitness. Examining the motivational elements of exercise behavior has increasingly become a pertinent topic. Current research has shown that SDT is effective in facilitating behavior change and improving motivation within the physical activity and fitness field.

Edmunds and Ntoumanis (2006) investigated the indirect effects of need satisfaction on exercise behavior, with motivational regulations being tested as potential mediators through cross-sectional survey. They also examined whether an autonomy-supportive setting provided by a group fitness leader corresponded to greater intrinsic motivation and identified regulation through the support provided for the three basic psychological needs (Edmunds & Ntoumanis, 2006). Participants included 369 male and females ranging in age from 16 to 64 years. They were recruited from settings such as sports clubs, public leisure centers, private fitness clubs, shops and supermarkets in the West Midlands, United Kingdom (Edmunds & Ntoumanis, 2006).

All participants were given the survey which assessed psychological need satisfaction through exercise, motivational regulations, and exercise behaviors. The participants who reported taking part regularly in group fitness and exercise classes completed an additional section of the survey inquiring about perceived autonomy support (PAS) provided by the instructor in the class in which they participated most often (Edmunds & Ntoumanis, 2006). All participants reported engaging in some forms of mild exercise. They reported autonomy being the most highly satisfied need ($M=5.25$, $SD=.82$), followed by relatedness ($M=5.16$, $SD=1.03$)

and competence ($M=5.07$, $SD=.90$). Intrinsic motivation ($M=3.65$, $SD=1.00$) was the most highly recognized reason for exercise followed by identified regulation ($M=3.61$, $SD=.82$) (Edmunds & Ntoumanis, 2006).

The regression procedures of Baron & Kenny (1986) were used to examine mediation effects of the three needs on motivational regulation and exercise behavior (Edmunds & Ntoumanis, 2006). Edmunds (2006) et al found that PAS predicted intrinsic motivation ($B=.23$, $p<.05$). Likewise PAS significantly predicted autonomy ($B=.28$, $p=.01$), relatedness ($B=.46$, $p=.00$), and competence ($B=.28$, $p=.01$) need satisfaction through exercise and therefore established mediation (Edmunds & Ntoumanis, 2006). PAS and competence experienced due to exercise were shown to be significant forecasters of intrinsic motivation (Edmunds & Ntoumanis, 2006). Therefore, designing an autonomous exercise environment effectively improves motivation to be active.

To further their research, Edmunds and Ntoumanis (2008) tested their previous findings (2006) in actuality by examining the effect of an autonomy supportive group exercise class on class participants' psychological need satisfaction, motivation regulations and exercise behavior. Participants were female university students and staff who signed up for one of the two exercise classes in the university recreation center. One class was randomly designated the SDT group (SDT based teaching style), while the other class was the control class. The SDT class consisted of 25 women ranging in age from 18 to 54 years old while the control class consisted of 31 women ages 18-38 years (Edmunds & Ntoumanis, 2008).

The two classes were both intermediate Cardio Combo classes. The SDT class was held on Monday evening while the control class was held on Wednesday evening (Edmunds & Ntoumanis, 2008). The intervention was 10 weeks long. Both classes were conducted by the

same instructor; a 28 year old female, certified by the Canadian Association of Fitness Professionals with 11 years of experience (Edmunds & Ntoumanis, 2008). This allowed for control of individual differences in treatment styles of the participants.

Week one of classes served as a “test” class in which participants were able to decide whether or not they wanted to sign up for the full 10 weeks. Therefore the SDT week one class was not manipulated (Edmunds & Ntoumanis, 2008). After participants were made aware that they were in a study, they made their decision to sign up for the full duration of the class (Edmunds, 2008). Neither class was told they were to be compared to another class nor was the SDT group informed of the teaching manipulation (Edmunds & Ntoumanis, 2008). Two trained independent observers, blind to the experimental conditions, rated the level of autonomy support, structure and interpersonal involvement provided by the instructor (Edmunds & Ntoumanis, 2008). They also rated the active engagement demonstrated by participants in each condition (behavioral intensity and emotional quality of participants’ involvement) (Edmunds, 2008).

From week two to the end of the study the exercise instructor manipulated her teaching behavior to fit the regulatory style selected for each group. In the SDT class, the instructor focused on promoting autonomy support by taking the perspective of the participants into account, acknowledging their feelings, providing them with pertinent information and opportunities to choose which exercises they wanted to perform in class (Edmunds & Ntoumanis, 2008). The exercises chosen by the SDT group were also completed in the control group reducing the chance that class differences in outcome variables could be credited to differences in workload (Edmunds & Ntoumanis, 2008). The control group was intended to replicate the style of teaching regularly observed in the group fitness setting (Edmunds & Ntoumanis, 2008). Both classes received comparable physical workouts. Autonomy supportive

environment and interpersonal involvement were not intentionally promoted in the control class yet no attempts were made to undermine participants' experiences. (Edmunds & Ntoumanis, 2008).

Participants rated measures of PAS, structure and interpersonal involvement provided by the instructor, psychological need satisfaction, motivational regulations, behavioral intention and positive and negative affect during weeks one, five, six, nine and ten. Likewise, the same trained observers rated the autonomy support, structure and interpersonal involvement provided by the exercise instructor and the amount of active engagement displayed by the participants in weeks one, four and eight.

Results showed that the SDT class, the autonomous supportive style, significantly improved the psychological needs and motivation of participants. Compared to the participants in the control class, participants in the SDT showed a significantly greater increase in relatedness ($B=.50$, $P<.05$) and competence ($B=.66$, $p<.01$) (Edmunds & Ntoumanis, 2008). Also, participants in the SDT class demonstrated a greater increase in positive affect ($B=.25$, $p<.01$) while the control group showed lower levels of positive affect derived from exercise ($B= -.34$, $p<.05$) (Edmunds & Ntoumanis, 2008). Results also showed that the effects of autonomy on motivation varied over time but had a significantly positive effect later in the study. Autonomy was a significant positive predictor ($B=1.35$, $p<.001$) of integrated regulation from week six to ten (Edmunds & Ntoumanis, 2008).

The manipulated environment was not effective on changes in behavior regulation for exercise but was effective in changing need satisfaction, motivational regulation for exercise and affective exercise outcomes. Autonomy support and autonomy need satisfaction became more positive over time in the prediction of the three most self-determined forms of motivation:

intrinsic, integrated and identified. This shows that the psychological needs play an important role in enhancing quality of motivation.

Levy & Cardinal (2004) evaluated a mail-mediated intervention based on SDT to determine the impact on adults' exercise behavior. A randomized control trial over a two month period was conducted on randomly assigned participants who were either in the experimental group or the control group. Dependent variables included on the questionnaire were perceived autonomy, competence, relatedness, exercise behavior regulation and exercise behavior. The participant included 59 males and 126 females ranging in age from 22 to 79 years (Levy & Cardinal, 2004). Participants who reported exercising fewer than three times a week on a regular basis but with intention to begin an exercise regime were eligible to take part in the study (Levy & Cardinal, 2004).

Participants were randomly assigned to either an intervention-only, intervention-plus-booster, or control group (Levy & Cardinal, 2004). After returning the initial questionnaire, participants in the intervention groups were mailed the intervention packet, while those in the control group were mailed a similarly formatted packet containing American Heart Association (AHA) physical activity and health facts (Levy & Cardinal, 2004). At month one the participants filled out and returned the second set of questionnaires after which the intervention-plus-booster group was mailed the booster postcard. All participants completed all measures again after two months.

The intervention consisted of a four-page printed packet that had been assessed for content validity and acceptability by gathering input from three experts in the area of SDT, two fitness professionals, and 24 individuals enrolled in a fitness walking class (Levy & Cardinal, 2004). The packet consisted of behavioral and cognitive strategies promoting a sense of

autonomy, completeness and relatedness regarding exercise behavior (Levy & Cardinal, 2004). For instance, the packet included strategies for goal setting, encouraged participants to make choices about exercises and activity and encouraged them to find a support system. The booster postcard merely consisted of five short messages highlighting the main points in the intervention packet and was designed to highly emphasize strategies presented in the packet (Levy & Cardinal, 2004). The postcard was in brief form. For example, the postcard included the statements, “Each day you can take charge and choose how to add physical activity to your usual routine.”

Data were analyzed by a three (group) X three (time) repeated measures analysis of variance and in order to examine the role of the theoretically proposed mediators of change, a three (group) X three (time) repeated measures multivariate analysis of variance was conducted for perceived autonomy, competence, and relatedness (Levy & Cardinal, 2004). Separate three (group) X three (time) repeated measures multivariate analysis of variance were conducted for men and women for perceptions of each need (Levy & Cardinal, 2004). Women increased exercise over the course of the intervention due to increases in perceptions of autonomy ($p < .01$) (Levy & Cardinal, 2004). However no significant interactions were found for either men or women for the different motivation continuum levels of behavioral regulation or for perceptions of competence or relatedness (Levy & Cardinal, 2004).

The mailing intervention was only two months long and therefore may not have been long enough to result in significant changes in the participants’ perceptions of autonomy, competence, relatedness or motivation of behavioral regulation for exercise. With exception of the increase in perceived autonomy of women participants, the intervention was not effective. The autonomy supportive mail letter was conducive to autonomy need satisfaction of women,

which follows the SDT. However, longer mailing interventions or face to face interventions may be more effective in the exercise setting.

Exercising or participating in sports with friends has been shown to satisfy need fulfillment and improve motivation according to the proposals of SDT. Wilson et al (2004) found that among female students and staff enrolled in a team-based intramural physical activity event, perceived autonomy support from friends was associated positively with intrinsic motivation and identified regulation. Participants included 232 females involved in a team-based intramural event sponsored by a large university completed a survey in small groups not exceeding 15 people (Wilson, 2004). Participants ranged in age from 17 to 31, reported healthy body mass index (BMI) values, and were regular exercisers according to ACSM guidelines (Wilson, 2004).

The survey examined the PAS that reinforce different regulations that predict behavior intentions in the context of exercise. Participants were approached about the study prior to participation in the intramural event. Pearson correlations were computed to examine the bivariate relationships between study variables (Wilson, Rogers, Rodgers, & Wild, 2004). And structural equation modeling (SEM) analysis, using AMOS program, was used to examine the multivariate relationships between perceived autonomy support from friends, exercise regulations, and behavioral intentions to exercise (Wilson et al, 2004). Bivariate correlations indicated that perceived autonomy support from friends was highly associated with identified and intrinsic regulations (Wilson et al, 2004). Also, autonomous (identified and intrinsic) exercise regulations were more strongly correlated with greater intentions to exercise (Wilson, 2004).

Wilson et al (2004) showed that social support from friends in the exercise environment creates an autonomous atmosphere enhancing PAS which positively affects behavioral intentions towards exercise. Once again, research shows that the propositions of the SDT regarding need fulfillment contribute to motivation and intention to exercise and are facilitated by social factors such as friends.

Need Satisfaction and Motivation Facilitated by Dog Ownership

Although the effect pet dogs have on the three needs of their owners has not been examined, research leads to the hypothesis that dogs may support the three needs: autonomy, competence and relatedness. Firstly, in most situations, a person with a pet dog experiences autonomy due to the fact that the owner is the “leader of the pack,” is responsible for the dog and is in charge of the pet. These responsibilities that come with dog ownership provide educational benefits such as learning how to care for another (Triebenbacher, 2000). Contradictory, a pet may cause role strain and diminish autonomy due to restricting the lifestyle of the owner. The moderating variables marital status, gender and age may affect the psychosocial benefits dog ownership. Thus owning a dog can cause either role strain or role enhancement depending on these variables (Cline, 2010).

Being a leader or being in charge of a situation such as owning a pet may increase competence. The owner is beneficial to the dog, knowledgeable and capable of completing tasks such as feeding the dog, walking the dog, or taking the dog out. Multiple studies have shown that owners believe the main advantages of pet ownership are friendship and companionship experienced along with a sense of belonging (Horn, 1984; Endenburg, 1994; Zasloff; 1995) satisfying the need for relatedness and also providing social support. Pet ownership may also improve other psychological needs during physical activity. For instance, a pet dog may reduce

negative feelings toward exercise due to their ability to reduce stress and anxiety in certain situations (Katcher, 1981, 1982, Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). Allen et al (1991) found that pet dogs act as stress buffers for women dog owners during stressful situations if their dogs are present. So dogs can potentially reduce feelings of stress of their owners while on dog walks or during other physical activity completed with pet dogs. Similarly, walking with a dog is a form of social support during physical activity. A pet dog fulfills the psychosocial needs in everyday life which may carry over to physical activity and exercise. A companion dog to walk with may meet the three needs of the self-determination theory during physical activity completed with the pet dog. Firstly a dog owner experiences autonomy through being in control during the walk, when they will walk, where they will walk and pace. Taking a dog for a walk possibly increases competence as the owner leads the dog on the walk and is the one taking care of the dog's needs. Equally, the owner has a walking buddy and is not alone while being active. Consequently the owner becomes competent and more knowledgeable of a walking program and physical activity through dog walking. Experience is essential to gaining competence (Ryan & Deci, 2000, 2001). Being extrinsically motivated and obligated to walk the dog allows the owner to have mastery experiences during walks as the walks become more frequent. The need of relatedness is met through socializing and bonding with the pet dog during the walk. The owner feels needed, loved and a sense of belonging. Walking with a companion dog meets the three needs of the SDT and may increase motivation to be active therefore increasing exercise adherence.

Dog Ownership and Physical Activity: Epidemiological Data

A positive relationship between physical activity and dog ownership has been consistently documented (Oka, 2009; Ham, 2006; Cutt, Wood, 2008; Cutt, Knuiiman, 2008;

Yabroff, 2008). However, not all dog owners walk their dog. Swelling levels of obesity along with declining activity levels and higher levels of dog ownership in modern society, highlight the necessary examination of the potential dog ownership has to increase activity levels of dog-owners. It is still unclear as to what factor or factors about dog ownership cause increases in physical activity.

Dogs, like people, require exercise. Many pet dogs are walked by their owners for exercise due to limitations such as place of residence (Cutt & Wood, 2008). Many people live in apartments or areas where they are not able to let their dog out to roam. Thus the dog must be taken on a walk by the owner resulting in more physical activity completed by the person.

Japanese adults, both men and women dog owners and non-dog owners, responded to an internet-based cross-sectional survey regarding their average physical activity completed (Oka & Shibata, 2009). They were split up into groups consisting of “dog owner”, “non-dog pet owner”, and “non-pet owner” (Oka & Shibata, 2009). Participants gave self-reported moderate-vigorous physical activity, walking behavior and sedentary behavior by completing the International Physical Activity Questionnaire (Oka & Shibata, 2009). Overall, 33% (n=1723) of the participants were pet owners, 18% (n=930) were dog owners, and 15.3% (n=793) were non-dog owners (Oka & Shibata, 2009). Results showed that dog owners had a significantly greater amount of moderate and vigorous physical activity than non-dog owners and non-pet owners ($p<.001$) and additionally, dog owners had a significantly greater amount of walking ($p=.008$) and a significantly less amount of sedentary behavior time ($p=.003$) (Oka & Shibata, 2009). Although not all dog owners may reach the physical recommendations for health, Oka et al (2009) reported that dog owners were 1.5 times more likely than non-dog owners and non-pet owners to achieve the recommended levels of physical activity for health ($p<.05$).

A United States study found that 60% of female dog owners and 53% of male dog owners had walked their dog in the last week (Suminski, Poston, Petosa, Stevens, & Katzenmoyer, 2005). An Australian cross-sectional study reported that dog owners walked an additional 18 minutes more per week than non-owners (Bauman, Russell, Furber, Dobson, 2001). Although only 23% of dog owners walked their dogs five or more times per week, the adjusted odds of achieving the recommended amounts of physical activity in general (with or without their dog) were 57% to 77% higher among dog owners compared with non-owners (Cutt & Knuiiman, 2008). Nearly 40% of households own a dog in the US, therefore the contribution of regular dog walking to overall physical activity levels may have a positive effect on the proportion of the total population who are adequately active to achieve health benefits (Cutt & Wood, 2008). As stated earlier, it is recommended individuals engage in 30 or more minutes of aerobic activity at least five days per week or 20 or more minutes at least three days per week (ACSM, 2010).

Not all dog owners meet the recommended amounts of exercise to receive health benefits (Oka & Shibata, 2009). According to a study conducted in Japan (Oka & Shibata, 2009), 32.9% of Japanese dog owners met the recommended criteria for physical activity while only 25.0% of non-pet owners and 26.4% of non-dog owners met the recommended amount of physical activity. The percentage of dog owners meeting the recommended level of activity represented roughly a 50% higher likelihood than that among other pet and non-pet owners to meet recommendations (Oka & Shibata, 2009). This may be an indication as to whether owners are more extrinsically or intrinsically motivated to partake in activity. Although owners have higher levels of activity than non-owners, most are still not meeting recommendations. Based on this, it is unclear whether owners are simply walking out of obligation or if they enjoy walking the dog

for activity. On the other hand Schofield et al (2005) observed that dog owners reported no relationship between dog ownership and weekly walking time for leisure, leading to the assumption that dog owners walked without their dogs for recreation. Similarly, Bauman (2001) reported that 58% of dog owners did not walk their dog at all. There are many other factors that may suppress owners from walking their dog such as the breed of dog, size of the dog, age of the dog or health of the dog. Nevertheless, dog owners do have more encouragement to walk than non-owners due to their furry social support and the belief and reality that dogs also require exercise (Cutt & Knuiman, 2008; Oka & Shibata, 2009).

Physical Health Benefits of Dog Ownership

Pet ownership and its effects on physical health are controversial. Most studies report pet owners having lower blood pressure, lower heart rate and lower total blood cholesterol levels compared to non-owners (Katcher, 1981, 1982; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1998, 1980; Allen, 1988, 2002). Longitudinal surveys conducted in Germany and Australia show that people who continuously own a pet are the healthiest group and people who cease to have a pet or never had one are less healthy (Headey, 1995).

The German Socio-economic Panel (SOEP) was conducted by the German Institute for Economic Research in Berlin (Headey & Grabka, 2006). The survey began in 1984 in Germany and initially included over 12,000 participants ages 16 and older (Headey & Grabka, 2006). In the years 1995, 1998 and 2000 new samples were drawn which approximately doubled the initial sample size. Headey et al (2006) analyzed 9,723 German respondents regarding health and pet ownership in both 1996 and 2001. The International Social Science Survey Australia (ISSS-A) survey is conducted annually by the Australian National University and the Melbourne Institute

(Headey & Grabka, 2006). A national sample of 1,246 Australians was drawn for the health and pet ownership survey conducted by Headey et al (2006) in 2001.

The survey was conducted by mail in both Germany and Australia and asked participants about their health and pet ownership. Participants were asked to self-report health, average doctor visits per year and pet ownership. German participants were asked whether they owned a pet, and if so, whether they owned a dog, cat, bird, fish, horse or “other” type of pet while Australian participants were asked only if they owned a dog, cat or “other” type of pet (Headey, 2005). Results from both surveys concluded a significant Pearson correlation ($p < .05$) between ownership of all types of pets and measures of self-reported health and annual doctor visits (Headey, 2005).

Headey et al (2006) then divided the participants into four groups: “pet always” (owned a pet now and five years ago), “pet now” (owned a pet now but not five years ago), “pet five years ago” (owned a pet five years ago but not now), and “pet never” (did not own a pet now nor five years ago). Regression analyses compared the three groups to the “pet never” group as a baseline group (Headey, 2005).

In 1996 37.7% of Germans were pet owners and by 2001 this had fallen slightly to 36.3% (Headey & Grabka, 2006). Over a thousand people had newly acquired a pet during the five years (11.4% of the sample) and even more no longer had one (12.8%). In 1996 people who owned a pet averaged 11.1 visits a year to the doctor and non-owners averaged 12.0 visits (Headey & Grabka, 2006). Everyone had aged 5 years by 2001; however pet owners made 11.0 times a year on average, whereas non-owners averaged 12.9 visits (Headey & Grabka, 2006).

In Australia 64.3% of respondents owned pets in 2001, down from 71.6% in 1996; 25.2% of those owning dogs. On average pet owners had been to the doctor 4.9 times in the last year

while non-owners averaged 5.6 visits. The Pearson correlation between pet ownership and self-reported health in Germany was 0.06 in 2001, and between pet ownership and annual doctor visits it was -0.05 while in Australia the correlation between pet ownership and health was 0.04 and between ownership and doctor visits was -0.10 ($p < .05$) (Headey & Grabka, 2006). Headey et al (2006) used negative binomial regressions to assess the relationships between health and pet ownership and average doctor visits and pet ownership to determine that pet owners average significantly fewer doctor visits than non-pet owners even if they had the same standard of health in 1996. More specifically, people who always had a pet (in 1996 as well as 2001) made significantly few doctor visits ($p < .01$) than people who ceased to have a pet or had never had a pet (Headey & Grabka, 2006). Because pet and dog owners make fewer visits to the doctor than non-owners (Headey & Grabka, 2006), we can assume dog owners are physically healthier than non-pet owners.

Cross sectional studies are open to objection that healthy people possibly acquired pet dogs, rather than people became healthier as a consequence of dog ownership (Katcher, 1981, 1982; Albert, 1988; Garrity, 1989). In either case, the increased levels of physical activity associated with owning a dog allow owners to reap health benefits.

Nonetheless Parslow et al (2003, 2005) found no relationship between pet ownership and reductions in heart disease, especially among the elderly. Pet owners between the age of 60 and 64 years conveyed poorer physical health than people of the same age who did not own a pet (Parslow, Jorm, Christensen, Rodgers, & Jacomb, 2005). However, pets may be more of a burden for the elderly rather than a companion resulting in poorer health of older adults. Some older individuals may not want to take on extra responsibility such as a pet dog. Unnecessary responsibility may decline the physical health of the mature. Likewise a pet may be a

psychological burden to older adults. Conversely, Roberts et al (1996) found that elderly people with pets have fewer symptoms of depression than those without pets. It is critical to consider the great range of current health status and lifestyles among the elderly which can notably explain how a pet will affect the individual. However, a majority of researchers have shown that companion animals improve the well-being of most pet owners despite age.

Psychological Health Benefits of Dog Ownership

Pet owners are shown to have superior psychological well-being compared to non-pet owners (Katcher, 1981; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). Studies suggest that they will have lower levels of mental stress, fewer feelings of loneliness and depression and have higher self-esteem (Katcher, 1981, 1982; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). This may be contributed to the satisfied feelings of competence, autonomy and relatedness a companion dog gives to the owner.

The organization Hearing Dogs for Deaf People provides assistance dogs that alert their deaf or hard-of-hearing owner to key sounds (Guest, 2010). Fifty one participants who were deaf or hard-of-hearing and who applied for a trained Hearing Dog took part in a longitudinal study to monitor the dogs' working performance over time and to examine the social and psychological effects of having a hearing dog (Guest, Collis, & McNicholas, 2010). Forty of these participants were women while 11 were men ranging in age from 22 to 87 years. The Profile of Mood State (POMS) questionnaire and the General Health Questionnaire (HDQ) were combined with the Hearing Dog Questionnaire (HDQ) specifically designed for this study (Guest et al, 2010). All the participants had a Hearing Dog placed with them for the duration of the study. The dogs were trained for specific sounds such as the alarm clock, doorbell, telephone, oven timer, smoke alarm and fire alarm (Guest et al, 2010).

The POMS assesses participants' levels of tension, depression, aggression, vigor, fatigue, confusion and overall mood disturbance (Guest et al, 2010). The GHQ measures anxiety, depression, social functioning, sleep and includes an overall GHQ score (Guest et al, 2010). The HDQ measures factors pertinent to the deaf and hard-of-hearing regarding difficulty in responding to environmental sounds (Guest et al, 2010).

Data was collected five times in the form of interviews. Interviews were conducted by the lead researcher or a member of the Hearing Dogs for Deaf People staff (Guest et al, 2010). Time one questionnaires were completed by each participant during the formal home interview that assessed the applicant's eligibility to receive a Hearing Dog. Participants completed the POMS, GHQ and HDQ and were informed of the waiting time for their Hearing Dog (Guest et al, 2010). There were 12 months between the first and second interview in which the participants did not yet have a Hearing Dog assigned to them (Guest et al, 2010).

Time two was at the end of the waiting period for the Hearing Dog, which was about 9.5 months after the first interview. Participants attended a five day residential training series at the Training Center when they began working with their assigned Hearing Dog (Guest et al, 2010). Once again participants completed the GHQ and the POMS. Interview three was at the end of the five day training week when participants returned home with their assigned dog. Participants only completed the POMS questionnaire in their own home.

Time four was a week prior to the final assessment of the dog-participant partnership which took place three months after taking the dog home (Guest et al, 2010). The participants filled out the POMS, GHQ and HDQ at their residence.

Time five was the last data collection and took place at a follow-up visit 14 months after bringing the dog home (Guest et al, 2001). The participants completed the POMS, GHQ, and the HDQ at their place of residence.

Guest et al (2010) used paired-sample t tests (two-tailed) to compare the five data collection points. There were no significant changes in health or mood of participants during the 12 month waiting period/before reception of the dog (Guest et al, 2010). There were significant differences ($p < .05$) for the overall scores of the POMS and GHQ between pre-dog placement and after receiving the dog. Levels of health and mood during interview five slightly moved toward initial levels, however they were still significantly improved from times one and two (Guest et al, 2010). Thus tension, depression, aggression, fatigue, confusion, anxiety, social functioning and overall mood disturbance decreased while vigor increased and sleep patterns improved. Once again these improvements were seen from the time when participants began working with their dogs during the week long training session up to the last interview (Guest et al, 2010). It can be stated that the onset of living with the dog was associated with improvements in well-being and psychological health.

The hearing dogs assisted their assigned person thus decreasing the amount of support the person needed from other people. In conjunction, the person did not need to ask for help as often as they did without the dog. This made the deaf or hard-of-hearing client feel much more autonomous and competent and in charge of his or her life or current situation. The dog allowed the person to feel in control, independent and capable of taking care of his or her self.

Pets can buffer reactivity to acute stress as well as diminish perceptions of stress (Allen, Blascovich, Tomaka, & Kelsey, 1991). Pet dogs provide friendship and give owners a feeling of relatedness and a sense of belonging. Those who have companions in their lives are at less risk of

depression and are more capable of dealing with stressful situations (Katcher, 1996). In fact the action of just stroking or petting an animal has continually been shown to decrease blood pressure and heart rate both of which are indirectly associated with mental well-being (Katcher, 1981; Friedmann, 1983). Likewise the presence of a companion animal reduces heart rate and blood pressure relative to the presence of a friend or spouse (Allen, 2002; Allen, 1991).

Allen et al (2002) examined the effects of the presence of friends, spouses, and pets on cardiovascular reactivity to psychological and physical stress. Participants included 240 married couples, half of whom owned a pet. All participants were healthy, had normal blood pressure and none took cardiovascular medications (Allen, Blascovich, & Mendes, 2002). The participant completed mental arithmetic exercises and cold compressor tasks in four randomly assigned social support conditions (Allen et al, 2002). These conditions consisted of alone, with pet or friend, with spouse, with spouse and pet/friend. Each non-pet owning participant identified a same-gender close friend to participate.

The study took place in the participants' home to promote a neutral setting for the participants. Physiological measures including heart rate and blood pressure were recorded once each minute throughout the procedure. Number of attempts and errors during the math task were recorded as behavioral measures (Allen et al, 2002). The participant sat quietly and rested 10 minutes for baseline heart rate and blood pressure recording and then listened to instructions about performing an upcoming task including 5 minutes of rapid subtraction and a two minute immersion of a cold compressor task: hand in ice water (Allen et al, 2002). After each task, there was a 15 minute rest period. Physiological data were collected instantly once per minute throughout the rest and task periods as well. Any potential source of social support was in the room from the beginning of the procedure (Allen et al, 2002). Social support included pets,

spouses or friends. The half of the participants without pets had friends in substitution of pets. Participants also completed tasks alone (Allen et al, 2002). The researcher was out of site during all conditions. During the in-the-presence-of-others” tasks, the pet(s) was allowed to roam around the room of the home freely and friends were sitting comfortably and naturally (Allen et al, 2002).

Pet owners showed significantly lower ($p < .001$) resting heart rate and blood pressure than non-pet owners during the math procedures (Allen et al, 2002). Among pet owners, the presence of the pet and spouse resulted in significantly more cardiovascular reactivity during the math tasks than with just the pet present but significantly less ($p < .001$) reactivity than with just the spouse present (Allen et al, 2002). Thus pet ownership by presence-of-others interaction was primarily driven by the presence of a pet for pet owners, which resulted in significantly lower reactivity than any other condition.

Results were similar during the cold compressor task for pet owners. Pet owners showed significantly lower ($p < .001$) blood pressure during the cold compressor task than non-pet owners (Allen et al, 2002). Pet owners displayed the greatest increases in reactivity during the cold compressor task when alone however the presence of a pet or a pet plus spouse resulted in significantly lower ($p < .001$) cardiovascular reactivity than did the presence of just the spouse.

Post hoc analysis revealed that among pet owners, the slowest blood pressure recovery after the tasks was in the presence of spouses, which was significantly slower than the other three conditions. Heart rate recovery was significantly quicker in the pet and pet plus spouse condition compared with alone or just spouse condition (Allen et al, 2002). Therefore, among pet owners, the presence of their pet following mental math resulted in quicker recovery compared with the presence of spouses or alone (Allen et al, 2002). Among non-pet owners, the synonymous friend-

presence condition did not result in significantly quicker recovery after the task (Allen et al, 2002).

Studies have shown that animals can reduce levels of anxiety and help owners better deal with stressful life events such as divorce or death of a loved one (Folse, 1994; Garrity, 1989). Also companion animals enhance feelings of responsibility and sense of purpose (Beck 1984, Katcher, 1981; Albert, 1988; Garrity, 1989) which may implement feelings of autonomy and competence. Decreased stress levels, increased competence and autonomy improve self-confidence and reduce depression (Folse, 1994; Cline, 2010; Guest, 2006).

Studies conflict on whether pet ownership affects self-worth. Several studies showed an increase in the self-esteem of dog owners when compared to non-dog owners (Katcher, 1981; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). For instance Bustad et al (1990), report a positive correlation between companion animal ownership and self-esteem in women. Age and gender of pet owners may play a significant role in the benefits gained. For example, women place higher importance on their pets compared to men and therefore potentially acquire greater feelings of competence, autonomy and social support from their dogs than men (Bustad, 1990). Also, those who are single and living alone, usually young adults, will place higher importance on their pets. This is possibly due to lack of companionship. Only one study reviewed (Triebenbacher, 1999) found no direct relationship between levels of self-esteem and pet ownership in American children. Children depend greatly on parents and friends as companions and may not place a high position on their pets. Likewise children and couples who have established social support tend to be at less risk for self-esteem issues and loneliness.

Pets can reduce an owner's feelings of loneliness and isolation (Headey, 1998). Siegel et al (1999) found that men with AIDS who owned a pet, particularly those with a poor social support system, reported less depression than those who did not own a companion animal. Similarly, elderly people with pets have also been shown to have fewer symptoms of depression than those without pets (Roberts, McBride, Rosenvinge, Stevenage, & Bradshaw, 1996). Pet dogs are companions, friends and entertainment. Dogs can fill a void when it comes to an individual's social life. As stated earlier people with hearing impairments also showed reduced improved well-being and increased perceptions of social support after obtaining a service dog (Guest, Collis, & McNicholas, 2006). The hearing-impaired have a difficult time communicating and socializing with those who cannot sign language. Outside of the hearing impaired community, their social life may be somewhat deficient. Most people need a support system and companions to lead a happy life.

Companionship is a critical factor in the decision of purchasing a pet dog. There may be certain factors such as gender, age, and status that manipulate whether or not companion animals influence the well-being of owners. For example, the beneficial effects of dog ownership on well-being are greater for single persons than they are for married persons (Cline, 2010). Single persons are more likely to feel lonely and lack of camaraderie compared to couples.

Dog ownership decreases depression and enhances well-being through social support (Cline, 2010). In 2006 a national sample of adults in the United States was taken using random digit dialing (Cline, 2010). A telephone survey was given to 201 adults ranging in age from 19 to 94 years and consisted of 200 questions regarding health, environmental and social issues (Cline, 20010). Cline (2010) used variables from the survey relevant to health, mental well-being and dog ownership.

Ordinary least squares (OLS) regression was used to examine if marital status, gender, and age, moderated the relationship between dog ownership and psychological well-being; specifically depression (Cline, 2010). OLS regression was used again, which examined the effects of the moderating variables and was accomplished by creating interaction terms for dog ownership, gender, age, and marital status (Cline, 2010).

The dependent variable depression was measured using the CES-D 7-item scale (Cline, 2010). Satisfaction with social support was measured by asking respondents how satisfied they were with the level of emotional support that they received from their friends and family (not pets) on a scale of one to four; a single item measure (Cline, 2010). Physical activity was measured by asking participants how often they exercised on a scale of zero to five; a single item measure (Cline, 2010). Age was coded as age in years, gender was coded into a binary variable, and marital status was coded into a binary variable. Cline et al (2010) found that there is an interaction between dog ownership and marital status ($B=.23, p=.034$) on depression. More precisely the interaction indicates that the relationship between dog ownership and depression differs for married and single individuals (Cline, 2010). The beneficial effects of dog ownership on well-being are greater for single individuals than married individuals (Cline, 2010). Likewise there is an interaction between dog ownership and gender in that women dog-owners experience greater well-being effects due to owning a dog than men dog-owners ($B= -.22, p=.040$) (Cline, 2010).

Cline et al (2010) determined that there is no main effect of dog ownership on depression. However, under certain circumstances, a pet dog will improve well-being and decrease depression symptoms. Specifically, dog owners who are women and dog owners who are single individuals experience greater well-being benefits due to a pet dog than men and married couples

(Cline, 2010). Dog ownership may be more of an unnecessary responsibility or chore for married couples. Dog ownership was also associated with lower depression among women, but not men because women seem to place greater value on their relationship with their dogs (Cline, 2010). Another factor that influences this association is that women are at greater risk for depression than men (MMWR, 2010). Pet dogs have the potential to reduce depression symptoms and improve well-being by enhancing the social support system of owners.

Although dog ownership is associated with lowered depression rates, people who are depressed or lonely may seek out dogs as sources of companionship (Cline, 2010). Both physical activity and dog ownership are shown to improve psychological health and social support. However, it is unclear whether both factors independently improve mental well-being or if one factor is the primary cause.

A pet dog is considered by most owners as a friend and a form of social support (Horn, 1984; Endenburg, 1994; Zasloff; 1995). This social support satisfies the need for relatedness. Cohen (2004) defines social support as the provision of psychological resources intended to benefit an individual's ability to cope with stress. A pet dog comforts owners, provides emotional support and according to research is a stress coping mechanism (Allen, 1999; 2001). They provide owners with a strong bond and in fact express empathy, care, reassurance and trust (Horn, 1984; Endenburg, 1994; Zasloff; 1995; Cohen, 2004). Likewise pet dogs are very noteworthy for owners who are not socially integrated. This social support may be carried over to behavior and behavior modification.

Adherence to Physical Activity Due to Social Support/Relatedness

There are multiple motivating factors that influence people to be physically active. Social support is a strong motivator that encourages physical activity and exercise among many

(Cohen, 2004). Cohen (2004) determined that social support is a powerful predictor of adopting and maintaining healthy eating behaviors and exercise habits. Dogs or exercise buddies as social support therefore can potentially increase exercise competence, autonomy and motivation to partake in activity and increase adherence to an exercise program. Exercising with a friend is correlated with participation in vigorous exercise (Sallis, Grossman, Pinski, Patterson, & Nader 1987).

A 16 week intervention consisting of four groups assessed the role of social support in exercise and diet adherence for weight loss (Wing & Jefferey, 1999). Participants in group one were recruited alone and given a standard behavioral treatment (SBT). Group two participants were recruited alone, given SBT and given a social support intervention (Wing & Jefferey, 1999). Group three participants were recruited with three friends and given SBT. Group four participants were recruited with three friends, given SBT, and given the social support intervention.

All groups attended weekly group meetings, self-monitored calorie intake and expenditure, and were given an exercise and diet regime to follow. SBT consisted of learning self-monitoring techniques while the social support intervention consisted of weekly group interaction and social support methods completed together (Wing & Jefferey, 1999). For instance, during week one, the groups with the social support intervention were required to call each other in the form of a phone chain and were to give each other encouragement and motivation. Social support methods were learned and carried out by groups two and four each week (Wing & Jefferey, 1999).

The Sallis Social Support Scales for Eating and Exercise Behavior was used to assess perceptions of positive and negative support from family and friends in regards to eating a heart-

healthy diet and exercising (Wing & Jefferey, 1999). Likewise, participants were able to indicate how supportive other study participants had been of their weight-loss efforts on a scale ranging from one to five and the frequency with which they poked to other members, exercised with them, ate out with them, or shared information relating to weight control with them outside of meetings (Wing & Jefferey, 1999).

Primary analyses compared the four treatment groups on changes in weight from months zero to four, months four to ten and from months zero to ten (Wing & Jefferey, 1999). Experimentally created teams (groups two and four) were used as a nested factor within treatment group. Planned orthogonal contrasts were used to specifically test for effects that were due to recruitment (with friends versus alone), treatment intervention (SBT alone or SBT and social support) and their interaction (Wing & Jefferey, 1999). Initial weight, center, gender, employment status and prior experience with organized weight loss programs were used as covariates (Wing & Jefferey, 1999). Chi square was used to compare the proportion of participants who successfully maintained weight loss versus those who regained weight.

Results showed that the social support intervention was most beneficial to participants who were recruited alone (Wing & Jefferey, 1999). Participants who were recruited with friends and received the social support intervention had the highest completion rate of 98 percent (Wing & Jefferey, 1999). This completion rate neared significance ($p=.068$). Those who were recruited with friends and received the social support intervention also had a 66% weight loss maintenance in full at the 16 month follow-up (Wing & Jefferey, 1999).

Although no studies have been conducted regarding physical activity in relation to social support of those exercising with dogs, it can be considered that exercising with a pet dog in place of a friend could be just as effective. Likewise, there is a strong social component for novice

exercisers. Those just beginning an exercise program and who exercised with a buddy showed decreased attrition (Wing & Jefferey, 1999). Pet dogs act as social support in many settings including physical activity. Social support or relatedness is a significant motivator to engage in activity and promotes adherence to an exercise program due to motivational regulation.

Increased physical activity levels along with a pet dog combine to improve owners' lifestyles and overall health. Dog owners have increased aerobic activity generally in the form of walking the dog and are also psychologically healthier than non-owners (Oka, 2009; Ham, 2006; Cutt, Wood, 2008; Cutt, Knuiman, 2008; Yabroff, 2008; Katcher, 1981; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). Both physical activity and companion dogs decrease, stress, lower or eliminate depression and lessen anxiety (Katcher, 1981, 1982; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). Likewise both improve self-efficacy and self-esteem (Beck 1984, Katcher AH, 1981; Albert, 1988; Garrity, 1989; Anderson, 1992; Friedmann, 1983; Allen, 1991). Owners also have more motivation and confidence to partake in physical activity and greater commitment to physical activity than non-owners (Cutt & Wood, 2008). Walking with a companion dog will increase enjoyment of physical activity and outlook toward activity. Also, improved psychological health will increase delight and feelings toward exercise.

Summary

Dog owners have higher levels of activity than non-owners. Therefore, owners generally are physically and psychologically healthier than non-owners. However this may be dependent upon moderating variables such as marital status and gender (Cline, 2010). Companion animals have the potential to buffer peoples' stress response during traumatic situations and life events, reduce heart rate and blood pressure during everyday living and act as considerable social

support. This social support potentially increases feelings of competence, autonomy, and relatedness. Consequently a pet dog paired with increased levels of physical activity has the potential to greatly improve health and quality of life. There have only been suggestions as to why dog owners are more active and have better overall health. It is undetermined whether the increase in physical activity of dog owners is due to an increase in enjoyment of physical activity or an increase in obligation to be physically active. In other words it is uncertain if dog owners have higher levels of self-determined motivation to engage in physical activity than non-owners.

CHAPTER III. METHODS

Participants

The data sample in the current study consisted of 223 male and female respondents ages 18 and older. Both men and women dog owners and men and women non-dog owners residing in US cities voluntarily completed the survey. Out of 275 volunteers, 223 completed the study. Nearly 50 were excluded due to incomplete surveys. Exclusion criteria included participants who left half or more of the questionnaire unanswered. The characteristics of the participants who completed the survey are shown in Table 1.

Demographics

Age, gender, ethnicity, height, weight, marital status, parental status, level of education, zip code, and area of residence (urban or rural) were included in the survey. Whether the participant enjoys walking in his or her neighborhood was also assessed.

Measures

Behavioral Regulations in Physical Activity

Mullan et al (1997) developed the Behavioral Regulation in Exercise Questionnaire (BREQ) to measure the continuum of behavioral regulation in exercise contexts based on Deci & Ryan's (2000, 2002) self-determination theory. The BREQ assesses the dependent variables external, identified, introjected and intrinsic regulations but did not assess amotivation. The BREQ-2 was amended in order to include amotivation items. There are a total of 19 items to assess external, introjected, identified, intrinsic and amotivation regulations. BREQ-2 does not assess integrated regulation motivation. Responses are scored on a 5-point scale ranging from 0= "not true for me" to 4= "very true for me." Confirmatory factor analysis indicated an excellent model fit.

The BREQ-2 is widely used. It has been used multiple times to assess physical activity and exercise regulations in relation to motivation. BREQ-2 has been used to assess the impact physical activity and exercise interventions have on self-determined motivation (Wilson, Rodgers, & Fraser, 2004). It is applicable for a variety of populations such as college students (Wilson et al, 2004) and cancer patients (Milne, Wallman, Gordon, & Courneya, 2008). Also, it has been used to assess physical activity motivation in physical activity counseling interventions (Fortier, 2010).

The relative autonomy index (RAI) is a single score derived from the subscales that gives an index of the degree to which respondents feel self-determined. The index is obtained by applying a weighting to each subscale and then summing these weighted scores. In other words, each subscale score is multiplied by its weighting and then these weighted scores are summed. The current study used separate scores for each subscale and used the RAI.

Psychosocial Needs

The Psychological Need Satisfaction in Exercise (PNSE) scale is a multidimensional instrument designed to measure perceived psychological need satisfaction based on Ryan & Deci's (2000, 2002) self-determination theory (Wilson, 2006). More specifically it measures perceived competence, autonomy and relatedness in exercise settings (Ryan & Deci, 2000, 2002). The PNSE has high internal consistency estimates (Cronbach $\alpha > .90$) for all subscale scores (Wilson, Rogers, Rodgers, & Wild, 2006). It is a 6-point Likert scale ranging from 1=false to 6=true (Wilson et al, 2006). Participants fill out the PNSE in terms of how they usually feel while exercising ("The following statements represent different feelings people have when they exercise. Please answer the following questions by considering how you typically feel while you are exercising") (Wilson et al, 2006).

The PNSE measures perceived competence, autonomy and relatedness within the exercise setting. For the purposes of this study, the word “exercise” was replaced with “physical activity” because physical activity is being measured in the current study. Also, when perceived relatedness is being assessed, the PNSE survey asks about “people” or “exercise companions”. For the purposes of the current study, these are replaced with “people and/or pet dog(s)” or “people and/or pet dog(s)” is placed in parentheses after “exercise companions” so the participants can include people and pets alike.

Physical Activity Completed with Dogs

The Dogs and Physical Activity Tool (DAPA) measures important attributes relating to dog-walking behaviors of dog owners. Dr. Cutt-Christian created the DAPA Tool and has used it to examine the relationship between dog ownership and activity levels and to explore social, environmental and intrapersonal stimuli for walking the dog (Cutt, 2007; Cutt, 2008). The DAPA tool is the first comprehensive, reliable ($\alpha > .70$) tool for measuring dog owners’ physical activity and walking completed with their dog. The DAPA Tool has been used few times in research by educators at The University of Western Australia to measure walking behavior of dog owners and assess physical activity with dogs from a Social Cognitive Theory perspective.

The DAPA Tool is a series of 12 questions using a Likert Scale relating to dog ownership and activity. The survey inquires about the dog’s size, weight, level of attachment, physical activity undertaken with their pet dog(s), primary dog walker, social support provided by dog(s) and physical environment features. Attitude, adherence and control beliefs in relation to daily dog walking were assessed. The current study did not use any questions from the DAPA that were based on the SCT. Refer to Cutt et al (2008) for further details.

The BREQ-2, PNSE and certain questions from the DAPA Tool (specific to physical activity with pet dogs) were combined to develop the survey for the current study (appendix B).

Procedures

A cross-sectional internet-based survey was posted on Craigslist (in the community/volunteer segment) cities across the United States including Raleigh NC, Atlanta GA, Birmingham AL, Columbus OH, Panama City FL, Pensacola FL, Tallahassee FL, New York City NY, Sacramento CA, St. Louis MO, Columbia MO, Denver CO, Boulder CO, Oklahoma City OK, Omaha NE, Wyoming, Topeka KS, San Diego CA, and Los Angeles CA. The survey was also posted on the researcher's Facebook wall to recruit participants. The survey was available to take during the entire month of October, 2011.

The survey inquired about physical activity on an average weekday, quality of motivation to engage in physical activity, perceived competence, autonomy, relatedness, and enjoyment when physically active, and activity completed with a pet dog. The survey was a combination of the Dog and Physical Activity Tool (DAPA) (Cutt-Christian, 2007), the Behavioral Regulation in Exercise Questionnaire 2 (BREQ-2) (Mullan, Markland, & Ingledew, 1997), and the Psychological Need Satisfaction in Exercise (PNSE) (Wilson, Rogers, Rodgers, & Wild, 2006). The survey was designed using East Carolina University's Qualtrics survey-creating program and given an internet link. The link was posted on Craigslist. IRB permission was granted to send post the survey. Participants denoted their agreement to complete the questionnaire. To recruit participants, survey takers were given the incentive of receiving one of three \$40.00 Visa Gift Cards in a random drawing. So, three participants were randomly selected to win a \$40.00 Visa Gift Card. The questionnaire took 5-10 minutes.

Analysis

There was a final sample of 223 participants. An independent t-test was conducted to assess physical activity levels of dog owners compared to non-dog owners. Also, an independent t-test was conducted to compare the three psychosocial needs (competence, autonomy, and relatedness) and to assess whether self-determination motivation of dog owners is different from non-dog owners. The relative autonomy index (RAI) is a single score derived from the subscales that gives an index of the degree to which respondents feel self-determined and is a sum of the weighted amotivation, external regulation, introjected regulation, identified regulation, and intrinsic regulation scores. The RAI scores of dog owners and non-dog owners were calculated and also compared using an independent t-test.

A series of regression analyses were conducted on each sub dimension (psychosocial variables, self-determination motivation, and dog ownership) to determine whether age, marital status, and gender improved prediction of physical activity levels. Age, marital status, and gender had no significant effect on the relationship between dog ownership and physical activity.

The relationship between dog walking and self-determination motivation of dog owners, was assessed by conducting a correlation analysis. A multiple regression analysis was conducted to examine how well the quality of self-determined motivation predicted total Dog walking time. The five predictors were amotivation, external regulation, introjected regulation, identified regulation, and intrinsic motivation, while the criterion was total dog walking time.

CHAPTER IV. RESULTS

After institutional review board approval and consent were obtained, 275 participants were recruited via Craigslist and Facebook. Out of 275 volunteers, 223 completed the study. Nearly 50 were excluded due to incomplete surveys. The characteristics of the participants who completed the study are shown in Table 1.

In general, dog owners and non-dog owners were similar. There were more men respondents than women in both groups. Also, a majority of both dog owners and non-dog owners appear to be young adults who are overweight single individuals living in urban areas. A majority of respondents reported enjoying walking in their neighborhoods.

Table 1

Participant Demographics

		Non-Dog Owner	Dog Owner
Age	18-20	6	7
	21-30	57	45
	31-40	12	13
	41-50	13	23
	51-60	14	20
	61-70	5	5
	71-80	1	0
	80 years and older	2	0
	Ethnicity	Native Hawaiian	0
Black or African American		14	9
White or Caucasian		86	91
Native American		2	2
Asian		3	2
Hispanic or Latino		2	4
Other		3	3
Gender	Female	35	28
	Male	75	85
Marital Status	Single	76	59
	Married	31	48
	Separated	2	5
	Widow/Widower	1	1
Parent	Yes	30	46
	No	80	67
Area of residence	Urban	95	87
	Rural	15	26
I find it enjoyable to walk in my neighborhood	Yes	81	95
	No	29	18
Level of education	High School/GED	31	29
	Associate's Degree	16	22
	Bachelor's Degree	38	45
	Master's Degree	24	13
	Ph.D.	1	4
Mean BMI		26.317	26.887
Total		110	113

Psychosocial Needs

There were no significant differences between physical activity competence, $t(243) = 6.639, p = .501$, or autonomy, $t(243) = -0.137, p = .891$, of dog owners and non-dog owners. However, there was a significant difference between physical activity relatedness, $t(243) = 3.645, p = .001$, of dog owners and non-dog owners. Dog owners reported having higher levels of perceived physical activity relatedness (Table 2).

Table 2

Psychosocial Needs of Dogs Owners Compared to Non-Dog Owners

	No Dog (Mean)	Dog (Mean)	t	df	SD	ES
Competence	3.624	3.528	6.639	243	1.172	-0.1
Autonomy	4.365	4.380	-0.137	243	0.257	-0.02
Relatedness	3.437	4.004	3.645*	243	1.150	-0.5

Note. * $P < 0.001$

Self-Determination Motivation to Engage in Physical Activity

There was no significant difference in the RAI score between dog owners and non-dog owners, $t(243) = -0.076, p = 0.891$, There were no significant difference between amotivation, $t(243) = 0.91, p = 0.788$, external regulation, $t(243) = 0.418, p = 0.923$, introjected regulation, $t(243) = -0.292, p = 0.945$, identified regulation, $t(243) = 0.131, p = 0.938$, or intrinsic motivation, $t(243) = 0.169, p = 0.62$, of dog owners compared to non-dog owners (Table 3).

Table 3

Self-Determination Motivation of Dog Owners Compared to Non-Dog Owners

	No Dog (Mean)	Dog (Mean)	T	df	SD	ES
Amotivation	1.425	1.417	0.91	243	.696	.01
External Regulation	1.927	1.878	0.418	243	.924	.05
Introjected Regulation	3.126	3.168	-0.292	243	1.118	-0.04
Identified Regulation	4.092	4.078	0.131	243	.850	.02
Intrinsic	3.837	4.079	0.169	243	1.046	.02

Regression of Total Dog Walking Time and Self-Determined Motivation

A multiple regression analysis was conducted to examine how well self-determined motivation predicted total dog walking time. Total dog walking time was gathered from the DAPA results. The five predictors were amotivation, external regulation, introjected regulation, identified regulation, and intrinsic motivation, while the criterion variable was total dog walking time. The linear combination of the five levels of quality of self-determined motivation was significantly related to total dog walking time, $R^2 = .16$, adjusted $R^2 = .12$, $F(5, 107) = 4.18$, $p = .002$ (Table 4). Approximately 16% of the variance of total dog walking time can be accounted for by the linear combination of the quality of self-determined motivation. Identified regulation produced a significant positive Beta ($P < .05$; See Table 5). Interestingly, amotivation was negatively correlated with total dog walking time while identified regulation and intrinsic motivation were positively correlated with total dog walking time (Table 4).

Table 4

Total Dog Walking Time and Self-Determined Motivation

		Total Dog Walking Time	Amotivation	External Regulation	Introjected Regulation	Identified Regulation	Intrinsic
Total Dog Walking Time	Pearson Correlation		-.188*	-.107	.007	.384**	.302**
	Sig. (2-tailed)		.046	.259	.938	.000	.001
	N		113	113	113	113	113
Amotivation	Pearson Correlation			.506**	.034	-.478**	-.439**
	Sig. (2-tailed)			.000	.723	.000	.000
	N			113	113	113	113
External Regulation	Pearson Correlation				.386**	-.200*	-.230*
	Sig. (2-tailed)				.000	.033	.014
	N				113	113	113
Introjected Regulation	Pearson Correlation					.292**	.080
	Sig. (2-tailed)					.002	.400
	N					113	113
Identified Regulation	Pearson Correlation						.781**
	Sig. (2-tailed)						.000
	N						113
Intrinsic	Pearson Correlation						1
	Sig. (2-tailed)						
	N						113

Notes. *P < 0.05 level (2-tailed). **P < 0.01 level (2-tailed). Dog Ownership = Dog Owner

Table 5
Total Dog Walking Time and Self-Determined Motivation

Model		Unstandardized		Standardized		Sig.
		B	Std. Error	Beta	t	
1	(Constant)	-10.389	9.686		-1.073	.286
	Amotivation	.175	2.530	.008	.069	.945
	External Regulation	.408	1.906	.024	.214	.831
	Introjected Regulation	-1.880	1.508	-.135	-1.247	.215
	Identified Regulation	8.492	2.938	.463	2.890	.005
	Intrinsic	-.528	1.980	-.039	-.267	.790

Notes: a. Dog Ownership = Dog Owner

b. Dependent Variable: Total Dog Walking

A second analysis was conducted to evaluate how well the self-determined motivation psychosocial needs (competence, autonomy, and relatedness) predicted total dog walking time. The linear combination of the self-determined motivation variables demonstrated a significant relationship to total dog walking time, $F(5, 105) = 4.18, p = .003$. Overall, the combination of the three variables account for 16% of the variability as the multiple correlation coefficient was .39. In addition, there were significant bivariate correlations for all three self-determined motivation variables (See Table 7) and produced a significant Beta for competence ($p < .01$, See Table 6).

Table 6

Dog Walking Time and Psychosocial Needs

Model		Unstandardized		Standardized		
		Coefficients		Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	-.043	10.816		-.004	.997
	Competence	5.074	1.704	.399	2.978	.004
	Autonomy	-.657	2.074	-.036	-.317	.752
	Relatedness	.186	1.507	.013	.124	.902

Notes. a. Dog Ownership = Dog Owner

b. Dependent Variable: Total Dog Walking Time

Table 7

Relationship of Dog Walking Time Completed by Dog Owners and Psychosocial Needs

		Total Dog Walking Time	Competence	Autonomy	Relatedness
Total Dog Walking Time	Pearson Correlation	1	.397**	.219*	.187*
	Sig. (2-tailed)		.000	.020	.047
	N	113	113	113	113
Competence	Pearson Correlation	.397**	1	.586**	.424**
	Sig. (2-tailed)	.000		.000	.000
	N	113	113	113	113
Autonomy	Pearson Correlation	.219*	.586**	1	.421**
	Sig. (2-tailed)	.020	.000		.000
	N	113	113	113	113
Relatedness	Pearson Correlation	.187*	.424**	.421**	1
	Sig. (2-tailed)	.047	.000	.000	
	N	113	113	113	113

CH. V. DISCUSSION

The goal of the present study was to examine the relationship between dog ownership and perceived competence, autonomy, and relatedness toward physical activity, and self-determined motivation to engage in physical activity. According to the current results, there are no significant differences between dog owners' and non-dog owners' perceived competence and autonomy toward physical activity or quality of self-determined motivation to be active. However, dog owners perceived significantly greater feelings of relatedness toward physical activity compared to non-dog owners. Fostering feelings of competence, autonomy, and relatedness during physical activity enhances self-determination motivation (Ryan & Deci, 2000, 2001). To enhance competence, autonomy, and relatedness during physical activity, individuals must feel knowledgeable, experienced, in control, and a sense of belonging (Ryan & Deci, 2000, 2001). Relatedness or social support from friends, family, coaches, and peers has shown to enhance the three psychosocial needs, the quality of motivation during activity, and improve adherence to an exercise program (Edmunds, 2008; Wilson, 2004; Levy, 2004). Pet dogs are also a substantial source of social support. However, the role pet dogs play in enhancing their owners' perceived competence, autonomy, and relatedness during physical activity has not been explored until the current study.

The regression analysis of total dog walking time was conducted because our physical activity measure results were not valid. Total dog walking time was taken from DAPA results, while the invalid PA results were discarded. Identified regulation was a significant predictor of total dog walking time ($P < .05$). If one is physically active because he or she experiences identified regulation motivation, he engages in activity to reap certain benefits, such as health benefits (Ryan & Deci, 2001). We cannot conclude what dog owners believe the benefits to be

of dog walking. Nevertheless, dog owners who experience identified regulation motivation recognize benefits to dog walking. For example, it is very possible that dog owners walk their dogs to reap health benefits themselves or to keep their dogs healthy. It is also possible that dog owners walk their dogs to keep their dogs' well-behaved while indoors and to decrease hyperactivity of dogs. Other owners may walk their dogs to briefly socialize with neighbors or a variety of other potential benefits. On the other hand, the current sample of dog owners may not walk their dogs at all.

Identified regulation precedes intrinsic motivation on the self-determined motivation continuum, and is therefore considered higher quality self-determined motivation. Therefore, according to the results, higher quality self-determined motivation is a positive predictor of dog walking. Enhancing self-determined motivation is crucial to increase physical activity levels of people. The current results suggest that if dog owners recognize benefits to dog walking, they are more likely to walk their dog. Dog owners may not be generalizable to the overall population. However, the current study insinuates that if people recognize benefits to physical activity and exercise, they are more likely to engage in activity.

According to the results, competence is a significant predictor of total dog walking time ($p < .01$). Competence is feeling knowledgeable and capable of engaging in a behavior, in this case, dog walking (Ryan & Deci, 2001). The more competent owners feel about walking and/or walking with a dog, the more likely they are to increase dog walking time. The current sample is overweight and do not typically walk their dogs (average 17 minutes per week dog walking). It is possible that the current sample is not experienced when it comes to being physically active or is not knowledgeable about physical activity. It is also possible that the current sample is not knowledgeable about dog ownership, how much exercise dogs need, and keeping their dogs

healthy. The current results insinuate that enhancing perceived competence about physical activity and exercise may increase physical activity levels of people. Enhancing perceived competence about physical activity and proper dog ownership may promote more dog-walking in communities.

Triebenbacher (2000) suggests that dog ownership potentially reduces stress in everyday life, provides social support, and enhances responsibilities. This insinuates that dog owners potentially have enhanced perceived competence, autonomy, and relatedness in everyday life due to the high status they place on their pets. Competence, autonomy, and relatedness were not directly measured, but results found in Triebenbacher's (2000) study insinuates that the three psychosocial needs are met in everyday life due to dog ownership. Whether dog owners experience enhanced perceived competence, autonomy, and relatedness toward physical activity due to dog ownership has never been examined until the current study. However, many people are not regularly active and do not claim physical activity as part of their everyday life. Therefore, these perceived feelings of competence, autonomy, and relatedness during everyday life due to dog ownership may not transfer over to physical activity. Even dog owners who avidly walk their dog may not feel competent enough to try modes of physical activity other than walking.

It was hypothesized that dog owners would have higher self-determined motivation: intrinsic motivation, integrated regulation motivation and identified regulation motivation due to dog ownership. Also, non-dog owners would have lower self-determined motivation: amotivation, external regulation, introjected regulation. When compared to non-dog owners, dog owners were expected to have higher perceived feelings of competence, autonomy, and

relatedness toward physical activity. Dog owners had significantly higher levels of perceived relatedness toward physical activity when compared to non-dog owners.

Pet dogs are able to provide social support or feelings of relatedness in many, if not all, situations, even during physical activity. However, pet dogs may not enhance feelings of competence and autonomy during activity. Feeling competent and autonomous about dog ownership is completely different from feeling competent and autonomous during physical activity. Therefore, it is understandable that dog owners only have higher perceived relatedness during physical activity in comparison to non-dog owners. Relatedness is the need of belonging and to experience social interactions (Ryan & Deci, 1985, 2000, 2001). Multiple studies have shown that owners believe the main advantages of pet ownership are friendship and companionship experienced along with a sense of belonging (Horn, 1984; Endenburg, 1994; Zasloff; 1995) satisfying the need for relatedness and also providing social support. Some dog owners may not experience these feelings of relatedness if they do not have an exercise buddy, social support during physical activity, or do not take their dogs with them during physical activity. Dogs may increase some owners' perceived relatedness, but pet dogs cannot increase their owners' knowledge of physical activity.

According to the SDT, enhancing perceived competence, autonomy, and relatedness will improve quality of self-determination motivation to be physically active (Ryan & Deci, 2000, 2001). Because dog owners have significantly higher perceived relatedness, it would be assumed that they would also have higher quality self-determined motivation. However, dog owners do not have higher quality self-determined motivation when compared to no-dog owners. According to the current results and based on the current population, it may be necessary to enhance all three psychosocial needs to improve quality of self-determined motivation.

Based on the results, the current population is not highly active. When people are not physically active, it is hard to properly assess physical activity competence, autonomy, relatedness and self-determined motivation to be active. Likewise, if the population is not highly active, there is a small chance they are not active with their pet dogs. Therefore, there is a lesser chance of mastery experiences during physical activity and in turn, enhancing physical activity competence and autonomy.

Gender, marital status, and age did not moderate the relationship between dog ownership and self-determined motivation to be physically active. Women place a higher role on their pets (Cline, 2010). Likewise, single individuals and older adults reap more benefits from dog ownership (Headey, 1998; Siegal, 1999; Guest, 2006; Cline, 2010). It was therefore hypothesized that women, single, and older dog owners would experience higher perceived competence, autonomy, relatedness, and higher self-determination motivation to be active than men dog owners. But, based on the demographics of the current sample, it is difficult to truly test this hypothesis. For instance, only 28% of the sample is female and only 6% of the population is 61 years of age and older. Therefore, the current sample may be inapt for testing whether these variables (gender, marital status, and age) moderate the relationship between dog ownership and self-determination motivation to be active.

Implications for the Future

There are many improvements that need to be made on the current study. For instance, the DAPA tool was not useful from a theoretical standpoint. It was based SCT while the current study was based on SDT. However, the DAPA tool was valuable in collecting information regarding characteristics of dog owners such as what types of dogs they own, whether their dogs were of normal weight, and how often the owners walked their dogs.

It would be beneficial to create a questionnaire based on the SDT for dog owners. Directly measuring self-determined motivation toward physical activity due to dog ownership would assess the relationship between dog ownership and self-determined motivation to be active. Likewise, directly measuring the psychosocial needs competence, autonomy, and relatedness, would assess the relationship between dog ownership and the basic needs. Focus groups would be a necessary first step in creating this survey.

Future Research

It would be beneficial to further this study by examining the walkability of participants' areas of residence. Participants may not be able to walk their dog or be active with their dog due to their location. It would also be beneficial to further this study by assessing available facilities of participants' area of residence. Likewise, perceived lack of facilities would be a valuable variable. Many areas do not have parks, dog parks, trails or sidewalks, which are barriers to walking the dog. It would also be interesting to measure perceived lack of facilities from a SDT perspective. Whether actual or perceived lack of facilities, these are still barriers that keep owners from walking their dogs.

Many dog owners refrain from walking their dog or engaging in activity with their dog due to an extensive list of barriers. Cutt et al (2008) reported that dog size, socializing, and dog behavior are all barriers to going for walks with their dogs. Thus these factors are also barriers to engaging in physical activity in the form of dog walking. It would be beneficial to examine perceived and actual barriers from a SDT standpoint. Would dog owners with high quality self-determined motivation let barriers keep them from being physically active? Also, would dog owners with low quality self-determined motivation allow barriers to keep them from being active?

The current study has furthered previous research regarding physical activity and self-determination motivation to engage in physical activity. It may be advantageous to conduct similar studies, both cross-sectional and longitudinal, with a greater sample size. According to the current study, dogs can enhance physical activity relatedness. Dogs may be just as effective social support as other exercise buddies. Likewise, dog walking time is related to higher quality self-determined motivation to be active. Therefore, it may be beneficial to design interventions that include dogs or dog walking. Likewise, based on the current findings, it may be useful to assess walkability of neighborhoods. Although the current findings are not generalizable, the results have provided some insight on dog owners' relationships with their dogs, and how pet dogs enrich their owners' lives.

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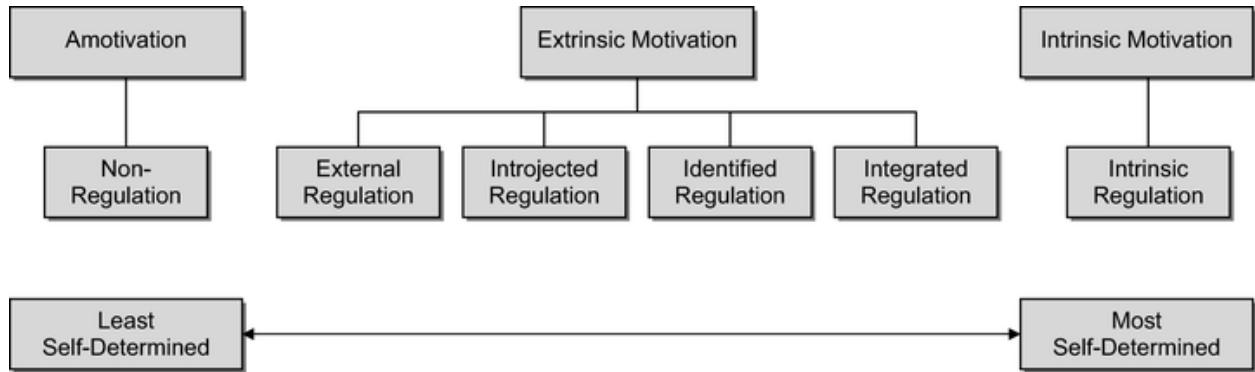
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APPENDIX A: SELF-DETERMINATION MOTIVATION CONTINUUM



APPENDIX B: SURVEY

You are being invited to participate in a research survey study titled *Does Dog Ownership Affect the Owner's Motivation to Engage in Physical Activity?* being conducted by Courtney Frueauf, a graduate student at East Carolina University in the Kinesiology department. The simple and quick survey will take 10-15 minutes of your time. After completion of the survey, you will have the opportunity to enter your name into a drawing for the chance to win one of three \$40 prepaid Visa gift cards. Your name and address will only be used for this purpose and will not be associated with your responses to the survey. The survey will take approximately 10-15 minutes to complete. Anyone 18 years or older, both pet owners and non-pet owners are asked to participate. It is hoped that this information will assist us to better understand if dog ownership enhances motivation to engage in physical activity. We are also asking you to provide other demographic information about yourself such as marital status, age, gender, education, and zip code. However, your responses will be kept confidential. No data will be released or used with your identification attached. Your participation in the research is voluntary. You may choose not to answer any or all questions, and you may stop at any time. There is no penalty for not taking part in this research study. Please call Courtney Frueauf at 252-737-4680 for any research related questions or the Office for Human Research Integrity (OHRI) at 252-744-2914 for questions about your rights as a research participant.

The following statements represent different feelings people have when they are physically active. Please answer the following questions by considering how you typically feel while you are physically active:

	Not true for me	1	2	3	4	Very true for me
I am physically active because other people say I should be	0	1	2	3	4	5
I feel guilty when I am not physically active	0	1	2	3	4	5
I value the benefits of being physically active	0	1	2	3	4	5
I am physically active because it's fun	0	1	2	3	4	5
I don't see why I should have to be physically active	0	1	2	3	4	5
I take part in physical activity because my friends/family/partner say I should	0	1	2	3	4	5
I feel ashamed when I miss a physical activity session	0	1	2	3	4	5
It's important to me to be physically active regularly	0	1	2	3	4	5
I can't say why I should bother being physically active	0	1	2	3	4	5
I enjoy my physical activity sessions	0	1	2	3	4	5
I am physically active because others will not be pleased with me if I don't	0	1	2	3	4	5
I don't see the point in being physically active	0	1	2	3	4	5
I feel like a failure when I haven't been physically active in a while	0	1	2	3	4	5
I think it is important to make the effort to be physically active regularly	0	1	2	3	4	5

I find physical activity a pleasurable activity	0	1	2	3	4	5
I feel under pressure from my friends/family to be physically active	0	1	2	3	4	5
I get restless if I am not physically active regularly	0	1	2	3	4	5
I get pleasure and satisfaction from participating in physical activity	0	1	2	3	4	5
I think physical activity is a waste of time	0	1	2	3	4	5

	1 False	2	3	4	5	6 True
I feel that I am able to complete physical activities that are personally challenging						
I feel confident I can do even the most challenging physical activities						
I feel confident in my ability to perform physical activities that personally challenge me						
I feel capable of completing physical activities that are challenging to me						
I feel like I am capable of doing even the most challenging physical activities						
I feel free to be physically active in my own way						
I feel free to make my own physical activity program decisions						
I feel like I am in charge of my physical activity program decisions						
I feel like I have a say in choosing the physical activity that I do						
I feel free to choose which physical activities I participate in						
I feel like I am the one who decides what physical activities I do						
I feel free to choose which physical activities I participate in						
I feel like I am the one who decides what physical activities I do						

I feel attached to my physical activity companions[people and/or pet dog(s)] because they accept me for who I am						
I feel like I share a common bond with the people and/or pet dog(s) who are important to me when we are physically active together						
I feel a sense of camaraderie with my physical activity companions [people and/or pet dog(s)] because we are physically active for the same reasons						
I feel close to my physical activity companions [people and/or pet dog(s)] who appreciate how difficult physical activity can be						
I feel connected to the people and/or pet dog(s) I interact with while we are active together						

How many, if any, of the following pets do you have? (if none, skip to *What is your age?*)

None Cat(s) Dog(s) Birds(s) Other (please specify)_____

If you currently have a dog, how many years have you had your current dog? _____

How many consecutive years have you owned and lived with a dog(s)? _____

Dog weight

Dog one:

Very Underweight Underweight Normal Weight Overweight Very Overweight

Dog two:

Very Underweight Underweight Normal Weight Overweight Very Overweight

Dog size

Dog one:

___ Small breed ___ medium breed ___ large breed

Dog two:

___ Small breed ___ medium breed ___ large breed

How strongly do you agree or disagree with the following statements about your dog(s)? (Circle the number that is closest to your answer where 1=Strongly Disagree and 5= Strongly Agree)

I consider my dog(s) a friend	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree
I talk to my dog(s)	1	2	3	4	5
Owning a dog(s) adds to my happiness	1	2	3	4	5
I talk to others about my dog(s)	1	2	3	4	5
My dog(s) knows how I feel about things	1	2	3	4	5
My dog(s) is considered part of the family	1	2	3	4	5
Having my dog(s) makes me walk more	1	2	3	4	5
I often play with my dog(s)	1	2	3	4	5
I considered my dog(s) to be my friend	1	2	3	4	5

Who, if anyone, usually walks or jogs with your dog(s)? (check all relevant)

No one → go to question 9

___ Me ___ Spouse/partner ___ Children ___ Shared with family members ___ Other

In a usual week, how many times per week, if any, do you personally walk or jog with your dogs(s)?

Please write number of times/week: _____

In a usual week, how much time in total, if any, do you personally walk or jog with your dog(s)?

Hours: _____ Minutes: _____

My dog(s)....
 (Circle the number that is closest to your answer)

MY DOG...	Never	Seldom	Half of the time	Most of the time	Always
Goes walking with me	1	2	3	4	5
Gives me encouragement to go walking	1	2	3	4	5
Does other physical activity with me	1	2	3	4	5

What is your age?

18-20 years of age

21-30 years of age

31-40 years of age

41-50 years of age

51-60 years of age

61-70 years of age

71-80 years of age

80 years of age and older

What is your ethnic background?

Black or African American

White or Caucasian

Native American

Asian

Native Hawaiian and other Pacific Islander

Hispanic or Latino

Other

What is your height (in inches)?_____

What is your weight (in pounds)?_____

What is your gender?

Male Female

What is your marital status?

Single Married Separated Widow/Widower

Are you a parent?

Yes No

What type of area do you live in?

Urban Rural

I find it enjoyable to walk in my neighborhood.

Yes No

Level of education

High school Associates degree

Bachelor's degree Master's degree

Ph.D.

Name (for gift card drawing)

Address (for gift card drawing only) [street, city, state, zip code]

Thank you for completing this questionnaire

APPENDIX C: PERMISSION LETTER

EAST CAROLINA UNIVERSITY

University & Medical Center Institutional Review Board Office

1L-09 Brody Medical Sciences Building · Mail Stop 682

600 Moye Boulevard · Greenville, NC 27834

Office 252-744-2914 · Fax 252-744-2284 · www.ecu.edu/irb

Notification of Exempt Certification

From: Social/Behavioral IRB
To: [Courtney Frueauf](#)
CC: [Nicholas Murray](#)
Date: 10/7/2011
Re: [UMCIRB 11-000955](#)
Dog Ownership and Motivation

I am pleased to inform you that your research submission has been certified as exempt on 10/4/2011. This study is eligible for Exempt Certification under category #2.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period. The Chairperson (or designee) does not have a potential for conflict of interest on this study.