

An Evaluation of Pet Owners' Attachment Style and the Human-Animal Bond

by

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### **Abstract**

The specific problem explored in this study was how attachment style may moderate the relationship between strength of the bond and stress in pet owners, measured by levels of avoidance and anxiety in attachment relationships, in a convenience sample of pet owners. The strength of the human-animal bond, a moderating variable, was measured by the Owner Pet Relationship Questionnaire and attachment anxiety and avoidance, the other two moderating variables, were measured by scores obtained on both anxiety and avoidance from the Pet Attachment Questionnaire. The Perceived Stress Scale represented the dependent variable, which is a common measure of stress used in psychological applications. Participants included pet owners over the age of 18 and were recruited online through SurveyMonkey. The data were analyzed through the use of multiple regressions to test whether the independent variables interact in their effects on the dependent variable. Four hypotheses were tested. Significant effects were found for strength of bond and avoidance on stress in the pet owner. Significant moderation of attachment style, with the relationship, between strength of the human-animal bond and pet owner's stress reduction, was found controlling for anxiety and avoidance. However, anxiety was not found to be a significant effect on stress. A future study in this area could attempt to use a random sample of respondents, or a similar methodology, in order to obtain a sample of individuals whom are representative of a larger population. The use and collection of panel data, or longitudinal data on a specific sample of respondents would allow for the determination of causality between measures, as opposed to the use of a cross-sectional sample.

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## Chapter 1: Introduction

The prevalence of pet ownership highlights the importance of companion animals in modern life. A majority of households in the United States include a pet, with over 50% of households reporting that they include a dog or cat as companion animal (Pace, 2011). The bond between human and animal, referred to as the human-animal bond (HAB), has been demonstrated to be a mutually beneficial and interactive relationship for both humans and animals (American Veterinary Medical Association, 2014). Animals have been utilized as sources of support in diverse settings and populations (Barker, Knisely, McCain, Schubert, & Pandurangi, 2010; Geist, 2011; Pace, 2011). Companion animals have increasingly been utilized in therapeutic settings where animals are used to decrease physical and psychological stress in patients (Geist, 2011; Jaspersen, 2010; Pace, 2011). Animals have been seen to provide a constant bond for those undergoing stressful physical events as well as psychological stress (Gillum & Obisesan, 2010; Peacock, Chur-Hansen & Winefield, 2012). Researchers have validated the emotional and psychological value of the human-animal bond (McConnell, Brown, Shoda, Stayton & Martin, 2011; Zilcha-Mano, Mikulincer & Shaver, 2011a, 2011b, 2012). For owners, pets can offer an uncomplicated and consistent relationship and can generate positive feelings of connection (Pace, 2011).

Attachment theory, serving as a framework for this study, originated with Bowlby's research on the parent and child bond (1958, 1973, 1980). Researchers have applied the theory to adult relationships in addition to the parent and child bond (Ainsworth, Blehar, Waters, & Wall, 1987; Connors, 2011; Fraley & Shaver, 2000; 2010). Attachment theory has been extended to relationships with companion animals in

various settings including therapeutic use of animals (Geist, 2011; Jasperson, 2010), and in studies of overall wellbeing (Kurdek, 2008; 2009a; 2009b; McConnell et al., 2011). Attachment features are characterized by behaviors seeking care from an attachment figure. Separation distress and proximity maintenance refer to the need for nearness and distress upon absence of an attachment figure. Secure base and safe haven refer to the need for alleviation of distress and feelings of security connected to an attachment figure (Ainsworth et al., 1978). Attachment styles, or the enactment of attachment behavior, include secure attachment, anxious attachment, avoidant attachment, and a style exhibiting both anxious and avoidant features (Bartholomew & Horowitz, 1991). Attachment styles have been investigated as a dimensional framework, with high anxiety indicating anxiety and self-doubt surrounding attachment figures, and high avoidance indicating avoidance and denial of close relationships (Connors, 2011). However, few researchers who have investigated the owner and companion animal bond have examined strength of the bond, and how this may affect the ability of a pet to alleviate stress in an owner.

A connection between pet ownership and stress has been established by previous research into the implication of pet ownership, in areas including physiological stress, and physical benefits or drawbacks of the human-animal bond (Brown & Rhodes, 2006; Gillum & Obisesan, 2010; McConnell et al., 2011). Stress is defined as the physiological, behavioral, and emotional responses to events perceived as a threat to general wellbeing (Jeshmaridian, 2008). Stress has been described as lack of appropriate coping response to conditions perceived as challenging (Cohen & Wills, 1985; Cohen &

Jerecki-Deverts, 2012). Perceived stress is the subjective interpretation and evaluation of stress, and how individuals cope with specific events (Cohen & Wills, 1985).

## **Background**

In modern life, companion animals have become increasingly common in households, with an estimate of over 68% of American households currently owning a pet (McCune et al., 2014). Animals hold a place of increasing importance in the household, with studies indicating that individuals often feel their pet is a member of the family (Walsh, 2009a, 2009b). Researchers from several fields such as human-animal interaction (HAI), animal-assisted therapy (AAT), and health practitioners have found that interaction with a pet may have physical and physiological benefits (Cutt, Giles-Corti & Knuiiman, et al., 2008; Friedmann, Barker & Allen (2011). Benefits of pet ownership may include improved physiological symptoms with connections to stress (Friedmann & Thomas, 1995; Friedmann, Thomas, Son, Chapa & McCune, 2013). Headey and Grabka (2011) identify several examples of surveys, which report correlational links between pet ownership and improved health, including the German Socio-Economic Panel Survey (Wagner, Frick & Schupp, 2007) and China after the legalization of pet ownership (Headey & Grabka, 2011; Fu Na & Sheng, 2003). Researchers connect positive outcomes for physical health and pet ownership in a wide range of studies, including the effect of blood pressure.

Bowlby and Ainsworth (Ainsworth et al., 1978; Ainsworth & Bowlby, 1991) developed the main precepts of attachment theory, drawing from the fields of ethology, developmental psychology and psychoanalysis. Bowlby (1958; 1973; Carr & Rockett, 2013) observed and recorded the basic components of the attachment bond between

mothers and children through observations of postwar abandoned children. Ainsworth et al. (1978) tested the concepts of attachment theory empirically among infants and children, and they were responsible for developing the concept of secure base, from which an infant can establish a secure bond to explore their surroundings.

The theory, originally applied to attachment connections for infants and primary caregivers, has been expanded to include other types of attachment relationships, including romantic and institutional (Hazan & Shaver, 1987; Fraley & Shaver, 2000; 2010). The theory has been applied in therapeutic and institutional clinical applications (Connors, 2011; Mikulincer & Shaver, 2003; 2007). Researchers have inquired into the possibility of attachment as an element in the pet and owner bond, (Kurdek, 2008, 2009a, 2009b), as well as what types of attachment functions the pet can serve (Zilcha-Mano et al., 2011a, 2012).

The therapeutic application of attachment theory has been an area of inquiry by mental health practitioners (Connors, 2011; Geist, 2011). Animals appear as part of therapeutic interventions in animal-assisted therapy, and have been used to relieve stress or other physiological conditions (Geist, 2011; Connors, 2011). Investigation of attachment to pets and the stress-buffering effects of attachment connections has been a focus of study, usually among pet owners (Kurdek, 2009b; McConnell et al., 2011; Zilcha-Mano et al., 2011a, 2012). In this study, the connection of the attachment bond, stress, and pet ownership were investigated, with a consideration of the stress-buffering effects of attachment connections.

## **Statement of the Problem**

Examining stress in association with the pet and pet owner relationship is important in relation to psychological and physiological wellbeing in pet owners (Krause-Parello, 2012; McConnell et al., 2012; Sable, 2013; Zilcha-Mano et al., 2011a; 2011b, 2012). Stress, in particular perceived stress, is an issue with psychological and physical health implications that can increase levels of depression and lower overall physiological health and wellbeing (Cohen et al., 1998; Cohen, Kamarck, & Mermelstein, 1983; Cohen & Williamson, 1988; McConnell et al., 2011). Pets have been shown to serve as sources of important attachment relationships (Peacock et al., 2012; McConnell et al., 2011). However, the capability of a pet to function as a secure attachment for owners' attachment style may be impacted by attachment style of the pet owner (Zilcha-Mano et al., 2011a, 2012; Mikulincer, Shaver, Bar-On, & Ein-Dor, 2010). Specifically, how anxious and avoidant attachment may affect the ability to alleviate stress has been an area of inquiry (Kurdek, 2008, 2009; Zilcha-Mano et al., 2012).

How those who own pets receive benefits, such as alleviation of stress, from relationships with family members and friends may be impacted by patterns of attachment (Connors, 2011; Julius, Beetz, Kotrschal, Turner & Uvnas-Mobery, 2012; Krause-Parello, 2012). Prior investigators speculate that attachment style may also affect benefits, which pet owners receive from the owner and pet relationship (Kurdek, 2008, 2009a, 2009b; McConnell et al. 2011; Zilcha-Mano et al., 2011a; 2012). How attachment style moderates stress in pet owners has not been specifically addressed by previous research. The specific problem for this study was how attachment style moderated the relationship between strength of the bond and levels of stress in pet owners. Studying

attachment in the context of attachment with pets also assisted in helping to determine the extent to which attachment theory is upheld within this less-studied area.

### **Purpose of the Study**

The purpose of this quantitative study was to test whether attachment style, as measured by levels of avoidance and anxiety in attachment relations with pets, moderated the relationship between strength of the human-animal bond and perceived stress in a convenience sample of pet owners. The strength of the human-animal bond, which served as one of the moderating variables, was measured by the Owner Pet Relationship Questionnaire (Winefield, Black & Chur-Hansen, 2008). Attachment anxiety and avoidance, the other two moderating variables, were measured by scores obtained on both anxiety and avoidance from the Pet Attachment Questionnaire (Zilcha-Mano et al., 2011a). The dependent variable was measured by the Perceived Stress Scale, a common measure of stress used in psychological applications (Cohen et al., 1983). Subjects were recruited online through a national survey service. Rather than lose the variability associated with the continuous measures of anxiety and avoidance by creating artificial dichotomies of low and high scores in order to use ANOVA, data were kept continuous and analyzed through the use of multiple regressions to test whether the independent variables significantly interact. Complete vs. reduced model testing was used to test for moderation using multiple regressions and is an accepted technique for maintaining the richness of the variability captured in continuous IVs. An a priori power analysis for multiple regression analysis with three predictors determined a minimum sample size of 76 when using an effect size of .15 and  $p = .05$ . Off the shelf data collection instruments were used to collect data for the study. Results from this study could be used for

contributions to theories of the human-animal bond and attachment, and the relationship of attachment between pet owners and pets to stress in pet owners.

### **Theoretical Framework**

A framework for this study is the theory of attachment, the human-animal bond, and the connection to stress. The theory of attachment originated with the work done by John Bowlby in examination of the parent-child bond (1958, 1968, 1973, 1980). A main precept of the theory specifies the need for proximity to a friendly caregiver during childhood in order to develop in a secure way (Bowlby, 1958; 1968). Attachment, materialized as internalized representations of self and others, has been found to affect functioning in relationships for children and for adults (Connors, 2011).

Bowlby (1958, 1968, 1973, 1980) laid the groundwork for the basic precepts of attachment theory. The theory provided a framework for examining how connections to caregivers allow children to form secure bonds. Ainsworth (Ainsworth, 1991; Ainsworth et al., 1978) developed a framework for evaluation of attachment through observation of interactions between caregivers and children. Through the test of the *Strange Situation*, a child's attachment patterns could be observed through 20 minutes of play with caregivers and strangers. The child's reactions and levels of stress would be noted throughout the procedure, in particular upon reunification of child and caregiver immediately after a period of separation.

Ainsworth (1991) classified three basic characteristics of attachment from these observations of caregiver and child interactions (Ainsworth et al., 1978; Mikulincer & Shaver, 2012). From these, four basic attachment features have been developed (Connors, 2011; Main & Solomon, 1990). The first is proximity maintenance, or a

longing to be close to an attachment figure. Safe haven is a returning to the attachment figure for safety during times of fear. In secure base, the figure of attachment provides a secure base from which to explore outside the attachment relationship. Separation distress occurs when an attachment figure disappears or is not available (Main & Solomon, 1990; Mikulincer & Shaver, 2012).

Attachment patterns have been found to form as a child and become internalized as internal working models (Bartholomew & Horowitz, 1991; Mikulincer & Shaver, 2012). Internal working models are composed of and internalized as mental representations of others and oneself. These models can influence mental and social functioning (Connors, 2011; Ein-Dor, Mikulincer, Bar-On & Shaver, 2010; Mikulincer & Shaver, 2007). These models become activated as attachment behaviors, or styles, based on internal models of self and models of relationship partners (Bartholomew & Horowitz, 1991; Fraley & Shaver, 2000; Mikulincer & Shaver, 2007; Mikulincer & Shaver, 2012).

The establishment of a secure attachment to a stable caregiver has been a focus of studies in attachment and early childhood development. For example, according to researchers, a secure base and safe haven are central to creating a healthy attachment to a caregiver and central for the development of healthy internal working models for a child (Colmer, Rutherford & Murphy, 2011; Connors, 2011). Bowlby distinguished caregiving behaviors and attachment behaviors as related to behaviors of seeking care and support. The creation of a safe haven and secure base is aligned with attachment behaviors, while caregiving behaviors are associated with proximity maintenance or separation distress in much of the attachment relationship research (Bell & Richard, 2000; Bowlby, 1958; Kurdek, 2008; Mikulincer & Shaver, 2007; Mikulincer et al., 2010, 2012; Zilcha-Mano et

al., 2012). Attachment was first observed as a phenomenon with the interaction of infants and caregivers (Bowlby, 1958; Colmer et al., 2011; Fraley & Shaver, 2000).

While researchers into attachment and children have examined the development of a secure attachment connection, researchers in adult attachment have focused on attachment style, and the degree of anxiety and avoidance exhibited in attachment relationships (Bartholomew & Horowitz, 1991; Ein-Dor, Mikulincer, Bar-On & Shaver, 2010; Fraley & Shaver, 2000). Attachment styles include secure, anxious-insecure, avoidant-insecure and anxious-avoidant. Individuals with secure attachment include those who are securely attached in relationships, with positive expectations of themselves and the relationship partner. Those with anxious-insecure attachment can be characterized by self-doubt, and by generally more negative expectations of self and others in relationships. Individuals with avoidant-insecure attachment can be characterized by a tendency to avoid attachment. Anxious-avoidant attachment is characterized by isolation and denial of close relationships, along with high anxiety and self-doubt about relationships. This fourth style incorporates aspects of both the anxious and avoidant styles (Bartholomew & Horowitz, 1991; Ein-Dor, Mikulincer & Shaver, 2011; Fraley & Shaver, 2000).

Romantic relations have been a focus of studies in adult attachment, with researchers finding that romantic attachment figures may become primary attachment figures for adults (Hazan & Shaver, 1987; Hazan & Zeifman, 1994; Li & Chan, 2012). However, other types of relationships have been found to fulfill or address attachment bonds, including those within therapeutic settings (Tasca, Ritchie & Balfour, 2011) and institutional relationships (Richards & Shat, 2011). Tasca et al. (2011) found that any

benefits from therapy for eating disorders were affected by attachment-associated insecurities. Richards and Shat (2011) found that anxiety and avoidant attachment styles predicted criteria related to counterproductive work behavior, organizational citizenship, and reports from employees of turnover intention of leaving the workplace.

Researchers have extended attachment theory to the human-animal bond, suggesting the same attachment processes and styles (secure, avoidant, anxious, anxious-avoidant) that occur among human adults may also occur with humans and animals (Kurdek, 2008, 2009a, 2009b; Zilcha-Mano et al., 2011a). Kurdek (2009b) discovered that dog owners, in particular, felt emotionally close to their pets. Zilcha-Mano et al. (2011a) found that human and pet relations may exhibit the four elements of attachment, which are generally accepted as defining attachment relations. Zilcha-Mano et al. created a Pet Attachment Questionnaire (PAQ) scale for measurement of the human-animal bond. The PAQ draws from self-report scales such as the Experiences in Close Relationships-Revised (ECR-R), with two subscales assessing avoidance and anxiety (Fraley, Waller & Brennan, 2000). Confirming the reliability of the measure, they found that the two dimensions aligned in theoretically expected ways with other psychological measures. For example, anxious pet-owner attachment was directly correlated with stress. Avoidant attachment was inversely correlated with extraversion (Zilcha-Mano et al., 2011a).

Stress has been defined in terms of reactions by humans to external and internal stressors (Jerhmaridian, 2008). Stress has been seen from a biological perspective as a physical response to stimuli from the environment, and one that can be measured by indicators such as blood pressure or susceptibility to disease (Cohen et al., 1983; Cohen, Tyrrell, & Smith, 1993). Cohen et al. (1983) conjectured that stress could be regarded

subjectively by individuals. A definition of perceived stress was developed as the subjective evaluation of an individual's abilities to cope with the demands of events or encounters and their emotional reaction to that evaluation (Cohen et al, 1983; Cohen & Wills, 1985). A common scale of stress, the Perceived Stress Scale (PSS) was developed in response to Cohen et al.'s (1983) speculation that individuals' perceptions could trigger different stress reactions to the same life events. The aspect of social support is a factor in stress (Cohen & Wills, 1985). Social support is a factor, which is believed to cause differentiation of stress responses, and social supports have been shown to offset the effects of stress (Cohen & Wills, 1985).

Researchers have examined stress and attachment in the human-pet bond (Kurdek, 2008, 2009a, 2009b; McConnell et al., 2011; Peacock et al., 2012). Kurdek (2009b) found that pet owners were more likely to go to pets instead of best friends and other family members during stressful events. Pets have been seen to provide stress relief through closeness and proximity to their owners (Zilcha-Mano et al., 2012). Pet owners enjoy overall greater wellbeing in association with owning of a pet (McConnell et al., 2011). McConnell et al. (2011) observed specifically social support derived from pets and other human attachment figures, utilizing the Inclusion of Self in Others Scale (IOS Scale; Aron et al., 1992). The IOS was administered up to four times, for four categories of parents, closest friends, siblings, and pets, along with a set of questions specifically for the study, using the same four categories (parents, closet friend, siblings, pets) indicating how much social support the subject perceived they received from each target. Pet owners were found to derive as much social support from pets as from human attachment

relationship. Support from pets was also found to be positively associated with greater social supports derived from human relationships (McConnell et al., 2011).

Alleviation of stress through interaction with a therapy animal has been shown in studies of animal-assisted therapy (AAT) and in studies of animals in other types of therapeutic settings (Geist, 2011; Plass, 2010). Pets have been shown to influence physical symptoms of stress. Pets can help lower blood pressure as a person holds or strokes a pet, or interacts with a pet through daily activities, such as walking (Kruglikova, Robertson, Hanson, & MacLin, 2008; McCune et al., 2014). Investigators into the human-animal bond find that pets may play a role in the moderation of stress for pet owners (Barker, 2008; Walsh, 2009a, 2009b). Attachment theory serves as a framework for various relationship types, including infant and caregivers as well as adult relationships (Fraley & Shaver, 2000; Richard & Shat, 2011; Tasca et al., 2011). The attachment framework has also been evoked in studies examining the pet and owner bond (Kurdek, 2008, 2009a, 2009b; McConnell et al., 2011; Zilcha-Mano et al., 2011a, 2011b, 2012). These areas are considered more thoroughly in the next chapter.

### **Research Questions**

Previous investigators have examined benefits that pet owners may derive from companion animals. Questions, which were considered here, include attachment bonds between owners and pets (Kurdek, 2009a, 2009b; Zilcha-Mano et al., 2011a; 2012) and reduction of stress for pet ownership (Kurdek, 2009; McConnell et al., 2011). This study addressed the following research questions:

**Q1.** Is pet owners' perceived stress associated with the strength of the human-animal bond?

**Q2.** Is pet owners' perceived stress associated with attachment anxiety?

**Q3.** Is pet owners' perceived stress associated with attachment avoidance?

**Q4.** Does attachment style moderate the relationship between the human-animal bond and stress reduction?

### **Hypotheses**

**H1<sub>0</sub>.** There is no effect of the strength of the bond on perceived stress when controlling for anxiety and avoidance.

**H1.** There is an effect of strength of the bond on perceived stress when controlling for anxiety and avoidance.

**H2<sub>0</sub>.** There is no effect of anxiety on perceived stress when controlling for strength of the bond and avoidance.

**H2.** There is an effect of anxiety on perceived stress when controlling for strength of the bond and avoidance.

**H3<sub>0</sub>.** There is no effect of avoidance on perceived stress when controlling for strength of the bond and anxiety.

**H3.** There is an effect of avoidance on perceived stress when controlling for strength of the bond and anxiety.

**H4<sub>0</sub>.** There is not a moderating effect of anxiety and avoidance on the relationship between strength of the bond and pet owner stress.

**H4.** There is a moderating effect of anxiety and avoidance on the relationship between strength of the bond and pet owner stress.

### **Nature of the Study**

The relationship between stress in pet owners and attachment style of the owner is addressed in the following pages. Wellbeing and stress in relation to pet ownership has been examined in prior research (Kurdek, 2008, 2009a, 2009b; McConnell et al, 2011; Zilcha-Mano et al., 2011a, 2012). The complexity of relationship between stress and pet ownership were examined here by measuring anxious and avoidant attachment in pet owners. Previous studies of attachment and pets have been incomplete in considering the relationship of attachment style to pet ownership. In this study, attachment style and the moderation of stress in pet owners were addressed, with a focus on the moderating effect of attachment style in alleviation of everyday stress. Attachment anxiety and avoidance have been connected to pet ownership in previous studies. However, the research has been inconclusive in determining the effect of attachment style and how this may affect strength of the attachment bond (Zilcha-Mano et al., 2011a, 2012).

A quantitative approach was appropriate for this study. While new questions, or questions based upon local practices or constituencies, are often generated from qualitative studies, the hypotheses for this study are developed based upon data from previous studies, and from questions asked in prior research (Arcidiacono, Procentese, & Di Napoli, 2009). Established measurement instruments are available, and include the Pet Attachment Questionnaire (Zilcha-Mano et al., 2011a), the Pet Relationship Questionnaire (Winefield, Black & Chur-Hansen, 2008), and the Perceived Stress Scale (Cohen et al., 1983). Quantitative methods were appropriate to acquire data from the population in the sample, as participants were drawn from a large survey database, and the sample was large enough to generalize any conclusions. This study survey was made

available online, on a national survey database, and was available to potential participants regardless of geographic location. A quantitative approach was appropriate for gathering of data from a representative sample, allows for testing and validating data from a large sample size, and in addition allows for the generalization of data (Arcidiacono et al., 2009).

Researchers have attempted to demonstrate correlation between pet ownership and the wellbeing of pet owner (Kurdek, 2008, 2009a, 2009a; McConnell et al., 2011). Investigators examining specific populations have found connections between human wellbeing and pet ownership (Chur-Hansen, Stern & Winefield, 2010; Peacock et al., 2012). A long-term connection between physical health and the presence of a companion animal has been seen in longitudinal studies (Friedmann & Thomas, 1995; Friedmann et al., 2013). A correlation has been indicated in data from national surveys between the wellbeing of pet owners and the presence of a companion animal in the household (Headey & Grabka, 2011; Wagner, Frick & Schupp, 2007). The goal of this study was to confirm research questions in this area of inquiry and to provide a foundation for future quantitative studies of the effects of human and pet attachment. It is important to study how pets may provide security and assist in relieving stress through an attachment bond between owner and pet.

### **Significance of the Study**

The results from this study may be applied to different populations and studies, which examine the relationship of anxiety and avoidance in attachment. Overall, the results can be applicable to the human-animal bond and attachment. A particular area of investigation was the relationship of attachment between pet owners and pets to overall

wellbeing in pet owners. The outcome of this study may be applicable to the complexity of the pet and owner relationships and how it relates to wellbeing for human pet owners. How individual indications of high anxiety/high avoidance, or low anxiety/low avoidance can limit effectiveness of the pet and owner relationship were considered, as it applies to owner reduction of stress.

Knowledge of attachment style in the pet and owner bond can be useful for clinicians and those who work with pets in therapy. Owning a pet and/or having a relationship bond with a pet, has not been consistently acknowledged by practitioners working with patients and clients in therapeutic settings (Geist, 2011; Plass, 2008; Walsh, 2009a, 2009b). How attachment style and pets affect stress in owners can be applied, for example, in work with elders or other vulnerable populations. Knowledge of the pet and human bond may assist those who work with pet owners to effectively address or implement aspects of the pet relationship into therapy with a client or patient (Jasperson, 2010; Plass, 2008).

### **Definition of Key Terms**

**Attachment Element.** Four elements are present in a relationship classified as an attachment bond (Ainsworth et al., 1978). In general, proximity maintenance and separation distress express needs for nearness to an attachment figure, and distress upon absence from the attachment figure. Safe haven and secure base focus on distress alleviation and security connected to the attachment figure (Ainsworth et al., 1978). Separation distress and proximity maintenance are categorized as caregiving behaviors. Safe haven and secure base are categorized as attachment behaviors. The ability to

obtain safe haven and secure base are seen as central to establishment of an attachment relationship (Bell & Howard, 2000; Kurdek, 2008).

**Attachment Style.** Attachment styles refer to the ways in which attachment bonds occur. These are enacted from internal working models of attachment, which become enacted with relationship partners. These styles include four styles of attachment: secure attachment, insecure attachment characterized by either anxious and avoidant attachment, and a fourth style exhibiting both anxious and avoidant features (Bartholomew & Horowitz, 1991; Fraley & Shaver, 2000, 2010).

**Human-Animal Bond.** The bond between human and animal, referred to as the human-animal bond (HAB), is a beneficial and interactive relationship that can confer psychological, social, and physical benefits (Gillum & Obisesan, 2010; Walsh, 2009a, 2009b).

**Proximity maintenance.** Proximity maintenance represents a longing to be close to an attachment figure. In general, having the attachment figure near and accessible is desired (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991; Mikulincer & Shaver, 2012).

**Safe haven.** Safe haven refers to a returning to the attachment figure for safety in fear. The attachment figure is looked for assurance and contact during stress (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991; Mikulincer & Shaver, 2012).

**Secure base.** The figure of attachment provides a secure base from which to explore outside the attachment relationship. The attachment figure is regarded as a source of comfort that can be depended upon and who alleviates stresses associated with exploration (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991).

**Separation distress.** A separation which incites a reaction of distress, and which happens when an attachment figure disappears. Being separated from the attachment figure ends in negative outcomes such as anxiety upon separation (Ainsworth et al., 1978; Bartholomew & Horowitz, 1991).

**Stress.** Stress is the range of responses an organism has to stimuli that disrupt its balance and exceed its capability to deal with (Cohen & Janicki-Deverts, 2012). For this study, the aspect of stress that was considered is perceived stress. Perceived stress is considered the subjective perception of stress (Cohen et al., 1983).

### **Summary**

Pets serve an increasingly important role in modern life, with pet owners considering companion animals as very important parts of their lives. Pet owners often consider pets to be additional family members or significant members of the household (Barker et al, 2008; Walsh, 2009a; 2009b). Benefits, which owners may derive from pet ownership, include physical health, psychological health, and overall wellbeing (Kurdek, 2008, 2009a, 2009b; McConnell et al., 2011; Zilcha-Mano et al., 2011a, 2012).

Attachment theory, developed by Bowlby (1958; 1973), has been applied to the relationship between infants and primary caregivers. Attachment categories include secure, insecure, fearful, and avoidant, with fearful incorporating elements of both anxious and avoidant attachment. The theory has been applied to several types of other attachment relationships, including romantic relationships (Hazan & Shaver, 1987; Fraley & Shaver, 2000; 2010) as well as other significant life figures (Beck & Madresh, 2008; Kurdek, 2008). Researchers delving into the human-animal bond have addressed pets serving as attachment figures (Kurdek, 2008, 2009a, 2009b), and the types of attachment

functions the pet may serve (Zilcha-Mano et al., 2011a, 2012). The moderation of stress in pet owners and how this relates to pet ownership are a focus of this study. While college populations and specific clinical and community populations have been featured in previous studies of attachment style and pet ownership, participants for this study were drawn from a national survey database, available without geographic restriction. This assisted in ensuring that data is generalizable to the population and that results are not based upon local practices.

## **Chapter 2: Literature Review**

The purpose of this study was to investigate the connection between attachment style, pets and owners, and stress. Features, which characterize attachment, include safe haven, proximity maintenance, and separation distress (Connors, 2011; Ainsworth et al., 1991). Attachment style refers to the degree to which anxious or avoidant attachment is expressed in attachment relationships. Attachment style may determine how well a companion animal can serve as an attachment relationship, and whether a companion animal can serve as a source of safe haven (Zilcha-Mano et al., 2011a, 2011b, 2012).

The historical development of adult attachment theory and the theoretical development of the attachment framework are presented in the first section of the literature review. An overview of research on attachment as applied to the pet and owner bond is presented in the next section. An overview of the research examining the effects of pet ownership on physical and mental well-being and the effects on stress are presented in the next section. The chapter ends with a survey of research related to adult attachment and attachment in the pet-owner relationship.

### **Documentation**

The literature search strategy began with a broad search using the keywords: attachment, adult attachment, human-animal bond, stress, physiological stress, as well authors of relevant studies and theoretical works. Searches were performed with an open date range, and after the initial exploratory searches were completed, the date range was narrowed to the past five years. Databases used included initial searches in the Roadrunner Discovery Service, available at Northcentral Library's start page. From there, searches were narrowed to specific databases, which included ProQuest,

EBSCOHost and PsychArticles. Databases also used included SAGE Journals Online, RefWorks for relevant chapters from reference works and Gale Academic ONEfile for additional article searches. Citations from primary articles used for the Concept Paper were mined for additional sources. Google Scholar provided links to full-text articles and citations not available in Northcentral library databases. Books were available as downloads and from Interlibrary Loan.

### **Attachment Theory**

Investigators in attachment theory describe patterns of relationships developed in childhood. These patterns were initially described by Bowlby (1958; 1973) and investigated by Ainsworth (Ainsworth et al, 1978; Ainsworth, 1991) as structured ways of interaction between infants and caregivers (Bowlby, 1958; 1973; Carr & Rockett, 2013; Conners, 2011). The concept of safe haven, or a safe place in case of threat, and a secure base, or place to return to after exploration, structure the ways in which infants and children explore their immediate environment and result in patterned ways of interacting with caregivers and other significant attachment figures (Ainsworth et al., 1978; Bowlby, 1958, 1969).

Bowlby (1958; 1969; 1973) described an attachment system in which goal-directed behavior leads a person (child or adult) to progress towards a goal of proximity and security with an attachment figure. A complex processing of information, monitoring responses, and appraising the usefulness of attachment behaviors takes place with adjustment of behaviors as needed by the individual seeking attachment. This process becomes a model of attachment for the individual, which Bowlby formulated as the internal working model of attachment. The formulation of the model involves both

knowledge of the individual's own behaviors, as well as the details of his environment and of the attachment figure. To summarize, the working model includes working models of others and a working model of self, and encompasses expectations about the self and connections to others (Carr & Rockett, 2013; Connors, 2012; Fraley & Shaver, 2010; Mikulincer & Shaver, 2012). Although the models can change with new input, these are carried across the life span, and eventually become fairly stable models of attachment relationships.

Ainsworth initially developed a framework to describe attachment, based on the work of Bowlby, termed the *Strange Situation* (Ainsworth et al., 1978). This framework developed from the observation that “in normal development, children show distress on separation from an attachment figure, but are quickly comforted on reunion” (Connors, 2011). In essence, the *Strange Situation* involved bringing an infant and caregiver together, then introducing a stranger with the absence of the caregiver. The caregiver is then reintroduced, and the reactions of the infant are gauged to both the presence of the stranger and of the caregiver (Ainsworth et al., 1978; Ainsworth, 1991).

Three distinct patterns of interaction emerged through observation of infants with caregivers. Securely attached infants sought reassurance from attachment figures when distressed, expressed distress upon absence of the caregiver, and engaged in independent exploration with the attachment figure as a secure base. Infants with avoidant attachment distanced themselves from their attachment figure, showed little interest in the reappearance of the primary caregiver after the introduction of a stranger, but as with secure infants, also engaged in exploration of their environment. Infants with anxious attachment did not engage in exploration, but clung to caregivers, yet were not

comfortable with or rejected primary attachment figures after an absence (Ainsworth et al., 1978).

The scenario has been used to extend the attachment framework to other relationships beyond the primary caregiver (Kurdek, 2008, Zilcha-Mano et al., 2011a). Assumptions of attachment theory include that the attachment framework formed with primary caregivers is repeated in interactions with other relationship partners as adults. Mikulincer and Shaver (2007, 2010, 2012) developed a model to express the pattern of attachment seeking behavior in adults, encompassing the original work of Bowlby (1958, 1973, 1980) and Ainsworth et al. (1978; 1991), and the development and refinement of previous work on attachment models (Bartholomew & Horowitz, 1991; Fraley & Shaver, 2010) with the large body of research literature developed since the theoretical writings of Bowlby and Ainsworth et al. (Chopik, Edelstein & Fraley, 2013; Connors, 2011; Mikulincer & Shaver, 2007, 2012). Activities of monitoring and appraising of threats are the first step of the model, and the working model then is seen to activate the attachment system. The second aspect deals with assessing the availability of the attachment figure. This is related to individual differences in security and correlates of secure attachment. The third aspect relates to proximity seeking as a strategy to deal with attachment insecurity. Here, the choice is presented to use either a deactivating or hyper activating strategy to cope with insecurity.

The choice to use one of these strategies, either hyper activating or deactivating, is often unconscious and related to internal models which serve as structures for attachment behaviors. All steps in this process can be responsive to context, as well as personality traits. Changing information about attachment figure availability affects all

steps of the process; in an example, a chronically anxious person reminded of supportive behavior by an attachment figure can feel temporarily more secure, and will behave accordingly (Connors, 2011; Mikulincer & Shaver, 2007, 2010, 2012).

***Framework of attachment.*** Ainsworth originally visualized attachment as a three-category typology through observations of infants and caregivers (1991). In the research of Bartholomew & Horowitz (1991) attachment features were described with a four-category typology, coalesced generally around four categories envisioned by Bowlby (1958, 1973). These categories included safe haven, separation distress, proximity maintenance, and secure base. Safe haven relates to the attachment figure providing protection in times of need. Secure base refers to an attachment figure allowing exploration while serving as a basis for attachment. Proximity seeking refers to seeking out the attachment figure in times of need. Separation distress refers to distress upon separation from the attachment figure. These four elements are present generally in relationships described as an attachment relationship. It is important to recognize that not all social relationships are considered attachment relationships displaying identifiable features of attachment.

Generally, categorical assessments of attachment are composed of three or four features (Bartholomew & Horowitz, 1991; Fraley & Shaver, 2000; Hazen & Shaver, 1987). Shi, Wampler and Wampler (2013) discuss the development of self-report attachment measures, and state that there is a wide variety of self-report measures available, including measures incorporating both the three category (Attachment Style Prototype, Hazan & Shaver, 1987) and four category models (ECR, Brennan, Clark & Shaver, 1998; ECR-R, Fraley, Waller, & Brennan, 2000).

Some researchers have followed the three-category model of Ainsworth, such as Hazen and Shaver (1987) who developed a three category typology including secure, avoidant and anxious/ambivalent, as a measure of romantic attachment, and Collins and Read (1990), who established a three scale measure based upon Hazen and Shaver's work (Shi, Wampler & Wampler, 2013). However, Bartholomew and Horowitz (1991) developed four attachment styles based on the earlier work of Bowlby (Bowlby, 1973), arguing that these captured the original conceptual view of the self and others developed by Bowlby. The four-element typology developed by Bartholomew and Horowitz (1991), included the three elements of Ainsworth's typology of secure, anxious/resistant, avoidant, with the addition of a fourth category of disorganized/anxious. The fourth element was seen as the most extreme and represents a breakdown in the attachment bond, with no clear organizational pattern for a child's attachment to an attachment figure (Bartholomew & Horowitz, 1991; Fraley & Shaver, 2010).

Investigators in adult attachment research have focused on romantic attachments as a particular area of concern (Fraley, 2010; Fraley & Shaver, 2000; Hazan & Shaver, 1987). Hazan and Shaver (1987) continued earlier research by Weiss (as cited in Bartholomew & Shaver, 1998, p. 26) in describing romantic relationships as attachment bonds. They speculated that chronic loneliness experienced by adolescents and young adults were associated with insecure attachment and that the loneliness was due to lack of success in obtaining a romantic relationship. Hazen and Shaver conceptualized not only that the features of attachment can be used to describe adult romantic attachments, but that the attachment styles of adults were a development of previous attachment experiences. Citing research into romantic love, they surmised that aspects of romantic

attachments exhibited the same patterns as those of infants and parents, and they adapted Ainsworth's categories as a framework for differences in the behaviors seen in romantic attachments (Bartholomew & Shaver, 1998).

*Attachment dimensions.* While earlier researchers investigated attachment through categorical assessment of attachment, Bartholomew & Horowitz speculated two orthogonal dimensions on a continuous scale, and the researchers were able to distinguish two distinct dimensions of anxious and avoidant attachment that do not overlap (1991). Categorical attachment attributes tended to be mutually exclusive and arbitrary, while dimensional differences in attachment could occur incrementally (Shi, Wampler & Wampler, 2013). Researchers in the application of attachment theory to adult relationships have shown that attachment can be described by a dimensional attachment framework more specifically than a categorical assessment of attachment to explain activation of attachment strategies (Mikulincer & Shaver, 2012; Fraley & Shaver, 2010; Wei, Russell, Mallinckrodt & Vogel, 2007). An individual position on the attachment scale indicates a degree of anxiety or avoidance in attachment relationships (Chopik, Edelstein & Fraley, 2013; Mikulincer & Shaver, 2012). An anxious attachment can activate hyper vigilant behaviors in attempts to secure attachment from an attachment figure. A position on the avoidance dimension indicates avoidance of attachment and distrust of relationship partner's intentions, and a striving to maintain independence from relationship involvement (Mikulincer & Shaver, 2007).

Individuals who are anxiously attached possess a negative view of self, which results in hyper activating strategies such as over dependence or over reaction to cues presented by others. Individuals who are avoidant tend to view others as unavailable or

unresponsive. This, in contrast to anxious strategies, leads to deactivating strategies, including denying a relationship and avoiding emotional closeness (Mikulincer & Shaver, 2012). Those who have low levels of both tend to be securely attached, and able to negotiate stresses in interpersonal relationships.

Fraley and Shaver (2010) provided a visual referent for attachment along a two-dimensional scale, in which scores are assigned along a dimension with secure attachment, avoidant-insecure attachment, anxiety-insecure attachment, and anxious-avoidant attachment assigned to four quadrants around an axis. The four quadrants represent areas of high avoidance/high anxiety (anxious-avoidant), low avoidance /low anxiety (secure), high avoidance /low anxiety (avoidant), high anxiety/low avoidance (anxious). For example, anxiety or avoidance may manifest along a continuum, with someone exhibiting low avoidance but high anxiety, placing them in the upper right quadrant between low avoidance and anxiety (Fraley & Shaver, 2000; 2010). Fraley and Shaver (2010) also incorporate the four types of Bartholomew and Horowitz (1991), which are secure, fearful, preoccupied, and dismissing, in the quadrants. These align with Fraley and Shaver's quadrants with secure positioned between low avoidance and anxiety, preoccupied between high anxiety and low avoidance, fearful between high avoidance and high anxiety, and dismissing between high avoidance and low anxiety.

Measures of two-dimensional anxiety and avoidance as indicative of insecure attachment were developed from the initial work of Brennan, Clark and Shaver (1998). Brennan et al. (1998) examined a large pool of 482 items taken from prior self-report measures for attachment. From these, items were reduced to 323 items, which measured 60 different attachment constructs. By factor analysis of the 60 subscales, anxiety and

avoidance emerged as independent categories of attachment, in an orthogonal relationship.

A commonly used self-report scale for attachment along the dimensions is the Experiences in Close Relationships (ECR) first created by Brennan, Clark, and Shaver (1998) and further developed by Fraley, Waller, and Brennan (2000) as the Experiences in Close Relationships Revised (ECR-R). The availability of secure attachment to relationship partners and the perceived responsiveness of partners and perceptions are indicated by the scale (Fraley, 2000; Hazan & Shaver, 1987). Both the ECR and the revised version, the ECR-R, include 18-item subscales of avoidance and anxiety, focused on romantic relationships. The ECR and ECR-R draw from the same pool of responses; in general, the measures are seen as fairly identical (Fraley, 2012). The ECR-R is often used to measure romantic attachment. Another use of the measure is to research the correlation of attachment with appraisal of social support by subjects (Ravitz, Maunder, Hunter, Sthankiya & Lancee, 2009). Shi et al. (2013) compared two measures of attachment, a three-category measure, with the ECR, in a study of romantic attachments among 448 undergraduate students, and found that the ECR a more robust measure, with better predictive power.

However, the orthogonal relationship of anxious and avoidant attachment has been questioned by Cameron, Finnegan and Morry (2012) who examines the ability of the ECR and the ECR-R to distinguish between anxious and avoidant attachment as orthogonally related. Anxious and avoidant attachment may not be equivalent variable, as Cameron et al. (2012) point out that Fraley and Shaver (2000) suggest anxiety may serve a monitoring function, and that avoidance could be a behavioral adjustment

response. Cameron et al. (2012) found more correlation between the two orientation on the ECR-R, thus the ECR was found to more accurately distinguish between anxious and avoidant attachment than the ECR-R, where the two dimensions were more positively correlated.

Attachment anxiety, avoidance, and attachment insecurity has been an area of inquiry related to a range of mental disorders (Connors, 2011; Ein-Dor, Doron, Solomon, Mikulincer & Shaver, 2010; Levi & Ellison et al., 2011; Liotti, 2011; Mikulincer & Shaver, 2007, 2012). Attachment theory as a theory of lifespan development serves as a framework for incorporation into a therapeutic program of treatment for many types of mental conditions (Connors, 2011). In a representative study, Tasca et al. (2011) examined eating disorder patients within an attachment framework, and found that completion of a treatment program for eating disorders may be predicted by insecure attachment, and that patients who exhibited anxious attachment were more likely to complete treatment than those exhibiting avoidant attachments. Tasca et al., (2011) found patients responded to therapies for eating disorders in predicted ways based on their attachment in relationships. Higher levels of attachment avoidance were seen in patients who quit therapy for the disorder, versus highly anxious attachment patterns, which predicted the patient would remain in treatment. Attachment relationships form the basis for behaviors in workplace and school. Richards and Shat (2011) examined workplace relationships using attachment theory, and found that attachment anxiety and avoidance predicted workplace behaviors such as intention to leave, and supervisory reports of poor citizenship behavior and lax work behavior. Higher levels of attachment anxiety, measured by the ERS, a revised version of Brennan et al.'s (1998) scale, were

associated with higher levels of anxiety behaviors such as emotional support seeking and increased intentions to quit the organization.

### **Attachment and Pets**

While attachment as a framework for relationships has been applied to human bonds, researchers developed the premise that bonds between human and animal could be classified as attachment relationships (Amion & Bastet, 2015; Kurdek, 2008; McConnell et al., 2011; Zilcha-Mano et al., 2011a, 2011b, 2012). Barry Levinson (1965, 1969) was among the first who studied the benefits of contact between children and animals in a therapeutic setting. Levinson, a child therapist, discovered that a mentally impaired young patient benefited from interaction with his dog, Jingles, during therapy sessions where the dog was present. Levinson speculated that proximity to an animal allowed children and youth therapy patients to develop trust and emotional connection free from possible pitfalls of human connection. From there, Levinson began incorporating his pet dog in therapy sessions with children and youth. While attachment theory was not actively invoked as a framework, Levinson (1965, 1969) cited the work of Bowlby in relation to the animal and human connection and the perceived benefits experienced by his patients. Rynearson (1978) referenced etiologic work on similar bonding behaviors exhibited by humans and animals. Crawford, Worsham and Swinehart (2006) first proposed the use of “attachment” to refer to the human-companion animal bond, and that this may share features with bonds between humans. Carr and Rockett (2013) discuss multiple frameworks, which may exist for attachment. Attachment frameworks may constitute “an attachment ‘hierarchy’ or ‘network’ of individuals that are each perceived to perform attachment functions ...” (p. 4). Individuals may develop an internal working

model of attachment based upon multiple attachments, or develop multiple models of attachment based on several attachment relationships.

While a focus of researchers was the parent and infant bond, the attachment framework was applied to other relationships outside the primary attachment bond (Hazen & Shaver, 1987; Bartholomew & Horowitz, 1991). Romantic figures, other family members and friends emerged as areas for attachment research (Fraley & Shaver, 2000; Hazen & Shaver, 1987). To examine what other figures might represent attachment figures, researchers employed open-ended ranking scales (Doherty & Feeney, 2004; Trinke & Bartholomew, 1997) in exercises where participants were asked to identify those most close to them. Trinke and Bartholomew (1997) used an open list-and-rank exercise with college students who listed those freely with whom they had a strong emotional tie. Several types of attachment figures were established, and each figure was then rank ordered for the four features of attachment. Doherty and Feeney (2004) followed a similar procedure with a community sample of adults aged 16-90 years, while also looking at strength of attachment for six listed attachment figures. Tancredy and Fraley (2006) constructed a rating scale with listed attachment figures including siblings, mothers, fathers, romantic partners and friends.

Researchers adapted measured scales for human and romantic attachments for study of the human-animal bond. Beck and Madresh (2008) adapted measures developed for human relationships, including the Relationship Questionnaire (RQ, Bartholomew & Horowitz, 1991) and the ECR-R (Fraley, Waller and Brennan 2000), and posed the question of whether measures developed for human bonds can be adapted for bonds between pet and owner. Issues that arose included changing the questionnaires to a

different target of an attachment relationship with pets. Some modifications that Beck and Madresh made to the measures included changing of wording, eliminating redundant items, and for the ECR-R, shortening each of the two 18-question scales measuring attachment anxiety and avoidance down to eight items each. They removed items based on item loadings with each scale (Sibley & Liu, 2004), and by the item relevance to the owner and pet relationship. Thus items were removed that did not focus on a particular relationship, such as “I worry a lot about my relationships”. Items were reworded to reflect the pet relationship, including a central item to the scale, “I often discuss my problems with my partner,” was reworded to reflect the pet relationship. They also followed Fraley et al. (2000) recommendation to balance the scales with both insecure and secure items in wording by reverse scoring.

Beck and Madresh (2008) then compared the relationships of pets and romantic partners from 192 web-based respondents. The measures were found to be consistent with the structure of insecurity for both pet and human attachment relationships, and they also found that insecure attachment was similar for pet attachments as for human attachments. Correlations of pet and human scales supported that attachment styles were not determined by personality traits of owners. If this were the case, behaviors would be expected to be consistent across relationship domains. However, patterns of anxiety and avoidance were not consistent for human and pet relationships.

Beck and Madresh (2008) also found that ratings of pet relationships did not strictly correlate with human relationships. They found that relationships with pets were found to be more secure. They speculate that a relationship with a pet may represent a controllable source of secure relationships, one in which human partners can expect a

consistent source of support. They concluded that attachment measures would be useful in examining the pet and owner relationship and how this may affect other aspects of the owner life, such as buffering negative human behavior

Kurdek (2008) proposed that pet dogs, in addition to human attachment figures, could serve as attachment figures. In the first of a series of studies, Kurdek examined how dogs fit the features of an attachment figure in four distinct samples of college students. Participants, who were dog owners, were asked about closeness of attachment figures (Sample 1), dog caregiving and personality (Sample 2), rating of dog and their own personality from the NEO Five-Factor Inventory (Costa & McCrae, 1989) (Sample 3), and rating of dog and attachment style from the ECR (Brennan, Clark & Shaver, 1989) (Sample 4). Kurdek found that dogs fit the four features of attachment, and that some aspects of the attachment bond between human and pet were based on the caregiving role, which allowed for an attachment bond to develop between human and pet.

Beck and Madresh (2008) and Kurdek (2008) established the pet as an attachment connection, and that attachment measures could be adapted to examine the owner-pet bond. Other researchers have examined attachment and the human-animal bond associated with attachment style, personality, social support, loneliness and depression. Antonacopoulos and Pychyl (2010) looked at attachment and pets in a sampling of 132 dog and cat owners, and found that pet attachment interacted with social support derived from humans; high social support and high attachment for dog owners was correlated with low loneliness and depression, whereas high attachment but low social support from humans was correlated with reported higher depression and loneliness.

Researchers have examined wellbeing and social support provided by pets (McConnell et al., 2011). McConnell et al. examined overall wellbeing and personality features of pet owners from a community sample, and compared them to non-pet owners. Social support and wellbeing connected to pet ownership were measured with instruments including individual differences in personality (including personality and attachment style), and other measures of social support. Using a measure developed by Bartholomew and Horowitz (1991), four categorical attachment styles were measured (secure, fearful, preoccupied, and dismissing). Using the four-featured frame employed by Bartholomew and Horowitz, the subjects were asked to select the style they felt described their own view of relationships (categorical), and in addition select from a continuous scale of 1 (not at all) to 9 (completely true) describing their own view of relationship attachments.

While McConnell et al. (2011) did not focus on attachment specifically, but as associated with general wellbeing, non-pet owners were shown to demonstrate higher scores on fearful or preoccupied attachment than pet owners. Pet owners demonstrated greater wellbeing, healthier personality features and also demonstrated attachment styles less negative towards image of self, in that they are less fearful or preoccupied. Findings also included that humans derived benefit from the pet and owner attachment relationship independently from other human sources of social support, and that those who experienced bigger benefits from their animal pets also enjoyed closer bonds to human attachment figures (McConnell et al., 2011).

It was found that pet owners demonstrated more secure attachment, but in examining mean differences between pet owners and non-owners, dismissive attachment

style was scored more highly for pet owners than non-pet owners. Whereas the dismissing style in human relationships can be negatively construed and indicative of isolation and avoidance of relationships, in this study the style was correlated with positive personality qualities such as openness or agreeableness. McConnell et al. (2011) explained this as a positive indication of pet owner personality, and indicative of pet owners' ability to "take or leave" human relationships due to greater social support derived from owning a pet.

*Safe haven and pets.* The development of safe haven and secure base are seen as integral for a child to form stable attachment, and these are also central to distinctions that are made in attachment theory, in distinguishing between an attachment relationship and a caregiving relationship (Bell & Richard, 2000; Kurdek, 2008; Ein-Dor et al., 2011; Mikulincer & Shaver, 2012). Kurdek (2008, 2009a, 2009b) and Zilcha-Mano et al. (2011a, 2011b, 2012) examined whether a pet could serve as a source of safe haven, seen as crucial to establishing a relationship as an attachment relationship. Kurdek (2008, 2009a, 2009b) distinguished between developments of safe haven and secure base, or behaviors devoted to attachment and caregiving behaviors of separation distress and proximity maintenance. Separation distress and proximity maintenance are distinguished as characteristic of caregiving bonds, while for an attachment bond to exist, the features of safe haven and secure base should be present in a relationship.

Kurdek (2008) developed a 16-item measure adapted from several attachment measures, and used with four college-aged samples in the study, to determine the ability of pet dogs to provide the four features of attachment, in comparison to five human attachment figures. The four samples were given Kurdek's measure, measures of pet

attachment and personality (the NEO Five-Factor Inventory), and measures evaluating pet dog personality. Kurdek found that the students ranked secure base and proximity maintenance as the most salient features of attachment. Stating that the finding regarding secure base was new to this study, Kurdek concludes that dogs can provide attachment bonds with their owners. Kurdek (2008) also examined the human-dog bond by owner perceptions of dog personality, using items from the Dog Personality Questionnaire (DPQ; Gosling, Kwan, & John, 2003), with items written for the study. Kurdek (2008) discovered that dog owners who ranked high levels of attachment to their dogs correlated with high levels of five personality features of the dogs, including intelligence, affection, energy, and emotional reactivity. Kurdek speculated, from the measures of dog personality included in the study that high levels of caretaking behaviors along with dog personality may predicate development of attachment, and that attachment may then provide motivation for continued caregiving behaviors for a pet.

Kurdek (2009a) conducted another study with two samples of college students from 18-25, a group that can be seen as reorganizing attachment ties and developing ties to those outside parents or family. Participants were taken from Introductory Psychology courses and received partial credit for participation (Sample 1,  $N=401$ , females = 289; Sample 2,  $N = 165$ , females=112). Kurdek looked again at attachment bonds distinguished from caregiving bonds, and asked participants to rank attachment figures. Participants ranked the four features of attachment for attachment figures listed in a five-item open ranking, and freely prioritized human or pet attachments that met the criteria for specific attachment features. For the first sample, participants were instructed to list the first name of up to five individuals or pets, ranked in order of likelihood they turn to

these figures. Then the participants were asked eight questions with two questions about each attachment feature, such as “Who do you talk to when you are worried about something?” The second sample ranked six human attachment figures for safe haven. A similar procedure was followed for sample two.

Kurdek (2009a) specifically wished to identify the degree to which pet dogs, over human attachment figures, were sought for safe haven. In this study, Kurdek found that safe haven was the least relevant of the four attachment features and that separation distress and proximity maintenance were highly ranked in association with attachment figures. However, from the second sample, participants preferred pets over fathers and brothers for safe haven, and were just as likely to go to pet dogs as sisters for safe haven.

Kurdek (2009b) further examined safe haven and pet ownership with a community sample ( $N=975$ ) who responded to a survey, publicized across the Midwest, using the same developed measure from the 2008 study, along with the Emotional Reliance scale (Ryan, LaGuardia, Solky-Butzel, Chirkov & Kim, 2005). Using both attachment figure and attachment feature as moderating variable in analysis of findings, Kurdek (2009a; 2009b) found that dog owners turned to their pet dogs for proximity maintenance over other attachment elements of safe haven, secure base or separation distress. Kurdek (2009b) also found in this study that participants rated safe haven as least salient of attachment features, and proximity maintenance was found to be the most outstanding attachment feature. However, dog owners reported that they turned to their dog for alleviation of stress over all human connections with the exception of romantic partners, even with safe haven the least salient of all attachment elements.

The heterogonous sample of this study is noteworthy, in comparison to the earlier studies where a college sample was used (Kurdek, 2009b). The heterogeneous sample ( $N = 975$ ) included single (14%) and married (64%) respondents, along with a predominance of female respondents (789 women and 186 men). The sample was also skewed towards owners with positive assessments of their dogs (Kurdek, 2009). Supporting the predilection towards proximity maintenance as a central feature of the pet and owner relationship, Antonacopoulos and Pychyl (2010), found that companionship was cited as the most significant aspect of pet ownership for both dog and cat owners, followed by physical activity, love and affection, thus indicating that physical proximity and closeness are important aspects of the pet and owner relationship.

Kobak (2009), in a critique of Kurdek's (2009b) study, examined caretaking versus attachment bonding, and the implications for attachment bonds to pets. Kobak (2009) referenced the variability of caretaking versus attachment behaviors seen in prior studies, and identified that measuring these constructs as an adult have not validated the safe haven and secure base framework of attachment that provides the basis for attachment in infant behaviors. While proximity seeking and separation distress are constructs of the attachment framework, they are also identified with other relationship constructs that are not attachment oriented.

According to Kobak (2009), adult needs for secure base and safe haven may become less primary than to infants, where these constructs of attachment are differentiated and readily observable behaviors, directed to a primary attachment figure. Bowlby and Ainsworth, in their original research with infants and children, stated that as children matured, becoming adolescents or teens, they might have fewer experiences that

will directly activate the attachment framework. In addition to less activation of attachment behaviors, adults may activate caregiving or proximity bonds separately from attachment behaviors. For adults, behaviors that are seemingly attachment behaviors may work independently, although in concert, with attachment systems. Adult attachment may be arranged according to hierarchical distinctions, which have not been systematically studied (Kobak, 2009).

Kwong and Bartholomew (2011) examined the role of caregiving versus attachment in a qualitative study of 25 participants, all of who lived with assistance dogs. The 25 participants in the study had previously experienced death of an assistance dog, and questions in interviews were directed to the relationship with the deceased assistance animal. The participants were recruited from two assistance dog-training institutions in Canada, with most relying upon an assistance dog for visual impairment, and three for ambulatory impairment. Kwong and Bartholomew identified three predominant themes emerging from interview questions, which supported the establishment of attachment behaviors between assistance dog and owner. Twenty-one of the 25 participants identified that the dog provided safe haven or a source of comfort during periods of stress. A feature particularly identified as salient was contact comfort, echoing the types of comfort found in physical contact between infant and caregiver.

Two other features of the bond identified less frequently but also salient, were secure base and separation anxiety (Kwong & Bartholomew, 2011). Thirteen of 25 respondents identified secure base as a feature of the dog and owner relationship, identifying the dog as supplying confidence and a base for exploration. Finally separation anxiety emerged as a significant feature of attachment between owner and

dog, with the majority of participants identifying separation from the dog as frustrating and cause for avoidance of situations where the dog could not be brought. However, participants also identified caregiving as an equally important dynamic for the assistance dog owners, imparting a sense of responsibility and purpose in caring for their dog, which assisted them in life activities. Kwong and Bartholomew (2011) speculate that attachment and caregiving are fundamental needs of humans, and thus relationships with other species can be used to fulfill these needs. Dogs in particular have been bred over thousands of years to bond with humans, and thus a relationship with a dog may provide ideal conditions for bonding between human and animal.

***Dimensional attachment and pets.*** Dimensional models of attachment can be described as a continuum from anxiety to avoidance (Brennan, Clark, and Shaver, 2000). Attachment is seen as two-dimensional and continuous along a scale, rather than a categorical, discrete assignment of attachment style. Zilcha-Mano et al. (2011a) examined how pets can serve as attachment figures, with a goal of developing a dimensional scale to measure pet owner attachment. Zilcha-Mano et al. incorporated a dimensional framework of attachment, basing the development of the Pet Attachment Questionnaire (PAQ), on validated measures of attachment. These measures include the ECR-R (Fraley, Waller, and Brennan, 2000), and the Adult Attachment Interview (Collins & Read, 1990). The dimensional model of anxious and avoidant attachment are incorporated into each measure. Zilcha-Mano et al. included two subscales in the PAQ to assess the two main dimensions of insecure attachment in pet owners towards their pets, and the measure was developed for all pet types, in addition to dogs. The subscales capture the degree of anxiety or avoidance owners feel in the pet relationship. One

subscale for anxiety measures the degree to which owners feel heightened fears about something happening to their pet, intense need for nearness to the pet, or doubts about their value in regard to their pet. The other subscale measures avoidance, or the degree to which owners feel uncomfortable with emotional or physical closeness with their pet. Zilcha-Mano et al. found that the two subscales were associated with expected theoretical constructs, such as psychological distress and extraversion, in that distress was positively linked with anxious attachment, and extraversion was negatively linked with avoidant attachment.

As part of a subsequent study utilizing the PAQ, Zilcha-Mano et al. (2012) incorporated an experimental situation with subjects ( $N=120$ ) who completed a stress-inducing task followed by a goal-setting task, with subjects divided into three groups in which one had their pet present, one in which the pet was thought about but not present, and a control group with no pet present physically or cognitively. Zilcha-Mano et al. discovered that subjects with the pet physically or cognitively present experienced lower systolic and diastolic blood pressure measured during the task. Subjects in the third control group did not demonstrate significantly lower blood pressure. This was correlated with anxious and avoidant attachment for those who had the pet present in the two groups through scores on the PAQ. It was found that subjects exhibiting anxious attachment demonstrated lower blood pressure, while those reporting avoidant attachments did not show the same benefit in blood pressure. Zilcha-Mano et al. concluded that subjects reporting avoidant attachment style were less likely to use their pet for a source of safe haven, while those who reported anxious attachment were able to use their pet as a source of safe haven and alleviation of stress.

## **Stress Reduction and the Human Animal Bond**

Pet ownership may aid individuals facing significant life stressors and everyday stress (McCune et al., 2014; Somerville et al., 2008; Walsh, 2009a). This is important as pet ownership is at an unsurpassed high, with an estimate of over 68% of homes in the United States owning a pet of some type (McCune et al., 2014). Walsh (2009b) found that some people are more emotionally close to their companion animals than to their closest family members, including regarding the pet as a child-surrogate. The companionship of a pet may facilitate adaptation in response to turbulent life transitions, as pet owners value companion animals during crisis, stress, and loss, through troublesome transitions, and in weathering long challenges (Barker, 2008).

Pet owners may choose the companionship of a pet over other human relationships under stressful situations (Kurdek, 2009a; 2009b; McConnell et al. 2011; Zilcha-Mano et al., 2011a, 2012). Kurdek (2009a) found that owners preferred their pet over other human relationships when facing a stressful situation with the exception of romantic attachments. It has been observed that a relationship with a pet can help human emotion regulation, including happiness (Gillum & Obisesan, 2010). After a stressful day at work, their love, enthusiastic greeting, and nonjudgmental support lead many to prefer the company of their pets then their spouses (Walsh, 2009a).

***Health Benefits of Pet Ownership.*** While pet ownership has been associated with general overall wellbeing, a significant area of research has involved positive physiological outcomes associated with stress. McCune et al. (2014) presented a review of recent research on the human-animal bond. The role of pets in overall health has been identified in studies of cardiovascular health, stress, both physical and emotional, and

physiological conditions such as loneliness and depression. In particular, physiological conditions such as blood pressure and cardiovascular health have been seen to be responsive to interaction with pets or animals. Researchers in the human-animal bond have examined benefits of health related to blood pressure and cardiovascular health (Friedmann & Thomas, 1995; Friedmann et al. 2013; Sommerville, Kruglikova, Robertson, Hanson & MacLin, 2008) as well as other physiological conditions including blood pressure, cholesterol and cardiovascular health (Walsh, 2009a, 2009b). In a controlled study of stress reactions and pets, a pet was found to be more effective than the presence of a spouse or friend in lessening cardiovascular effects of stress (Allen, Blascovich & Mendes, 2002). Allen et al., (2002) found lower blood pressure with lower cardiovascular activity among 240 married couples, while taking part in a stressful task while a pet was present. Among the half of the couples who owned a pet, significantly lower blood pressure and quicker recovery was seen from a stress-inducing task than non-pet owners. Another study looked at stress response after viewing video of different types of animals, and found reduced blood pressure and heart rate among college students who completed a moderately stressful activity after viewing the videos (Allen et al., 2002).

Researchers have examined the relationship between the development and progression of coronary artery disease and pet ownership in several foundational studies. Friedmann, Katcher, Lynch and Thomas (1980) examined the connection between cardiovascular health and animal companionship of survival rates of patients one year after release from a coronary support unit. In this landmark study, it was shown that pet owners were likely to survive one year after release from a coronary care unit, at 28.2%,

compared to 5.7% for those who did not own pets. Even removing the factor of dog ownership, assuming greater physical activity involved with owning a dog, survival rates for pet owners of all types of pets was shown to be higher. In a similar study by Friedmann and Thomas (1995), participants were restricted to dog owners and non-dog owners. Comparing survival rates, dog owners were found to have significantly higher one-year survival rates following a heart attack, than compared to non-dog owners (Friedmann & Thomas, 1995).

Somerville et al. (2008) found that companion animals have a calming effect on autonomic nervous system activity, with lowered blood pressure through the presence of a pet, in an experimental condition where some reduction of diastolic blood pressure was recorded in a group of college students after holding a dog or cat. Blood pressure and heart rate were taken after five-minute intervals alternating between holding a dog or cat versus not holding an animal. While changes in the systolic pressure were insignificant, the diastolic pressure was shown to decrease considerably after holding an animal (Somerville et al., 2008).

In a later study also focusing on hypertension, Friedman, Thomas, Heesook, Chapa, and McCune (2013) found that people who share their homes with pets have healthier reactions to stress physiologically, including reduced blood pressure and baseline heart rate, as well as faster recovery from mild stressors. In a study of 32 pet owners, repeated observations of owners aged 50-83, who demonstrated either normal or high systolic and diastolic blood pressure were monitored through daily diaries of activities and monitoring of blood pressure at 20-minute intervals for a period of 24 hours. A present dog was linked with diastolic BP and lower systolic. A present cat was

linked with higher systolic BP and lower diastolic BP throughout the study period. These results suggest that pets may be helpful as an intervention to decelerate the development of hypertension in adults.

Human interaction with an animal has been shown to decrease secretion of cortisol, or relieve self-reported anxiety (Barker et al 2010). Stress facilitates the production of cortisol, in response to stress; and suppresses immune responses to disease (Friedmann et al., 2011). The production of cortisol can suppress immune function in humans, leading to a variety of health conditions (Barker et al., 2010). Researchers have found that both people and dogs also release oxytocin in positive interactions between humans, with examples such as interaction between mother and infant. The release of oxytocin may explain reductions in cortisol and the feeling of wellbeing, which relationships with animals may provide.

Beetz, Uvnae-Moberg, Julius and Kotrschal (2012) provided a review of studies examining the effects of pet ownership and animal-assisted therapy on the release of stress hormones, including cortisol. Investigators into the phenomenon of stress hormones and the presence of a pet have found the reduction of cortisol and other stress hormones in studies which included a stressor and those that did not include a stressor (Beetz et al., 2012). Barker, Knisely, McCain, and Best (2005) compared quiet rest with interaction with a therapy dog among healthcare professionals. A significant reduction in cortisol was seen in sessions with the dog in comparison to sessions of quiet rest. Odendaal and Meinties (2003) examined cortisol levels compared in dog owners interaction with their own pet, with an unfamiliar dog, and during a quiet period alone reading a book. Lower cortisol levels were seen with both the pet and unfamiliar dog, but

not in the reading period. In a study including a stressor, Cole, Gawlinski, Steers, and Kotlerman (2007) compared usual hospital care, with visits by humans, to those that included a dog to patients experiencing heart failure. Lower hormone levels including ephedrine and nor ephedrine levels were recorded during visits including the dog.

Recently, the role of social support conferred by pets has been an area of investigation. It is thought that health benefits conferred by pets are due to increased social support, which buffers everyday stresses (Friedmann & Son, 2009; McConnell et al., 2011). Nearness of a pet has been found to relieve stress in semi-experimental studies. McConnell et al. (2011) found that those who thought of their pet while completing a stressful task experienced more stress relief than those who did not. While examining stress through monitoring of blood pressure after a stressful task, McConnell et al. found that owners find alleviation of stress through nearness to their pets both cognitively and physically. McConnell et al. examined subjects placed in stressful situations while thinking of a pet, contrasted with control groups with no access physically or cognitively to their pet. Three groups conducted a writing exercise about a best friend, their pet, or a control neutral activity of drawing a campus map. Before and after the manipulation, subjects completed a social needs scale. Through computing the difference score it was seen that those who wrote about their pet negated the negative effects of the social rejection exercise as well as those who wrote about their best friend, while those who completed the control activity did not negate the effect, shown through scores on the social needs scale.

*National Studies of Pet Ownership.* Pet ownership and health questions have been have incorporated into large- scale and national studies. Headey and Grabka (2011)

provide examples from the German Scio-Economic Panel Survey (Wagner, Frick & Schupp, 2007). The surveys feature issues of economic and labor force participation, but also issues of health, doctor visits and home life. Questions about pet ownership were added after 1996, with over 12,000 respondents asked about pet ownership and changes or issues in health. Headey & Grabka found that a longitudinal comparison of data included 9,723 respondents who answered the same health and pet questions in 1996 and 2001. Of the respondents, more than 1,000 acquired a pet, and more than 1,200 had ceased to own a pet. Comparing frequency of doctor visits, it was found that the healthiest group of respondents had owned a pet during both 1996 and 2001, and the next healthiest owned a pet by 2001. These groups were healthier by a statistically significant margin than those who did not own a pet at either of the dates, even allowing for omitted variables accounting for the difference, and allowing variables such as increased health contributing to acquiring of a pet as a possible confounding variable. Statistical regression analysis controlling for other health related variables also validated these results. Matched groups of pet and non-pet owners also validated the results, with dog and cat owners at 24% fewer doctor visits than non-owners (Headey & Grabka, 2011).

Another opportunity for a large-scale study is provided by China, where research on pet ownership and health within a new population of pet owners has been possible due to pet ownership becoming legal in China only after 1992. In China, prior to the allowance of pet ownership by the government, the practice had been banned and regarded as an indulgence. Due to this fact, China has provided what Headey and Grabka (2011, p. 153) refer to as a “natural experiment”. The rapid spread of pet ownership after

1992 has allowed study of a naturally selected population, one that has had no previous history of pet ownership.

Approximately 10% of households in China have acquired a pet since 1992, indicated by data taken from national surveys. The largest group of those acquiring pets has been younger women, and this particular group of pet owners has been the subject of studies. In a survey of 3,000 females, split roughly between dog and non-dog owners, it was found that the new dog owners were considerably healthier compared to non-dog owners. It was found that dog owners reported less doctor visits, sick days, and more exercise than non-dog owners (Fu Na & Zheng, 2003; Headey & Grabka, 2011). To avoid bias in response, respondents were told the survey was about lifestyle issues. After an opening question randomly asking about computer, dog, and home theater ownership, questions were asked about health, exercise, and then specific questions about dog ownership. Dog owners exercised more (36%) than non-owners, reported fewer nights of bad sleep (46%), and reported less than half the amount of doctor visits and days off from work. On self-rated health and fitness scales, dog owners also scored significantly higher than non-owners. Regressing for effects of age, marital status and other variables such as education and occupation, the results remained validated (Fu Na & Zheng, 2003; Headey & Grabka, 2011).

In another major example of study of pet ownership and health, researchers provided evidence of pet ownership associated with protection from developing coronary heart disease (Anderson, Reid & Jennings, 1992). Of 784 pet-owners aged 20-59 compared to 4957 non-owners, pet owners were shown to have lower systolic blood pressures as well as other blood indicators of artery disease than non-owners. Headey

and Grabka (2011) advised that evidence based on national representative surveys is important for examining the larger implications of health connections of pets and pet owners, as population estimates are more conclusive for future research than are estimates from special samples or samples of convenience.

***Vulnerable Populations and Pet Ownership.*** An estimated 14% of senior citizens in the United States own pets (American Pet Products Association [APPA], 2010). Researchers have found that older adults who are dog owners have been shown to be more physically active than non-dog owners (Thorpe et al. 2012). Martin, Paetzold and Rholes (2010), found that stroking a pet was soothing and calming for elderly family members at family gatherings, facilitating their inclusion without the requests of keeping up with the fast pace of interaction. Smith (2012) investigated a sampling of seniors selected from completion of a short survey on loneliness, with multiple interviews conducted over a three-month period about how the respondents dealt with loneliness. Many cited pets as contributing to the alleviation of their loneliness through their constant presence and companionship. Watt and Pachana (2007) found that older adults are more likely than other age groups to either live with a spouse or alone, as according to the Australian Bureau of Statistics, (the study setting), it is estimated that almost 44% of those 60 years or older live alone, with 70% or more of those who live alone being female.

Animal-assisted therapy (AAT) has been conceptualized and delivered within a framework of attachment theory. This includes vulnerable populations such as disabled or troubled youth (Geist, 2011; Jasperson; 2010, Plass; 2008). In the use of AAT within an attachment framework, the animal is an intervention that allows the therapist to

explore the inner working models of attachment through guided activities and behaviors. Geist (2011) examined the use of AAT at Hilltop Academy, a residential school for boys aged kindergarten to twelfth grade, where animal-assisted therapy is utilized with five full-time therapy dogs and trained therapists on-site.

Geist specifically looked at the use of AAT after destabilizing events requiring restraint or medication of the boys after traumatic events. In examples of AAT, two boys who became unstable after precipitating events (the parents of one boy arrested, and another who learned of a friend's suicide) were taken to a therapy room with a dog present. Through interaction with the dog, the anxiety of both boys decreased. In these examples, the boys felt ready to reenter the classroom after a couple of hours (Geist, 2011). In comparative events where students became unstable without the use of the therapy dog, often two or three days elapsed before students felt ready to enter the classroom again. Geist (2011) identified safe haven and proximity maintenance to explain why AAT demonstrated effectiveness in improving functioning of students at the Hill Top Academy. The animal in AAT further serves as a 'transition object', which allows for mediation of stresses between outer conditions and the emotional condition of the patient, and assists, with reintegration into the classroom (Geist, 2011; Plass, 2008). Geist references the nonverbal aspect of the intervention with the therapy dog, and speculates this can address some reintegration of right-brain activities and stored traumatic events through a positive attachment experience.

Walsh (2009a) pointed out that animals have been used in a wide range of therapeutic settings, usually with the goal of alleviating stress in therapeutic encounters. Examples of studies include observations of animal therapy with disturbed or abused

inmates (Jaspersen, 2010) and with abused children (Plass, 2008). Jaspersen (2010) found more positive self-assessment of therapy outcomes from disturbed and abused inmates who interacted with a therapy dog in therapy sessions. Plass (2008) found improvement through assessment of disturbed and abused children's behavior as reported at school, through long-term animal assisted therapy

While animal-assisted therapy has often been used without a consistent framework, researchers have looked toward attachment theory to provide a consistent structure to apply the therapy (Plass, 2008; Jaspersen, 2010). Zilcha-Mano et al. (2011b) conceptualized animal assisted therapy within an attachment framework, and states that clients usually have formed a hierarchy of attachments, within which the therapy animal will be placed by the client. Connecting the focus of the animal as a transitional presence, Geist (2011) identifies a major function of attachment is as a system of regulation. The primary caregiver attends to an infant and through the attachment bond, assists in regulation of emotional state. Attachment to an animal can serve the purpose of regulation of emotional state, as Geist states, by serving as a transitional object to patients or residents under distress.

***Attachment anxiety, avoidance and stress.*** Kurdek (2008; 2009a; 2009b) contributed a foundational set of studies to the question of safe haven and attachment to pet dogs. Kurdek examined how pet dogs fulfilled safe haven in an attachment bond, or ability to alleviate distress, and distinguished this aspect of attachment from features of separation distress, proximity maintenance, and secure base. Kurdek found in the first study (2008) that among dog owners, safe haven was considered one of the highest ranked of the four attachment features. However, Kurdek found in subsequent studies

that owners sought nearness through proximity maintenance (Kurdek, 2009a, 2009b). However, Kurdek's findings from one study (2009a) indicate that owners sought out their pets over all other human attachment figures including parents, siblings, friends and children, with the exception of romantic partners, implying an attachment rather than a caregiving bond.

Mikulincer and Shaver (2007, 2012) proposed that dissimilarities in attachment avoidance and anxiety affect both attachment security and the ways in which an individual will deal with stress. Alleviation of stress, and distress in the attachment relationship, is related to the attachment element of safe haven, of the four attachment elements, and is specifically related to the ability of the attachment figure to provide a secure attachment (Hazan & Zeifman, 1994; Mikulincer & Shaver, 2007, 2012). Zilcha-Mano et al. (2012) looked specifically at how attachment insecurity affects a pet's capability to aid as a source of safe haven for an owner. They found that attachment insecurities tended to lessen the ability of the pet to serve attachment functions such as safe haven for their owners. They examined whether pets specifically could serve as a figure of safe haven through the presence or absence of the pet while the owner completed a goal-setting task. Distinguishing between attachment avoidance and anxiety, the researchers found that subjects who experienced avoidant attachment did not benefit from enhanced performance on a goal-setting task with their pet present, whereas those with anxious attachment benefited from enhanced performance and lowered blood pressure. Zilcha-Mano et al.'s study supported the finding that anxious attachment allows use of the pet as a safe haven focus of attachment whereas avoidant attachment does not.

***Drawbacks of Human-Animal Bond.*** Strong bonds to pets are also seen in less desirable relationship situations. The question of attachment to a pet as a negative factor in wellbeing is examined by Peacock et al. (2012). In a sample of 152 Australian adults, Peacock et al. (2012) assessed psychological wellness, attachment to a companion animal and social support. Greater attachment to an animal was found to be a predictor of distress including depression and anxiety. Those who were strongly attached spent the most time with their pets, but the time spent with a pet tended to correlate with those who were isolated or lacked significant other social supports.

Researchers looking at the relationship between adults and pet ownership have suggested that attachment to pets may benefit owners who have fewer sources of social support (Chur-Hansen et al., 2010; Peacock et al., 2012). Peacock et al. (2012) found that the demographic variables of being unmarried or uncoupled, and being a younger female, was shown to be significantly linked with psychological distress and with greater time spent with a pet. Chur-Hansen et al. (2010) also examined owner prioritizing of pets over other social supports, specifically where owners prioritize pets over human relationships. They stated that this is not well understood, and may result in less desirable outcomes for owners such as staying in unhealthy but pet-friendly housing situations, and can lead to neglect of owner health.

Antonacopoulos and Pychyl (2010) examined the connections between pet ownership, loneliness and depression on a group of 132 Canadian pet owners (dog owners = 40, and cat owners =16). The population was divided evenly between pet and non-pet owners ( $N=66$ ). The Lexington Attachment to pets Scale (LAPS) (Johnson, Garrity and Stallones, 1992) was utilized to assess participant emotional attachment to

pets, with other measures of loneliness and depression. Low social support was a significant factor in reported depression and loneliness, as reported on scales of social support. A significant finding from the study was that among dog owners and non-pet owners with high social support from other sources, dog owners experienced a significantly lower level of loneliness compared to non-pet owners, although the same effect was not found with cat owners. Among pet owners residing alone with low societal support, those who reported high levels of pet attachment experienced significantly more loneliness and depression than pet owners (of both dogs and cats) with low levels of attachment. Among pet owners with high levels of human social support, levels of depression and loneliness did not change according to levels of attachment to pets. Miltiades and Shearer (2011) found that older adults who reported high levels of attachment to their pets also reported higher levels of depression than those who were not as attached. However, in another study focused on overall wellbeing, McConnell et al. (2011) found that wellbeing measures of personality and mental health were positively correlated to use of pets as sources of social support.

***Type of pet.*** Researchers examining the pet and owner relationship have found that type of pet may influence level of stress reduction. Gillum and Obisesan (2010) studied adults living with a dog companion in a longitudinal study of 11,394 adults aged 40 and over, from 1988-1994, and found that living with a dog was associated with higher physical activity and lower mortality rates. While benefits were found with all types of pets, those living with a dog were found to be in the highest activity group for leisure-time physical activity and least likely to be a no activity grouping (p. 2457). Siegel (1990) discovered that owning a dog was a stress buffer, and demonstrated that

dog owners spent more time outdoors, playing with their pets. Brown and Rhodes (2006) concluded that dog ownership was positively linked with higher levels of physical exercise, and with lower stress levels overall.

Dog ownership has been shown to provide specific physical benefits tied to exercise and physical activity, as well as lowered blood pressure (Somerville et al., 2008; Walsh, 2009). There has been a recent surge of studies exploring the role of dog walking as a potential way of increasing motivation for and practice of physical activity, as well as meeting national guidelines for physical activity (Christian et al., 2013). From a public health perspective, promoting dog walking as a means of reaching physical activity guidelines is appealing due to the high proportion of people who share their lives with dogs, and the ease of incorporating dog walking into a daily routine (McCune et al., 2014).

Dog ownership is directly correlated to higher levels of physical exercise as indicated by studies of pet owners and dogs (Cutt et al., 2008; McConnell et al, 2011; Walsh, 2009a). Cutt et al. (2008) examined the connection of physical activity to dog ownership by examining the practices of dog owners in walking or exercising their pet, and the availability of facilities for activities with a pet dog. Cutt et al. found positive correlation in a tendency to be more physically active to dog ownership. Physical exercise gained through walking or exercising a pet represents an indirect benefit of greater physical exercise through daily activities with the pet. Johnson et al. (2011) described dog walking as accessible to dog owners, as walking is a moderate type of activity prescribed for those with health conditions. In a review of recent studies of dog ownership and physical activity, Christian, Westgarth, Bauman, et al. (2013) reviewed

studies from 1990-2010, which compare dog owners to non-dog owners. Of the 29 studies considered, 11 considered dog owner and non-dog owner walking, and six considered dog owner and non-dog owner physical exercise beyond dog walking. They stated that studies demonstrated more walking and a greater level of physical exercise by dog owners than by non-dog owners ( $d = 0.26$  and  $d = 0.16$ ). The researchers stated that studies have also provided directional evidence of walking and dog ownership through a longitudinal design. In one study, Thorpe, Simonsick, and Brach (2006) examined dog-walking behavior of dog owners versus non-dog owners (dog owners=394, non-dog owners=2137), looking at walking speed over three years among community-dwelling older adults (range 71-82 years). At the time of follow-up, dog walkers appeared twice as likely as non-dog walkers to achieve recommended walking levels, separate from demographic and health-related issues. They found that dog owners not only engage in physical activity centered on dog walking, but engage in more physical activity overall, with dog owners engaging in more times per week of physical activity (dog owners=329; non dog owners=227). Kurdek (2009b) speculated that characteristics of particular dogs, including openness and energy level, might contribute to a human-pet bond encouraging greater interaction and activity. Dogs may form a bond unique from other types of pets. For example, in settings with working dogs, the human-animal bond has transitioned from a working relationship, such as that seen with working dogs, to one of trust between pet owners and their pets (Cutt et al., 2008).

The ability of other types of animals to relieve stress has been considered by researchers. Plass (2008) found similar levels of response to a variety of animals in long-term animal-assisted therapy with abused children. Animals used included dogs,

cockatiels, rats, and hamsters. The type of animal was not significant to the progress made by each child or adolescent in therapy. Studies show benefits such as lowered blood pressure and decreased loneliness in connection with other pet types. Lowered blood pressure was recorded in studies after holding both a dog and a cat (Somerville et al., 2008; Zilcha-Mano et al., 2012). In one study, elderly adults in two rehabilitation facilities were found to benefit from avian companionship. The presence of a budgerigar (small bird) in each patient's room during a five-month period resulted in more positive assessment of self-report measures of depression and loneliness (Jessen, Cardiello, & Baun, 1996).

*Type of pet and attachment.* Investigators into the pet and pet owner relationship are inconclusive if the type of pet can affect attachment between humans and animals. Findings from the Human Relations Area Files (eHRAF) showed that dogs are the most common pets, followed by birds, cats, and then other animals (Gray & Young, 2011; Somerville et al., 2008). Kurdek (2008, 2009) found that attachment was positively linked to caregiving behavior for pet dogs, and the extent to which dogs met relational needs, along with dog traits of energy and responsiveness. Zilcha-Mano et al., (2011a, 2012) surveyed mainly dog and cat owners. Participants in Zilcha-Mano et al. (2012), were distributed with a majority of dog owners, with 82.75% dog owners, and 17.3% cat owners. However, the association of pet type with attachment style was not specifically considered.

## **Summary**

Pet ownership is widespread in the United States, with over 63% of households in the United States owning a pet (Barker, 2008). Some anecdotal evidence exists for the

health benefits of owning a pet (McConnell, 2011, Zilcha-Mano et. al., 2011a, 2012). The benefits surrounding companion animals in the household include physical and psychological benefits. Specifically, researchers have revealed benefits for cardiovascular health and lowered blood pressure as well as other aspects of physical health (Allen, Blascovich, & Mendes, 2002; Somerville et al, 2008). Investigators looking at psychological wellbeing have found that pets may provide overall greater wellbeing for owners than non-pet owners (McConnell et al, 2011; Zilcha-Mano et al, 2011a, 2012). While researchers have established a link between wellbeing, attachment, and pet ownership, how attachment style may serve as a moderating variable between pet ownership and stress has not been established. This study will include an investigation of effects of attachment style on pet ownership and stress.

Researchers have demonstrated that relationship quality can be predicted in bonds with attachment figures using attachment theory as a framework. Theorists used attachment theory initially to describe the bond between an infant and child and a primary caregiver. Previous investigators and practitioners have expanded the theory to include other figures such as other family members, friends, and romantic relationships with significant others (Bowlby, 1958; 1973; Fraley & Shaver, 2000; Hazan & Shaver, 1987). Potential attachment figures now include non-human figures, specifically companion animals and pets. Companion animals have consisted of all types of pets from dogs and cats, the most common pets, to other types of small mammals, reptiles, and birds (Walsh, 2009a; 2009b). The various roles of the animals within the bond include therapy animals, companion animals for the disabled, and pets, kept in the household for companionship. Practitioners began to recognize the benefits available to patients and clients through use

of animal assisted therapy, and through the use of animals in therapeutic interventions (Geist, 2011; Jaspersen, 2010; Plass, 2008). Animal-assisted therapy was among the first areas where the benefits of an animal presence for psychological and physical benefits were recognized. This relates to the role of attachment as a regulatory system, in which dyadic pairs regulate the emotional state of a partner (Geist, 2011; Zilcha-Mano et al., 2011). For infant and caregiver pairs, the regulation of the emotional state contributes to the development of the infant's regulatory systems, including attachment, which assists with stress alleviation. Health benefits of companion animals include lower blood pressure and cardiovascular health (Friedmann et al., 1995; Friedmann et al., 2013). Over-all wellbeing and alleviation of physiological stress are other benefits, which have been demonstrated in research studies (McConnell et al., 2011; Zilcha-Mano et al., 2011a; 2012).

### **Chapter 3: Research Method**

The relationship between strength of the human-animal bond and stress reduction and how attachment styles moderate this relationship was examined in this quantitative, quasi-experimental study. Questions asked include: How does the human-pet attachment style moderate the relationship between strength of the bond and stress? Does the strength of the human-animal bond predict owners' stress levels? Here, stress will be considered perceived stress, as measured by appropriate scales to determine stress level. This study stems from and will contribute to attachment theory and stress.

Quantitative methods were appropriate for this study, as the goal was to demonstrate patterns among a sample of pet owners that can be generalized to a larger population of pet owners. Qualitative research is often implemented at a formative stage, when there is little knowledge of questions to ask or hypotheses to test (Arcidiacono, Procentese, & Di Napoli, 2009). Initial stages of research and the process of developing questions surrounding a phenomenon can be addressed by a qualitative study.

Quantitative research methods are a means to assist in determining how prevalent a phenomenon may be across many instances. In comparison, qualitative research is generally more limited in how results might be generalized to a larger population.

Quantitative methods may be used to evaluate the effects of one or more independent variables and one or more dependent variables. The ability to analyze data and to examine data through statistical analysis and modeling are advantages of quantitative methods (Arcidiacono et al., 2009). In this study, the researcher will investigate a dependent variable (stress) and how this relates to several independent variables: attachment style, as measured by anxiety and avoidance, and the strength of the

human-animal bond. A quantitative design was found to be appropriate for this study with the availability of measurement instruments, including several self-report measures which have been well validated.

Regression between variables was found to be a suitable analysis for this study. Regression is a method which can be used to examine predictive relationships between predictor and criterion variables and can also be used to test for interaction effects among continuous variables, as was the case in this study. This approach also allows the researcher to examine the predictor variables (strength of the bond, anxiety, and avoidance) as it relates to the outcome variable (stress reduction), without having a control group.

The researcher anticipated minimal risk for the participants of the study. Participation was voluntary, and participants were surveyed on their attachment to a pet. Participants answered a closed-ended survey with questions about the strength of their bond with their pets and stress. The integrity of this study and the data were ensured. The sample was large, with data collected in a standardized manner (with existing and objective measures). I provided a phone number at the beginning of the survey to call with any questions or concerns related to the study. Both options assisted with concerns participants may have had with participation in the study.

The research methods and design of the study and descriptions of the population and sample are included in the chapter. The materials and instruments are described and related to the study theses. Limitations, delimitations and ethical considerations are also reviewed and addressed at the end of the chapter.

## **Research Methods and Design**

Quantitative methods were used in this study, with the aim of examining phenomena through hypotheses constructed by the researcher and based upon prior research (Arcidiacono et al., 2009). Quantitative studies are distinguished through numerical rather than narrative evidence. According to Aliaga and Gunderson (2000), quantitative research can be defined as ‘Explaining phenomena by collecting numerical data that are analyzed using mathematically based methods, in particular statistics’. Researchers using quantitative research methods make use of predetermined instruments that yield numerical data, which is then analyzed through the use of statistical tests. A structured questionnaire for data collection was used in this study, with a quantitative, correlational methodology to test the study's research questions.

Experimental design is seen as the beginning point of reference for quantitative research design, due to the ability to draw causal relationships between experimental variables (Vogt, 2011). However, in cases where variables are pre-existing within a population, or cannot be controlled, an experimental design is not possible. In this study, pet ownership, a variable of the study, could not be controlled, as participants in the study already owned their pets. Thus conditions for an experimental study design could not be met with the requirements of experimenter control of variables. Rather than establishing causal links between variables, the goal of this study was to generalize a finding from the study sample to a population. To achieve this goal, convenience sampling from among an existing population was used to examine the relationship between variables of pet ownership, stress and attachment. A drawback of correlative study design is that causal links between data cannot be verified (Vogt, 2011). However, a correlative design has

the advantage of taking place in a natural setting, with study results applicable to a general population (Arcidiacono et al., 2009; Vogt, Vogt, Gardner & Haeffele, 2014).

Concerns for researchers who use quantitative methods include reliability and validity in the design of the study and in the measures used to gather data. Vogt (2011) identifies external validity as a concern of survey research. Specific concerns include sampling of the population and external validity of measurement instruments. These concerns were addressed in this study through use of validated measurement instruments, and through convenience sampling provided by the SurveyMonkey.com database of participants. Instruments of measurement are judged to be reliable if they consistently produce the same results in similar groups or individuals. Evidence of reliability and validity can be provided by use in prior studies, and through statistical measures such as Cronbach's alpha, which can provide data about the reliability of an instrument.

Sampling concerns were addressed by the large population of over 41 million members of SurveyMonkey Contribute, and by the balancing of participant pools by age, gender, and region through SurveyMonkey's collection of demographic data from respondents. The large pool of available participants for the study ensured an even distribution of subjects among a population, replicating the general population in age, gender, and regional characteristics.

### **Population**

The population in this study was derived from a database of potential participants at [www.SurveyMonkey.com](http://www.SurveyMonkey.com). The population was composed of pet owners. This is defined as ownership of one or more pets in the household. All pet types were allowed, including dogs, cats, as well as other types of animals. Additionally, the population was

selected to include only participants who are 18 or over in age. There are no other requirements for gender, ethnicity, age or region for participation. Pets can be been owned for any length of time; participants can have just acquired their pet or have owned them for several years.

### **Sample**

Survey responses were collected through [www.SurveyMonkey.com](http://www.SurveyMonkey.com). The survey service guaranteed a specified number of responses through a paid survey option with the researcher paying a set amount for a specific number of responses. The group from which paid survey responses were drawn is Surveymonkey Contribute, which operates on a charity-based incentive format, with participants offered contributions to a charity and entries into a sweepstakes as incentives for survey participation.

Surveymonkey collects basic demographic information from participants in their database. This information includes age, gender, income level, region, and the device type used to take the survey. The survey service provided pre-screening of survey participants based on age, gender, and the region of the country. The service provided a balance of respondents by age, gender and region, with the aim of reflecting the general population with even distribution of gender and distribution by age. Thus respondents were diverse and representative of the general population.

The sample of participants from the survey database was a convenience sampling of pet owners who are 18 years of age and over. Surveymonkey.com distributed the survey among potential respondents represented in their database. Selection was based upon the requirements of pet ownership and age of 18 years or older.

Surveymonkey.com participants were reflective of an online sampling, in that all have

access to the Internet and have voluntarily joined a program to take surveys. The survey service screens and matches respondents according to requirements of the study. For this study, requirements are that potential participants be pet owners, and be aged 18 years of age or older.

Concerning sample size, an a priori power analysis for multiple linear regression analysis with three predictors was conducted, a minimum sample size of 76 was found when using an effect size of .15 and  $p = .05$ . Three hundred and twenty four participants responded to the survey, with 304 completing the survey. Incomplete responses were not counted in the total number of responses. Study participants were told that the study protocol will consist of completing a survey containing measures of wellbeing, attachment, and pet ownership. Survey answers were collected about pet-owners' stress level, and attachment style, addressing the research questions of pet ownership attachment and stress.

A pass code was provided to participants to enter the survey both online and in person. The password access protects participants' privacy and allows surveys to be gathered in a secure environment. A web page on [www.SurveyMonkey.com](http://www.SurveyMonkey.com) informed potential participants about the study. Once recruited, participants e-signed an Informed Consent, in which any risks and benefits was detailed.

### **Materials/Instruments**

The variables of the strength of the human-animal relation, the attachment style dimensions of avoidance and anxiety, and the dependent variable of stress was measured through existing instruments available for the study. The measures included the Perceived Stress Scale (PSS) developed by Cohen et al. (1983), the Owner-Pet

Relationship Questionnaire (OPRQ), developed by Winefield et al. (2008), and the Pet Attachment Questionnaire (PAQ) developed by Zilcha-Mano et al. (2011a). Reliability in this study was assessed by the use of established measures in psychological testing that have records of high reliability; coefficient alpha also was computed for each scale after data collection.

**Perceived Stress Scale.** The Perceived Stress Scale (PSS) is a validated measure of stress in psychology. The measure is validated to indicate the degree to which life events are perceived as stressful, and has been used in fields such as medicine to predict tendencies towards stress and illness (Cohen et al., 1983). The measure was created by Cohen et al. (1983), with the principle that cognitive assessment and perception of life events were the cause of stress, and that interpretations of events are as relevant as the events themselves. The measure is constructed for use with community samples, and the questions are designed to be general and free of specific content to all subpopulations. All items on the PSS are valued on a 5-point scale from never (0) to very often (4). Higher scores on an item indicate a greater degree of the measured construct. PSS-10 counts are found by overturning the counts on all four positive articles, such as 0=4, 1=3, 2=2, etc. and lastly adding through the ten articles. Articles 4, 5, 7, and 8 are the positively affirmed ones.

Validity and reliability have been demonstrated by the PSS in large-scale studies, and findings from the use of this measure are extendable to general population experiences of stress. Normative data is provided on the PSS based on a 1983 Harris Poll of a symbolic U.S. sample. A large-scale study of stress using the PSS, supported by the Harris Poll and funded by Johnson and Johnson, resulted in validity and reliability data

for the scale. The poll survey ( $N = 2387$ ) split between male and female respondents was .78 for internal reliability. Later surveys conducted throughout the United States with eNation and co-sponsored by Johnson & Johnson Foundation, in 2006 and 2009, each with 2,000 respondents, found .91 internal reliability in samplings from 2006 and 2009 (Cohen & Janicki-Deverts, 2012).

**Owner Pet Relationship Questionnaire.** Data about the pet owner's attachment style in relation to their pet was gathered with the Owner Pet Relationship Questionnaire (Winefield et al., 2008). This measure was developed to examine the emotional relationship between pets and pet owners based on attachment theories, and its effect on health outcomes (Winefield et al., 2008). Through the development of the OPRQ, Winefield et al., (2008) sought to create a valid measure for pet attachment, seen as lacking in prior studies of the health results of pet ownership. Researchers have used the measure to test attachment of owners to companion animals, per Bowlby's psychological attachment theories (Winefield et al., 2008).

Items on the measure are aligned with attachment theory (Bowlby, 1958; 1973) and items on the OPRQ are concentrated on the owner's desire to maintain nearness or proximity to the companion animal, along with the owner perceptions of the human-pet relation as mutual and supportive (Winefield et al., 2008). The OPRQ is a measure used to assess strength, but not characteristics of the attachment bond. The fifteen items of the instrument include questions to measure desire to maintain proximity to the animal and perception of the human-animal bond as mutual and emotionally supportive. Items on the questionnaire include reciprocity, emotional support, and proximity seeking. Responses to the OPRQ are scored 1–4 towards greater attachment, other than Q3, with

true = 4 or not true = 1. To differentiate between participants who are highly attached to their companion animals and to others, two questions formulated by Cohen (as cited in Winefield et al., 2008) asked: daily time with animal (<2 hours, or 3–6 hours, or 7–10 hours, or 11–15 hours, or >16 hours) plus a second question which asks if the subject is willing to have operation if it means time away from their pet animal; it is reverse scored (yes, unsure, no).

The OPRQ was shown to measure appropriately one variable (theory-based pet attachment) through factor analysis of the 15 items. In a use of the measure, in a sample ( $N = 179$ ) of a group of South Australian pet-owners over 60 years, internal consistency was seen with a Cronbach alpha score of .92. The mean was 39.3 ( $SD$  9.3), higher for women than men and human owners of dogs than cats (Winefield et al., 2008). The stronger the bond, the higher the score.

**Pet Attachment Questionnaire.** The third measure used in the study is the Pet Attachment Questionnaire (PAQ). The PAQ was developed by Zilcha-Mano et al. (2011), with the aim of creating a measure of attachment anxiety and avoidant insecurity in the owner and pet bond. The researchers speculated that human-animal attachment would demonstrate similar dimensions as those in human attachment relationships. This measure was used to test respondents' attachment style (moderating variable). The PAQ consists of two subscales measuring avoidance and anxiety, which are the attachment styles expressing attachment insecurity. These two dimensions have been shown to be orthogonally related in measures such as the ECR-R (Fraley, Waller & Brennan, 2000). To address attachment within adult relationships, the ECR-R is based on the two dimensions of anxious and avoidant attachment, which has been found to be more

accurately measured dimensionally than categorically (Bartholomew & Horowitz, 1991; Fraley & Shaver, 2000; 2010; Fraley, Waller & Brennan, 2000; Richards & Shat, 2011).

The PAQ was developed from validated measures of attachment, including the ECR-R (Fraley, Waller & Brennan, 2000), the Adult Attachment Scale (Collins & Read, 1990), and other scales which measure the human-animal bond. The ECR-R (Experiences in Close Relationships Revised) is a validated instrument developed to examine attachment in adults (Fraley & Shaver, 2000). The ECR-R scale has been adapted to several types of relationship outcomes, and demonstrates a high reliability score for parental relationships (.80), a relationship with patterns potentially similar to the owner-pet relationship. This has made it suitable for modification for testing owner-pet attachment styles (Fraley, 2013; Zilcha-Mano et al., 2011a).

Question items for the PAQ were also obtained from the Adult Attachment Scale (Collins & Read, 1990), another well-validated measure of adult attachment (Zilcha-Mano et al., 2011a). Items were chosen that seemed to measure human-pet relations and could be tailored to the study of pet attachment (e.g. "If I can't get my pet to show interest in me, I get upset or angry"). Items were also taken from scales, which measure human-pet relationships and bonds, including the Comfort from Companion Animal Scale (Zasloff, 1996) and the Lexington Attachment to Pets Scale (Johnson, Garrity, & Stallones, 1992). Items were chosen from these scales, which related to dependence on a pet and discomfort with closeness.

Items were also derived from semi-structured interview questions with 33 pet owners who described their relationship with their pets (Zilcha-Mano et al., 2011a). From the interviews, statements indicating avoidance and anxiety were changed into

scale items (e.g. “She is so precious to me. I don’t know what I would do without her”). From all scales and measures, a pool of 50 items was generated (28 from the ECR and AAS, five from human-pet relation scales and 17 from the interview questions). Then a group of 10 additional pet owners (not pet owners involved with the semi-structured interviews) were asked to rate each item in terms of relevance to the human-pet bond. Half the items were gauged to measure anxious attachment, and half were gauged to assess avoidant attachment (Zilcha-Mano et al., 2011a). The PAQ was narrowed to 26 items. Questions were then assigned a seven-point scale from 1 (not at all) to 7 (very much). The two subscales of anxiety and avoidance were found to be orthogonally related, and distinct in measuring each construct.

For the 2011 study, participants took each subscale twice, six months apart, and pet attachment anxiety was found to have a test–retest reliability coefficient equaling .75. Pet avoidant attachment showed a test–retest reliability coefficient equaling .80. The two scales were then determined to possess test–retest reliability and passable internal consistency throughout six months (Zilcha-Mano et al., 2011a).

### **Operational Definition of Variables**

**Strength of the Human-Animal Bond.** The Owner Pet Relationship Questionnaire (OPRQ) in Appendix A will measure the variable of pet attachment in this study. A higher score will indicate stronger bonds. A low score will indicate weaker bonds. A continuous scale from low to high was used. Responses to the OPRQ are scored 1–4 towards greater attachment, other than Q3, where true = 4 and not true = 1. A number of researchers have suggested that ordinal data can be treated

as interval data in statistical analyses (Bohrstedt & Carter, 1971; Labovitz, 1967, 1970).

**Human-Pet Attachment Style: Attachment Anxiety.** Attachment Anxiety is an ordinal variable. The Pet Attachment Questionnaire (PAQ), which yields a score on a scale from 1 (not at all) to 7 (very much) will measure the anxious dimension.

**Human-Pet Attachment Style: Attachment Avoidance.** Attachment Avoidance is an ordinal variable. The Pet Attachment Questionnaire (PAQ), which yields a score on a scale from 1 (not at all) to 7, will measure the avoidant dimension.

**Owners' Stress Level.** This variable was measured on a continuous scale by the Perceived Stress Scale (PSS) in Appendix B. This is an ordinal variable. Items on the PSS are valued on a 5-point scale from never (0) to very often (4), and higher scores indicate higher levels featured in the particular item.

### **Data Collection, Processing and Analysis**

The survey, containing questions from the three measures, the PSS, the OPRQ, and the PAQ was distributed through SurveyMonkey.com. The survey was made available to potential study participants, with potential participants having equal opportunity to participate regardless of geographical location. The study population, described previously in this chapter, was invited to take the survey via this website. Further administrations would have been planned if the sample achieved is below the minimum indicated by the a priori power analysis conducted. It was found further administrations were not necessary as the sample size was reached with the first administration. If potential respondents were not pet owners, a question routed them to a page taking them out of the survey, and thanking them for their participation. If

participants indicate they are not 18 years of age or over, they were routed to a page taking them out of the survey.

Diagnostics were conducted on these data in order to determine whether there are any data points that needed to be recoded. These data were also examined to determine the percentage of missing data associated with each variable. Incomplete survey questionnaires were eliminated from the total number of surveys. All electronic data is encrypted for the purposes of security. Data will be stored in a secure location on a hard drive at the residence of the primary researcher upon the completion of the study.

Data were analyzed through the use of multiple linear regressions to test whether the independent variables interact in their effects on the dependent variable. The overall purpose of multiple regressions is to examine the relationship between several independent or predictor variables and a dependent or criterion variable. Multiple regressions were found to be suitable for this study rather than ANOVA, as the use of ANOVA will create artificially low and high scores. Using multiple regression served to retain the variability associated with the continuous measures of anxiety and avoidance. Complete vs. reduced model testing was used to test for moderation using multiple regression and is an accepted technique for maintaining the richness of the variability captured in continuous independent variables. Assumptions for linear regression included the lack of multicollinearity, a lack of autocorrelation, linearity between the predictors and outcome, the lack of influential outliers, normally distributed residual error, and homoscedasticity. Multicollinearity was assessed through the calculation of variance inflation factors, with autocorrelation tested through the use of the Durbin-Watson coefficient. Linearity and outliers was assessed through the use of partial

regression plots, with the normality of the residual error assessed using a histogram of the regression standardized residuals as well as an associated probability-probability plot of these data. Finally, homoscedasticity was assessed through the construction of a scatterplot in which the regression standardized predicted values are plotted on the x-axis, with regression-standardized residuals plotted on the y-axis. Data was analyzed through the construction of an SPSS syntax file, with the null hypotheses being tested and the research questions being answered on the basis of the statistical significance of the associated effects in these multiple linear regression models.

### **Assumptions**

Assumptions included that participants would respond honestly to the survey. Respondents read the Informed Consent before advancing to the survey, and did not continue with the study if they fell outside the age range (eighteen and over) or other requirements. In order to encourage honesty in response, participants' privacy was protected. Respondent answers were confidential and anonymous. Another assumption was that data would be found to conform to assumptions needed for statistical analysis. Alternatives would have been used if the statistical assumptions in the study were found to be violated.

### **Limitations**

There are limitations with quantitative studies. A shortcoming of this study is that it was not structured as a pure experimental study. While an experimental design may be the strongest design to see if there is a moderating effect, a pure experimental study is not ethically or physically feasible to address the research study. Participants also owned pets before the commencement of the study. They could not be randomly assigned to

have pets or not to have pets to see what benefits they may confer for them. Another limitation is represented by the fact that the kind of attachment pet owners have could not be manipulated to study how the attachment moderates the relation between pet owner stress level and reduction. Another limitation included the type of pet, as prior studies suggested that the type of pet may affect the attachment between owner and pet (Gillum & Obisesan, 2010; Kurdek, 2008, 2009a). Limitations also included the self-report nature of the measures used in the study.

Finally, another limitation is that the study is correlational in design and thus associations can be drawn from the data, but not causal inferences. A relationship can be demonstrated by correlation but cause and effect cannot be inferred (Creswell, 2009; Arcidiacono et al., 2009). However, correlational design has the advantage that it can be generalizable to a larger population as correlative designs generally take place in a natural and not experimental setting. Although there may be confounding variables, all efforts were made to control for variables that may obscure confuse results of the data.

### **Delimitations**

Delimitations are represented by limitations of native spoken language of possible study participants. Speakers of other languages were not recruited, and the issues surrounding languages other than English were not addressed. Also included were those who have subscribed to SurveyMonkey.com and provided pet ownership information. Other communication issues may be represented by access and communication through the Internet.

## **Ethical Assurances**

Approval was sought prior to any data collected from Northcentral University Institutional Review Board. Principles, which should be in place when a study includes human subjects, have been recommended by the Belmont Report (National Commission for the Protection of Human Subjects; 1978). These include approval by an institutional IRB office and rights concerning the conduct of researchers toward subjects. These principles includes that the participant should be fully informed about the extent of the study, a provision to make sure the subject was not coerced, and an assurance of privacy of a subject's identity. For this study, these recommendations were followed. There was no obligation on the part of any subject to participate in the study. Participants were allowed to stop their involvement with the study at any time without penalty.

Information about the study was made available for anyone with questions or concerns. No personal data was collected from participants, and all responses were anonymous. As the data collection took place completely online, anonymity was achieved, and participants are not recognizable and were not required to reveal any identifying information. Data was gathered through a well-known, reputable survey company. Data was then downloaded onto a secure computer located at the researcher's house. Data will be kept by the researcher at a secure location for seven years.

## **Summary**

Data were gathered from the population using self-report measures validated in previous studies. The population will include pet owners 18 years of age and older, and will include both male and female respondents. The study survey, based upon off the shelf instruments, was made available through an online survey service. Guidelines were

followed for the study in which participants are protected from any undesirable effects from the study. Guidelines from the Belmont Study were followed. Participant privacy was respected. Identifying data was not collected in the survey, as the survey was taken anonymously. To further minimize the risk to participants, contact information was provided in the survey, which participants could contact for any issues or concerns. The data for the study will be stored in secure servers online and downloaded onto a personal computer at the home of the researcher.

Quantitative methods were suitable for the research questions of this study (Creswell, 2009; Arcidiacono, 2009). The research questions were derived from prior research into attachment and pet ownership. The researcher examined attachment and pet ownership as independent variables and stress as a dependent variable. The off-the-shelf instruments used in the study have been validated by use in prior studies. Researchers using the instruments have produced consistent results obtained from similar populations or individuals, and are correlative in design. As such, the study results were generalizable to a larger population.

## Chapter 4: Findings

The results of the analyses conducted testing this study's hypotheses are presented and discussed in this chapter. Initially, a series of reliability analyses were conducted in order to determine whether the scale items used in this study have an acceptable level of internal consistency reliability. Following this, four sets of two linear regression analyses were conducted in order to test this study's four hypotheses.

### Results

Initially, a series of reliability analyses were conducted on these data in order to determine whether an acceptable level of internal consistency reliability was present with regard to these scale constructs. The standard of .70, measured by Cronbach's alpha, has been suggested as the minimum level of acceptable reliability. First, a reliability analysis was conducted on Appendix A, which consisted of the Owner Pet Relationship Questionnaire. This analysis found a Cronbach's alpha of .776, while the reliability analysis conducted on Appendix B, which consisted of the Perceived Stress Scale, achieved a Cronbach's alpha of .796. Following this, a reliability analysis was conducted on Appendix C, the Pet Attachment Questionnaire. This was found to achieve a Cronbach's alpha of .953. Finally, separate reliability analyses were conducted on the Avoidant and Anxiety scales. A Cronbach's alpha of .953 was found with regard to the Avoidant scale, while a Cronbach's alpha of .925 was found with regard to the Anxiety scale. These results indicate acceptably high reliability in all cases.

Study participants were part of SurveyMonkey Contribute. SurveyMonkey.com offers incentives in the form of charity donations to participants in their survey program. Survey respondents are balanced in region, age, and gender. Of respondents who

responded to a prompt to enter their name, 134 were female, and 125 were identified as male. The age range of respondents was 18-80, with a mean age of 58.

**Q1.** Is pet owners' perceived stress associated with the strength of the human-animal bond?

***Hypothesis 1.*** The first hypothesis included in this study consisted of the following:

*H1. There is an effect of strength of the bond on perceived stress when controlling for anxiety and avoidance.*

In order to test this hypothesis, a hierarchical regression analysis was conducted. The results of these two linear regression models are summarized in the following table. In the initial model, which incorporated only Strength of Bond as a predictor, a statistically significant result was found, with a one-unit increase in this measure being associated with a .559 unit increase in the outcome, Perceived Stress. In the second model, this measure was again found to be significant, after controlling for the effects of Anxiety and Avoidance. Specifically, in the second model, a one-unit increase in Strength of Bond was found to be associated with a .621 unit increase in the outcome, Perceived Stress. Additionally, while the effect of Anxiety was not found to achieve statistical significance in this model, Avoidance was found to achieve significance, with a one-unit increase in this measure found to be associated with a .303 unit increase in the outcome.

Additionally, both regression models were found to achieve statistical significance, with an adjusted  $R^2$  of .108 found in the initial model, and an adjusted  $R^2$  of .403 indicated in the second model. Additionally, a significant  $F$ -change was indicated when comparing the first and second regression models. A Durbin-Watson coefficient of

1.882 was indicated in the second model, which did not indicate a violation of this assumption. With regard to the assumption of the lack of multicollinearity, the variance inflation factors found in relation to the second linear regression model were not found to be above five with regard to any predictor, indicating the lack of multicollinearity.

**Table 1**

*Hypothesis 1: Regression Analysis*

Model	<i>B</i>	<i>SE</i>	Beta	<i>t</i>	<i>p</i>	95.0% CI for <i>B</i>		VIF
						Lower	Upper	
<i>Model 1<sup>a</sup></i>								
(Constant)	18.964	2.821		6.723	.000	13.413	24.514	
Strength of Bond	.559	.091	.333	6.135	.000	.379	.738	1.000
<i>Model 2<sup>b</sup></i>								
(Constant)	10.653	2.520		4.227	.000	5.693	15.613	
Strength of Bond	.621	.087	.370	7.161	.000	.450	.792	1.356
Anxiety	-.013	.039	-.023	-.329	.742	-.090	.064	2.532
Avoidant	.303	.036	.563	8.459	.000	.232	.373	2.251

*Note.* <sup>a</sup> $R = .333$ ,  $R^2 = .111$ , Adjusted  $R^2 = .108$ ;  $F(1, 302) = 37.642$ ,  $p < .001$ ; <sup>b</sup> $R = .640$ ,  $R^2 = .409$ , Adjusted  $R^2 = .403$ ;  $F(3, 300) = 69.278$ ,  $p < .001$ ;  $\Delta F(2, 300) = 75.776$ ,  $p < .001$ ; Durbin-Watson = 1.882.

Following this, a series of descriptive statistics were conducted in order to test the remaining assumptions of linear regression in relation to the second and final model conducted for this hypothesis. All figures discussed here are presented in Appendix D. First, a histogram was constructed illustrating the distribution in the regression standardized residuals. This distribution was found to be relatively normal, with a small degree of positive skew indicated. Overall substantial non-normality was not indicated here with regard to the distribution of the residuals.

Next, the following figure constructed consisted of a normal probability-probability plot of the regression standardized residuals. Specifically, this figure plots the observed cumulative probability on the x-axis, and the expected cumulative probability

on the y-axis. Plotted circles that generally coincide with the superimposed 45° line would indicate normality, while substantial deviations from this would indicate substantial non-normality. A review of this figure indicated that the plotted data almost perfectly coincide with the superimposed 45° line. This result also indicates the normality of the residuals associated with this linear regression analysis.

The following figure constructed consisted of a scatterplot illustrating the regression standardized predicted values on the x-axis, and the regression standardized residuals on the y-axis. This figure was constructed for the purposes of determining whether the assumption of homoscedasticity was violated in this analysis. A review of this figure revealed a random cloud of plotted data. This would indicate the lack of heteroscedasticity, and therefore the lack of violation of this assumption.

Following this, a series of partial regression plots were constructed, one for each predictor variable included in the final regression analysis, which served the purpose of testing the assumptions of linearity and the lack of influential outliers. Within these scatterplots, linearity can be determined by the overall shape and pattern of the plotted data, while the presence of influential outliers would be suggested through the presence of extreme data points, which exist far from the remainder of the plotted data. The first scatterplot constructed served to illustrate the association between Strength of Bond, the predictor, and Perceived Stress Scale. The pattern of plotted data indicates a moderate positive relationship between these two measures, with two minor outliers also being indicated on. Next, a partial regression plot was conducted between Anxiety and the Perceived Stress Scale. These data indicate no relationship between these two variables, with no influential outliers being found. The final scatterplot presented the plotted data

focusing upon the Avoidance predictor and the Perceived Stress Scale. A review of this figure illustrated a moderate, positive relationship was indicated between these two measures, with no extreme outliers being indicated. These results indicated a significant and positive impact of strength of the bond on perceived stress in both models, indicating the rejection of this first null hypothesis.

**Q2.** Is pet owners' perceived stress associated with attachment anxiety?

***Hypothesis 2.*** Next, the second hypothesis included within this study consisted of the following:

*H2. There is an effect of anxiety on perceived stress when controlling for strength of the bond and avoidance.*

In order to test this hypothesis, a series of two additional linear regression models were conducted. The results of these analyses are summarized in the following table. In the first model conducted, Anxiety was included as the sole predictor of Perceived Stress, while the second model also included as predictors, Avoidance and Strength of Bond. In the first model, the effect of Anxiety was found to achieve statistical significance, with a one-unit increase in Anxiety being associated with a .268 unit increase in the outcome, Perceived Stress. However, the effect of Anxiety was not found to achieve statistical significance in the second model, in which Avoidance and Strength of Bond were also controlled for. However, the second model found Avoidance to achieve statistical significance, with a one-unit increase in Avoidance being associated with a .303 unit increase in the outcome, Perceived Stress. Additionally, Strength of Bond was also found to achieve statistical significance in the second model, with a one-unit increase in this measure being associated with a .621 unit increase in the outcome.

The first regression model conducted was found to have an adjusted  $R^2$  of .234, with the second model achieving an adjusted  $R^2$  of .403. Additionally, both regression models were found to achieve statistical significance, with the second model also achieving a significant  $F$ -change. The Durbin-Watson coefficient associated with the second linear regression model was found to be 1.882, indicating that the assumption of autocorrelation was not violated in this analysis. Additionally, none of the variance inflation factors associated with the second model were found to be above five, indicating that the assumption of the lack of multicollinearity was not violated in this analysis.

**Table 2**

*Hypothesis 2: Regression Analysis*

<u>Model</u>	<u>B</u>	<u>SE</u>	<u>Beta</u>	<u>t</u>	<u>p</u>	<u>95.0% CI for B</u>		<u>VIF</u>
						<u>Lower</u>	<u>Upper</u>	
<i>Model 1<sup>a</sup></i>								
(Constant)	27.916	.968		28.842	.000	26.012	29.821	
Anxiety	.268	.028	.486	9.660	.000	.214	.323	1.000
<i>Model 2<sup>b</sup></i>								
(Constant)	10.653	2.520		4.227	.000	5.693	15.613	
Anxiety	-.013	.039	-.023	-.329	.742	-.090	.064	2.532
Avoidant	.303	.036	.563	8.459	.000	.232	.373	1.356
Strength of Bond	.621	.087	.370	7.161	.000	.450	.792	2.251

*Note.* <sup>a</sup> $R = .486$ ,  $R^2 = .236$ , Adjusted  $R^2 = .234$ ;  $F(1, 302) = 93.320$ ,  $p < .001$ ; <sup>b</sup> $R = .640$ ,  $R^2 = .409$ , Adjusted  $R^2 = .403$ ;  $F(3, 300) = 69.278$ ,  $p < .001$ ;  $\Delta F(2, 300) = 43.997$ ,  $p < .001$ ; Durbin-Watson = 1.882.

As before, a series of plots were then constructed in order to test whether any of the remaining assumptions of linear regression were violated here. First, a histogram of the regression standardized residuals found, as previously, slight positive skew, though overall, this measure was found to have an approximately normal distribution. The normal probability-probability plot constructed of the regression standardized residuals

also indicates the lack of a substantial deviation from normality with regard to the residuals.

Next, a scatterplot was constructed focusing upon the regression standardized predicted values and the regression standardized residuals. A diffuse cloud of data was illustrated here, indicating that the assumption of homoscedasticity was not violated in this analysis.

The following set of figures constructed consists of the partial regression plots conducted in relation to this second regression model. The first figure constructed presents the plotted data focusing upon Anxiety and the Perceived Stress Scale. No relationship was indicated, while linearity as well as the lack of influential outliers was also indicated on the basis of this figure. Next, the following partial regression plot constructed focuses upon Strength of Bond and the Perceived Stress Scale. This figure indicated a moderate, positive relationship between these two measures, with minor though non-influential outliers being found. Next, the final figure constructed presents the partial regression plot focusing upon the Avoidance predictor. Similar to the previous scatterplot, a moderate, linear, and positive association was indicated between these two variables, with no extreme outliers being indicated.

**Q3.** Is pet owners' perceived stress associated with attachment avoidance?

***Hypothesis 3.*** The third hypothesis included in this study consisted of the following:

*H3. There is an effect of avoidance on perceived stress when controlling for strength of the bond and anxiety.*

The results of the linear regression analysis conducted testing this hypothesis are presented in the following table. In the initial model conducted, the effect of Avoidance

was found to achieve statistical significance in its impact upon Perceived Stress. Specifically, a one-unit increase in Avoidance was found to be associated with a .284 unit increase in the outcome, Perceived Stress. In the second model conducted, Avoidance was included as a predictor, along with Strength of Bond and Anxiety. In the second model, Anxiety was not found to achieve statistical significance, while statistical significance was indicated with respect to the effects of both Avoidance and Strength of Bond. In this model, a one-unit increase in Avoidance was found to be associated with a .303 unit increase in the outcome, Perceived Stress, while a one-unit increase in Strength of Bond was associated with a .621 unit increase in Perceived Stress.

The first regression model conducted was found to achieve an adjusted  $R^2$  of .276, with the second model achieving an adjusted  $R^2$  of .403. Both regression models were found to achieve statistical significance, with a significant  $F$ -change also indicated between these two linear regression models. The Durbin-Watson coefficient associated with the second linear regression model was found to be 1.882, which indicates that the assumption of autocorrelation was not violated in this analysis. Furthermore, none of the variance inflation factors associated with the second linear regression model were found to be above five, which indicates that the assumption of the lack of multicollinearity was not violated.

**Table 3**

*Hypothesis 3: Regression Analysis*

<u>Model</u>	<u>B</u>	<u>SE</u>	<u>Beta</u>	<u>t</u>	<u>p</u>	<u>95.0% CI for B</u>		<u>VIF</u>
						<u>Lower</u>	<u>Upper</u>	
<i>Model 1<sup>a</sup></i>								
(Constant)	29.583	.761		38.899	.000	28.086	31.080	
Avoidant	.284	.026	.528	10.805	.000	.232	.335	1.000

*Model 2<sup>b</sup>*

(Constant)	10.653	2.520		4.227	.000	5.693	15.613	
Avoidant	.303	.036	.563	8.459	.000	.232	.373	2.251
Strength of Bond	.621	.087	.370	7.161	.000	.450	.792	1.356
Anxiety	-.013	.039	-.023	-.329	.742	-.090	.064	2.532

*Note.* <sup>a</sup> $R = .528$ ,  $R^2 = .279$ , Adjusted  $R^2 = .276$ ;  $F(1, 302) = 116.745$ ,  $p < .001$ ; <sup>b</sup> $R = .640$ ,  $R^2 = .409$ , Adjusted  $R^2 = .403$ ;  $F(3, 300) = 69.278$ ,  $p < .001$ ;  $\Delta F(2, 300) = 33.126$ ,  $p < .001$ ; Durbin-Watson = 1.882.

The first figure constructed in order to test the remaining assumptions of linear regression consisted of a histogram of the regression standardized residuals associated with this analysis. Non-normality was not indicated on the basis of this figure. Next, the probability-probability plot of the regression standardized residuals also indicated normality with respect to the residuals resulting from the second linear regression model.

Next, the following figure constructed consists of a scatterplot plotting the regression standardized predicted values with the regression standardized residuals, serving to test the assumption of homoscedasticity. As the plotted data illustrates a diffuse field, the assumption of homoscedasticity was not violated in this analysis.

Following this, a series of partial regression plots were constructed in order to test the assumptions of linearity and the lack of influential outliers. The first scatterplot constructed focuses upon the association between Avoidance and the Perceived Stress Scale. A positive, moderate association was indicated, which was found to be linear, with no influential outliers being indicated on the basis of this figure. The following scatterplot focuses upon the association between Strength of Bond and the Perceived Stress Scale. Similarly, a linear, positive, and moderate association was indicated between these two measures, with no influential outliers being indicated on the basis of this scatterplot. The following partial regression plot focuses upon the association between Anxiety and the Perceived Stress Scale. No association was indicated between

these two measures, while neither non-linearity nor influential outliers were indicated on the basis of this figure.

**Hypothesis 4.** Finally, the fourth hypothesis included in this study consisted of the following:

*H4. There is a moderating effect of anxiety and avoidance on the relationship between strength of the bond and pet owner stress.*

The results of the regression analysis conducted in order to test this hypothesis are presented in the following table. In order to test the effect of moderation, all mean effects were standardized for these analyses, with the interaction effects calculated also using these standardized measures. With regard to the initial regression analysis conducted, Strength of Bond was found to achieve statistical significance, with a one-unit increase in the standardized version of this measure being associated with a 3.285 unit increase in the outcome, Perceived Stress. In the second model, statistical significance was found with regard to Strength of Bond, Avoidance, as well as both interaction effects, indicating significant moderation. First, with regard to the effect of Strength of Bond, a one-unit increase in the standardized version of this measure was found to be associated with a 3.486 unit increase in the outcome. With regard to Avoidance, a one-unit increase in the standardized version of this measure was found to be associated with a 4.434 unit increase in the outcome. Next, both interaction effects were found to achieve statistical significance, with both unstandardized effects being positive. These results indicate that the effect of Strength of Bond on Perceived Stress becomes more positive with higher values of Anxiety and Avoidance.

With regard to the results of these two linear regression models, the initial model conducted was found to achieve an adjusted  $R^2$  of .108, with the second model achieving

an adjusted  $R^2$  of .457. Both models were found to achieve statistical significance, with a significant  $F$ -change also indicated when comparing these two models. The second model was found to have a Durbin-Watson coefficient of 1.946, indicating that substantial autocorrelation was not present in this analysis. Additionally, no variance inflation factors above five were found, indicating the lack of multicollinearity in this analysis.

**Table 4**

*Hypothesis 4: Regression Analysis*

Model	$B$	$SE$	Beta	$t$	$p$	95.0% CI for $B$		VIF
						Lower	Upper	
<i>Model 1<sup>a</sup></i>								
(Constant)	35.976	.533		67.507	.000	34.927	37.024	
Z Strength of Bond	3.285	.535	.333	6.135	.000	2.232	4.339	1.000
<i>Model 2<sup>b</sup></i>								
(Constant)	35.587	.468		75.994	.000	34.665	36.508	
Z Strength of Bond	3.486	.513	.353	6.801	.000	2.477	4.494	1.479
Z Avoidant	4.434	.667	.451	6.651	.000	3.122	5.746	2.519
Z Anxiety	-.148	.672	-.015	-.221	.826	-1.471	1.175	2.565
Z SOB*Z Avoidant	1.246	.583	.129	2.136	.033	.098	2.393	2.006
Z SOB*Z Anxiety	1.356	.566	.140	2.397	.017	.243	2.470	1.872

*Note.* <sup>a</sup> $R = .333$ ,  $R^2 = .111$ , Adjusted  $R^2 = .108$ ;  $F(1, 302) = 37.642$ ,  $p < .001$ ; <sup>b</sup> $R = .640$ ,  $R^2 = .676$ , Adjusted  $R^2 = .457$ ;  $F(5, 298) = 50.080$ ,  $p < .001$ ;  $\Delta F(4, 298) = 47.406$ ,  $p < .001$ ; Durbin-Watson = 1.946.

The first figure constructed in order to test the remaining assumptions of linear regression consisted of a histogram of the regression standardized residuals. On the basis of this figure, normality was indicated, with no indication of substantial skewness or kurtosis. Next, the following figure constructed consisted of a normal probability-probability plot of the regression standardized residuals. Very minimal deviation from the superimposed 45° line was found, which indicates normality with regard to the residuals in this analysis. Next, the following figure constructed consisted of a scatterplot

illustrating the association between the regression standardized predicted values and the regression standardized residuals. The shape of the plotted data, which indicates less variation in the regression standardized residuals as the regression standardized predicted values increase, indicate heteroscedasticity in this model.

Next, a series of partial regression plots were constructed in order to test for linearity and the lack of influential outliers. The first scatterplot constructed focuses on the association between Strength of Bond and the Perceived Stress Scale. A moderate, positive, and linear association was indicated between these two measures, with no influential outliers found on the basis of this figure. The next scatterplot constructed focuses upon the association between Avoidance and the Perceived Stress Scale. A positive, linear, and moderate association was indicated between these two measures, with no influential outliers being found on the basis of this figure. The next partial regression plot constructed focuses upon the association between Anxiety and the Perceived Stress Scale. This scatterplot illustrates no association between these two measures, while linearity was indicated, along with the lack of any influential outliers.

The next partial regression plot constructed focuses upon the association between the interaction between Strength of Bond and Avoidance and the Perceived Stress Scale. A positive association was indicated between these two measures, while neither non-linearity nor influential outliers were indicated here. In the final partial regression plot constructed, the interaction between Strength of Bond and Anxiety and the Perceived Stress Scale was focused upon. No association was indicated between these two measures, while neither non-linearity nor influential outliers were present on the basis of this figure.

## **Evaluation of Findings**

How attachment style may moderate the relationship between strength of the pet and owner bond and stress was the purpose of the current study. The null hypothesis was rejected for Research Question 1. An effect from the strength of the bond was found in two regression models, the first controlling for anxiety and avoidance, the second including anxiety and avoidance. Both models found significant impact of strength of the bond on perceived stress. The null hypothesis was accepted for Research Question 2. The second hypothesis posited that there was an effect of anxiety and stress when controlling for strength of the bond and avoidance.

The null hypothesis was rejected for Research Question 3. The third alternate hypothesis speculated an effect from avoidant attachment on perceived stress when controlling for strength of the bond and avoidance. A significant effect for avoidance was found in both models. The null hypothesis was rejected for Research Question 4. The fourth hypothesis posited a moderating effect of anxiety and avoidance on the relationship between strength of the bond and owner stress. Significant moderation on strength of the bond and stress by both anxiety and avoidance were shown.

The alternate hypothesis was found for hypotheses 1, 3 and 4. The null was accepted for hypothesis 2. Significant effects were not found for anxiety on stress of the pet owner. However significant effects were found for avoidance as an effect on stress of the pet owner. Significant interaction effects between strength of the bond and stress were found for both anxiety and avoidance, supporting that anxiety and avoidance provided significant moderation on strength of the bond and stress. The results of this study are supported by prior studies which have examined the human-animal bond

(Antonacopoulos & Pychyl, 2010; Kurdek, 2008, 2009a, 2009b), those which have looked at strength of the bond (Chur-Hansen et al., 2010; Winefield et al., 2008), and those which have looked at attachment orientations and the bond between human and pet (Zilcha-Mano et al., 2011a, 2011b, 2012). The results support a distinction between anxiety and avoidance as distinct attachment orientations which can be individually considered.

### **Summary**

In summary, in this chapter the results of the analyses conducted testing this study's hypotheses were presented and discussed. The initial reliability analyses indicated an acceptable level of internal consistency reliability with respect to all scale measures included in this study. Following this, four sets of two regression analyses were conducted in order to test each of this study's four hypotheses. Based on the results of these analyses, this study's first, third, and fourth null hypotheses were rejected, while this study's second null hypothesis failed to be rejected. Additionally, serious violations of the assumptions of linear regression were not indicated in any of the analyses conducted for this study. The following chapter will discuss these results in relation to previous literature, and will also present the limitations of the study as well as possibilities for future research.

### **Chapter 5: Implications, Recommendations, and Conclusions**

This study was inspired by investigation of the human-animal bond, and how the bond relates to stress in pet owners. Researchers have examined how animals have been utilized as sources of support in many different settings (Barker et al., 2010; Geist, 2011; Pace, 2011). Pet ownership is widespread in the United States, with over 50% of

households in the United States reported as owning an animal (Pace, 2011). Researchers into the human-animal bond have found that pet owners benefit from owning an animal (Amiot & Bastian, 2015; Gillum & Obisesan, 2010, McConnell et al., 2011). The value of pet ownership both emotionally and psychologically has been found to include provision of a consistent relationship and feelings of connection (Barker, 2009; McConnell et al., 2011; Pace, 2011).

Researchers have demonstrated that pet ownership is connected to overall health. Pet ownership has been shown to affect or reduce physiological, behavioral, and emotional stress experienced in everyday living (Brown & Rhodes, 2006; Gillum & Obisesan, 2010; McConnell et al., 2011). Overall, stress has been defined as a subjective and interpretive response to challenging conditions, which can be interpreted as stress (Cohen & Wills, 1985; Cohen & Jerecki-Deverts, 2012). Companionship of a pet has been seen as one coping mechanism or element that can affect physical and physiological health of an owner (Gillum & Obisesan, 2010; Peacock, Chur-Hansen & Winefield, 2012).

The purpose of the current study was to investigate the potential moderation of attachment style on the relationship between strength of the bond and stress in pet owners. This was studied by measuring levels of avoidance and anxiety in attachment relationships as well as the strength of the human-animal bond and perceived stress in a convenience sample of pet owners. The moderating variable, strength of the human-animal bond, was measured using the Owner Pet Relationship Questionnaire (Winefield & Chur-Hansen, 2008). Attachment was used in the current study as a framework to investigate attachment style and stress in pet owners. Anxiety and avoidance scores were

measured using the Pet Attachment Questionnaires (PAQ, Zilcha-Mano et al., 2011). The dependent variable was measured using the Perceived Stress Scale (Cohen, Kamarck, & Mermelstein, 1983).

The problem addressed in this dissertation is the extent to which, or whether, attachment style moderates stress among pet owners. This has been examined in few studies in the current literature. The potential moderation of attachment style on the relationship between strength of the bond and stress in pet owners was examined in this current study by measuring levels of avoidance and anxiety in attachment relationships as well as the strength of the human-animal bond and perceived stress in a convenience sample of pet owners. One moderating variable, strength of the human-animal bond, was measured using the Owner Pet Relationship Questionnaire, while the remaining moderating variables were measured on the basis of anxiety and avoidance scores from the Pet Attachment Questionnaire. Additionally, the dependent variable was measured using the Perceived Stress Scale. A discussion of the results found is presented in this chapter, along with the limitations of the study and possibilities for future research.

In this study, a group of 304 subjects ( $N=304$ ) subjects, aged between 18 and 80 years of age who were also pet owners, answered the surveys made available on SurveyMonkey.com. The subjects were balanced by age, gender and location through survey screening provided by SurveyMonkey.com. Ethical principles were followed recommended by the Belmont Report, as well as the requirements of Northcentral University Institutional Review Board. Participants were able to stop their participation at any time. All participation was anonymous, and no identifying information was

gathered about any participant. Data will be kept in a secure private personal computer for seven years, after which it will be disposed.

A discussion of the implications of the current study is presented in this chapter. Each research question and hypotheses are then discussed. The results are discussed in relation to other research literature in the area of investigation. Recommendations for further research and applications to practice are included at the end of the chapter..

### **Implications**

With regard to the previous literature, a number of areas of study relate to the current study. First, adult attachment theory and the development of the attachment framework are relevant to the current study, along with research conducted on attachment as applied to the bond between pets and owners, research on the effects of pet ownership on physical and mental well-being and stress, as well as research on adult attachment and attachment in the context of the pet-owner relationship (Kurdek, 2008, 2009a, 2009b; McConnell et al., 2011; Mikulincer & Shaver, 2007; Peacock et al., 2012; Zilcha-Mano et al., 2011a, 2011b, 2012). The attachment framework has been of interest to researchers in the human and companion animal relationship (Carr & Rockett, 2013; Kurdek, 2008, 2009a, 2009b; McConnell et al., 2011; Zilcha-Mano et al., 2011, 2012a, 2012b). As stated by Carr and Rockett (2013), attachment provides a consistent framework within which researchers can examine the human and pet bond. Advantages include a taxonomy that defines and distinguishes attachment from other bond types (Carr & Rockett, 2013). Four research questions were asked:

**Q1.** Is pet owners' perceived stress associated with the strength of the human-animal bond?

**H1<sub>0</sub>.** There is no effect of the strength of the bond on perceived stress when controlling for anxiety and avoidance.

**H1.** There is an effect of strength of the bond on perceived stress when controlling for anxiety and avoidance.

**Q2.** Is pet owners' perceived stress associated with attachment anxiety?

**H2<sub>0</sub>.** There is no effect of anxiety on perceived stress when controlling for strength of the bond and avoidance.

**H2.** There is an effect of anxiety on perceived stress when controlling for strength of the bond and avoidance.

**Q3.** Is pet owners' perceived stress associated with attachment avoidance?

**H3<sub>0</sub>.** There is no effect of avoidance on perceived stress when controlling for strength of the bond and anxiety.

**H3.** There is an effect of avoidance on perceived stress when controlling for strength of the bond and anxiety.

**Q4.** Does attachment style moderate the relationship between the human-animal bond and stress reduction?

**H4<sub>0</sub>.** There is not a moderating effect of anxiety and avoidance on the relationship between strength of the bond and pet owner stress.

**H4.** There is a moderating effect of anxiety and avoidance on the relationship between strength of the bond and pet owner stress.

First, with regard to the reliability analyses conducted, Cronbach's alpha was used in order to determine the level of internal consistency reliability associated with all scale measures included within this study. In all cases, measures of reliability were found to be

above .70, indicating an acceptable level of internal consistency reliability with respect all scale measures included in this study. Following this, separate sets of regressions were conducted in order to test the four null hypotheses included within this study. Hierarchical regression analyses were conducted in all cases. In addition, along with the results of the models themselves, the  $R$ ,  $R^2$ , and adjusted  $R^2$  values were also reported for each model, along with the ANOVA associated with each linear regression as well as the  $F$ -change test determining whether the addition of the new predictors in the second linear regression model associated with each set of linear regression models produced a significantly improved model.

**Research question 1.** The research question posited an effect of strength of the bond on perceived stress when controlling for anxiety and avoidance, an initial model regressed perceived stress on strength of the bond only, with the second model regressing perceived stress on strength of the bond along with anxiety and avoidance. The results of this model indicated a significant and positive impact of strength of the bond on perceived stress in both models. Both analyses rejected the null hypothesis.

The strength of the bond to a companion animal has been a focus of studies on physical and psychological wellbeing (Barker et al., 2010; Friedmann et al., 2013; McConnell et al., 2011; McCune et al., 2014; Peacock et al., 2010; Walsh 2009a, 2009b). Researchers have examined psychological and physical wellbeing in relation to the strength of bond to a pet, with results that have varied. Greater wellbeing in pet owners has been indicated in some studies while more common occurrences of psychological disorders have been indicated in others. The OPRQ, used in the current study, was developed by Winefield et al. (2008), to examine wellbeing and pet ownership among a

group of community dwelling older adults. The researchers did not find an association between strength of attachment to a pet and positive health outcomes using the results from the OPQR, as well as other measures of wellbeing. However, McConnell et al. (2011) found links between overall wellbeing and pet ownership, with higher positive scores on personality features and positive attachment styles to pets seen in pet owners compared to non-pet owners. While both studies featured community samples with no outstanding mental or psychological distress, Winefield et al. state that further studies would need to be performed with a population lacking human social supports.

While these studies examined links between health and pet ownership, Peacock et al (2012) found an increase of mental disorders such as depression in highly attached pet owners. In a study which examined most directly the strength of the pet and owner bond, Peacock et al. (2012) divided and compared three groups of subjects with those reporting the highest attachment to their pet compared to those reporting the lowest attachment. Attachment was then examined for correlation to psychological distress. It was found that those reporting high levels of distress were also highly attached to the pet. Reflecting the results of these studies, Antonacopoulos & Pychyl (2010) examined depression among a sample of 132 Canadian pet and non-pet owners who lived alone. Antonacopoulos & Pychyl found, that, generally, those who lived alone with low levels of human social support but with high attachment to their pets reported more loneliness, while those with high levels of attachment to their pet and with high levels of social support reported less loneliness. Peacock et al. (2012) states that their study did not find positive outcomes for stronger bonds with pets. The studies above are significant in light

of the current study findings in which found for significant association of strength of the bond and stress both with, and controlling for, anxiety and avoidance.

**Research question 2.** The second research question posited an effect of anxiety and perceived stress when controlling for strength of the bond and avoidance. In this model, the effect of anxiety was found to achieve statistical significance in the initial model, though became non-significant after controlling for avoidance and strength of the bond. The null hypothesis was accepted by both analyses. These results therefore failed to indicate support for the alternative hypothesis.

Zilcha-Mano et al. (2012) found that subjects with anxious attachment were able to access their pet as a source of safe haven, measured before and after a stressful activity. Kurdek (2009b) examined a similar situation in looking at the role of safe haven and how often owners turned to pet dogs for stress alleviation compared to other attachment figures. He found that although dog owners did not rank safe haven as the most prominent of the four attachment features, dog owners reported turning to their pets over human attachment figures for a feeling of security and relief (Kurdek, 2009b). This is significant for this study as safe haven is the attachment feature related to stress reduction. Here, an anxious attachment orientation was not significant when controlling an anxious attachment orientation in this study may also have a more positive association with stress reduction through the pet bond.

**Research question 3.** Following this, the third research question included within this study posited an effect of avoidance on perceived stress when controlling for strength of the bond and anxiety. Two linear regression models were again used in order to test this null hypothesis, with the results of these models indicating a positive and significant

effect of avoidance in both regression models. The null hypothesis was rejected by both models.

Attachment theory specifies categories of attachment which include secure attachment, anxious attachment, avoidant attachment, and a style exhibiting both anxious and avoidant features (Bartholomew & Horowitz, 1991). Researchers have used dimensional attachment measures such as the ECR (Brennan et al., 1998) and the ECR-R (Fraley, Waller & Brennan, 2000) to measure attachment through two dimensions of anxiety and avoidance. A dimensional framework of attachment is constructed with high anxiety indicating anxiety and self-doubt surrounding attachment figures, and high avoidance indicating avoidance and denial of close relationships (Connors, 2011).

Zilcha-Mano et al. (2011a, 2012) distinguished between anxious and avoidant attachment, with a focus of the PAQ being the ability to distinguish between the two attachment orientations. In the study in which they incorporated the PAQ with an experimental situation, they found that subjects who displayed avoidant attachment orientation on the PAQ were less able to access their pet as a source of safe haven and alleviation of stress (Zilcha-Mano et al., 2012). The addition of an experimental stressful activity in the study by Zilcha-Mano et al. (2012), serves to support the association of stress alleviation with an anxious attachment orientation. Here, avoidant attachment has shown to provide a significant effect on owner stress, which coincides with results of Zilcha-Mano et al. (2011a, 2012) in which owners with avoidant attachment orientations were less likely to obtain stress relief from the pet bond.

**Research question 4.** Next, in the fourth and final research question included within this study, it was posited that there is a moderating effect of anxiety and avoidance

on the relationship between strength of the bond and pet owner stress. Two linear regression analyses were again used in order to test the associated null hypothesis. In the results found in the second linear regression analysis, statistical significance was indicated with respect to the interactions between strength of the bond and avoidance as well as the interaction between strength of the bond and anxiety. Significant interaction effects would serve to indicate significant moderation. Therefore, the null hypothesis was rejected for the fourth research question.

Zilcha-Mano et al. (2011a, 2011b, 2012) examined specifically the interaction effects of anxiety and avoidance on the quality of the pet attachment relationship. Their developed scale, the PAQ, was derived from earlier attachment measures including the Adult Attachment Interview and the ECR (Brennan et al., 1998). The ECR is the first version of the Experiences in Close Relationships, which was later revised by Fraley et al. (2000) to a shortened version, the ECR-R, or the Experiences in Close Relationships Revised. It is significant to this study, that in considering the strength of the bond as a factor in predicting pet attachment orientations, Zilcha-Mano et al. (2011a) points out that measures of strength of the bond to a pet are inconsistent in predicting attachment orientations. Mikulincer and Shaver (2007) review studies which assess strength of bond to human attachment partners of various types, and state that these fail to show a consistent association to how the attachment framework functions within specific relationships. While the OPRQ has been shown to be robust in capturing strength of the human and pet bond, strength of the bond as associated with stress is not conclusive in this study as varied results have shown both positive and negative outcomes from a stronger bond with a companion animal.

The orthogonal nature of anxious and avoidant attachment was considered by Cameron et al. (2012). They examined the ECR (Brennan et al., 1998) and the ECR-R (Fraley et al., 2000), testing the assumption of orthogonal association of anxiety and avoidance in the two scales with a meta-analysis of 242 studies using the scales. Their findings included that the ECR was found to be more robust in distinguishing the orientations. Cameron et al.'s analysis of 242 studies of the ECR and ECR-R found a higher anxious and avoidant correlation in those featuring the ECR-R. The PAQ (Zilcha-Mano et al. 2011a) used in this study derived questions from the ECR version of the scale. Cameron et al. demonstrated that the ECR may be the more robust version of the Experiences in Close Relationships scale, or the version most able to capture the distinction between the two attachment orientations.

The purpose of this study was to look at how attachment style may moderate the relationship between strength of the pet and owner bond and stress. This study makes a contribution to knowledge of the pet and owner bond, and the effect of the bond on owner stress. Studying attachment in the context of attachment with pets will also help determine the extent to which attachment theory is upheld within this less-studied area. Results from this study might be used for contributions to theories of the human-animal bond and attachment, and the relationship of attachment between pet owners and pets to stress in pet owners.

The results of this study are supported in studies by Zilcha-Mano et al (2011a, 2012) in developing and incorporating the PAQ. Using the PAQ, Zilcha-Mano et al. (2012) found that avoidant attachment as measured by the PAQ was significant in predicting perceived stress. Zilcha-Mano et al. (2012) found that avoidant attachment

was significant in impacting an owners' ability to derive alleviation of stress from their pets' cognitive or physical presence while completing a stressful activity. However, attachment anxiety did not demonstrate significance in impacting an owner's ability to derive alleviation of stress from contact with their pet during the stressful task (2012). Zilcha-Mano's findings are supported by the findings of the current study, which found for the alternate hypothesis for Research Question 3, which asked "Is pet owners' perceived stress associated with attachment avoidance?" Avoidant attachment was found in this study to be significantly related to stress as a dependent variable.

While prior researchers found that pets could fulfill the functions of an attachment figure, they did not distinguish between attachment orientations (Kurdek, 2008, 2009a, 2009b; McConnell et al., 2011). This study is significant for building upon the work of Zilcha-Mano et al. (2011a, 2012) in distinguishing pet attachment orientations. This study builds upon the construction of anxiety and avoidance as orthogonal dimensions, separate within the attachment framework. Bartholomew and Horowitz (1998) describe the dimensional nature of attachment with anxiety and avoidance on separate ends of a two-dimensional spectrum. The two features are orthogonal supported by several studies, which describe the orthogonal nature of the two dimensions in the attachment framework (1998). In developing the PAQ, Zilcha-Mano et al. (2011a) found that anxiety and avoidance were not significantly correlated, and thus dimensions which may operate separately. Zilcha-Mano et al. identified the orthogonal dimensions of attachment-related anxiety and avoidance as a conceptually and statistically sound way of examining the human-pet attachment relationship. In this study, Cronbach's alphas for the PAQ anxiety and avoidance scales resulted in .953 for the avoidant scale, and .925 for the anxiety scale

measured in separate reliability analyses, close to the .87 for anxiety and .91 for avoidance from the study by Zilcha-Mano et al., (2011a) in which the PAQ was developed and tested. Further supporting the distinct nature of anxiety and avoidance, Zilcha-Mano et al., (2011a) found non-significant correlation ( $r = .04$ ) for both scales. Also, Zilcha-Mano et al. developed the PAQ based upon the ECR (Brennan et al., 1998), the version of the Experiences in Close Relationship scale which may more accurately capture distinctions between anxious and avoidant attachment. The orthogonal distinction between anxious and avoidant attachment is supported by the findings in this study. Avoidant attachment was found to be significantly related to stress, while anxious attachment was not significant, implying two distinct variables, which can be tested independently.

The first hypothesis found an effect of strength of the bond controlling for anxiety and avoidance. The fourth hypothesis found a significant moderating effect for anxiety and avoidance of strength of the bond on perceived stress. Prior researchers have found strength of the bond associated with increased psychological conditions (Winefield et al., 2008), and as sources of support which can be perceived as more secure than human relationships (Beck & Madresh, 2008; Zilcha-Mano et al., 2011a, 2012). Zilcha-Mano et al (2011) state that most studies of the pet and owner bond have focused on the strength of the bond in association with well-being in a pet owner (McConnell et al., 2011). Zilcha-Mano et al. (2011a, 2012) examined attachment orientations and association with the strength of bond. Examining the association of anxiety and avoidance to strength of bond, Zilcha-Mano et al. (2011a) used scales measuring strength of the human-pet relationship (Comfort from Companion Animal Scale, Lexington Attachment to Pet

Scale, Companion Animal Bonding Scale) in addition to the PAQ which they developed as part of the study. They found that results of these were inversely correlated with PAQ avoidance scores while positively related to PAQ anxiety scores. Controlling for each of the human-pet bond strength measures, they find that scales measuring strength of the bond can be distinguished from report scales for attachment orientation. However, they indicate that the strength of the bond as associated with attachment measures do not predict attachment orientations

While pet owners were not questioned about other attachment figures in the current study, the effect of strength of bond on perceived stress is also significant in light of prior studies investigating the attachment category of safe haven in the human and pet bond, the attachment category most associated with alleviation of stress (Kurdek, 2009a, 2009b). Kurdek (2009a, 2009b) examined the connection of safe haven to pet attachment, and investigated whether humans could regard pets as a source of safe haven. Using a measure developed to test strength of attachment to a pet dog, Kurdek found that pet owners reported that they turned to pet dogs over all other attachment figures for alleviation of stress, although safe haven was seen as the least salient of the four attachment features. The strength of bond to a companion animal has been found to be associated with increased vulnerability and psychological conditions of pet owners in other studies (Winefield, Black & Chur-Hansen, 2008). This study supports an association between perceived stress and strength of bond. Additionally, a moderating effect was seen both from anxiety and avoidance on stress and bond.

## **Recommendations**

There are a number of possibilities for future research in this area of literature. First, based upon the limitations section, a future study in this area could attempt to use a random sample of respondents, or a similar methodology, in order to obtain a sample of individuals whom are representative of a larger population. In this way, the results found in such a future study could be applied and generalized to this larger population.

Additionally, the use and collection of panel data, or data on a specific sample of respondents taken over multiple time points, would allow for the determination of causality between measures. In this way, the use of such a methodology, as opposed to the use of a cross-sectional sample, would allow the researcher to definitively determine whether one measure causes or effects another. This would also require different statistical tests to be conducted, such as panel regression or cross-lagged structural equation models. Additionally, in order to replicate the current study, a similar analysis could be done on a population residing in another country, to determine whether the results found here hold in another culture. Findings may determine that these results are the same, or they may differ by on the basis of significance or non-significance, or they are stronger or weaker than those in the present study. Qualitative studies may be useful in examining specific groups of pet owners, incorporating interviews and observations to examine how these pet owners coexist with their pets on a daily basis.

The results of the current study can be applied to numerous populations, including community samples, patients undergoing therapy, as well as among households who own pets. The overall applicability of the results relate to the human-animal bond and attachment, with this study focusing specifically on attachment between pet owners and

pets and overall well-being in pet owners. Counselors who work with patients may consider the relationship of the bond to a companion animal in the scope of their treatment. It has been recommended that counselors and those who work with patients take relationships with companion animals into consideration in assessment of patient and in recommendations for treatment. Patients who are experiencing stress and are pet owners may benefit from consideration of the pet bond. Tests such as the OPRQ and the PAQ can be used to distinguish the attachment orientation of a pet owner. This can be informative as to how the bond may relate to stress in the owner.

This study incorporated several limitations. First, a random sample of respondents was not used in this study, which serves to limit the generalizability, and therefore, the external validity of the present study. Specifically, in order to generalize the results of the study from a sample to a larger population, a random sample or similar methodology such as a stratified random sample must be used in order to ensure that the sample of respondents included within the present study is representative of a larger population. Within the current study, a convenience sample was instead used, in order to more easily and affordably collect a sample of respondents for analysis. Therefore, these current results are not necessarily representative of a larger population, and can only be generalized cautiously. Additionally, through the use of a cross-sectional methodology, causality cannot be determined in the present study. Specifically, the extent to which one variable does or does not cause a second variable cannot be determined here, with this only being possible to determine when using panel data or time-series data along with different statistical tests appropriate to those types of data.

## Conclusions

In summary, the results of the analyses conducted for this study indicated an acceptable level of internal consistency reliability with respect to all scale measures, while the linear regression analyses conducted for this study indicated support for three out of this study's four alternative hypotheses. The limitations inherent in this study include the use of a convenience sample, which limits the generalizability and external validity of the study's results, as well as the use of a cross-sectional sample, which doesn't allow for the determination of causality between measures.

Future studies in this area of literature can expand upon the current study by attempting to attain a random sample of respondents, by using and analyzing panel data in order to determine causality, and by performing this study using respondents residing in foreign countries in order to determine the extent to which these results do or do not hold in other cultures. The findings of the current study are supported by research in the areas of the human and animal bond (Friedmann et al., 1995; Friedmann & Tsai, 2006; Friedmann et al., 2013; McConnell et al., 2011) and the attachment between human and companion animals (Carr & Rocket, 2013; Chur-Hansen et al., 2010; Kurdek, 2008, 2009a, 2009b; Peacock et al., 2012; Zilcha-Mano et al., 2011a, 2012; Winefield et al., 2008). The findings of the current study were significant for strength of the bond and association with stress. However, the findings are not conclusive as to the positive or negative nature of the association. The study findings were not significant for anxious attachment and association with stress. The study findings were significant for avoidant attachment and association with stress.

Pet ownership has been positively associated with health in studies. As well, national studies of wellbeing such as those conducted in Germany (Heady & Grabka, 2010) indicate positive association with health outcomes. However, based upon studies such as those of Peacock et al. (2012) and Chur-Hansen et al. (2010), strength of bond may be unpredictable as a gauge of pet ownership on human psychological or physical health. Further studies should acknowledge this. Also, the association with attachment to a pet and association with health or overall wellbeing may be other areas for further research.

Further areas of research could include the positive or negative nature of strength of the bond in the owner and pet relationship, and how this may specifically impact stress levels. A mixed method methodology could be used to gain both quantitative and qualitative data about pet owners, and the effects of pet ownership on both psychological and physical health.

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## Appendix

## Appendix A: Owner Pet Relationship Questionnaire

*www.adelaide.edu.au/library/guide/med/menthealth/OPRS.doc*

*Please put a circle around ONE possible answer, for each of the questions below.*

*If you have more than one pet, please answer these questions with regard to the one you feel closest to. This is a cat, dog, and bird, other (what ..... ) [tick one]*

1. I want to take my pet along when I go to visit friends or relatives

Never      sometimes      usually      always      no response

2. Pets should have the same rights and privileges as family members

Strongly disagree      disagree      agree      strongly agree      no response

3. I have a photo of my pet in my purse, wallet or mobile, or on display in my office or home.      True      not true      no response

4. My pet is more loyal to me than the people in my life

Strongly disagree      disagree      agree      strongly agree      no response

5. My pet helps me get through tough times

Never      sometimes      usually      always      no response

6. My pet gives me a reason for getting up in the morning

Strongly disagree      disagree      agree      strongly agree      no response

7. My pet is like a member of the family

Strongly disagree      disagree      agree      strongly agree      no response

8. My feelings towards other people are affected by how they react to my pet

Never      sometimes      usually      always      no response

9. My pet knows when I'm upset and tries to comfort me

Never      sometimes      usually      always      no response

10. My pet enjoys my company

Never      sometimes      usually      always      no response

11. My pet relies on me for love and care

Never      sometimes      usually      always      no response

12. I love my pet

Strongly disagree      disagree      agree      strongly agree      no response

13. I think about my pet when it is not with me

Never      sometimes      usually      always      no response

14. I do not like leaving my pet in someone else's care if I go interstate or overseas

Strongly disagree      disagree      agree      strongly agree      no response

15. I have got to know other people through having this pet.

Never      occasionally      quite often      frequently      no response

## Appendix B: Perceived Stress Scale

The questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate your response by placing an “X” over the circle representing HOW OFTEN you felt or thought a certain way. Although some of the questions are similar, there are differences between them and you should treat each one as a separate question. The best approach is to answer fairly quickly. That is, don’t try to count up the number of times you felt a particular way, but rather indicate the alternative that seems like a reasonable estimate.

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and “stressed”?
4. In the last month, how often have you dealt successfully with day-to-day problems and annoyances?
5. In the last month, how often have you felt that you were effectively coping with important changes that were occurring in your life?
6. In the last month, how often have you felt confident about your ability to handle your personal problems?
7. In the last month, how often have you felt that things were going your way?
8. In the last month, how often have you found that you could not cope with all the things that you had to do?
9. In the last month, how often have you been able to control irritations in your life?
10. In the last month, how often have you felt that you were on top of things?
11. In the last month, how often have you been angered because of things that happened that were outside of your control?
12. In the last month, how often have you found yourself thinking about things that you have to accomplish?
13. In the last month, how often have you been able to control the way you spend your time?

14. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Scale

Almost			Fairly		Very	
<b>Never</b>	<b>Never</b>	<b>Sometimes</b>	<b>Often</b>	<b>Often</b>	<b>No Response</b>	
0	1	2	3	4	5	

### Appendix C: Pet Attachment Questionnaire items

1: Avoidance Factor 2: Anxiety

1. Being close to my pet is pleasant for me (reverse-scored)

1 2 3 4 5 6 7 no response

2. I'm often worried about what I'll do if something bad happens to my pet

1 2 3 4 5 6 7 no response

3. I prefer not to be too close to my pet

1 2 3 4 5 6 7 no response

4. Sometimes I feel that I force my pet to show more commitment and desire to be close to me

1 2 3 4 5 6 7 no response

5. I prefer to keep some distance from my pet

1 2 3 4 5 6 7 no response

6. If I can't get my pet to show interest in me, I get upset or angry

1 2 3 4 5 6 7 no response

7. Often my pet is a nuisance to me

1 2 3 4 5 6 7 no response

8. Signs of affection from my pet bolster my self-worth

1 2 3 4 5 6 7 no response

9. I feel distant from my pet

1 2 3 4 5 6 7 no response

10. I often feel that my pet doesn't allow me to get as close as I would like

1 2 3 4 5 6 7 no response

11. I'm not very attached to my pet  
1 2 3 4 5 6 7 no response
12. I get angry when my pet doesn't want to be close to me as much as I would like it to .  
1 2 3 4 5 6 7 no response
13. If necessary, I would be able to give away my pet without any difficulties  
1 2 3 4 5 6 7 no response
14. I get frustrated when my pet is not around as much as I would like it to be  
1 2 3 4 5 6 7 no response
15. I have no problem parting with my pet for a long duration  
1 2 3 4 5 6 7 no response
16. I need shows of affection from my pet to feel there is someone who accepts me as I am  
1 2 3 4 5 6 7 no response
17. I get uncomfortable when my pet wants to be close to me  
1 2 3 4 5 6 7 no response
18. I feel frustrated if my pet doesn't seem to be available for me when I need it  
1 2 3 4 5 6 7 no response
19. I get nervous when my pet gets too close to me  
1 2 3 4 5 6 7 no response
20. Without acts of affection from my pet I feel worthless  
1 2 3 4 5 6 7 no response
21. I want to get close to my pet, but I keep pulling away

1      2      3      4      5      6      7      no response

22. I am worried about being left alone without my pet

1      2      3      4      5      6      7      no response

23. I try to avoid getting too close to my pet

1      2      3      4      5      6      7      no response

24. I need expressions of love from my pet to feel valuable

1      2      3      4      5      6      7      no response

25. When I'm away from my pet for a long period of time, I hardly think about it

1      2      3      4      5      6      7      no response

26. I need a lot of reassurance from my pet that it loves me

1      2      3      4      5      6      7      no response

1	2	3	4	5	6	7
Disagree e strongly	-----	-----	Neutral/ Mixed	-----	-----	Agree Strongly

To code the PAQ, you should reverse score item no. 1.

An individual's score in the avoidant dimension is the sum of the odd numbered questions.

An individual's score in the anxiety dimension is the sum of the even numbered questions

## **Appendix D: Informed Consent Form**

### Strength of the Human-Animal Bond and Stress Reduction: How Pet Owners' Attachment Style to Pets Moderates this Relationship

***What is the study about?***

The researcher requests your consent for participation in a study about attachment style, attachment to pets and stress. The purpose of this research study is to test how attachment style, particularly anxiety and avoidance, affects the relationship between strength of the human-animal bond and stress.

If you agree to take part in this study, you will be asked to complete an online survey/questionnaire. This survey/questionnaire will ask about stress, attachment to pets, and pet ownership. You will be asked to answer some questions where you check off rating scales about your relationship with your pet, about how you bond/attach with your pet and about your stress level. There are a total of 60 short questions. It will take you approximately 30 minutes to complete.

***Who is involved?*** The following people are involved in this research project and may be contacted at any time: Elena Pezzini and dissertation Chair Dr. Melanie Shaw

***Are there any risks?*** Although there are no known risks in this study, some of the questions might be personally upsetting. Your participation in this study is voluntary. You can withdraw at any time from the study, and you can also choose not to answer any question that you feel uncomfortable in answering.

The researcher anticipates that there will be minimal risk for the participants of the study. Respondents will remain anonymous. To minimize any possible risk to participants, a debriefing section will be set up on the website, and a contact phone number will be available. All efforts will be made to ensure the confidentiality of data from the study. To minimize risk of breach in confidentiality, the data will be stored in a secured location with an established survey company. The survey data will be encrypted, and survey response IP tracking will be disabled.

***What are some benefits?*** There are no direct benefits to you of participating in this research. There will be a small incentive in the form of coupons for pet services or supplies. Benefits to society may include greater knowledge and data about the pet and pet owner relationship, and the connection to everyday stresses.

***Is the study anonymity/ confidential?*** The data collected in this study are confidential. Your name or personal information is not linked to data. Only the researchers in this study will see the data.

***Can I stop participating the study?*** You have the right to withdraw from the study at any time without penalty. You can skip any questions on any questionnaires if you do not

want to answer them.

**What if I have questions about my rights as a research participant or complaints?**

If you have questions about your rights as a research participant, any complaints about your participation in the research study, or any problems that occurred in the study, please contact the researchers identified in the consent form. Or if you prefer to talk to someone outside the study team, you can contact Northcentral University's Institutional Review Board at [irb@ncu.edu](mailto:irb@ncu.edu) or 1-888-327-2877 ex 8014.

We would be happy to answer any question that may arise about the study. Please direct your questions or comments to: Elena Pezzini 702 518 6649  
[e.pezzini1486@email.ncu.edu](mailto:e.pezzini1486@email.ncu.edu) or [elenapezzini@gmail.com](mailto:elenapezzini@gmail.com)

Chair: Dr. Melanie Shaw [618-698-3280](tel:618-698-3280) [mshaw@ncu.edu](mailto:mshaw@ncu.edu)

**Signatures**

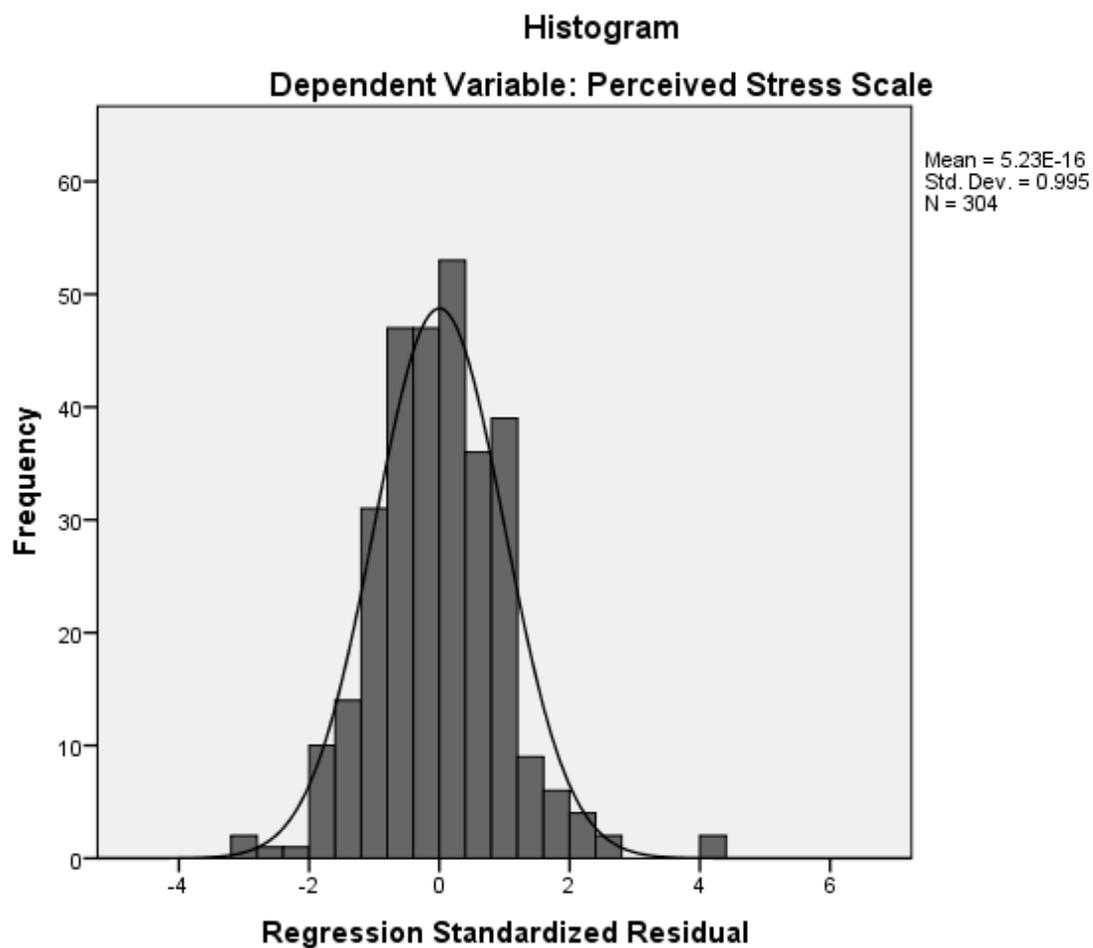
I have read the above description for the study, "Strength of the Human-Animal Bond and Stress Reduction: How Pet Owners' Attachment Style to Pets Moderates this Relationship". I understand what the study is about and what is being asked of me. My signature indicates that I agree to participate in the study.

Participant's Name: \_\_\_\_\_ Researcher's Name: Elena Pezzini

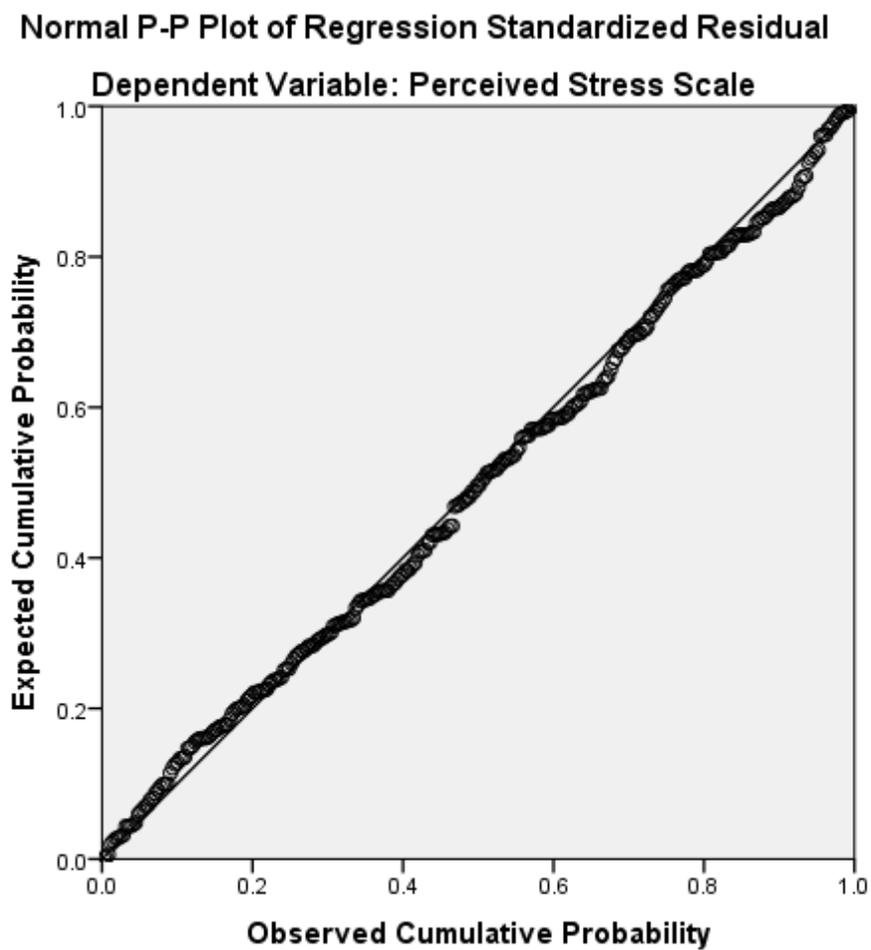
Participant's Signature: \_\_\_\_\_ Researcher's Signature: *EP*

## Appendix E: Charts

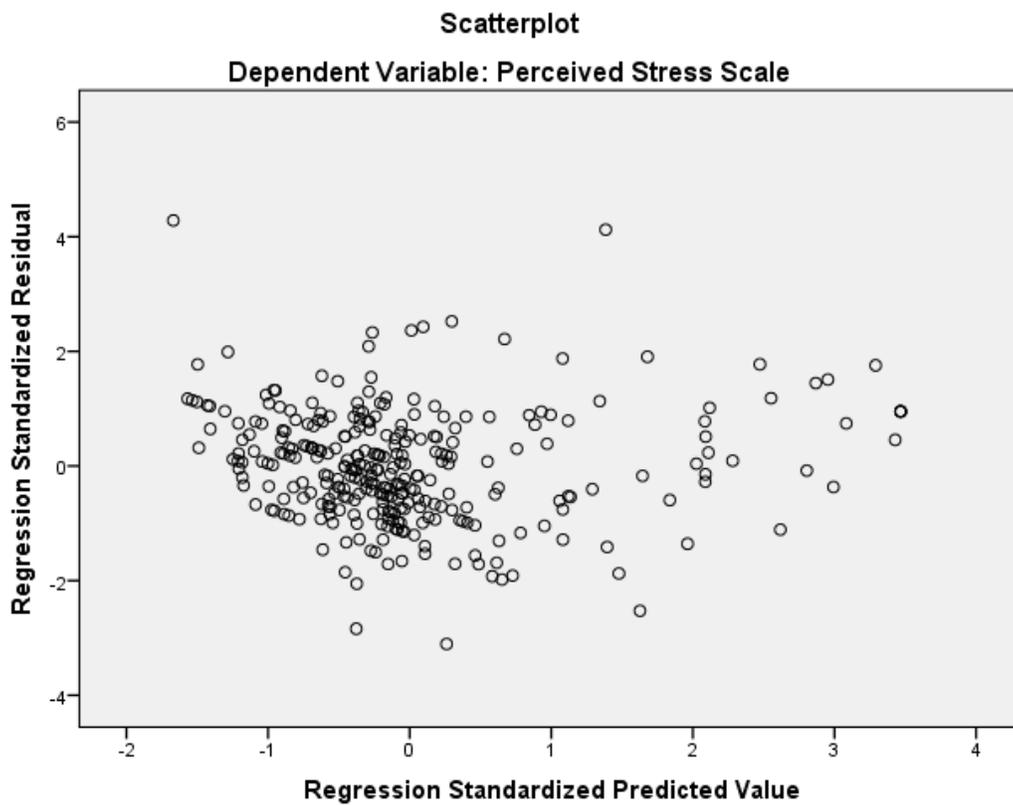
## Hypothesis 1



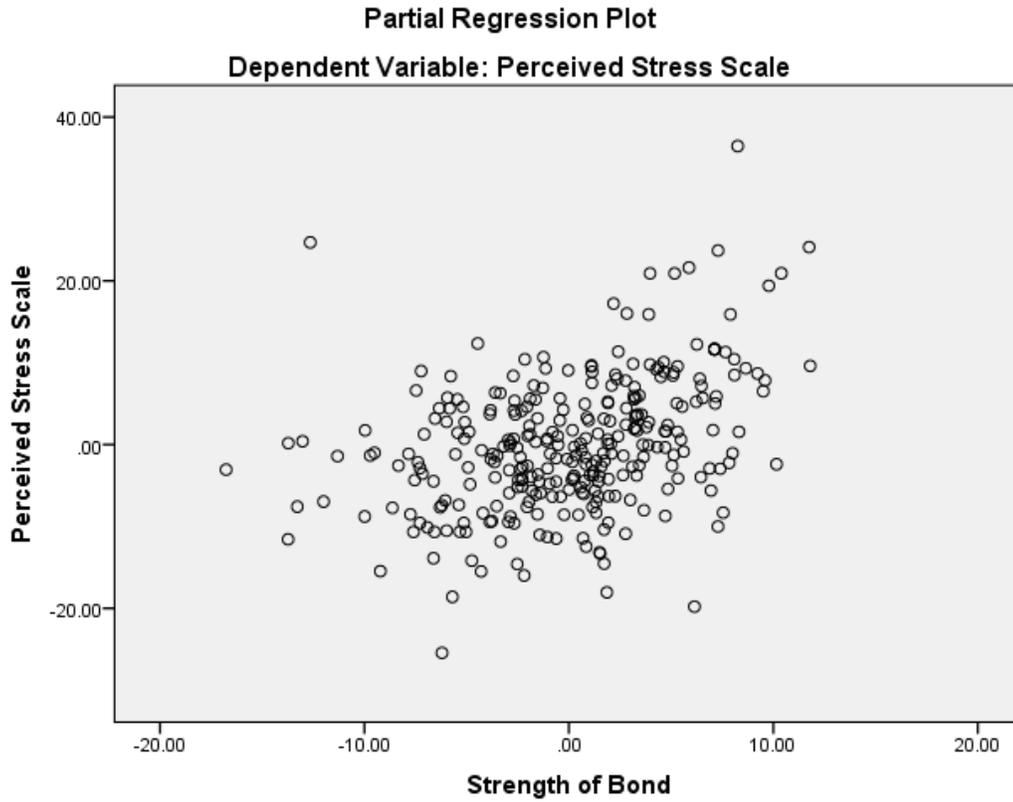
*Figure 1.* Histogram for frequency and regression standardized residual, dependent variable perceived stress.



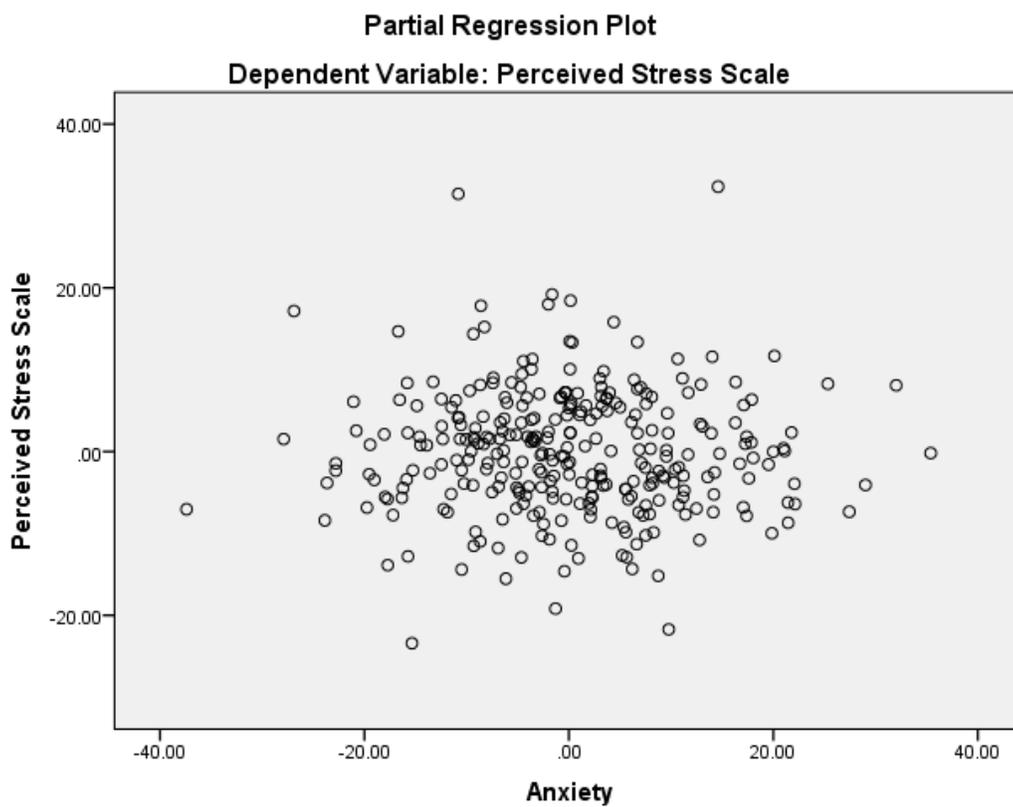
*Figure 2.* Normal P-P Plot of regression standardized residual, dependent variable perceived stress, expected cumulative probability and observed cumulative probability.



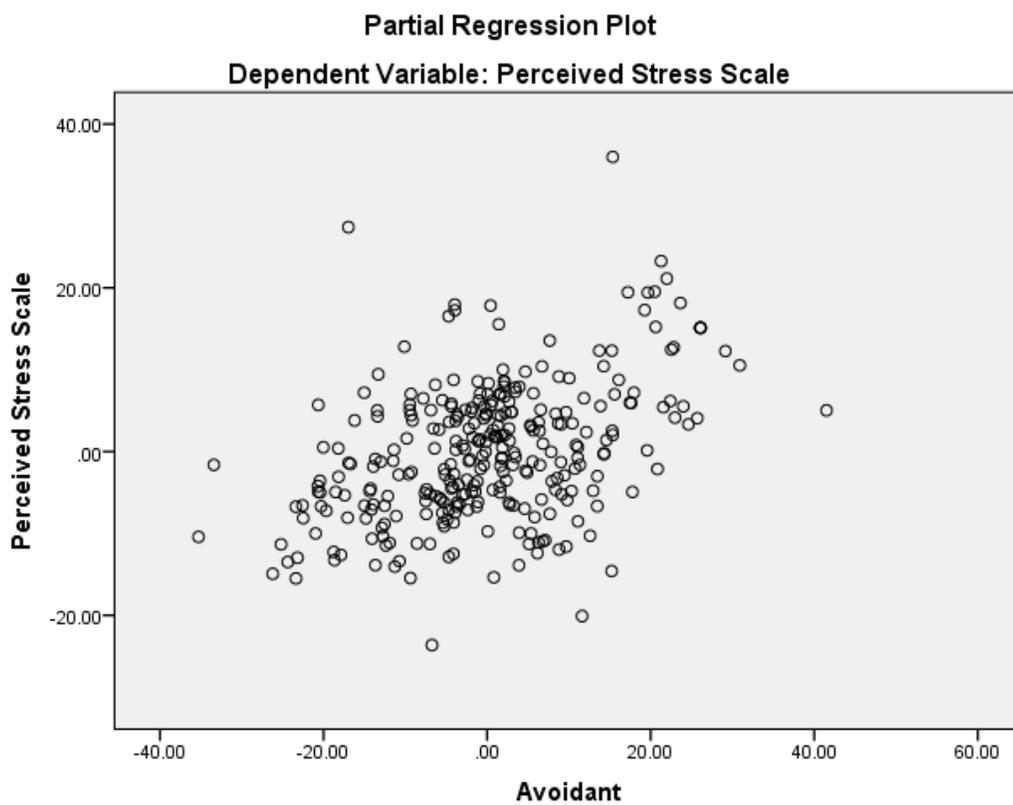
*Figure 3.* Scatterplot for regression standardized residual and regression standardized predicted value, dependent variable perceived stress..



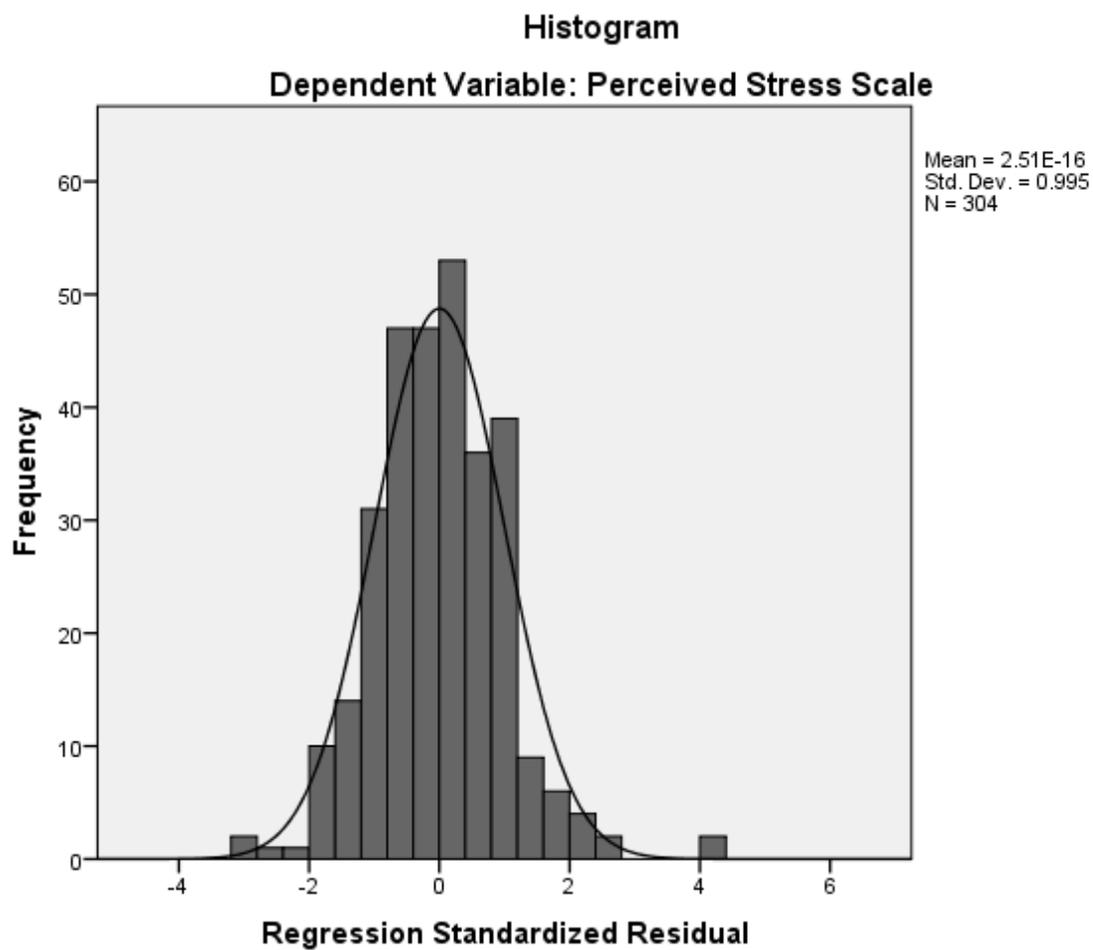
*Figure 4.* Partial regression plot for perceived stress dependent variable, strength of bond.



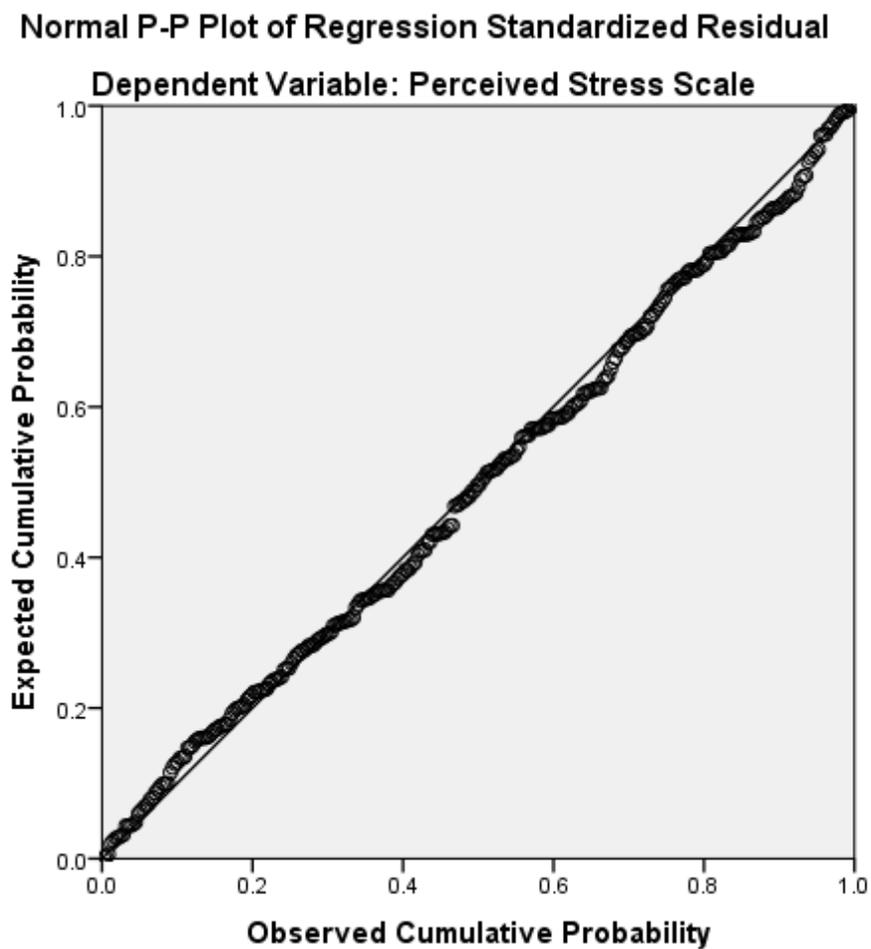
*Figure 5.* Partial regression plot for perceived stress dependent variable and anxiety.



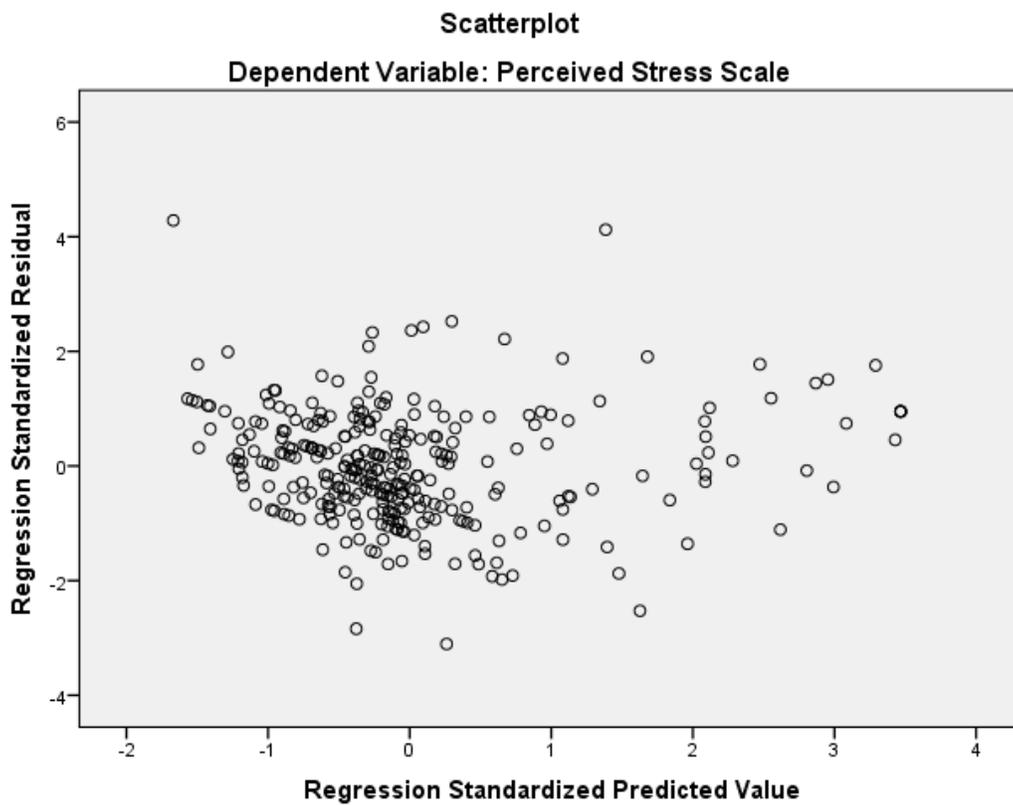
*Figure 6.* Hypothesis 2, partial regression plot for perceived stress dependent variable and avoidant.



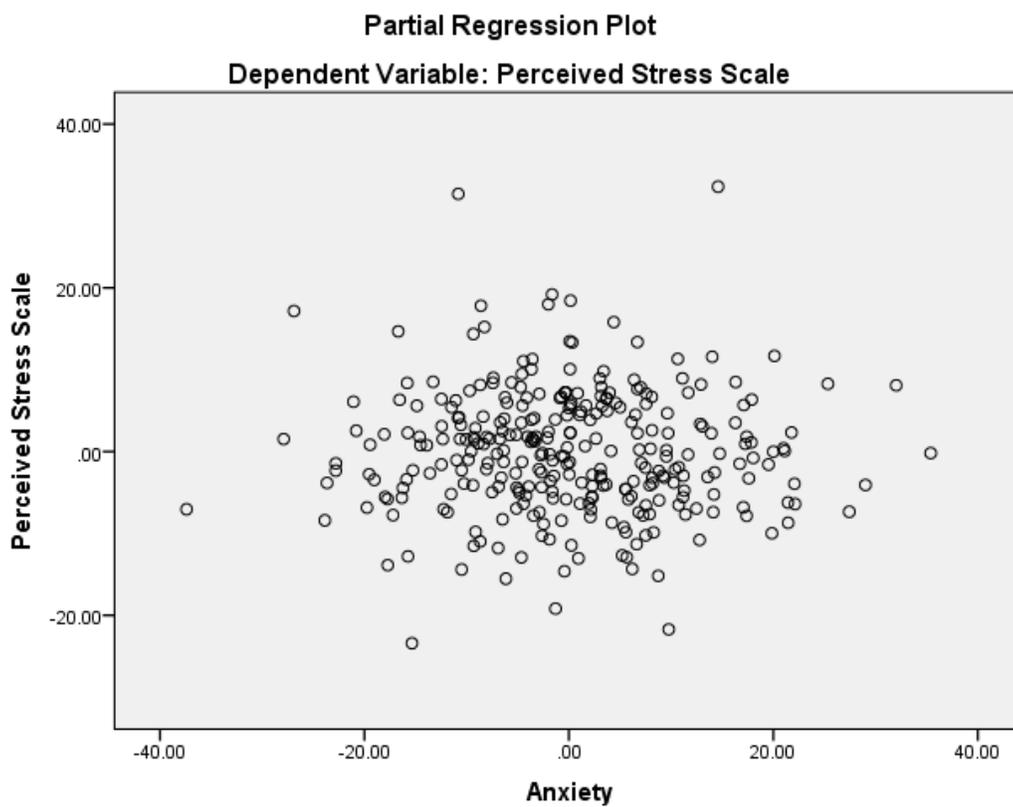
*Figure 7.* Histogram for perceived stress dependent variable and regression standardized residual.

**Hypothesis 2**

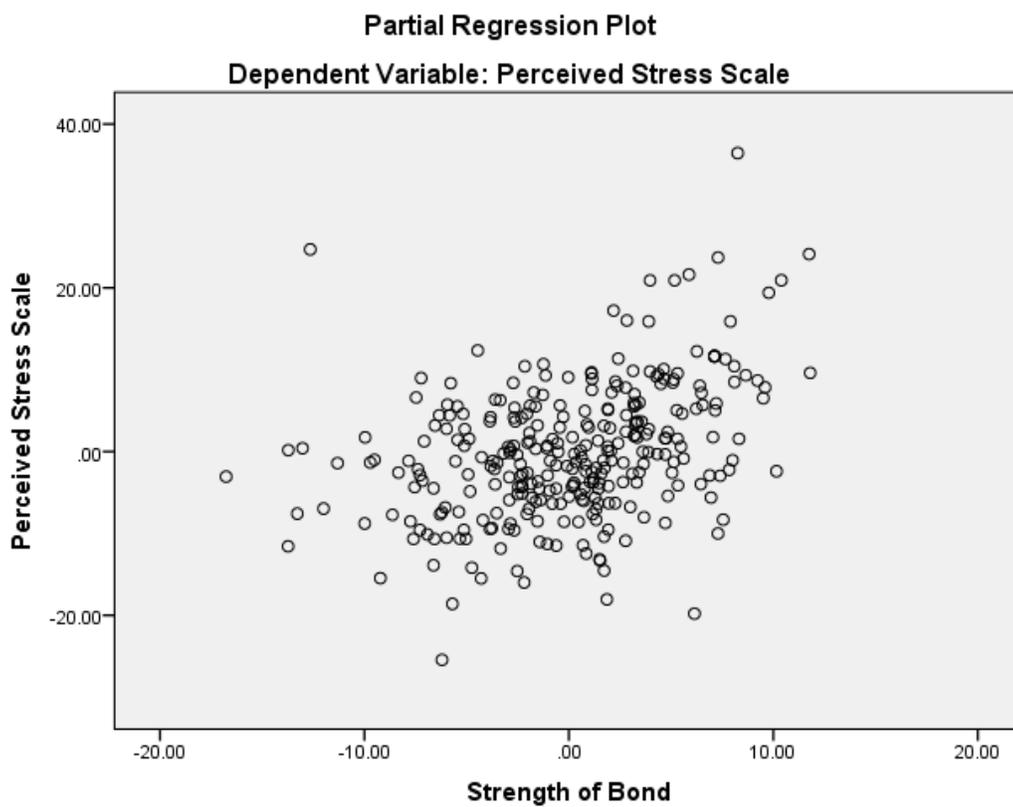
*Figure 8.* Normal P-P Plot of regression standardized residual dependent variable, perceived stress expected cumulative probability and observed cumulative probability.



*Figure 9.* Scatterplot for perceived stress dependent variable, regression standardized residual and regression standardized predicted value.

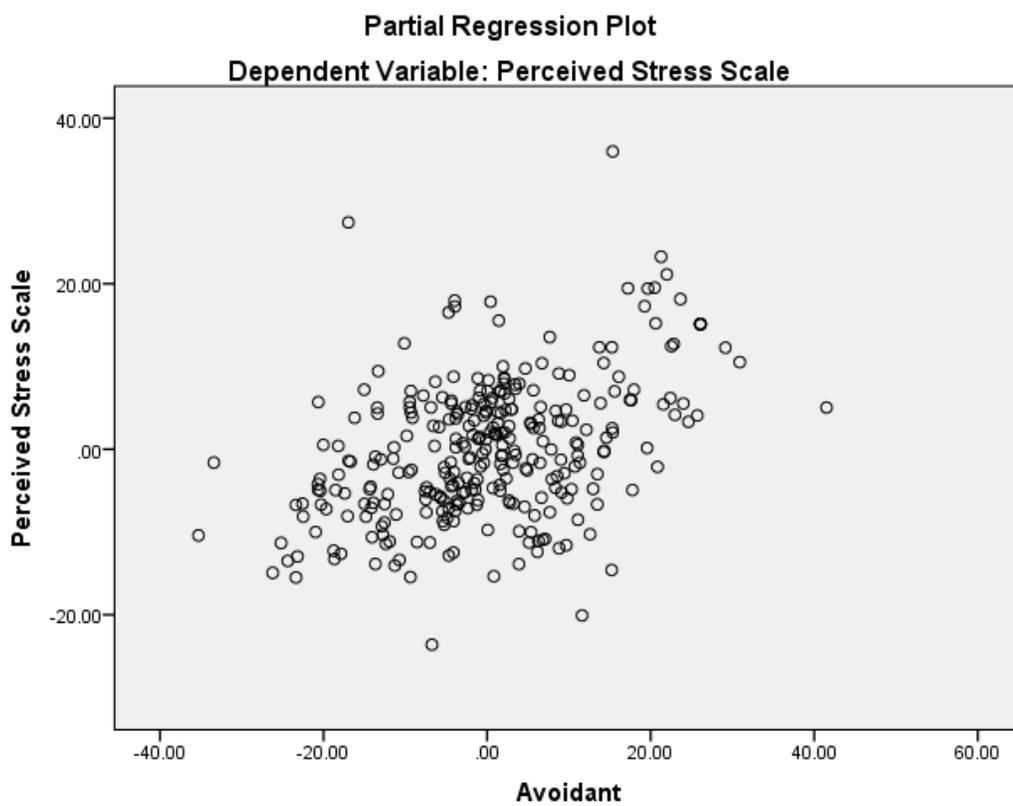


*Figure 10.* Partial regression plot for perceived stress dependent variable and anxiety.

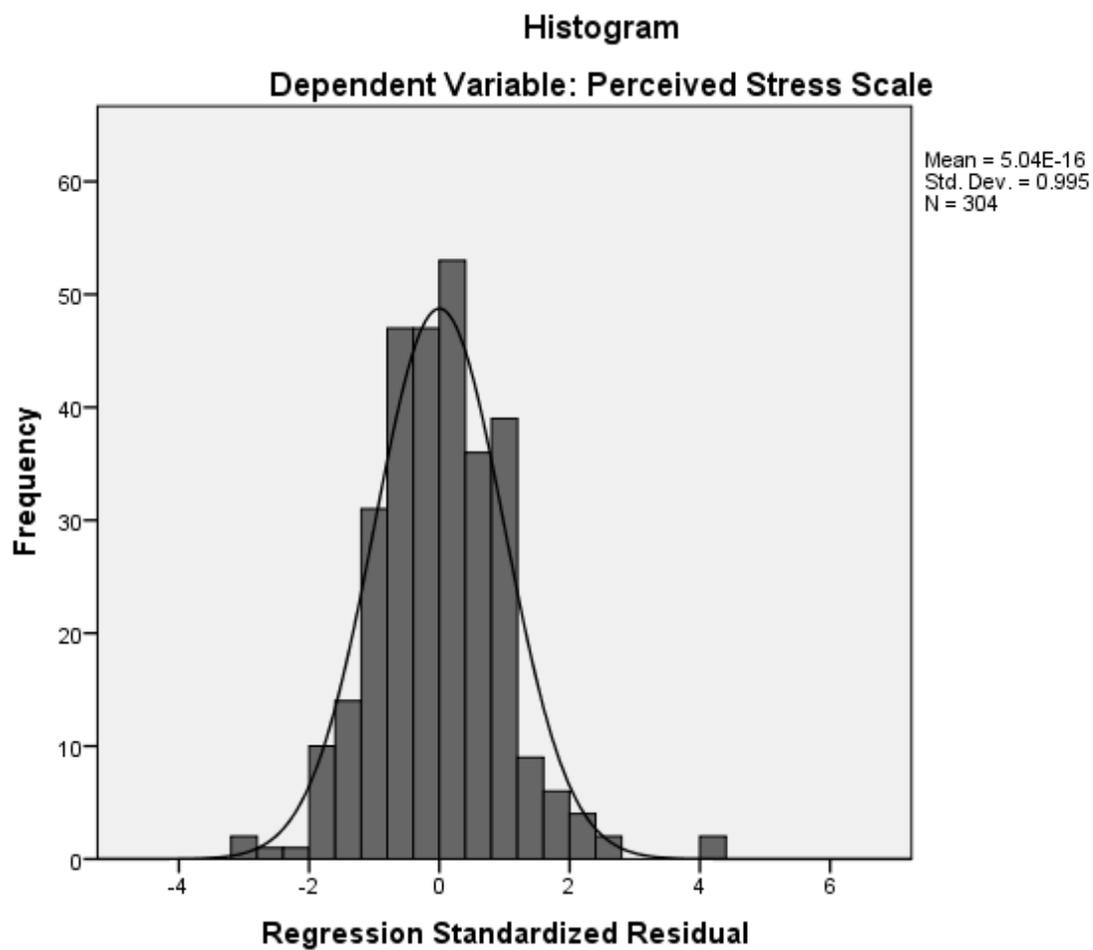


*Figure 11.* Partial regression plot for perceived stress dependent variable and strength of bond.

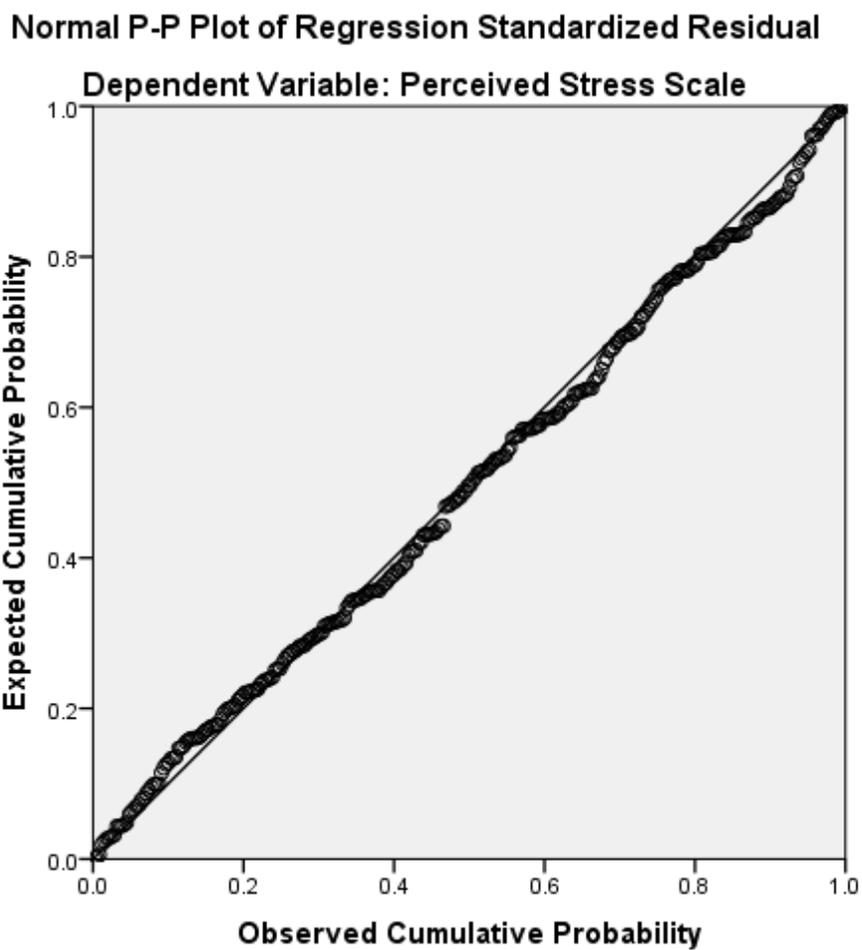
### Hypothesis 3



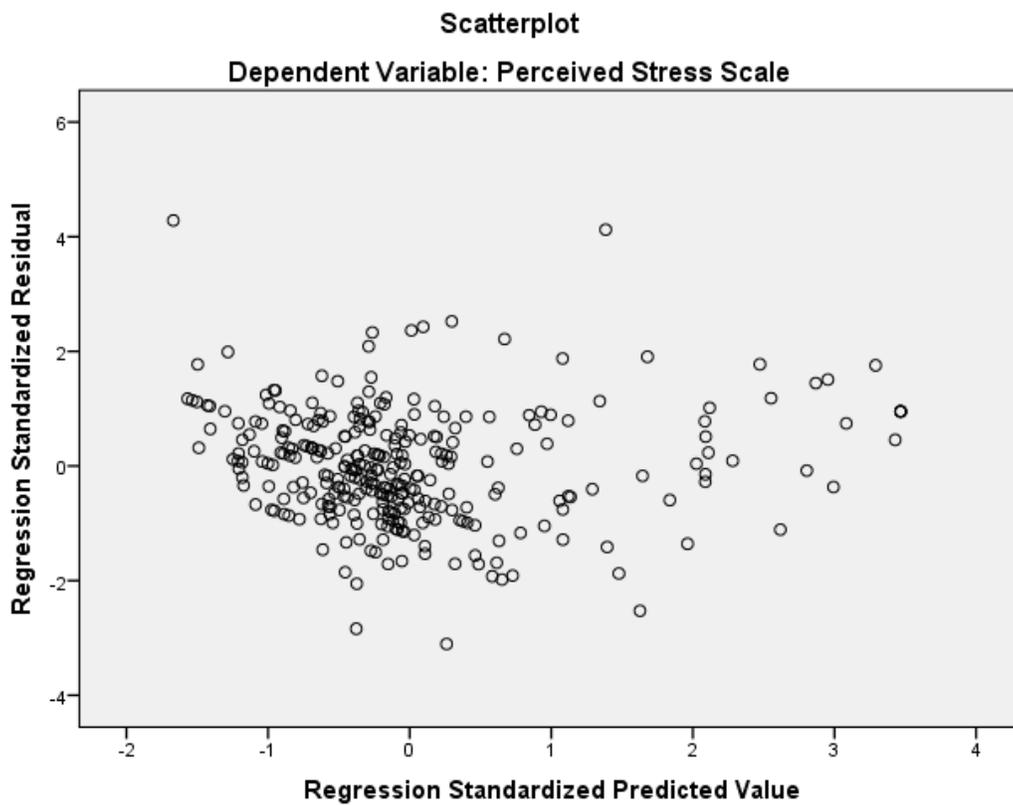
*Figure 12.* Hypothesis 3, partial regression plot for perceived stress dependent variable and avoidant.



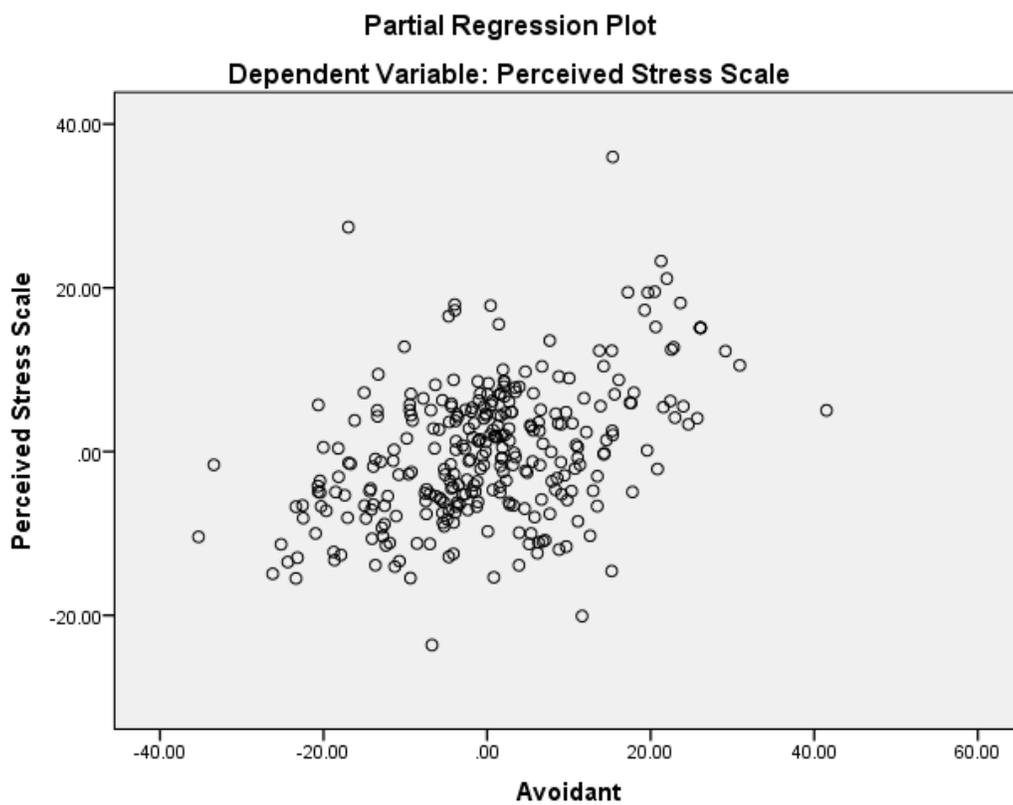
*Figure 13.* Histogram, dependent variable perceived stress and regression standardized residual.



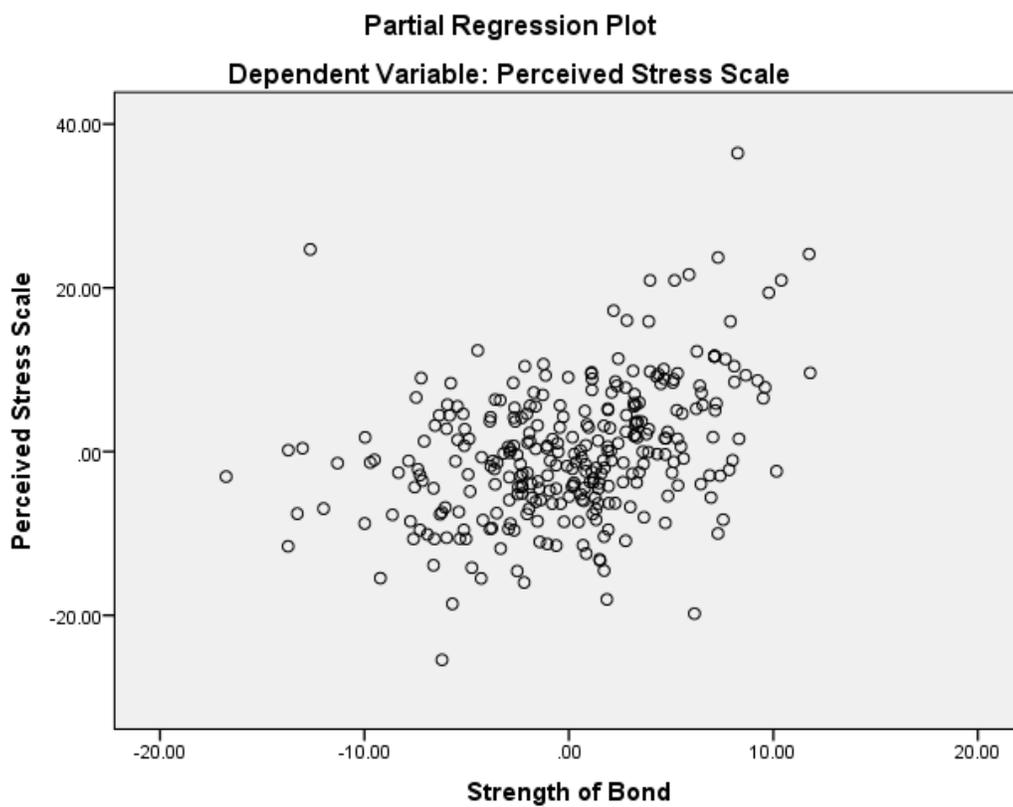
*Figure 14.* Normal P-P Plot of regression standardized residual dependent variable; perceived stress expected cumulative probability and observed cumulative probability.



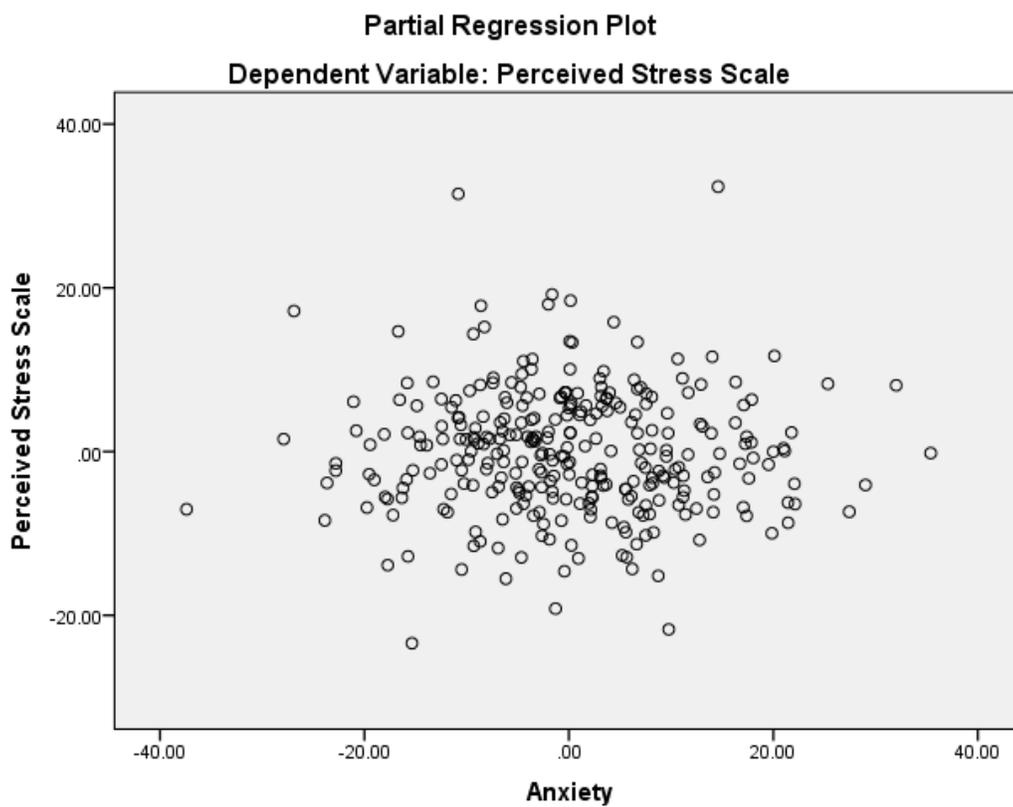
*Figure 15.* Scatterplot for perceived stress dependent variable, regression standardized residual and regression standardized predicted value.



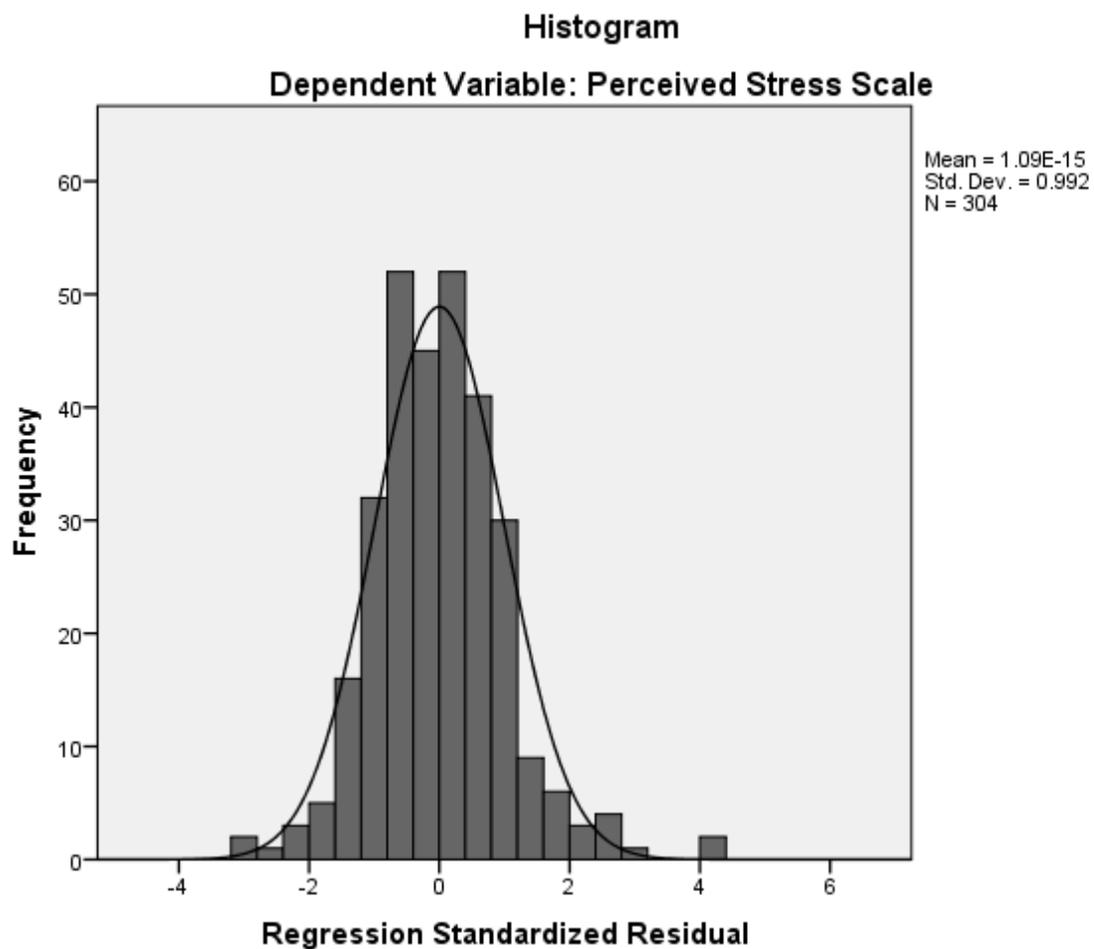
*Figure 16.* Partial regression plot for perceived stress dependent variable and anxiety.



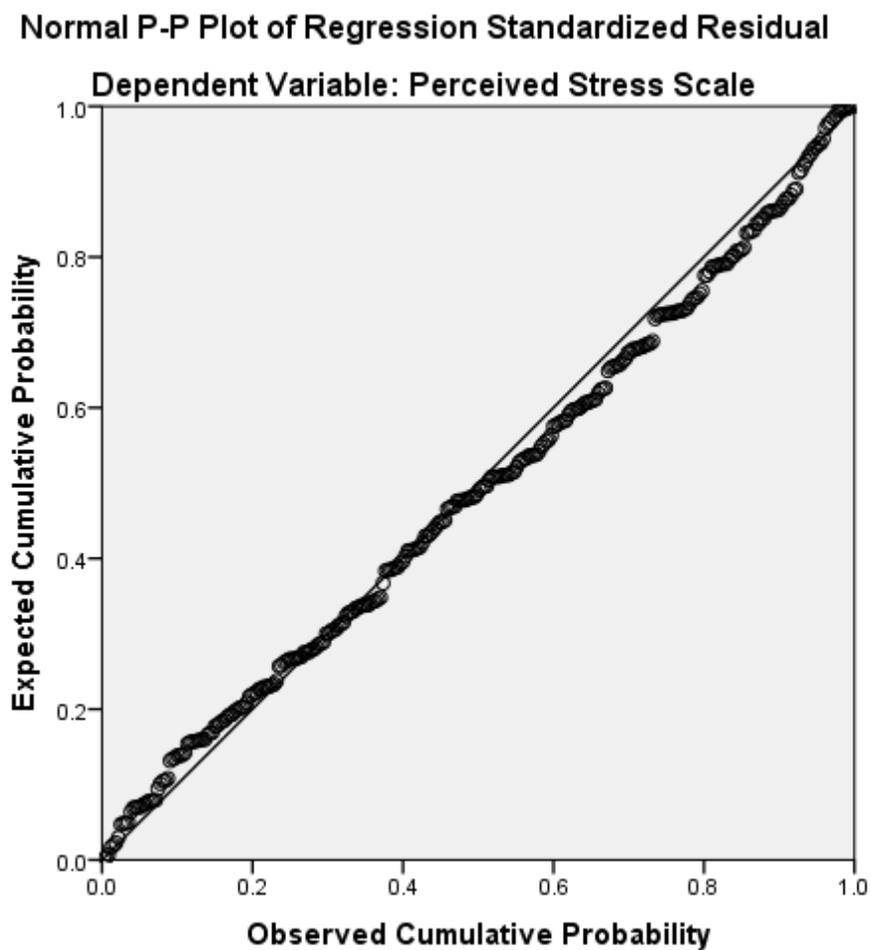
*Figure 17.* Partial regression plot for perceived stress dependent variable and strength of bond.



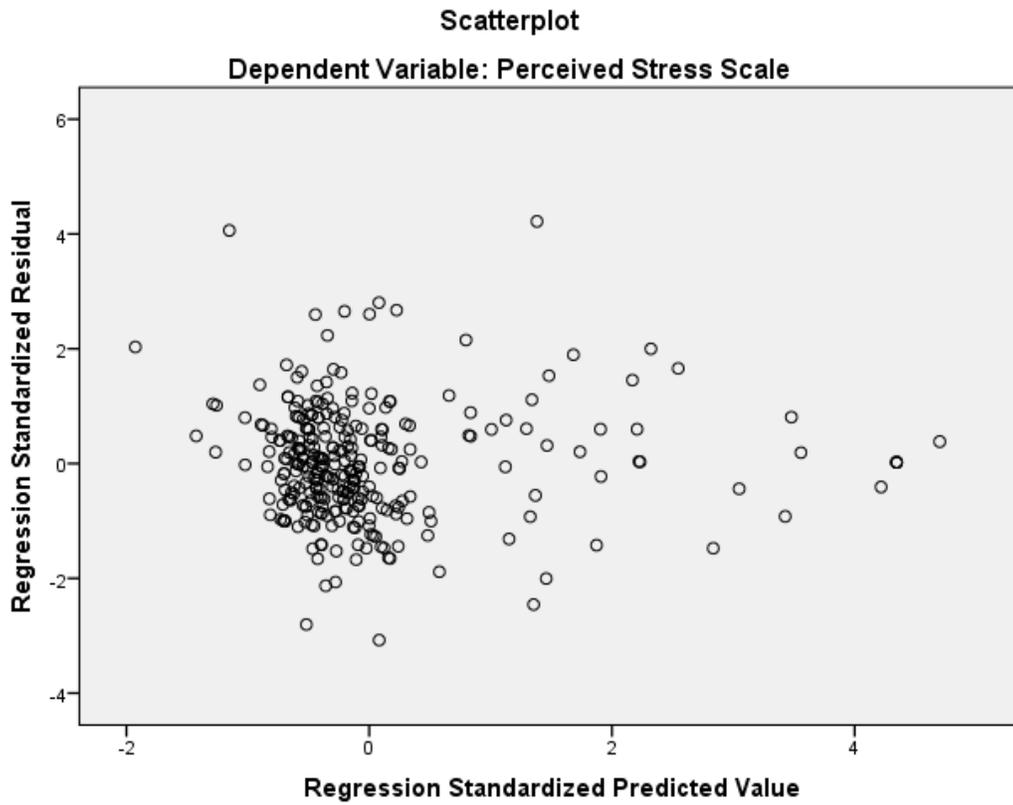
*Figure 18.* Partial regression plot for perceived stress dependent variable and anxiety.

**Hypothesis 4**

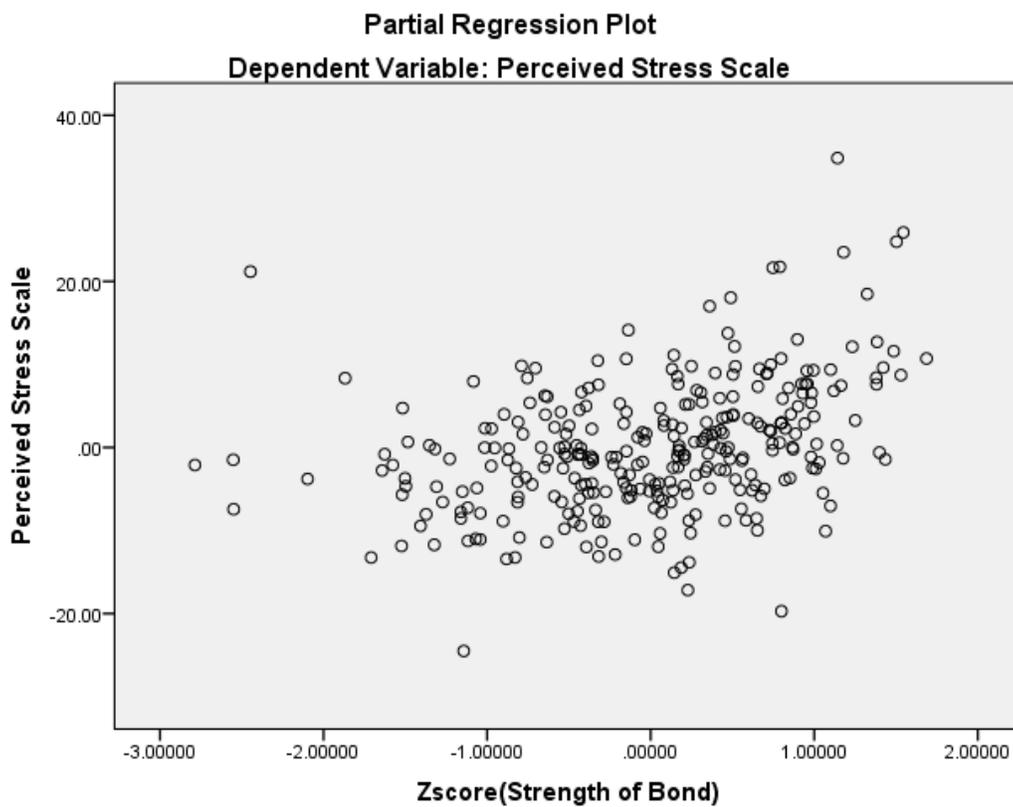
*Figure 19.* Hypothesis 4, histogram for perceived stress dependent variable and regression standardized residual.



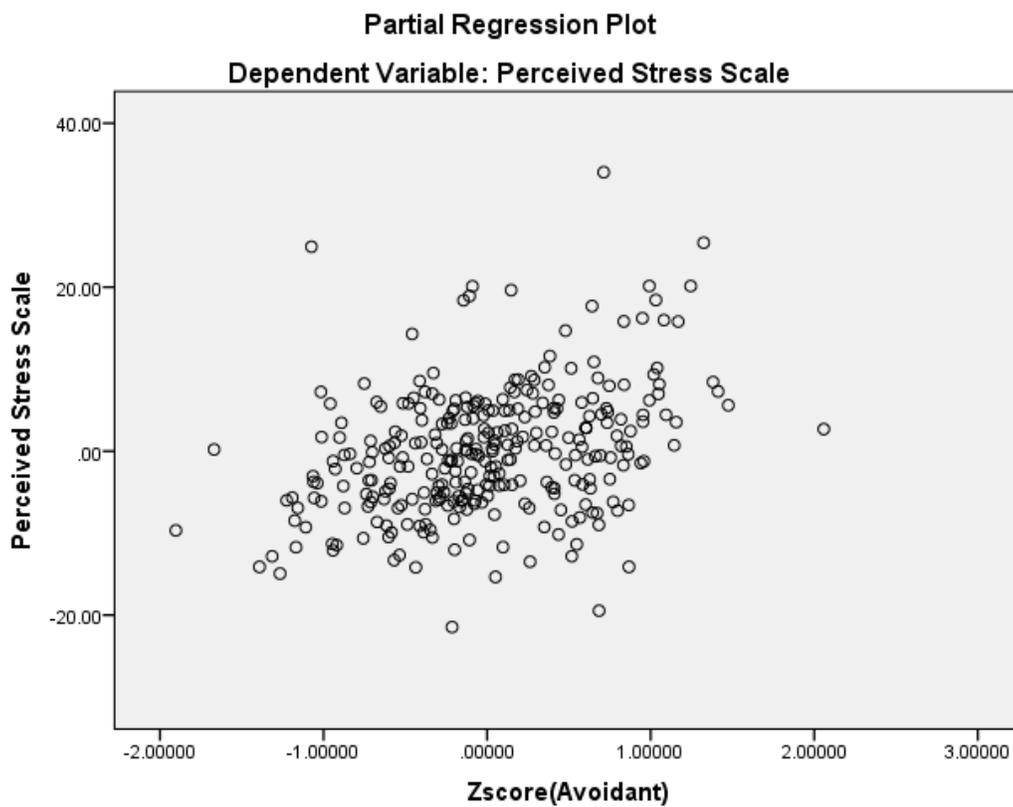
*Figure 20.* Normal P-P Plot of regression standardized residual dependent variable; perceived stress expected cumulative probability and observed cumulative probability.



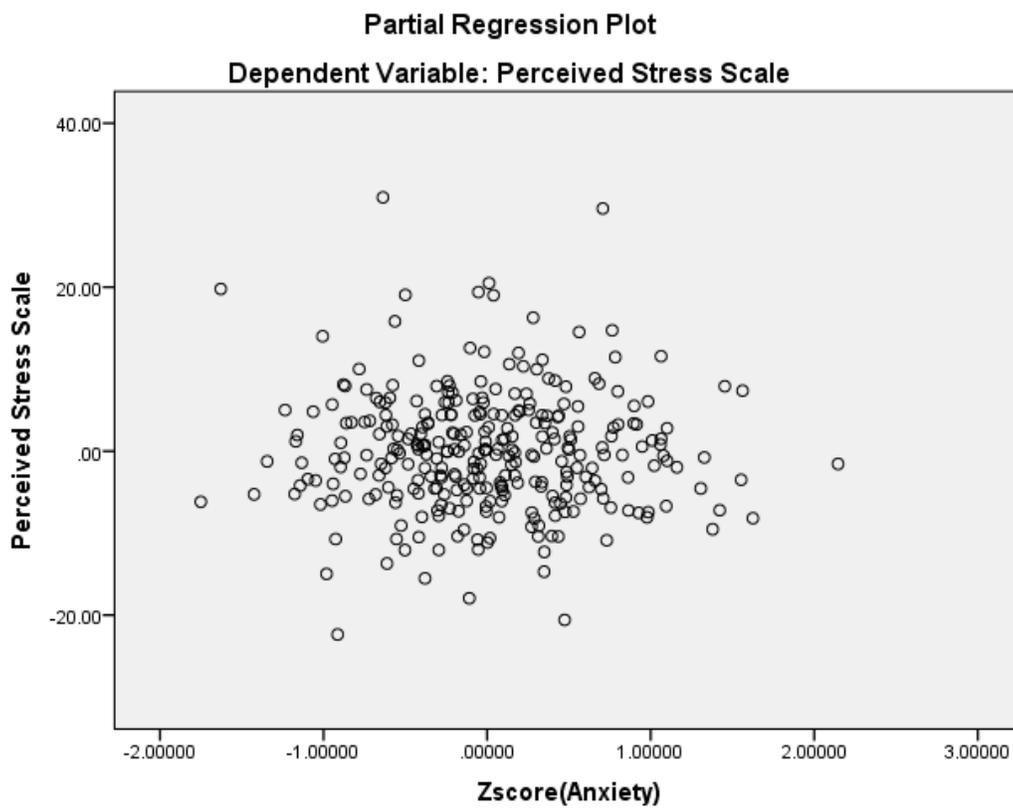
*Figure 21.* Scatterplot for perceived stress dependent variable, regression standardized residual and regression standardized predicted value.



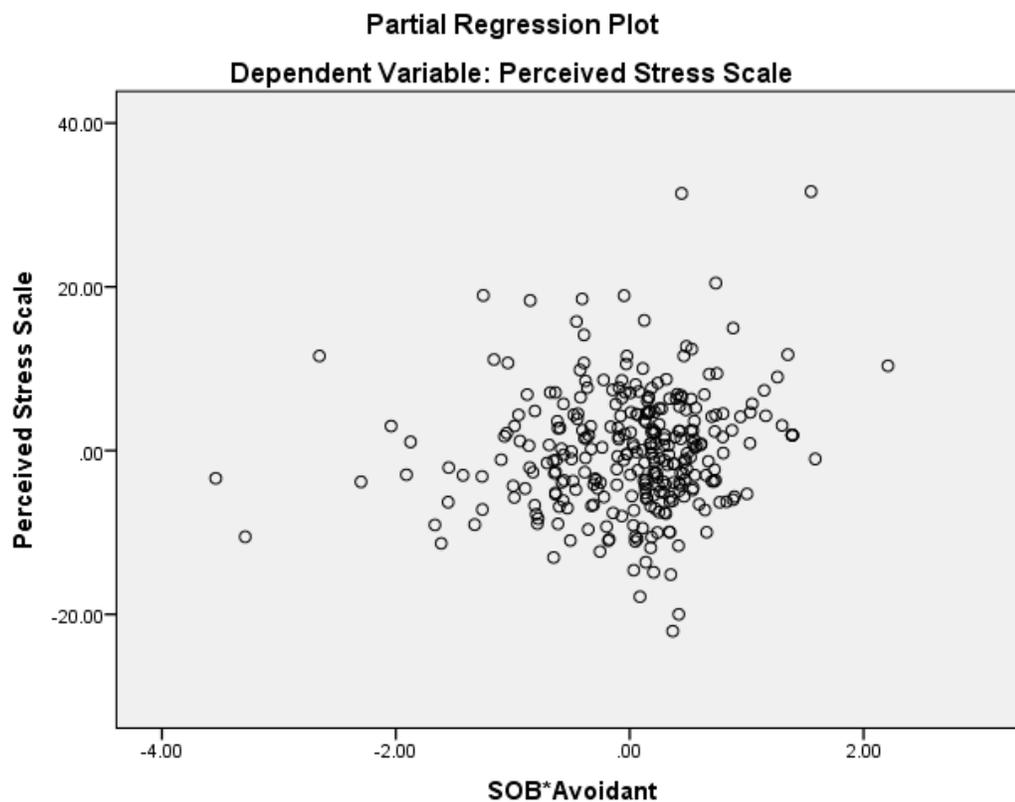
*Figure 22.* Partial regression plot for perceived stress dependent variable and Zscore (strength of bond).



*Figure 23.* Partial regression plot for perceived stress dependent variable and Zscore (avoidant).

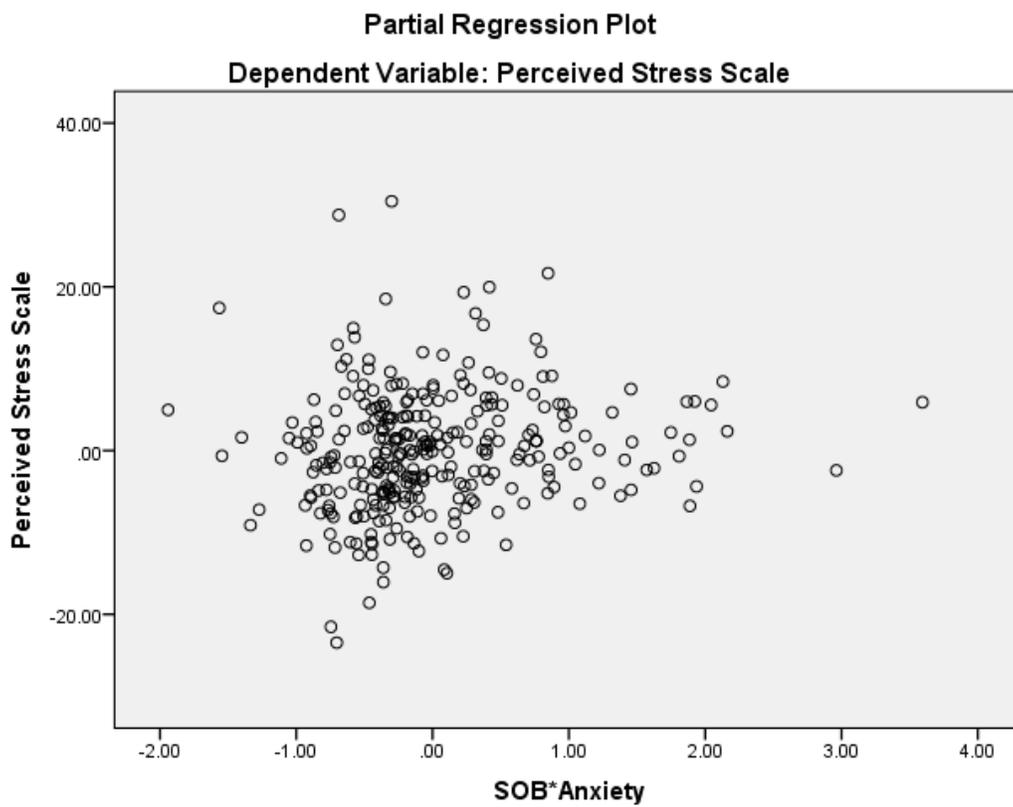


*Figure 24.* Partial regression plot for perceived stress dependent variable and Zscore (anxiety).



sob

*Figure 25.* Partial regression plot for perceived stress dependent variable and SOB (avoidant).



*Figure 22.* Partial regression plot for perceived stress dependent variable and SOB (anxiety).