PET DOG OWNERSHIP IN FAMILIES OF CHILDREN WITH AUTISM: CHILDREN'S SOCIAL SKILLS AND ATTACHMENT TO THEIR DOGS

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CHILDREN'S SOCIAL SKILLS AND ATTACHMENT TO THEIR DOGS

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A candidate for the degree of Doctor of Philosophy

and hereby certify that, in their opinion, it is worthy of acceptance.

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Dedication

I would like to dedicate this project to my daughters, Sarah and Lindsey, and my husband, Terry. Your unconditional love, unfailing support and faith in my abilities, provided the motivation for me to continue when I wanted to give up. I have been blessed by having you in my life. Terry, ours was a match made in heaven, I love you.

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PET DOG OWNERSHIP IN FAMILIES OF CHILDREN WITH AUTISM: CHILDREN'S SOCIAL SKILLS AND ATTACHMENT TO THEIR DOGS

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Abstract

This study compared the social skills of children with Autism Spectrum Disorder who lived with dogs and those who did not live with dogs. Interaction with dogs was investigated in this population, along with the attachment of those children who lived with dogs. This cross-sectional, descriptive study was conducted using a telephone survey. Seventy caregivers rated their child using the Social Skills Improvement System Rating Scale, and responded to open-ended questions regarding their child's interaction with dogs. Children living with dogs completed the Companion Animal Bonding Scale. Two-sample t-tests were used for comparison of children with and without dogs. Thematic analysis was used to evaluate the qualitative data. In seven of eight social skill areas, the mean social skill scores of children with dogs were greater than for those without dogs. Eighty-nine percent of parents with dogs described their child as "*very attached*" and children reported high bonding to their dogs using the CABS. Parents indicated the benefits of dog ownership for their child with ASD were companionship, unconditional love and responsibility opportunities. The findings suggest that dog ownership may be beneficial for some children with ASD.

Key Words: Autism, dog ownership, social skills, attachment, children

Chapter I

Introduction

The United States Centers for Disease Control and Prevention (CDC) has declared that the increasing rate of Autism Spectrum Disorder (ASD), one in 88, is an urgent concern for public health (CDC - Data and Statistics, Autism Spectrum Disorders - NCBDDD, 2012). Children with Autism Spectrum Disorder have deficits in social skills that limit their activities of daily living and, while evidence-based practice identifies some therapies targeting social skills as promising, none are universally effective (Reichow & Volkmar, 2009). Alternative approaches are indicated and one of these may include human animal interaction (HAI).

Characteristics of Children with Autism Spectrum Disorder

The defining characteristics of Autism Spectrum Disorder (ASD) include deficits in each of the following four criteria:

1. Social communication and interaction
2. Restrictive and repetitive behaviors or interests
3. Presentation of symptoms in early childhood
4. Impairment in activities of daily living, related to the combined symptoms ("APA DSM-5 | A 09 Autism Spectrum Disorder," 2012).

The most disabling problem is with limitations in social skills, which can include, but are not limited to the following areas: social reciprocity, non-verbal communication and both the development and maintenance of relationships (Leach & LaRocque, 2011). Social reciprocity is demonstrated by an ability to have

an awareness of the interpersonal expressions of others, to interpret those expressions, respond to what was interpreted and to have a motivation to interact socially with others (Constantino, 2003). Impaired skills of social reciprocity can create a long term limitation in communication for children with ASD (Mundy, 1995).

Children with ASD have lower levels of companionship and peer acceptance, when rated by peers (Chamberlain, Kasari, & Rotheram-Fuller, 2007). While individuals with ASD range in severity from low to high functioning, social skills and the ability to interact with others are consistent deficit areas important to address at all levels of functioning for these children. In one study, young children with ASD who were more securely attached to their mothers, demonstrated greater peer relationship qualities (Bauminger, Solomon, & Rogers, 2010). As children mature, establishing social support systems can be related to adult outcomes, such as ability to maintain employment and live independently. Individuals with lower Intelligence Quotient (IQ) and severe autism symptoms, often related to severe social skill deficits, were closely related to the necessity for institutionalization or group home living support for adults with ASD (Eaves & Ho, 2008). For individuals with a higher IQ, an ability to communicate and interact with others socially is often related to lifelong skills necessary for successful employment (Greenspan & Shoultz, 1981). While there remains a widely heterogeneous range of abilities for those with ASD, improved social skills are important for all individuals with ASD, from those in institutional settings, to group homes to those living independently.

Addressing social skill deficits early in life provides the greatest likelihood of successfully improving these skills, and is therefore critical to optimum long-term outcomes (Volkmar, Lord, Bailey, Schultz, & Klin, 2004). Lack of social interaction, early in the neurological process of development for young children with ASD, may lead to further derailment of normal behavioral development, creating a cycle of increasing behavioral disturbances (Mundy & Crowson, 1997). A review of the literature found that treatment measures directed at social skill improvement are warranted, however, no one method was found to be superior for all children (Reichow & Volkmar, 2009). Early diagnostic identification and evaluation for consideration of a variety of beneficial approaches to enhancing social skills for children with ASD, improves the likelihood of successful outcomes.

Sensitivities and Children with Autism Spectrum Disorder

Hypo or hyperactive sensory responses and focused interests commonly occur among children with ASD. These may include unusual interests in or responses to the environment, such as atypical sensitivity to sounds, smells or textures; or obsession with spinning objects, such as the wheel of a toy car (APA DSM-5 | A 09 Autism Spectrum Disorder, 2012). Children with ASD may also have minimal tolerance for any change in routine, responding with distress or emotional outbursts (APA DSM-5 | A 09 Autism Spectrum Disorder, 2012). Initial descriptions of autism included extreme fearfulness and anxiety as symptoms (Kanner, 1943). One study of low functioning adolescents with ASD found that up to 84% of individuals may have the co-occurring condition of anxiety (Bradley, Summers, Wood, & Bryson, 2004). Exaggerated responses to their environment,

coupled with anxiety can impair an individual's ability to respond to stress. Parents of children with all levels of severity of ASD who were surveyed, expressed overwhelming concern regarding the inability of their children to cope with stress (Harrington & Newschaffer, 2008). Adverse reactions to minor experiences, extreme sensitivities, and the inability to self-calm, present common challenges for children with ASD. The wide variation in severity of these symptoms, along with difficulty in treatment has resulted in a variety of approaches for addressing this stress.

Treatment Approaches for Autism Spectrum Disorder

Children with ASD include a broad range of impairments from mild to severe. A 2009 report showed that 41% of children with ASD had an IQ of 70 or less (Matson & Shoemaker, 2009; Sanders, 2009). The treatment needs of this lower-IQ group vary considerably from those with higher IQ's, such as are commonly found in Asperger's Disorder (Sanders, 2009). Due to the heterogeneity of this population, investigators have examined many types of approaches in addressing the social skill deficits of children with ASD.

Restricted and repetitive behaviors are frequently seen in children with ASD and can create challenges in interacting with peers. These behaviors often diminish over time, however, when these behaviors persist they can be difficult to ameliorate (Leekam, Prior, & Uljarevic, 2011). One method has been shown to decrease these behaviors and increase social interaction. Providing children with ASD lessons in initiating social interaction and self-monitoring, and using peers trained to respond in a positive manner, was associated with decreased restricted and repetitive behaviors and increased social initiation, in one study (Loftin,

Odom, & Lantz, 2008). This ability to practice social initiating in a "safe" environment may have generalized benefits, but more research is needed to determine whether results can be generalized and maintained over time.

Cognitive behavioral therapy (CBT), which teaches individuals to change their thinking regarding social situations and how they react to them, has been found to be successful for some individuals with higher functioning ASD (Koning, Magill-Evans, Volden, & Dick, 2011). Benefits of this approach have included children learning to interpret the body language and emotions of others, as well as how to interpret social situations, however, studies have been conducted using a no treatment group, rather than comparing it with other treatments (Koning et al., 2011). This technique is also limited to use for those with higher functioning ASD.

Reichow and Volkmar (2009) used a best evidence synthesis framework to review therapies utilized for children with ASD (Slavin, 1986). Six criteria for inclusion were established, using this framework, including the Evaluative Method for Determining Evidence-Based Practices in Autism (Reichow, Volkmar, & Cicchetti, 2008). Of the 66 studies included, 13 were rated as having strong rigor and 53 had adequate rigor. Applied Behavior Analysis (ABA) used alone or as an augmentative approach along with other interventions, was the most widely used intervention. Its use has been investigated in studies of participants enrolled in preschool through junior high, and possessing a wide variation of cognitive abilities. ABA uses the reinforcement of positive behaviors and discouragement, typically through ignoring, of negative behaviors (Smith & Eikeseth, 2010). Strong support for continued use of ABA was found (Reichow & Volkmar, 2009). Parent and peer training, social skills groups, and video modeling also demonstrated

promise as treatments, with further investigations necessary to identify best approaches, based on the age and cognitive abilities of children with ASD (Reichow & Volkmar, 2009). In this heterogeneous population, the availability of a variety of approaches offers the opportunity for greater individualization of therapeutic approaches.

In a review by Rogers (2000) of multiple methods working toward the improvement of social skills for children with ASD, she said this "Thus, social engagement appears to be a pivotal response, a skill that leads directly to increased attainment of other important skills without the need for direct programming" (p. 406). This review of methods found that in any type of social engagement, children with ASD had increases in novel verbalization, even when these were not the target of the intervention (Rogers, 2000). Another study examined the results of providing 8 - 10 minute social skill training sessions for siblings of boys with ASD, to increase the social skills of the affected siblings (Tsao & Odom, 2006). This investigation found that even though joint attention was not specifically targeted, there were increases for the children with ASD (Tsao & Odom, 2006). These enhanced skills in joint attention may be precursors to increased social interaction (Tsao & Odom, 2006). In another study, certain toys in preschools were identified as providing "setting events," which enhanced the likelihood of social interactions in children with disabilities (O'Gorman, Hughes, & Carter, 2002). These positive results from sibling interactions and interactions in group settings with toys, indicate there may be alternative ways of augmenting social skills, that could compliment the use of highly trained staff and long hours of interventions.

Benefits of Human Animal Interaction

The beneficial interaction of pets and people has a long historical tradition. Florence Nightingale, following her work during the Crimean War, observed and wrote about the positive role of animals as companions for the ill (Tsao & Odom, 2006). Benefits of human animal interaction (HAI) are found in the interaction with pets, Animal Assisted Activities (AAA), Animal Assisted Therapy (AAT) and Service Animals. Animal assisted activities include unstructured visits to individuals from a person who is accompanied by a trained animal. Animal assisted therapy includes the use of a trained animal in a therapy session conducted by a professional, for the purpose of meeting specifically determined goals for that individual. Service Animals are highly trained animals, typically dogs, who provide a specific assistance for an individual, as defined by the Americans with Disabilities Act (United States Department of Justice, 2010).

Scientific evidence supports many health benefits of pets for humans. Pet dogs have been associated with decreased feelings of loneliness and to aid in conversational initiation (Wood, Giles-Corti, & Collis 2005). Pet dogs have also been identified as a social catalyst (McNicholas & Collis, 2000; Messent, 1983). Pet ownership has been associated with fewer visits to health care providers (Headey & Grabka, 2006), decreased blood pressure (Allen, Blascovich, & Mendes, 2002), and greater survival rates following a myocardial infarction (Friedmann & Thomas, 1995). These benefits have been demonstrated with adults, but benefits of pet ownership have also been established for children.

In the population of children, pets have also been found to be associated with benefits that were similar to those received from the social support relationships

found with family members or friends. When asked to prioritize their closest relationships, many neurotypical children name their pets, and report sharing happiness, sadness and anger with their pets (Bryant, 1990; Melson, Gail, & Swarz, 1994). During transitions through various developmental phases, children may receive comfort and the feeling of unconditional love from their pets (Triebenbacher, 1998).

Children with Autism Spectrum Disorder and Human Animal Interaction

Studies examining the interactions of children with ASD and trained service and therapy dogs have been conducted. In one study of 42 children with ASD, stress was measured using levels of cortisol (Viau et al., 2010). Cortisol levels were lower after introduction of the service dogs and increased after removal of the dog, but differences were not significant. Qualitative questionnaires completed by the parents in this study provided evidence of clinically significant benefits from the presence of the dogs, including fewer episodes of repetitive behaviors and emotional outbursts, along with lessened sensitivity to the loud sounds of common household appliances such as vacuum cleaners for these children (Viau et al., 2010). However, there was no inquiry regarding the children's attachment to the dogs and the role the strength of the bond may have played.

Other studies have investigated the impact on social skills following the interaction among children with ASD and animals trained for use in AAA. In a study of children with mental retardation (a common co-occurring condition for children with ASD) and limited verbal skills, a significant increase was reported in verbal interaction with people, after the children had repeated interactions with a

trained dog (Esteves & Stokes, 2008). A limitation of this study was the lack of use of a control group, and the selection of participants as a convenience sample. While studies utilizing HAI have had small sample sizes, clinical findings have presented positive trends toward benefits. These preliminary results indicate that further investigations are warranted to determine if even slight improvements through decreased stress, reduction in problem behaviors may improve social acceptability for children with ASD. In addition to this, it will be valuable to explore whether the benefit of increases in social interactions found in association with the presence of a trained dog, can also be identified in relation to a pet dog. Only one study was found in the literature examining the interaction of pets with children in the specific population of children with ASD.

One study has explored the potential benefits of HAI for children with ASD who lived with pets (Grandgeorge et al., 2012). This study found that the introduction of a new pet into a family of a child with ASD, after the age of five years, was associated with an increase in pro-social behavior, when compared with a matched control group that had never owned a pet (Grandgeorge et al., 2012). These pro-social behaviors included "offering to share" and "offering comfort," which are part of the deficit areas experienced by individuals with ASD in the social skill areas of social initiations and attachment. The study was limited by several factors. A small sample size of 40 was used and IQ Mean scores were from 42.1 - 45.2, indicating very low-functioning abilities. In addition to this, limited information was collected regarding the children's attachment to their pets, which could have provided valuable insight into the strength of attachment in association with the pro-social behaviors found in this study. The presence of a

secure attachment between a child and a pet may be a factor in the ability to transition the social relationship skills, found in a child-pet relationship to the use of those skills in a relationship with the child's peers.

Theoretical Framework

The theoretical framework most widely used to describe the relationships between pets and owners is Attachment Theory (Bowlby, 1961). Attachment Theory describes the affinity of an infant to his/her mother as a form of self-preservation for the infant, due to the mother's protective abilities to provide security (Bowlby, 1961). An understanding how attachment with a human may be related to attachment with a pet has been described in several ways. The hypothesis of biophilia proposes that there is a natural interest and response of humans to nature (Wilson, 1984). Biophilia suggests there has been an evolutionary response of humans to avoid aggressive animals and be drawn to those animals that are perceived as friendly and providing a calming effect (Fine, 2010)

Another evolutionary factor in attachment is proposed by Goodson (2005). Social Behavioral Networks, are the similar anatomical portions of the brains of fish, birds and mammals that help to regulate ability to socialize and bond among socio-sexual partners (Goodson, 2005). This evolutionary presence is likely to have provided the foundation for social relationships between species (Julius, Beetz, Kotrschal, Turner, & Uvnäs-Moberg, in-press). The presence of these instincts in species with lower cognitive abilities, provides a basis for species with higher level cognitive functioning, in the development of more complex social

relationships (Julius, Beetz, Kotrschal, Turner, & Uvnäs-Moberg, in-press). These findings may help support the attachment between species.

Nearly all children express interest in living things (DeLoache, Pickard, & LoBue, 2011). Less is known about the interest of children with ASD and animals. Children with ASD typically have deficits in Theory of Mind, which is a limitation in their cognitive ability to interpret the mental states of others (Bar-On & Cohen, 1995). For this reason, interacting with a dog may occur more readily than with humans. The complex interpretation of facial expressions required with humans, is not necessary with dogs. In addition to this, body language is more easily interpreted with a dog through behaviors such as tail wagging. Also, there is no expectation of comprehending what a dog is thinking (Solomon, 2012). The perception of these decreased social demands may increase the likelihood of the establishment of a secure attachment to a dog.

Strength of attachment with a pet dog may be a key to identifying whether or not there may be benefits in living with a pet dog, for a child with ASD. Strength of attachment may also play a role in whether or not the child with ASD utilizes this connection to a dog to increase their social skills in connections to humans.

Specific Aims

The overall goal of studying the effect of HAI on the social skills of children who have ASD is to determine whether or not the same known tendencies of dogs to increase social interactions in the adult population, also apply to children with ASD. It is expected that there may be an association between children who are attached to their pet dogs and social skills among children with ASD. This may help to address the deficits in social skills, for these children. The literature is

limited to a preliminary survey and one study, which investigated the pets and the social skills of children with ASD (Grandgeorge et al., 2012). The specific aim of this study was to explore the social skills of children with ASD and the benefits and burdens of dog ownership in those families.

Chapter II

Review of the Literature

There are three major sections in this chapter. The first section includes a definition of Autism Spectrum Disorder (ASD). The second section includes a review of literature including; social skill challenges, problem behaviors, stress for children with ASD, and describes human-animal interaction for neurotypical children and children with ASD. The final section describes attachment theory and how this could be applied to the human animal bond between children with ASD and their pet dog.

Defining Autism Spectrum Disorder

Autism Spectrum Disorder cluster of developmental disorders including Asperger's Disorder, Autistic Disorder, Pervasive Developmental Disorder - Not Otherwise Specified and Childhood Disintegrative Disorder have been combined into the new category of ASD in the proposed fifth edition of the Diagnostic and Statistical of Mental Disorders (DSM) (American Psychiatric Association (APA) DSM-5 | A 09 Autism Spectrum Disorder, 2012). The current version of the DSM, DSM-IV-TR, published in 2000 by the APA, classifies each of the above disorders into separate categories and includes a fifth disorder, identified as Rhett Syndrome as being associated with ASD. Rhett Syndrome will not be included in the upcoming release of the DSM-5, due to the often temporary display of autistic symptoms only present in childhood for these children ("APA DSM-5 | A 09 Autism Spectrum Disorder," 2012). The proposed changes presented for the DSM-5 have been derived from over a decade of review. The APA began in 1999 by

developing a research agenda for the development of the DSM-5 and held international conferences with representation from the APA, National Institutes of Health and the World Health Organization from 2004-2007 to further define a direction of development for the DSM-5 ("Timeline | APA DSM-5," 2012). Starting in 2006, the APA named a DSM-5 Task Force chair, research director and work group members which were divided into topical areas ("Timeline | APA DSM-5," 2012). This Task Force, working with the individual work groups conducted literature reviews and secondary data analysis. Following this stage, Field Trials were conducted from 2010-2012 at large teaching hospitals, as well as private medical practices to investigate the reliability of the proposed revisions. As data became available, work groups began drafting proposed language for the DSM-5 and three public comment periods were opened during this time for feedback. The DSM-5 Task Force is scheduled to review the final draft in November 2012, before submission to the APA for publication. The timeline for the DSM-5 development includes the delivery of the final draft text to the publisher by December 2012, with the release date scheduled for May 2013. Due to the unlikelihood of further revisions at this date, ASD will be defined and referred to in this study based on the proposed DSM-5 criteria.

Deficits include two of the following areas: social skills, communication and/or repetitive and stereotypical behavior or interest. In addition, the disorder must not be better qualified by another developmental disorder or schizophrenia. Autistic Disorder is diagnosed through a combination of criteria including the following: impairments in social interaction, which may include lack of social reciprocity or development of relationships with peers; impairments in

communication, which may include delays in speech or conversational abilities; restricted, repetitive behavior patterns; social skill impairments before three years age (*Diagnostic and statistical manual of mental disorder*s, 2000). Asperger's Disorder includes deficits in all of the following areas: social interaction, restrictive and stereotypical behavior or interest, functional impairments based on these deficits, lack of language or developmental delay and inability to meet the criteria for other developmental disorders or schizophrenia. Pervasive Developmental Disorder, Not Otherwise Specified (PDD-NOS) is identified when severe impairment in the development of social interaction, communication and verbal skills are present along with repetitive and stereotypical behavior and interests. When these criteria are met or appear at a late age on onset and are not explained by another developmental disorder, schizophrenia or avoidant personality disorder, PDD-NOS may be diagnosed (*Diagnostic and statistical manual of mental disorders*, 2000). The complexity of the diagnostic criteria found under the DSM-IV is revealed in the 2,027 different combinations of criteria to diagnose ASD. The proposed DSM-5 to be released in 2013, includes the possibility of 11 combinations of criteria, with at least one from each category listed below as A, B, C and D, for a diagnosis of ASD (American Psychiatric Association, 2012):

> A. Persistent deficits in social communication and social interaction across contexts, not accounted for by general developmental delays, and manifest by all 3 of the following:
>
> 1. Deficits in social-emotional reciprocity; ranging from abnormal social approach and failure of normal back and forth conversation through reduced sharing of interests, emotions, and affect and response to total lack of initiation of social interaction,

2. Deficits in nonverbal communicative behaviors used for social interaction; ranging from poorly integrated-verbal and nonverbal communication, through abnormalities in eye contact and body-language, or deficits in understanding and use of nonverbal communication, to total lack of facial expression or gestures.

3. Deficits in developing and maintaining relationships, appropriate to developmental level (beyond those with caregivers); ranging from difficulties adjusting behavior to suit different social contexts through difficulties in sharing imaginative play and in making friends to an apparent absence of interest in people

B. Restricted, repetitive patterns of behavior, interests, or activities as manifested by at least two of the following:

1. Stereotyped or repetitive speech, motor movements, or use of objects; (such as simple motor stereotypes, echolalia, repetitive use of objects, or idiosyncratic phrases).

2. Excessive adherence to routines, ritualized patterns of verbal or nonverbal behavior, or excessive resistance to change; (such as motoric rituals, insistence on same route or food, repetitive questioning or extreme distress at small changes).

3. Highly restricted, fixated interests that are abnormal in intensity or focus; (such as strong attachment to or preoccupation with unusual objects, excessively circumscribed or perseverative interests).

4. Hyper-or hypo-reactivity to sensory input or unusual interest in sensory aspects of environment; (such as apparent indifference to pain/heat/cold, adverse response to specific sounds or textures, excessive smelling or touching of objects, fascination with lights or spinning objects).

C. Symptoms must be present in early childhood (but may not become fully manifest until social demands exceed limited capacities)

D. Symptoms together limit and impair everyday functioning (p. 1).

The present study will refer to the DSM-5 criteria, scheduled for release in May of 2013; however, participants will include those who have been diagnosed under the DSM-IV criteria.

Social Skills of Children with Autism Spectrum Disorder

Social skill deficits are identified as a core feature of all those diagnosed with ASD. Efforts to address these deficits in social skills may provide short-term benefits, such as improved success at school and interacting with family and peers, as well as long term outcomes, such as improved employment success. In one study, toddlers who were more likely to avoid their peers, had lower language acquisition scores (Ingersoll, Schreibman, & Stahmer, 2001). This lack of interaction with others may have lasting effects. A longitudinal study of adolescents with ASD found increased social interaction with peers, associated with improved social skills (McGovern & Sigman, 2005). Into adulthood, successful employment for individuals with intellectual disabilities, is related to successful application of social skills such as interacting with others, rather than problem behaviors, such as those that are socially inappropriate (Huang & Cuvo, 1997; Schopler & Mesibov, 1983). Children with ASD often do not identify themselves as lonely and lacking in social interactions (Chamberlain et al., 2007), which may complicate assessing their social skills and gaining their acceptance or interest in addressing this deficit area.

These early differences in social skill abilities may also impact levels of parental stress. One study comparing neurotypical toddlers and children diagnosed with ASD found that increased deficits in social skills were associated with increase maternal stress, for the mothers of children with ASD (Baker-Ericzn, Brookman-Frazee, & Stahmer, 2005). Another study with parents of toddlers found that both fathers and mothers of children with ASD identified their children's deficits in social skills to be significantly stressful (Davis & Carter,

2008). In the 2007 National Survey of Children's Health (N = 70,030), parents of children with ASD identified themselves as having greater stress than parents of children with other special health care needs (Schieve et al., 2011). Addressing social skill deficits for children with ASD may be one approach to decreasing parental stress.

Problem Behaviors for Children with Autism Spectrum Disorder

Children with ASD who have more problem behaviors, are more likely to have poorer social skills (Schieve et al., 2011). In a study of 109 children ages three to 16 years, greater problem behaviors were predictive of poorer total social skills (ß = 0.96, $p < .01$) (Matson, Hess & Mahan, 2013). One case study found that by addressing problem behaviors and social skill deficits, improvements were made in social skills (Hagopian, Kuhn & Strother, 2009). Addressing these problem behaviors has presented a challenge. The majority of investigative interventions for problem behaviors have involved costly implementation with specially trained individuals under situations not typical in the average classroom, creating the need for alternative methods (Strain, Wilson, & Dunlap, 2011). The inclusion of the identification of problem behaviors, along with social skill measurements, may provide a more comprehensive assessment of a child's total social skills. Once identified, alternative approaches may be sought to address these challenges.

Physiological Responses in Human Animal Interaction

Stress is defined as the physiological response to the perception of either a physical or psychological threat. The adrenal glands secrete cortisol in higher levels in response to stress, and measuring these levels may provide one method of physiologically measuring stress. Several studies have investigated

comparative responses using cortisol measurements for children with ASD and neurotypical children. One study (N = 50) utilized a blood draw as a stressor and measured serum cortisol, while also using salivary cortisol measurements for baseline readings (Huang & Cuvo, 1997; Schopler & Mesibov, 1983). Using this method, Spratt et al (2010) found that children with ASD had significantly higher serum cortisol levels than a control group of neurotypical children, following the procedure of a blood draw. Another study measured cortisol levels in relation to social situations (Corbett, Schupp, Simon, Ryan, & Mendoza, 2010). In this study social interaction during play between children with autism and neurotypical children ages eight to 12 years were examined. The older children with autism were more likely to voluntarily interact with their neurotypical peers than the younger children with autism, yet had a significant elevation in serum cortisol $X2(3) = 8.24$, $p = 0.04$ (Corbett, Schupp, Simon, Ryan, & Mendoza, 2010). This may have indicated that while older children with autism were more willing to interact socially with their peers, they did so under a state of physiological arousal and possible stress. Children with ASD may benefit from approaches that provide calming benefits during interaction with others.

Benefits of Human-Animal Interaction

Scientific evidence now points to the health benefits of pets. Most families who have pets consider them to be a member of the family and identify them as providing similar companionship as would a human member of the family (Cohen, 2002). A longitudinal study in Germany (N = 9723) and Australia (N = 1246) found that pet owners have 15% fewer doctor visits annually, when compared with those who did not own pets (Headey & Grabka, 2006). A study

found that individuals who suffered a myocardial infarction were significantly more likely to survive greater than one year, if they owned a dog, when compared with those who did not own a dog ($n = 282$, $p < .05$) (Friedmann & Thomas, 1995). In another study where women were asked to perform an arithmetic problem, their blood pressure was demonstrated to be lowest when the mental challenge was conducted in the presence of their pet, when compared with the presence of their spouse or a friend (Allen et al., 2002). A survey in Australia found that owners of dogs reported being less lonely than those who did not own dogs (Headey, 1999). These studies provide evidence of health benefits of living with pets for adults, and benefits have also been found for children.

In the United States, 46.3 million households own pet dogs (American Pet Products Association, 2011). This translates to an estimated 62% of American households with a pet, and 46% of those pets are dogs. The most common reason identified in one study for adding a pet to the family was for companionship (Endenburg, 1995). Triebenbacher (1999) investigated the relationships of children and pets in a study of children including those in elementary school ($n = 610$), middle school ($n = 128$), high school ($n = 127$), and undergraduate college ($n = 225$). There was a significant correlation in attachment using the Companion Animal Bonding Scale (CABS) and grade level, with elementary students found to be least attached to their pets, when compared with the other age groups of children ($F = 4.4950$, $p = .004$) (Triebenbacher, 1999). Using one on one interviews, another study of children ($N = 174$) ages preschool through grade 5, identified pets as providing emotional support and as a social catalyst, indicating that companion animals may act as a transitional object for young children

(Triebenbacher, 1998). Animals are not just a passive part of the lives of children; instead, they interact with and influence child development (Melson, 2001).

Another finding is that children who have lived with companion animals during their development, have been identified as having increased levels of self-esteem, empathy and social competence in comparison with their peers (Daly & Morton, 2006; Endenburg & van Lith, 2011). Investigations have demonstrated that children look to their dogs for comfort and as a confident (McNicholas & Collis, 2000). Some children were more likely to confide in their dog than to a friend, and ranked their relationship with their pet higher than some non-immediate family relationships, such as grandparents, aunts and uncles (McNicholas & Collis, 2000). This ability of a pet to aid children through a form of social support may be particularly beneficial during transitional stages, like adolescence, or for those who have no siblings (Robin & Bensel, 1985).

A study surveying 213 school aged children found that 51% of children identified dogs as their favorite type of pet with cats a distant second at 27% (Bryant, 1990). Evidence in the literature to date indicates a positive influence of dogs on child development (Endenburg & van Lith, 2011). Pet preference among children with ASD has not been identified.

Benefits of Animal Assisted Therapy and Animal Assisted Activity

Trained therapy dogs have been associated with benefits for neurotypical children. One of the early introductions to the possibility of benefits related to HAI for children came from Boris Levinson, in his book titled *Pet-Oriented Psychotherapy* (Headey, 1999). Levinson (1969) was successfully using a dog in his own practice and believed well-trained animals could serve as a catalyst to

help children dealing with emotional and problem behaviors in therapy (Headey & Grabka, 2006). One way that animals may provide this benefit is through stress reduction, which may be related to their increased willingness to work with a therapist. In a two-group repeated measure design, children in a pediatric clinic had lower distress scores when a trained therapy dog was present, than without the presence of a dog (Hansen, Messinger, Baun, & Megel, 1999). A meta-analysis of 250 studies of animal assisted interventions, including interaction with pets, AAA and AAT, found that dogs were the most commonly investigated animal (Nimer & Lundahl, 2007). Children identified pet dogs as protecting them, providing comfort during illness, and as a friend with whom they could share their secrets (McNicholas & Collis, 2001). Dogs were associated with improved scores among children and adolescents undergoing psychiatric care when AAT was utilized, on the Basler Befindlichkelts-Skala instrument, which uses self-report to measure changes in mood and mindset, including intra-emotional balance and social extroversion (Prothmann, Bienert, & Ettrich, 2006).

Remaining areas to investigate are causal relationships identifying the dosage and type of pet or dog most likely to result in measurable benefits for children, as well an examination of the strength of attachment. Information has also been limited on pet presence and attachment in special populations. Studies of pet dogs have included neurotypical children, but for children with ASD, other than one investigation of pets, and one preliminary survey, the literature has been limited to dogs with specific training.

Benefits of Trained Dogs for Children with Autism Spectrum Disorder

There is evidence of the benefit of dogs with advanced training, such as service or therapy dogs for children with ASD and other special needs. One study (N = 17) that examined the placement of service dogs with children who had disabilities, found that parents reported their children having increased social skills and improved mood, following the introduction of the service dog to their families (Davis, Nattrass, O'Brien, Patronek, & MacCollin, 2004). During this study, interviews were conducted with the 17 families who had lived with service dogs for at least one year. A repeated description of the dog by the children was "he's my best friend" (Davis et al., 2004). In another investigation, children were assigned to an intervention group, which received a service dog, or a control group, which did not, and there was a significant increase in social reciprocity (N = 20, p = .02) for the group with the dogs (Wild, 2012). Social reciprocity was measured using the Social Responsiveness Scale (SRS) (Constantino et al., 2003), and the instrument was completed online by parents of the children at six month intervals for 12 months (Wild, 2012). A study of 10 children with ASD found that after a service dog was placed with a child, the parents reported that their children had decreased levels of anxiety, fewer emotional outbursts and an overall increase in general happiness (Burrows, Adams, & Spiers, 2008).

Repetitive behaviors and emotional outbursts can lead to social isolation for children with ASD (Prothmann, Ettrich, & Prothmann, 2009). In one case study, a child with ASD was found to have a decrease in repetitive behaviors, after a service dog was permanently placed with the child (Burrows, Adams, & Millman, 2008). In that case study, parents described the need for consistent and ongoing

training with the service dog and the need to work toward the establishment of a bond between their child and the dog (Burrows, Adams, & Millman, 2008). These studies have included small sample sizes, which limits generalization. A questionnaire identifying problem behaviors of children with ASD was completed by parents, in a study that included placement of a service dog with the child for four weeks (Viau et al., 2010). In that study, Viau (2010) found that children with ASD had significantly fewer problem behaviors while living with a service dog and after the service dog was no longer in the home, when compared with before the arrival of the dog ($N = 42$, $p < .001$).

In another study, the impact of children with disabilities receiving a service dog was examined in comparison to a control group of similar children with disabilities, during observations completed at the public school where the children attended, as well as in the social setting of a shopping mall (Mader, Hart, & Bergin, 1989). In this study the children were observed for the number, type and duration of interactions with other children. Observations included the eye gaze of children passing by and whether it was directed to the child with the disability or the service dog for the experimental group, or the child alone, for the control group with no dog. Interactions also included talking, touching or smiling in the direction of the child with the disability (Mader et al., 1989). The findings revealed that children with dogs received significantly more conversations directed at the team of a child with a dog and directed at the child with a dog, as compared to a child without a dog ($N = 6$, $p < .01$) (Mader et al., 1989). This finding was true both in the school setting and the public setting. The children in this study did not have ASD, but the positive increase in social interactions for

children with disabilities provides an indication for similar investigations for children with ASD.

Trained dogs, used in AAA and AAT, have been associated with an increase in pro-social behavior and a decrease in problem behaviors such as wandering, hand flapping, making clicking sounds and being self-absorbed for children with ASD (Redefer & Goodman, 1989). This may be related to a reduction in stress in the presence of a dog. Reduced stress for children with ASD is associated with fewer repetitive behaviors and emotional outbursts (Lytle & Todd, 2009). A study with children who were diagnosed with Pervasive Developmental Disorder (PDD), found that when compared to a stuffed dog and toy ball, the participant children were more likely to maintain a focused gaze with a live dog (Martin & Farnum, 2002). In verbal exchanges, the same children were more likely to engage in discussion related to the therapy, when in the presence of the live dog. Children also were also more likely to comply with requests of the therapist in the presence of the live dog (Martin & Farnum, 2002). A pilot study of 22 school aged children with a primary diagnosis of autism was conducted during occupational therapy sessions in a public school (Sams, Fortney, & Willenbring, 2006). Paired two sample t-tests were used to compare the mean numbers of behaviors per minute between occupational therapy sessions with and without a dog. Greater verbalization ($p < .05$) and greater social interactions ($p < .01$) were identified for the children in the sessions utilizing a therapy dog compared with those in the standard occupational therapy sessions, without a dog (Sams et al., 2006). These results indicate an increase in focus on humans, during AAA, for some children with ASD.

A meta-analysis of AAT evaluated 49 studies using Cohen's "d" to measure effect size with 0.80 being using to identify large effect and 0.50 to identify moderate effect (Nimer & Lundahl, 2007). The highest effect was measured for changes in autistic behavior (d = 0.72) and moderate changes for behavior and medical issues, when an animal was included through AAT (d = 0.51) (Nimer & Lundahl, 2007). Individuals with disabilities were found to have greater medical benefit than others with measures including heart rate, blood pressure and coordination (d = 0.96) (Nimer & Lundahl, 2007). A variety of animals were included, but dogs were the only animals to be consistently identified with significant benefits (Nimer & Lundahl, 2007). The finding of an increase in socially outgoing behavior of children with ASD during AAT sessions also provides support for the presence of a dog to increase social interactions (Prothmann et al., 2006). All the animals included had received some type of training to aid in their interaction for AAT in calm and assistive ways, so investigation of similar effect with untrained pet dogs may further knowledge of whether these same benefits may be identified for pet dogs, without formal training. Given the sensory challenges of many children with ASD, it may be expected that dogs with a similar calm temperament may be associated with a stronger attachment and/or greater benefits, while those who exhibit more uncontrolled behavior may not. It is notable that all these studies have small sample sizes. These numbers may be the result of the small available sample population of children with ASD who receive service dogs. While the numbers have been small, there has been a consistent trend toward benefits, providing an indication for further investigation among children with ASD.

Benefits of Pet Dogs for Children with ASD

One preliminary study was done exploring potential benefits of a pet dog for children with ASD. It was conducted at a Midwest regional autism conference for parents of individuals with ASD and health care providers (HCP) serving this population. Twenty seven percent of the parents completing the survey had a pet dog. Among all those surveyed, including those with and without a pet dog, 67% believed that children with ASD would benefit from a pet dog. The survey was conducted using a questionnaire that utilized a five-point Likert-type scale with responses of one "*strongly disagree*" to five "*strongly agree.*" For the parents that had a pet dog and a child with ASD, they consistently reported a belief that their child experienced numerous benefits from that dog, including the variables seen in Table 1. Parents who did not have a pet dog and HCP were asked about perceived benefits of a pet dog. Sixty eight percent of the parents without a dog reported that they believed a pet dog would benefit a child with ASD, and 60% of HCP reported their belief that a pet dog would be a benefit for a child (Table 2). This preliminary work provided an indication for further investigation of potential benefits of HAI for children with ASD and pet dogs.

Table 1: Interaction Variables Between Parents' Child and Dog (n=16)

Variables	n	Mean	Median	Range	SD
Child has a close bond with the dog	15	4.2	4	1-5	1.1
Child enjoys petting the dog	16	4.4	4.5	3-5	0.7
Dog increases companionship/affection for child	16	4.3	5	1-5	1.2
Dog helps increase exercise for child	16	3.8	4	1-5	1.3
Dog helps increase social interaction for child	16	4.3	4.5	1-5	1.1
Dog helps increase safety for child	16	4.2	4	3-5	0.8
Dog helps increase relaxation for child	16	4.4	5	3-5	0.8

Note: 1 = "*strongly disagree*" and 5 = "*strongly agree*"

Table 2: Perceived Benefits of a Dog (n=56)

Variable	n	Mean	Median	Range	SD
Children of parents:					
Dog would enhance social interactions	18	4.7	5	4-5	0.5
Dog would be helpful to parents	19	3.8	4	1-5	1.1
Dog's presence would be helpful with therapy	19	4.3	4	2-5	0.8
Children of HCP's:					
Dog would enhance social interactions	37	4.3	4	2-5	0.8
Dog would be helpful to parents	37	3.9	4	3-5	0.7
Dog's presence would be helpful with therapy	37	3.8	4	2-5	0.8

Note. 1 = "*strongly disagree"* and 5 = "*strongly agree*"

One study has been identified in the literature examining pets and children with ASD (Grandgeorge et al., 2012). This study examined four groups of children with ASD who were all from the same university-based day care facility. The instrument used to measure social skills was the Autism Diagnostic Interview-

Revised (ADI-R), which is widely regarded for its reliability and diagnostic use in identifying children with ASD. The ADI-R is a 93-item instrument and is designed for use by highly trained professionals to guide an interview with an informant in the evaluation of developmental disabilities (Rutter, LeCouteur, & Lord, 2003). The ADI-R measures three areas: language/communication, reciprocal social interactions and restricted, repetitive, and stereotyped behaviors and interests (p. 1, Rutter, LeCouteur & Lord, 2003). All the participants had been evaluated using the ADI-R between the ages of four and five years, while attending the day care facility. At the time of the study, participants were again evaluated using the ADI-R for a comparison of their current scores with the baseline scores from their earlier age. The first two groups included the following: children with ASD who did not live with a pet until after age five years, but acquired a pet after this age (n = 12) and a matched control group consisting of children with ASD of the same age, gender and language ability who never owned a pet (n = 12). The ADI-R scores of the children with the new pets revealed fewer deficits ($p < .001$) in two of the 36 items including "*offering to share*" and "*offering comfort*." The second two groups included: children who had lived with pets since birth (n = 8) and a matched control group of children with ASD who never lived with pets (n = 8). There were no significant differences in the ADI-R scores of these second two groups. Only the children who acquired pets after the age of five years had fewer deficits in their pro-social behaviors and no other differences were found (Grandgeorge et al., 2012). Limitations of this study include its small sample size, variation in length of time child lived with the pet after the age of five, and the inclusion of a wide variation in pet types including

dogs, cats, one hamster and one rabbit. Only one yes/no question was asked regarding whether or not a child was attached to their pet. These studies, along with those including trained dogs, provide an indication for further investigation of the role of pet dogs for the specialty population of children with ASD.

Attachment Theory and the Human-Animal Bond

Attachment Theory first described by Bowlby (1961) was advanced by Ainsworth (1989) to consider how the bond between a mother and child may extend to other attachments a child makes with parents and peers as they develop. For example, bonds between siblings may form as a result of understanding and shared common experiences over time, resulting in an ability to form friendships with others outside the family (Ainsworth, 1989). Attachment theory and the bond between one human and another is well described, and some studies have investigated its application to the human-animal bond (Beck & Madresh, 2008; Bowlby, 1977; Kurdek, 2008). Melson (1990) described attachment in the relationships between children and pets. In her model she includes four components of the relationship including: "time with pet, affect toward pet, ideas about pet, and behaviors toward pet" (p. 98, Melson, 1990). Each of these areas provides insight into the relational qualities of the human animal bond for children, including attachment strength and security. Some studies have sought to quantify that bond through the investigation of the strength of pet attachment with children and adults.

Cohen (2002) found that the time adults spent with their pets was the most likely predictor of a close bond to their pet, using the Companion Animal Bonding Scale (CABS) ($p = .0001$). A limitation of this finding was that

participants were only asked about time spent with their pet, rather than time spent or the quality of the interaction with their pet. An investigation of pet attachment and college students found that they perceived their pets as providing a source of comfort and security that resembled their attachment to family members (Kurdek, 2008). Other investigations have examined children and their attachment to pets.

Some studies have found a lack of evidence supporting an association between pet ownership and positive emotional or behavioral outcomes for children, but these have measured pet ownership rather than measuring or describing the human-animal relationship (Poresky, Hendrix, Hosier, & Samuelson, 1987). One study that utilized the variable of attachment, found that children of elementary school age were more empathetic to others, if they were more attached to their pets (Daly & Morton, 2006; Poresky, 1996). Another study found that children who were more strongly attached to their pets had significantly greater scores in prosocial behaviors, compared with children who were less attached, or had not pet ($n = 826$, $p < .05$) (Vidović, S˘tetić, & Bratko, 1999).

Children's ideas about their pets have also been investigated. A study ($N = 174$) of neurotypical children ages preschool through grade school found that children identify their pets as family members and sources of friendship and security (Triebenbacher, 1998). In another investigation behavior measures were identified. In this study, older grade school children identified stronger attachments to pets when the children played with their pets more and were more involved in pet care (Melson, Peet, & Sparks, 1991).

In an examination of gender differences, a study of eight graders (N = 656) found that boys were just as likely to be attached to their pet as girls (Stevens, 1990). In this same survey of eighth graders, pet ownership was the most common demographic variable identified, indicating a common influence in the lives of most children. One boy described his need for his pet with this statement, "You need to understand your pet as he may be your only true friend" (p. 181, Stevens, 1990). This study provides valuable information, given that boys outnumber girls with ASD at a ratio of five to one ("CDC - Data and Statistics, Autism Spectrum Disorders - NCBDDD," 2012).

The common challenge for children with ASD is with the establishment of social relationships. An attachment to a pet dog may provide a positive relationship experience that could help these children connect to humans. Children with ASD have been described as having a deficit in theory of mind; the ability to understand the thoughts or intentions of others (Bar-On & Cohen, 1995). The absence of the necessity to read a dog's mind, may provide an explanation for the increased ability of children with ASD to interact in a social way with dogs (Solomon, 2012). An attachment to a pet may aid in the establishment of a secure attachment for children with ASD.

In a secure attachment, children experience safe and supportive care-giving, and actively seek out other close relationships (Beetz, Kotrschal, Turner, & Uvnäs-Moberg, in-press). In insecure attachments, children who may perceive inadequate support from their caregivers, are less likely to seek out relationships with others for social support (Beetz, Kotrschal, Turner, & Uvnäs-Moberg, in-press). The comparison of secure and insecure attachment for neurotypical

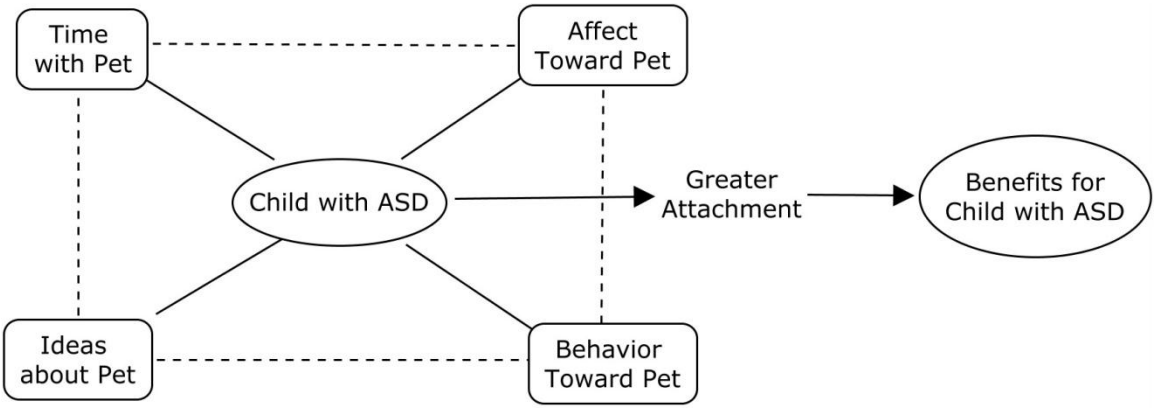
children has been demonstrated through differences in the responses of the children's parasympathetic and sympathetic nervous systems (Oosterman, De Schipper, Fisher, Dozier, & Schuengel, 2010). Children with secure attachments have been found to have a decrease in parasympathetic activity, when separated from their caregiver and an increase when reunited. Children with a disordered attachment had an increase in parasympathetic activity, when separated, followed by a decrease when reunited. The results of this study may indicate that children who are able to form secure attachments are less stressed, which may lead to their willingness to seek out other social relationships.

These findings of stress and attachment type in neurotypical children may provide guidance for the examination of attachment for children with ASD, who exhibit some characteristics of insecure attachment, such as avoiding social interaction. In older children with ASD, those who volunteered to engage socially with peers had an increase in cortisol, as a response to social situation, when compared to neurotypical peers (Corbett, Schupp, Simon, Ryan, & Mendoza, 2010). Thus, a willing social interaction with peers was associated with a stress response. In contrast, the presence of a service dog, was associated with a decrease in cortisol levels for children with ASD (Viau et al., 2010). Secure attachment with a dog may help facilitate a decrease in stress, increasing the willingness of a child to seek out other relationships.

Identifying and describing the attachment of children with ASD to pet dogs may aid our understanding of HAI for this population. A baseline of examining this attachment should include the child's perception pet dogs, and this can be described based on time spent together, thoughts about, emotional feelings about

and behavior toward companion animals (Melson, 1990). A variety of pet attachment instruments are available. An unanswered question is whether interaction with and attachment to a pet dog could produce the type of increase in socialization seen with neurotypical children, in the population of children with ASD. Figure 1 represents a model of how Bowlby's and Melson's theories of attachment may apply to children with ASD and pet dogs.

Figure 1: Modified Model of Pet-Child Attachment (Bowlby, 1961; Melson, 1990)



Summary

This review of the literature demonstrates that there has been limited investigation to date that examines social skills of children with autism who live with a pet dog versus those who do not live with a pet dog. In addition to this, attachment has not been investigated in relationships between children with ASD and their pet dog. The present study provides an investigation linking what is known about HAI for neurotypical children, with children who have ASD and pet dogs.

If the presence of a pet dog is determined to be positively associated with the children's social skills, it may be possible to conduct randomized clinical trials with families willing to adopt a dog. The present study provides a basic

description of the association between pet dog ownership among children with ASD and social skills, parental description of the children's interaction with dogs and a description of parental decision-making regarding pet dog ownership. This will enable a progression to more advanced studies with more complex designs, to test the effects of pet dog ownership for children with ASD.

The following research hypotheses was tested in the present study:

1. Children with ASD, who live in a family with a pet dog, will have greater social skills than those who do not live with a pet dog.
2. Children with ASD, who are very attached to the family's pet dog, have more social skills than those who are not very attached.

The following research questions were also asked:

1. How do families of children with ASD make decisions regarding dog ownership?
2. How do children with ASD interact with their family's pet dog?
3. How do children with ASD who do not live in families that own pet dogs interact with dogs outside their home?
4. What benefits and barriers to dog ownership are experienced or perceived by families of children with ASD?

Chapter III

Design and Methods

This chapter describes the design and methods used in the study. The first sections include design, sample, measures and procedures for the study. The final sections will detail data management and protection of human subjects.

Design

An exploratory cross-sectional, descriptive design employing quantitative instruments along with a demographic questionnaire and responses to open-ended questions was used to address the research questions and hypotheses. Four open-ended response questions were asked of all adult participants to provide additional illustration of their perspectives regarding dog ownership. Ten of the parent participants were interviewed in depth, based on the richness of their responses to provide further qualitative data regarding their child with ASD and the child's interaction with dogs, and their perceptions and experiences of dog ownership.

Sampling Procedure

The data-base of potential research participants was made available through a Midwest autism treatment center. Inclusion criteria included children aged eight to 18 years, a diagnosis of ASD, autism or pervasive developmental disorder-not otherwise specified (hereafter, the diagnosis is referred to as ASD), and an Intelligence Quotient (IQ) > 70. Intelligence Quotient of > 70 was chosen due to the poor reading and word comprehension skills of individuals with mild retardation and IQ of < 65 (Cohen et al., 2001) A diagnostic exclusion was established due to the severe intellectual disability typical of children with Rett's Disorder and Childhood Disintegrative Disorder (Tidmarsh & Volkmar, 2003).

Contact was initiated by telephone and inquiry made to determine if potential participants met the additional enrollment criterion of the child with ASD being able to respond to questions using the telephone.

Participants were recruited from a data-base, which was comprised of families who had received services at a Midwest autism treatment center and agreed to be contacted for potential participation in research studies. A list of potential participants was generated from that data-base, using the inclusion criteria for the study. Over 953 children in the study site data-base met the child age criteria, and had a diagnosis of ASD. IQ scores were available for 411 of these children, and of this number, 285 met the criteria for inclusion. Potential participants were randomly selected from this final list and then contacted by telephone, using pre-randomized identification numbers, generated by a biostatistician at the University of Missouri. The list of pre-randomized numbers was used by the Primary Investigator (PI) to select the number of the potential participant to contact, from the numerically ordered names in the data-base. Determination of child's ability to respond to questions over the telephone was made by the parents. Participants who met the enrollment criteria were offered the opportunity to participate in the study and were enrolled, if they agreed. A $10 gift card was offered and parents were informed that child participation was not required for receipt of the gift card. Two parents refused the gift cards.

Sample

The primary caregivers (hereafter, called parents) of 73 children were enrolled using a waiver of consent (Appendix A). Forty-seven parents had pet dogs, and their children with ASD were also offered enrollment. These 47 children agreed to

participate, following a waiver of assent (Appendix B). In cases where the family had more than one pet dog, the parent was asked to identify the dog the child was perceived as most attached to and this was the dog the parents and child were asked to refer to in response to the study questions. Child participants who lived with dogs were included in an effort to examine the bonding perceptions of children with ASD to their dogs.

In this first exploratory descriptive study of Human-Animal Interaction (HAI) among children with ASD, it was critical to cast a wide net and learn as much as possible about relationships between dog ownership and social skills among these children. By broadening the enrollment criteria and allowing participation of a more heterogeneous group of children with ASD and their parents, information may be gained leading to narrower inclusion criteria in future studies.

Instruments

Social Skills Improvement System Rating Scale (SSiS-RS). The proprietary rights to the use the SSiS-RS utilized in this study was purchased through Pearson Clinical Assessment, from PsychCorp (Appendix C). This 79-item instrument measures social skills in children with ASD and is available in Teacher, Parent and Student Forms (Gresham & Elliott, 2008). Only the Parent Form was administered in the present study. The SSiS-RS measures social skills through items in seven sub-domains including Communication, Cooperation, Assertion, Responsibility, Empathy, Engagement and Self-Control (Table 1) (Gresham et al., 2010). Parent Forms also include measurements of problem behaviors from five sub-domains including Externalizing, Bullying, Hyperactivity/Inattention, Internalizing and Autism Spectrum. Measurements on the Parent Forms are based

on the perception of the rater for the frequency of the behavior on each item. The measurement is a four-point Likert-type scale with responses of "*never*," "*seldom,*" "*often,*" and "*almost always*." Measurements on the Parent Form also include items to aid in identifying behaviors requiring immediate attention. These importance ratings use a three point Likert-type scale with responses of "*not important*," "*important*" and "*critical*." Both scales use total scores calculated from the items within each subscale, for the respective ratings. Scores are reported as standard scores (M = 100, SD = 15) for the Total Social Skills and Total Problem Behaviors. The Parent Form of the SSiS-RS is designed at a fifth grade reading level and takes approximately 10-25 minutes to complete. The short amount of time for completion and low literacy level for comprehension provided a rationale for selection of the SSiS-RS for utilization in this telephone collection survey.

The SSiS-RS (Table 3) was normed on a national sample of 4,700 neurotypical children ages preschool through high school at 115 sites located in 36 different states. The sample was representative of the population using the March 2006 Current Population Survey from the U.S. Census Bureau for the demographics of male/female, race/ethnicity, socioeconomic and geographic regions matching the U.S. population. Reliability and validity for the SSiS-RS includes strong test-retest reliability and internal consistency. Test-retest scores for the total Social Skills were 0.84 and 0.81 for the Parent and Student Forms (Gresham, Elliott, Vance, & Cook, 2011). Test-retest scores for the total Problem Behavior were 0.87 and 0.77 for the Parent and Student Forms. Stability indices for Median subscales of the Social Skills (SS) and Problem Behavior (PB) were > 0.80 for the Parent and Student Forms. Coefficient alphas for the total Social Skills and Problem Behavior

scales for Student Forms and Parent Forms were > 0.93 (Gresham, Elliott, Vance, & Cook, 2011). In the present study, the Cronbach coefficient alpha for SS (N = 70) was 0.90. The Cronbach coefficient alpha for PB (N = 70) was 0.86.

Table 3: SSiS-RS Subscales and sample items

SCALE/SUBSCALE (number of items)	SAMPLE ITEMS FOR PARENTS
Social Skills:	
Communication (7)	Takes turn in conversations
Cooperation (6)	Follows your directions
Assertion (7)	Ask for help from adults
Responsibility (6)	Is well-behaved when unsupervised
Empathy (6)	Shows concern for others
Engagement (7)	Interacts well with other children
Self-Control (7)	Stays calm when teased
Problem Behaviors:	
Externalizing (12)	Disobeys rules and requests
Bullying (5)	Forces others to act against their will
Hyperactivity/Inattention (7)	Fidgets or moves around too much
Internalizing (10)	Withdraws from others
Autism Spectrum (15)	Is preoccupied with object parts

SSIS-RS (Gresham and Elliott, 2008)

Evidence of score validation for the population of children with ASD was conducted for the SSiS-RS. In Parent Forms, the mean scale scores for SS of children with ASD were greater than 1.5 SD lower than children in the neurotypical sample, and the mean scale scores for PB of children with ASD were greater than

1.75 SD than children in the neurotypical sample (Gresham & Elliott, 2008). These results validate the expectations that children with ASD would score lower on SS and higher on PB, providing evidence that the SSiS-RS is a reliable tool among this sample population. To decrease potential reporting bias through a false report, the instrument has built in measures that report any data in the final results that may provide conflicting information, such as the selection of opposite ratings for similar items. This information provides additional feedback regarding a participant's rating.

The SSiS-RS is a revised version of the Social Skills Rating System (SSRS), which was nationally normed on more than 4,000 students ages preschool through high school in 1989, and has since been used nationally and internationally to measure social skills and problem behaviors in 127 published studies and by 53 doctoral students in their dissertations (Gresham et al., 2011). The strong psychometric properties of the SSRS have been demonstrated through extant research. The SSiS-RS was based on the SSRS with the addition of several sub-domains and instructional application guides provided by the SSiS-RS, directly matched to item assessment scores to allow for testing efficacy of interventions. A study of comparability of the SSiS-RS to the SSRS demonstrated that it had higher correlations for the total Social Skills and total Problem Behaviors with Cronbach coefficient alpha of scores > 0.94 (Gresham et al., 2011).

Companion Animal Bonding Scale (CABS). Proprietary permission (Appendix D) to utilize the eight-item CABS was granted from Psychological Reports, for the purpose of this study (Poresky et al., 1987). A member of my dissertation committee (Dr. Micah Mazurek), who is an expert in the diagnosis of

ASD, provided consultation regarding the selection of an instrument to assess child-pet bonding. The CABS was chosen as an instrument that would be easily understood by child participants who met the criteria for this study. This same expert attested that most of the child participants meeting the inclusion criteria for this study would be capable of accurately completing the CABS through the use of a telephone survey, by an individual unknown to the children, the PI.

The CABS is used to identify the quality of human and pet relationships and attachment to pets. It uses a five-point Likert-type scale rating with responses of "*always*", "*generally,*" "*often*", "*rarely,*" and "*never*." The CABS was first used with adults, but has also been evaluated for use with children in multiple studies. In a study of 610 children the CABS had a Cronbach alpha of 0.80 when examined for use with ages in elementary school through undergraduate college (Triebenbacher, 1999). In a comparison with the Pet Attitude Scale, it was significantly correlated ($r = 0.51$, $p = .00001$) (Triebenbacher, 1999). While the CABS has been utilized with young children, it has not been utilized with children who had ASD, or with the use of a telephone survey for children. The CABS has been used in telephone with adults and completion time is from five to ten minutes.

In the present study, substitutions were made in wording to clarify the intent of the questions, so that children with lower verbal abilities would be able to respond to the questions. The word "*dog*" replaced the words "*companion animal*." The words "*responsive to*" were replaced with "*responsive to or likes*." The words "*close relationship*" were replaces with "*close relationship or close friendship.*" The later two changes were made to continue to include the original wording of the

CABS, but to also include simpler words for an increased likelihood of comprehension for children with a lower verbal ability. The changes were provided consistently to all child participants. The Cronbach coefficient alpha for the CABS in the present study (n = 47) was 0.55.

Demographic Questionnaire (DQ). Parents completed a 20-item, investigator developed demographic questionnaire (Appendix E), which was based on a preliminary study done with the advisor of the PI. Except for the variables of age, age of child with ASD, number of children, number of dogs owned, size of dog owned (small, medium or large), and length of time the dogs had been owned, instrument items used a nominal level of measurement. Questions also provided descriptive information regarding variables including the child's diagnosis, family income, parent education, pet ownership and dog training experience of the parents. An additional question was asked for those with a pet dog, to identify the level of attachment for the child with ASD and the dog. The options of "*very attached*," *attached*," and "*not very attached*" were used.

Open-Ended Questions. Open-ended questions (Appendix F) were asked in an interview over the telephone, at the end of the DQ, for the parents. These questions were asked to provide insight into the interaction and attachment of the children with ASD to their pet dogs. Parents who did not have pet dogs were asked to describe their child's interaction with dogs outside the home. Parents were asked to describe the reasons for their decision regarding dog ownership. Inquiry was also made about parental perceptions and experiences, regarding the benefits and burdens of dog ownership. In addition to this, ten parents were chosen to engage

in a more detailed interview regarding their child's experience with dogs and their own experiences and perceptions of dog ownership.

Field Notes. Field notes were recorded, immediately following all telephone calls. This provided additional information regarding the adult and child participants' tone of voice, manner of responding, time of day, date and any additional information offered by the participants, which I did not request. Notes also included questions asked by the participants. These notes were utilized for the qualitative analysis of the data.

Data Collection

Telephone recruitment (Appendix G) was conducted and study protocol was reviewed with all parents before enrollment. Parents who were interested in participation were queried regarding their child's willingness and ability to respond to eight questions about dogs from me using the telephone, without regard to whether the parent owned a dog. Questions were answered and consent to participate obtained from the parent.

After enrollment, I administered the demographic questionnaire and the SSiS-RS. When these instruments were completed, I requested permission from the parents to audio record their responses to the qualitative questions, for the purpose of accurately recording the content of their responses. Hand written notes were also taken, during this recording process, as a precaution in the event of a recording malfunction. Due to quiet vocalizations of participant # 91, the recording was inaudible. Hand written field notes were utilized for the analysis of that participant's responses. All of the parents agreed to be recorded. This was accomplished by conducting all interviews in a private office and activating my

telephone to speaker-phone mode, for the qualitative portion of the data collection. A General Electric micro-cassette recorder (model # 3-5375A) was used to audio-record this data.

The open-ended interview questions were used to initiate responses from the parents. Based on the recommendation of a member my dissertation committee, who is an expert in qualitative analysis (Dr. Lawrence Ganong), it was determined that extended interviews with approximately 10% of the participant population would provide valuable data to aid in illuminating the experiences of these families. Ten parents were chosen, based on the depth and length of their responses to the open-ended questions, for these extended in-depth interviews. Data were collected during a single telephone contact, except for one participant, who was called back later in the day, because the child was not available at the time of the initial contact. The goal was to allow the participants to tell their stories and for me, as the investigator, to remain an active listener (Richards & Morse, 2007).

Following completion of the DQ, SSiS-RS and qualitative questions, the parent was asked to call the child to the telephone for the purpose of offering the opportunity of enrollment to the child. Parents were offered the option of being given the five Likert-scale response options for the CABS, in order to write them down as a visual cue for their child to use during data collection and approximately 25% of parents chose this option. At the request of almost 25% of the parents, it was agreed that they could set their telephone in speaker-phone mode during the protocol review, assent and data collection with their child. Parents who requested this option stated that they preferred to be able to hear the questions their children

were being asked, and/or to be available, if I had any questions regarding their child during the survey. I was introduced to the child by the parents, and then followed this with a self-introduction to the child. Assent and protocol were reviewed with each child and none asked any questions before initiation of the data collection. All child participants were told that it was their choice if they wanted to answer the questions or not. Following this, the child participants were enrolled. None of the parents were heard attempting to answer for or influence their children's responses.

Questions were repeated for those children who asked for this assistance, or for those that did not respond with an answer to an instrument item within approximately five seconds. Each child was offered the opportunity to ask questions at the end of the survey. Upon completion of the CABS, each child was thanked for their participation and asked to return the telephone to the parent.

The children in the study responded readily to the CABS instrument. Thirty-seven required no additional assistance or prompting. Ten of the children required me to repeat questions and/or utilize the Likert response options, which had been written down by the parents for visual assistance in making response choices. Most answered promptly and had no questions for me at the end. Two parents stated that their child typically did not like to talk on the phone and they expressed surprise that their child answered the questions so readily, especially given that I was unknown to the children. Both parents attributed this to the fact that the questions were related to the child's dog.

All data were identified by utilization of participant identification numbers. Parents were offered a $10 gift card, following completion of the parent instruments. Addresses were obtained at that time, for mailing purposes.

Data Management

Data were maintained according to IRB approved procedures (4.4-1a). Privacy of participants was maintained by keeping raw data in folders that were stored in locked file cabinets. Identification numbers were assigned to participants and only those numbers were used in analysis of the data. Names and addresses of the parents were utilized only for purposes of mailing the gift cards and kept in separate files from the remainder of the data. Confidentiality was maintained by limiting the participant contact to me. Audio recordings of the interview portion of the data collection identified participants by number. I conducted all transcriptions of the data. The data were transcribed within 24 hours of collection, reviewing each recording a minimum of three times, or until no further additions or corrections were noted. Audio recordings were maintained in locked file cabinets, along with the paper data. Privacy of records was maintained, including the addresses of the participants' homes.

Data Analysis

Analysis for the quantitative portion of this cross-sectional study was done using SAS 9.3 for the data ("SAS 9.3 Software | SAS," 2011). For the demographic and CABS data, spreadsheets were created for data entry. To ensure the accuracy of entries, I entered the data twice. To assure the integrity of the data entry process, a verification procedure in the SAS software was used to identify any discrepancies. The discrepancies were resolved by cross checking items with the

raw data and adjusting the entries until they were "*clean*." Data from the resulting spreadsheet was then used for analysis of results. The SSiS-RS was scored using the ASSIST software, which provides a method of computer scoring following item entry from the instruments into the ASSIST software ("SSIS-RS, Pearson Education, Inc," 2012). I entered all raw data from the SSiS-RS at least twice, or more times, if needed, until data were "*cleaned*" using the ASSIST software. The verification program within the ASSIST software then created a final spreadsheet for use in SAS to perform the analysis of the demographic, CABS and SSiS-RS data. A University of Missouri biostatistician provided statistical analysis support.

For comparisons of the SSiS-RS scores between two categories (pet dog and no pet dog), a two-sample t-test was used. This was calculated using a one-sided t-test with the level of significance of .05. This addressed the first hypothesis that children with ASD who lived with a pet dog have more social skills than those who do not live with a pet dog. If a demographic variable, such as income level, was found to have a significant association with both the SSiS-RS and the groups, it was considered as a covariate in the multivariate model to adjust for a potential confounding effect. A t-test was also used to examine the second hypothesis: children who are "*very attached*" to the family's pet dog, have more social skills than those who are *"attached*." Because the sample of children who were "*not very attached*" was unusually small (n = 4), they were not included in this analysis. A p-value of less than .05 was considered significant.

Simple descriptive statistics and 95% confidence intervals for the two group comparisons, as well as for demographic variables were computed. Comparisons of differences between demographic variables and the two groups of dog owners and

those who did not own dogs were computed using the Chi-squared test. Through the use of these parameters, the variables were addressed descriptively across the dog owner/non-dog owner categories.

The qualitative analysis of the open-ended questions was conducted using thematic analysis. All responses to questions were transcribed within 24 hours, and further notes were taken at this time, as part of illuminating the field notes. Abstracting from the data were conducted as a continual process throughout the data collection and transcription. This was accomplished through reviewing the field notes and transcriptions every 48 hours, until the collection process was complete. Following completion of collection, transcriptions were reviewed along with field notes to search for the following: unique properties of the data, relationship of the data to the research questions and the emergence of any novel findings (Yin, 2011). The data were then deconstructed by searching the wording for common words by dividing responses into four categories for each group of dog-owning/non-dog owning, based on the open-ended questions. These categories included: families decisions regarding dog ownership, interactions of children with their dog, interactions of children who did not live with dogs when they encountered a dog outside their home, and perceptions of benefits/burdens to dog ownership. Consultation was made with my dissertation committee member with expertise in qualitative analysis (Dr. Lawrence Ganong) to review the analysis process. Based on this consultation, I continued reading and re-reading the data, selecting common wording and phrases. Common themes emerged from this process and these were reviewed and organized along with earlier notes using a concept mapping system (*Public Cmap Tools Client Software*, 1998). Frequencies

of these themes were then identified and tabulated for use in reconstructing the data through the use of concept mapping of generalized themes in each category. All themed data was then reviewed to aid in gaining an understanding of the parents' self-interpreted experiences regarding dogs and dog ownership for families of children with ASD.

Human Subjects Protection

University of Missouri Health Sciences Institutional Review Board approval was obtained through an expedited application, along with approval by the research committee of a Midwest autism treatment center (Appendix H), which provided the data-base of potential participants. I maintained IRB, and HIPPA training through online education from the UM HSIRB, throughout the study. Parent participants were given complete study information, in order to make informed decisions regarding their willingness to participate. Children were not permitted to participate, without the participation of their parent. Informed consent was obtained from the parent participants, and assent from the child participants. The study instruments were explained along with the expectations for the participants.

Privacy and Confidentiality

Confidentiality was maintained utilizing a number of protective measures. The same number throughout the records identified participants, linking their information. No information about one participant was divulged to another participant for any reason. Confidentiality was maintained by limiting the participant contact to the PI. Audio recordings were identified by participant numbers and kept in locked file cabinets. This data will be kept for a period of

three years and then destroyed in compliance with the policies of the University of Missouri. No photographs or video productions of the participants were taken.

Participants' Rights

The participants' rights were protected with consideration of privacy, anonymity, veracity and freedom from harm. Participants were informed that the study was being done to investigate the experiences of families of children with ASD who lived with and did not live with pet dogs, and was limited to a telephone call to complete the study instruments and interviews. Participants were offered the right to ask questions or suspend completion of the instruments until another mutually agreed upon time, or to discontinue participation in the study, for any reason, if they chose to terminate their enrollment. Participants were assured that their decision would not be shared with the Midwest autism treatment center, or affect their ability to receive services from the Midwest autism treatment center. Benefits were identified for the participants as that of providing information regarding dog ownership for families of children with ASD. A $10 gift card was mailed to parent participants as compensation for their time.

The sample included those who expressed a willingness to participate, and none were denied the ability to participate on any prejudicial basis. I was available to the participating parents at the study telephone number.

Inclusion of Women and Minorities

This study included parent participants and one guardian. Some of the participants were women. No data were available identifying the male to female ratio of caregivers who bring their children for diagnosis and treatment at the Midwest autism treatment center, which provided the data-base of potential

participants. Women are historically identified as the primary caregivers of children, but no data about who serves as the primary caregiver for children with ASD are available, so it was expected that many of the parent participants would be women. Sixty-two female parents enrolled in this study.

It was expected that child participants would consist of approximately 57 Caucasian, 7 African Americans, 3 members of two or more races and 3 Hispanic, based on the U.S. Census Bureau data for the geographic area of the sample collection site. The ratio of boys to girls is five to one among children with ASD ("CDC – Data and Statistics, Autism Spectrum Disorders – NCBDDD, "2012). Based on the planned total sample size 59 males and 11 females were expected. The parents of 67 male and five female children with ASD were enrolled.

Risks and Benefits

Completing the instrument may have caused the child participants distress, since anxiety is a common co-morbidity of ASD. If the child were to become anxious during completion of the instrument, a brief break would have been taken and the parent would have been asked to decide if the child was able to resume participation at that time, or not at all. I may also have chosen to halt participation, if the child was not able to complete the instrument because of perceived unresolved anxiety, temper tantrum or other emotional or behavioral issues. In cases of inconsolable distress, the parent would have been referred to the Midwest autism treatment center staff for assessment of assistance needs or the child's primary care provider. Completing the instruments may have caused distress for the parents. If any parents had verbalized distress or asked to discontinue participation before completion of the instruments, due to distress,

they would have been referred to their primary caregiver for assessment of assistance needs. All parent and child participants completed the instruments, following enrollment, and none expressed distress or desire to stop participation.

The relatively low risk for participants and the potential benefit of participation in the study led to the assumption that the Risk-Benefit Ratio for this study was weighted toward benefits. No participants made contact with me, during or immediately after collection of the data, regarding concerns.

Chapter IV

Results

This chapter is divided into four sections including demographic characteristics of participants and findings from hypothesis testing for each dependent variable. These dependent variables included the social skills of the children with ASD and the their attachment to their pet dogs. The outcome measures included the SSiS-RS scores, which were the Social Skills (SS) and Problem Behavior (PB) scores, along with the CABS scores. The final section includes the qualitative findings with perceptions of dog ownership for parents of children with ASD.

Demographics

Participant demographics. Data were collected from 73 parent participants. Three of these participants were excluded from data analysis. Of those excluded, one parent reported that they had dogs, but the aggressive behavior of the dogs required them to be penned up outside. This parent said the child had no contact with the dogs, but their presence may have contaminated the data reported from this parent. A second parent acknowledged that while they did not have a dog, they kept the dogs of multiple friends in their home, while the friends were away, and this occurred approximately every two months and they had done this for years. This participant was excluded due to the extensive interaction with dogs for this child with ASD inside his home, although the parent did not own a dog. The last participant was excluded since they had owned a dog from the time their child with ASD was born and only recently lost the dog

through death, and were planning to get another soon. No other participants in the no dog group reported the consistent availability of potential contact with dogs, therefore, it was determined that the data from these three participants would be excluded.

Participants included in the analysis totaled 70 parents of children with ASD (Tables 4 and 5). The children with ASD in the 47 families that owned dogs also actively participated. Parents ranged in age from 30-59 years with a mean of 41.94 years. Sixty-one parents were female and nine were male. Fifty-five of the parents had at least some college or technical school education, and 15 of the parents had a high school education or less. The racial and ethnic background of parents included 61 Caucasian, one African American, two Asian, two Hispanic, two Native American and two who identified as "*Other*." Families included from one to nine children with a mean of 2.87. The diagnosis of their children included 28 with Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), 18 with autism, 17 with Asperger's Disorder and seven with ASD.

Table 4: Characteristics of Parents (N=70)

	n	Dog	No Dog	p-value
Marital Status:				X2(1, N = 70) = 1.87, p = .17
Married	50	36	14	
Not married	20	11	9	
Race:				X2(1, N = 70) = 5.35, p = .02*
Caucasian	61	44	17	
Other	9	6	3	
Income:				X2(2, N = 67) = 11.02, p = .004*
< $ 30,000	20	8	12	
≥ $ 30,000 & < $ 90,000	36	30	6	
≥ $ 90,000	11	7	4	

* Significant for p < .05

Table 5: Characteristics of Children (N=70)

	n	Dog	No Dog	p-value
Age (years)	70	M = 13.18 (2.81)	M = 12.15 (3.06)	t(68) = -1.40, p = .08
Sex:	70			X2(1, N = 70) = .40, p = .53
Male	65	43	22	
Female	5	4	1	
# of siblings				X2(1, N = 70) = 1.65, p = .20
0-1	55	39	16	
2-8	15	8	7	
Medication:				X2(1, N = 70) = 4.60, p = .03*
Yes	31	25	6	
No	39	22	17	

*Significant for p < .05

Every child who was offered the opportunity to participate agreed by assent. Ninety-three percent of children in the study were male and there was no statistically significant difference in dog ownership by sex, X2(1, N = 70) = .40, p = .53. However, with this small sample of female children, it was not possible to make any generalizations regarding sex and dog ownership.

Pet demographics. Fifty-seven of the parents reported that they had some type of pet(s) and these pets are identified in Table 6. In the 47 families that had dogs, there were a variety of breeds identified. The most commonly reported breed was a Labrador retriever or a mix of this breed (n = 12), small mixed breed dogs were next (n = 10), and a variety of breeds identified as toy breeds were reported by seven parents. Four parents identified their dog's breed as a terrier, each of three parents said there dog was either a hound breed, a non-sporting

breed or a large mixed breed dog. The remaining dogs were identified as sporting or working breed dogs. Dogs were then classified by size with 22 being small and 25 medium to large size, based on parent description of their dog's size.

Table 6: Types of Pets (n=57)

	Dogs	Cats	Fish	Farm Animals	Rodents	Reptiles	Birds	Arachnids	Rabbits
n	47	36	11	9	5	3	1	1	3

If the family had more than one dog, the parents were instructed to respond to questions based on the dog they perceived their child to be most attached to. All questions for dog-owning participants in this study were related to this dog. This included the age of the child when the dog was acquired (Table 7). Parents were instructed to report the time the child spent interacting with the dog as time in active engagement, rather than just being in the same area together.

Table 7: Child and Dog Demographics (n=47)

	n	Mean	Range
Age of dog	47	4.4 years	0.5-13
Length of time owned dog	47	3.89 years	0.3-13
Age of child when dog acquired	47	9.12 years	0-17
Time child spends interacting with dog	47	1.48 hrs/day	0-6

Hypothesis Testing

Hypothesis testing was conducted utilizing $p < .05$.

Hypothesis 1. Children with ASD, who live in a family with a pet dog, will have greater social skills than those who do not live with a pet dog. There was no

significant difference in the SSiS-RS score for total Social skills (SS) of children who lived with a dog and those who did not live with a dog (Table 8). There was no significant difference in the SSiS-RS score for total Problem Behaviors (PB) of children who lived with and did not live with a dog. An itemization of individual subscale scores for children who lived with and did not live with a dog is found in Table 8. Using a one-tailed two-sample t-test for significance, pooled method, the difference in SS was not statistically significant at $p < .05$; therefore, hypothesis 1 was rejected.

Table 8: Comparison of SSiS-RS Scores Between Children with and without Dogs using a t-test (one-tailed)(N=70)

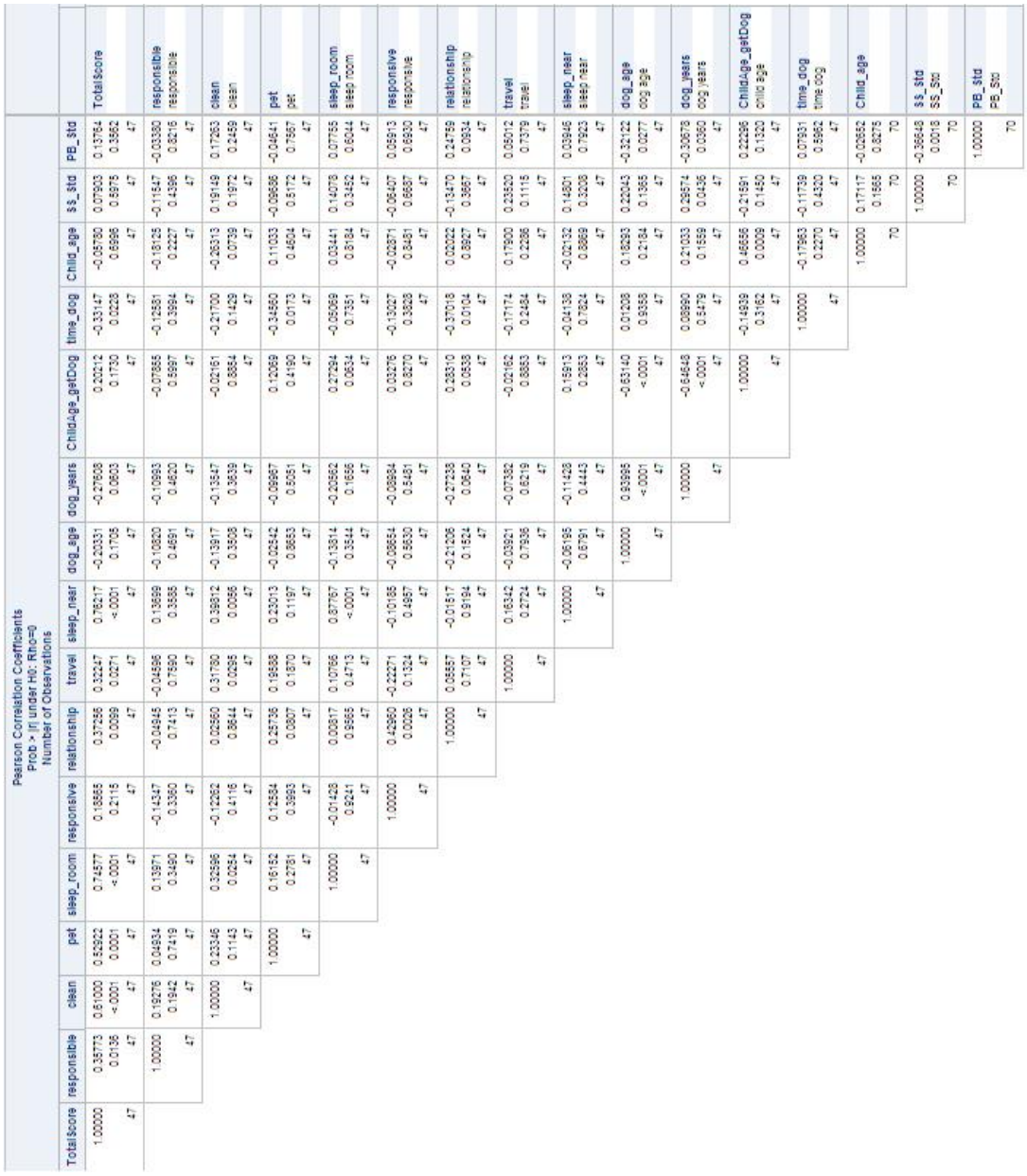
	No Dog (n = 23) M (SD)	Dog (n = 47) M (SD)	t- value	p-value
Total Social Skills	86.35 (15.49)	88.51 (14.42)	-0.58	.28
Subscales:				
Communication	13.04 (3.28)	13.40 (2.98)	-0.46	.32
Cooperation	12.17 (2.59)	12.30 (2.98)	-0.17	.43
Assertion	12.22 (3.13)	13.13 (3.13)	-.1.14	.12
Responsibility	12.09 (3.19)	12.36 (3.23)	-0.34	.37
Empathy	10.30 (4.65)	11.30 (3.44)	-1.01	.16
Engagement	10.70 (3.42)	10.66 (3.65)	0.04	.48
Self-Control	10.00 (4.13)	10.38 (3.71)	-0.39	.35
Total Problem Behaviors	120.70 (13.93)	125.30 (12.73)	-1.38	.09
Subscales:				
Externalizing	11.17 (4.23)	11.94 (4.74)	-0.65	.26
Bullying	2.09 (2.26)	2.28 (2.07)	-0.35	.36
Hyperactivity/Inattention	9.83 (2.93)	10.15 (3.06)	-0.42	.34
Internalizing	10.70 (5.03)	12.26 (4.15)	-1.38	.09
Autism Spectrum	19.09 (6.73)	19.40 (5.65)	-0.21	.42

Note. A higher score equals greater SS and more PB

Examination of correlations for dog ownership. Using Pearson's method, longer ownership of a dog, was significantly and positively correlated with a child's SS, r(45) = .30, p = .04, and significantly and negatively correlated with a child's PB, r(45) = -.31, p = .04, when controlled for child age (Table 9). Age of the dogs was not significantly associated with the children's SS, r(45) = .22, p = .14, but was significantly correlated with fewer PB, r(45) = -32, p = .03.

There was no significant correlation between the age of the children with dogs and the children's SS, $r(45) = .17$, $p = .16$ or their PB, $r(45) = -.03$, $p = .83$. There was no significant association between the age of child when the dog was acquired and their SS, $r(45) = -.22$, $p = .15$ or their PB, $r(45) = .22$, $p = .13$.

Table 9: Pearson Correlation Coefficients Comparing Demographic Variables, CABS, SS, and PB Scores (n=47)



Examination of pet ownership. The categorization of "any pet" was used, rather than dog only, for a one-tailed two-sample t-test comparison of children's SS with and without pets. Children who lived with a pet did not have significantly greater total SS, t(68) = 1.29, p = .10. Children who lived with a pet did have

significantly greater "*assertion,*" which was a subscale item of the SSiS-RS score, t(68) = 1.87, p = .04. Assertion includes the SS of initiating behaviors in social situations. There were no significant associations between any of the other SS/PB subscale items, for children ownership of "any pet" (Table 10).

Table 10: Comparison of SSiS-RS Scores Between Children with and without Pets using a Two-sample t-test (one-tailed) (n=70)

	No Pet (n = 13) M (SD)	Pet (n = 57) M (SD)	t- value	p-value
Total Social Skills	83.08 (14.59)	88.88 (14.64)	1.29	.10
Total Problem Behaviors	122.20 (14.50)	124.10 (13.02)	0.45	.33

Note. A higher score equals greater SS and more PB

Hypothesis 2. Children who are more attached to the family's pet dog will have more social skills than those who are not as attached. Attachment was examined using parent's report of time the children spent interacting with their dogs, and the children's perception of attachment using the CABS. There was no significant correlation between the total CABS score and total SS/PB, or the time the children spent interacting with their dog, and the children's SS/PB (Table 11). Because the differences were not statistically significant, hypothesis 2 was rejected.

Table 11: Pearson's Correlation of Attachment Measures and SSiS-RS Scores (n=47)

	Social Skills r(p-value)	Problem Behaviors r(p-value)
Time interacting with dog	-.12 (.43)	.08 (.60)
Total CABS score	.08 (.60)	.14 (.36)

There was no significant difference between the CABS score and the parent perception of their child as "*attached*" and "*very attached*" to their dog, t(41) = .43, p = .34, based on a one-tailed two sample t-test (Table 12). The rating of "*not very attached*" was excluded from the comparison due to the small number of participants who selected this rating. The parental report of their child's time spent interacting with their dog and the child's CABS scores were significantly correlated, r(45) = -.33, p = .02, indicating strong agreement of parent and child reports of attachment.

Table 12: Descriptive Statistic of CABS by Parent Perception of Child's Attachment (n=47)

	n	Mean	SD	Range
Not very attached	4	25.75	3.11	23-31
Attached	16	24.06	5.31	11-31
Very attached	27	23.37	5.05	12-35

Note: A lower score equals greater attachment on the CABS
(Possible score range on CABS is 8-40)

Examination of attachment. In comparing CABS by dog size, with size categorized in two levels of medium/large or small, children identified a significantly stronger attachment to small dogs, t(45) = 1.92, p = .03. There was a significant correlation between time spent interacting with their dog, and the total CABS score, r(45) = -.33, p = .02. Item scores on the CABS for "*petting*" their dogs, r(45) = -.35, p = .02, and having a "*close relationship*" with their dogs, r(45) = -.37, p = 0.01 were significantly correlated with children's time spent interacting with their dog. Children who were older when they got their dog, had

significantly weaker scores on the CABS item of "*close relationship*" with their dog, $r(45) = .28$, $p = .05$.

Qualitative Findings

The qualitative findings are reported in relation to the four research questions.

Research question 1. How do families of children with ASD make decisions regarding dog ownership?

Dog-owning families. In comprehending the decision-making process of dog ownership for parents of children with ASD, there are considerations that would be representative of families with neurotypical children and those that are unique to families of children with ASD (Table 13). Twenty-four parents in the study cited having grown up with pet dogs and considered them a part of their family. One father (ID # 43) said, "I'm an animal lover and my wife's an animal lover and, um, I just don't know what life would be like without'em (*sic*)," or the repeated phrase of "we've just always had dogs." This positive familiarity was a common theme among current dog owners. Parents with these positive historical experiences expressed a consistent rationale that pet dogs provide particularly beneficial results for all children. Three parents reported their dogs were most closely bonded to them, rather than their child.

Table 13: Reasons for Decision Regarding Dog Ownership (N=70)

	Dog (n = 47)	No Dog (n = 23)
"*Always had a dog*," grew up with dogs	24	0
Parents like/love dogs	18	0
Teach children responsibility	15	0
Good for children	15	0
Children wanted dog	13	0
Companion for children	13	0
Good for children with ASD	12	0
Teach compassion/calm child	9	0
Too much work	0	10
Too much cost	0	7
Child afraid/doesn't like dogs	0	7
Don't want any pets	0	5
Prefer cats	0	4
Allergies	0	3

Parents were also inclined to acquire a dog to aid in providing companionship and as a playmate for their children. Children (n = 13) often played a role in this by asking their parents for a dog. One mother (ID # 279) shared that "For boys, what little kid doesn't need a dog outside to play with …" Many children (n = 15) were expected by the parents to perform the responsibilities of caring, feeding, watering, walking and picking up after their dogs. Although parents (n = 6) reported often being required to provide reminders to their children to complete these tasks, they believed the presence of a pet dog initiated a rationale for their

children to learn responsibility. “It teaches them responsibility…I just think it’s a really important part in a child growing up,” said another mother (ID # 63).

While some parents (N = 22) already owned a dog before their child was diagnosed with ASD, others (N = 25) acquired a dog after having children. Some of these parents (n = 11) considered their child’s diagnosis of ASD and cited desire for the benefits of companionship, stress relief and the opportunity to learn responsibility for their child, while others (n = 8) described a similar desire for these benefits among all their children. Among these parents three made a deliberate effort to select a dog they believed would be a good match for their child with ASD. They cited contemplation of the breed, the size and the temperament with the desire to increase the likelihood that the dog would be accepted by their child; therefore, providing better benefits. One mother described how they deliberately looked for a dog with a different temperament than the dog they previously had owned.

> This particular dog we picked her out because of the breed. This dog is just as sweet as can be. That’s exactly what we wanted. She’s more of a comfort than a circus, like our other dog. She really adds a lot to the house. (ID # 78)

Another mother declared that she was not really an animal person, but decided to get a dog specifically to help her child with ASD.

> I got the dog for my son. I had read some stuff that children with autism or pervasive developmental disorder that don’t show emotion, um (*sic*), a dog would be there for him, be easier for him to talk. That’s why I got the dog. (ID # 107)

This desire for a special kind of companion for their child, because of their child’s diagnosis, was echoed by others, including one mother who said,

> I just thought it would be really good for him. I mean to have a companion … I mean you can stroke a dog and you don't have to tell them all your stuff, but you just feel understood in a nonverbal way. They can sense a lot of things about you. Like if you're sad. (ID # 187)

Another mother (ID # 170) said, "The reason we did get her was because both of our children don't' have many friends and so our dog has definitely been their best friend."

Families without a dog. For parents (n = 23) that decided not to have a dog, only two described having grown up with animals. Four parents said they disliked or were fearful of dogs, and three said they preferred cats. "I'm not a dog person. I've never wanted a dog," explained one mother (ID # 95). While parents (n = 20) stated they believed having a dog could be a positive experience through companionship and learning responsibilities, fifteen said the sensory issues of their child with ASD and/or that child's fear of dogs or allergies were the reasons they did not currently choose to own a dog. One mother (ID # 262) said they briefly tried keeping a puppy when their son was younger, "With his autism and ADHD, it won't work. We had a puppy once and it didn't work." Another parent (ID # 275) said that the reason they did not have a dog was due to her son's issues with aggression. She believed that a dog would not be safe in their home. In other families (n = 20) with a single parent or both parents working outside the home, in addition to the needs of a child with ASD, the additional responsibility of caring for a dog was not desirable. One mother stated,

> I know that my older son wants a dog, but I can't imagine getting him one for a pet. I just cannot imagine having the responsibility of a dog, because they have to be taken out, they have to be fed. I just don't want that responsibility and I don't' know how hard it would

> be to find one that would be good with my other son (her son with ASD). (ID # 120)

For others (n = 3), they acknowledged a desire for their child to have a pet, but due to the care responsibilities of a dog, or their child's fear of dogs they chose other pets. One parent got her child a rabbit and three families had cats. "We're only allowed to have one pet and cats tend to be easier to care for," said a mother (ID # 150). The same mother added,

> He's very attached to the cat. They're buddies. He'll pick him up and carry him around the house… he's like '*come here'* to the cat and he would come over and pick the cat up and give him attention. He helps to take care of the cat. They play together. (ID # 150)

Another mother reported her child liked his rabbit,

> he'll just sit there and pet her. He likes to watch her hop. She's just more docile, more calm, and he likes that. He likes cats for the same reason. They're just kind of their own entity they're not like dogs who come up and want the attention from you. (ID # 95)

The process of decision-making regarding dog ownership is seen in Figure 2. The red colored factors signify burdens, while the green signify benefits. This process is initiated when parents consider dog ownership. The possibilities for parents to consider were whether they liked dogs and believed there would be a benefit to dog ownership and whether the children liked dogs. The time and cost of care, as well as housing situation also played a role in the decision. Parents then described balancing their choices and 13 chose to have no pet. Others chose to have alternative pets with eight of those including cats, one with fish and one with a rabbit. Parents said these pets were less of a burden, and the children were able to have the benefits of a pet.

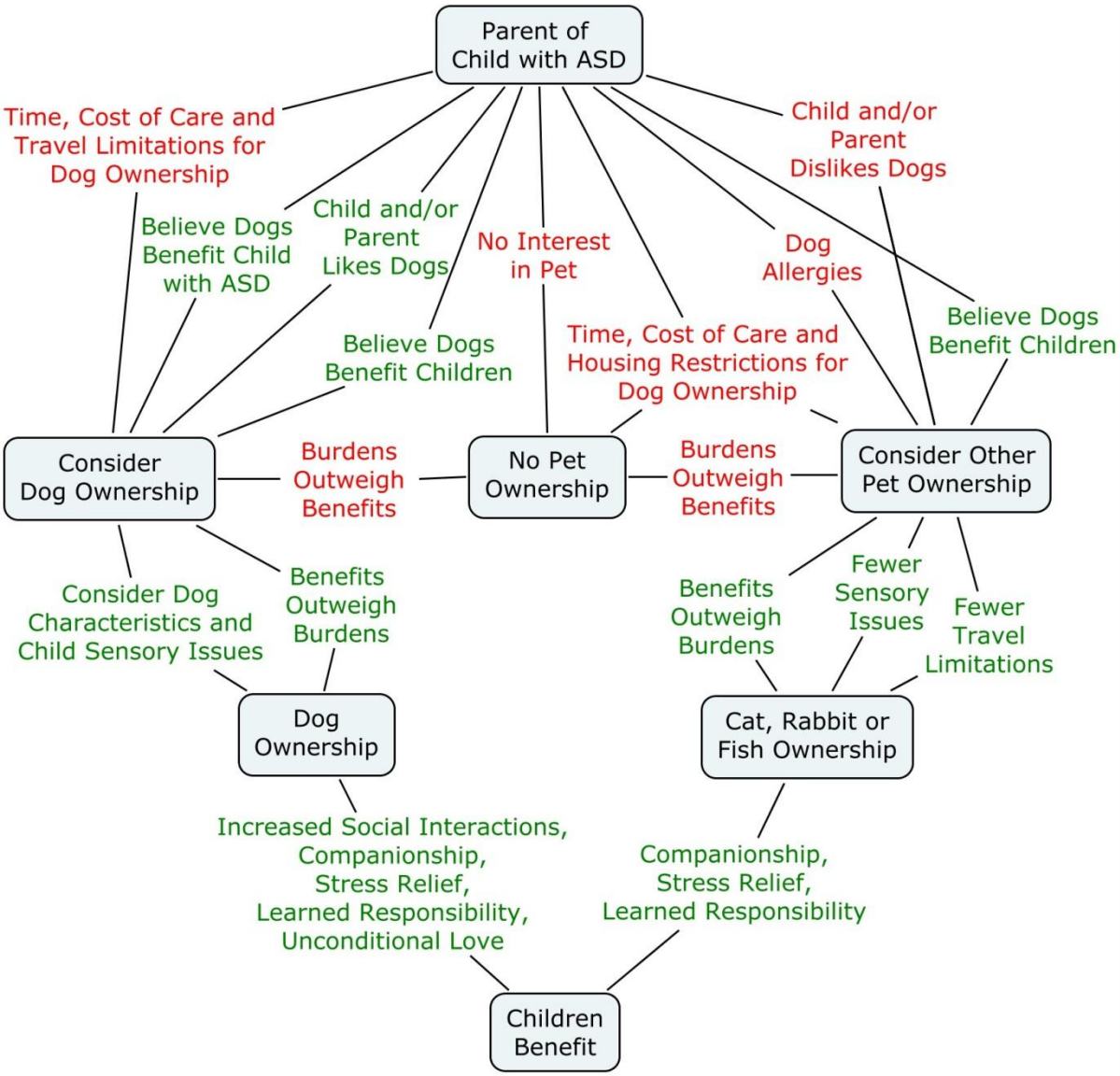


Figure 2: Decision-making Process for Dog Ownership

Research question 2. How do children with ASD interact with their family's pet dog?

Most of the children with ASD in families with dogs enjoyed interacting with their dog in some way, while the activity varied among the children (Table 14). Children liked to play outside, wrestle on the floor, play fetch or have their dog do tricks. One mother described a specific game her son plays with his dog as follows:

> I would say most of it would be parallel play or fetch… John will set up his army men around Buster and Buster is very still until John says 'O.K. Buster,' then Buster will jump up and knock over all the army men, so Buster defeated the army. (ID # 190)

In addition to these more vigorous activities, the children also enjoyed snuggling, holding or just sitting together while watching television or playing on the computer. A mother (ID # 236) said, "a lot of times he'll turn to his dog for comfort so he'll cuddle him cuz [sic] he's small. He's a lap dog." In other cases, there were specific interactions in which the parents observed their dog providing some form of stress relief for their child, such as laying with the child when the child was sick or sad. After the unexpected loss of his dog, one parent searched for another companion for her son. She said,

> It was sad for all of us…he was just really going through some teenage tough stuff and when he found out we were getting another dog, his whole being just changed. He was so excited and so I think when he does have a rough day, he will go and seek out the dog and she will seek him out and that really makes him feel better, just to snuggle with her, just to watch television with her by his side and be warm. He (child with ASD) really likes that. (ID # 78)

Table 14: Children's Interactions with Dogs (N=70)

	Dog (n = 47)	No Dog (n = 23)
Talks to	22	4
Loving/likes	0	16
Dog listens/calms	7	0
Play, wrestle, tricks	44	0
Pets	35	8
Snuggle, sit together, hang out	39	0
Responsible for care, walks	24	0
Sensory problems (jumping, barking, licking)	9	11
Afraid, doesn't like	0	4

In four families the children had difficulty interacting appropriately with the dog and the parent had to intervene at times to remind the child of acceptable behavior when interacting with the dog. In one case the child timed the dog's trips outside. The mother in this case relayed that she did not believe her child allowed the dog enough time to relieve himself before insisting the dog return inside. She said she had to work with her son, since this was part of his responsibility in caring for the dog, so that the boy increased the dog's time outside. Another mother (ID # 63) said, "He doesn't like her at all. He yells at her. He always makes derogatory comments about her." The mother elaborated that their dog was young and had behavior issues such as being destructive to household items, hyperactive and loud. In another case the mother said,

> Occasionally, if he's (child with ASD) really bad (upset or angry), you know then he might yell at his dog and make him go away, cuz [*sic*] he just doesn't want to be touched or anything, but if he's sad

> then he wants to be near him, he wants to cuddle with him. (ID # 236)

In a fourth case the mother described her son's behavior saying,

> Sometimes he's a little over the top with the dogs. He might get up in the dogs face. He'll walk up and try to pry the dog's mouth open. We have to constantly watch him. You know, him not wanting to let the dog eat sometimes. (ID # 255)

These parents recognized the need to provide for the safety of the dog, based on their child's behaviors, and reported monitoring the child and dog's interactions. Since some children with ASD have unpredictable behaviors and tantrums, these behaviors could result in a dangerous situation for the child, if the dog were to have a negative reaction, or potential injury for the dog.

Research Question 3. How do children with ASD who do not live in families that own pet dogs interact with dogs outside their home?

Interactions with dogs outside the home were reported to occur at the homes of relatives, friends and neighbors, for those that did not own dogs (n = 23). Many children (n = 16) with ASD were cited as enjoying these interactions and having affection for dogs. They were said to like to pet and talk to dogs and one mother (ID # 184) said, "He's (child with ASD) good with animals. If we pass someone walking and the person has a dog he would ask for the name or could he pet the dog." Sixty-five percent of the children without dogs were reported to be afraid of dogs or have sensory issues, such as disliking the smell, barking, licking or being jumped on by dogs. Some of these children were reported to be afraid of all dogs and others were comfortable with dogs if they were small and/or calm. Some children preferred other pets and one mother (ID # 239) describes her son's interaction with dogs this way,

> He doesn't like to be jumped on or licked by them. He will definitely shy away from them. He will even hide behind myself or my husband to try to get away from the dog, especially if they bark or try to jump on him. So, anyway. He's fearful. He does like cats a little better. I think he tolerates them because they're independent and they don't generally come up and jump on him a lot. (ID # 239)

Research Question 4. What benefits and burdens to dog ownership are experienced or perceived by families of children with ASD?

Dog-owning families. Dog owning parents describe similar benefits and burdens to dog ownership as parents who decided not to own a dog. Parents with dogs said their children were benefiting through companionship, unconditional love, stress relief, and learning empathy, learning responsibility and having laughter and happiness (Table 15). One mother (ID # 78) said,

> He's (child with ASD) a little bit hyper and he'll cuddle up with her (dog) and she'll fall asleep with him and he'll just instantly kind of calm down. It's really been good for him, really, really, really been good. We couldn't have picked a better dog. (ID # 78)

Another mother (ID # 203) said, "it's (having a dog) a great connector. I mean, it's a jumping off point for the kids to make friends or make conversation, you know, with their peers or even with the adults."

Table 15: Benefits of Dog Ownership (N=70)

	Dog (n = 47)	No Dog (n = 23)
Teaches responsibility	24	15
Companionship	22	20
Calming/stress relief	14	0
Entertainment/happiness	16	0
Unconditional love	12	5
Promotes social interaction	7	0
Teaches empathy/tolerance	7	0
Protection/safety	7	0
None	0	2

Almost half of the parents (n = 21) who owned dogs reported benefits for themselves related to the companionship and entertainment of their pets. One parent (ID # 203), when asked about her child's interaction with their dog said, "he greets him, he pets him, like a normal kid with a dog."

Some of the challenges in owning a pet dog were the financial costs and time for care, in addition to travel limitations (Table 16). One mother described these burdens as follows:

> We have a hard time if we go on a family trip. We have to get a dog sitter, because I'm not going to take her on a family trip. We have to give her medicine so we don't have a flea and tick problem and that gets a little expensive. (ID # 279)

Table 16: Burdens of Dog Ownership (N=70)

	Dog (n = 47)	No Dog (n = 23)
Cost of care	21	9
Time for care	18	20
Travel limitations	16	3
Must be right dog for right family	7	0
None	7	1
Destruction	4	0
Neighborhood, housing restrictions	0	11
Child may hurt dog	0	3
Dog may hurt child	0	2
Child afraid/doesn't like dog	0	2
Must be right dog for right family	0	1

Families without a dog. Parents who did not own a dog reported similar responses to those who owned dogs, when they were asked about potential benefits of dog ownership. They described the possibility of companionship, unconditional love and the opportunity to learn responsibility. However, 19 said that the burdens outweighed the potential benefits. One mother (ID # 247) explained her reasons as follows,

> I am sure there would be benefits for the children, but I don't think it would be a benefit for me…It's sort of work and time and one more thing I have to pick up after. So, um, no, I mean I like dogs, just the time it takes to train them and take care of them. I sort of got [*sic*] my hands full as it is. (ID # 247)

Repeated themes were identified regarding dog ownership, by parents without dogs. These themes included their historical experiences with dogs, and their

child's sensitivities to dogs, and these were named as most influential in their decision regarding dog ownership.

Child comments. Fifteen children shared information at the end of the data collection. Two children told of how their dogs had "peed (*sic*)" in the house and one said that her dog had had fleas but they had treated the dog who was now "better." One child asked why the survey included only dogs and not her cat. When asked which pet she liked better, she said her dog. Another child said his dogs "make me feel relaxed when I'm around them." Another said her dog is the "best dog ever and a great listener." The preference for his rabbit was voiced by one child (ID # 63) who said that he did not like the dog the family had now, because she was noisy. He did say he would recommend a pet dog to other families with children since he thinks a dog like his would provide protection for the family. This same child has a pet rabbit that he says is really playful and loving, and that he would "highly recommend a pet rabbit to other children, because you can tell them things."

Chapter V

Discussion

This chapter is divided into sections including: a brief summary of the study, a discussion of the findings based on the childhood pet attachment model (Figure 1), limitations of the study and recommendations for future research.

Summary

The study design was a mixed-methods cross sectional, descriptive investigation of the social skills of children with and without pet dogs. Data were collected through the use of a telephone survey. Parent completed the SSiS-RS and Demographic Questionnaire. They also responded to open-ended questions regarding their child's interaction with dogs, their decision-making process regarding dog ownership and the benefits and barriers of dog ownership. Children who lived with pet dogs also participated by completing the CABS. The results demonstrated a trend toward increased social skills for children with ASD who lived with pet dogs, however, no statistically significant difference between the groups was found.

Forty-four parents (92%) described their child with ASD as attached to their dog and the children reported a strong bond to their dog, however, there was no statistically significant difference between the social skills of children with ASD who were attached to their dogs and those who were not attached. The longer children lived with their dog, the greater their total social skills and the fewer their total problem behaviors. The strongest bonds of attachment were with small dogs. The decision-making process for dog and pet ownership for parents of

children with ASD includes parent preference for dog ownership and the benefit-burden considerations for each family. For parents that decided to own a dog, seven described how selecting a dog with characteristics that were a good match for their child would increase the likelihood of a stronger attachment between their child and dog.

Benefits of dog ownership cited by parents were companionship, unconditional love, stress relief and the opportunity for their child with ASD to learn responsibility. Burdens of dog ownership were described as related to cost and time to care for a dog, travel limitations, and restrictions based on the housing arrangements of the families. The findings represent important information for parents of children with ASD.

Discussion of Dog Ownership Findings

In the present study, no attempt was made to assign the sample participants into groups of dog owners and non-dog owners, in order to gather information on the prevalence and characteristics of dog ownership among children with ASD. Demographic descriptions of the characteristics of dog-owning families in the population of families with children who have ASD are limited to one preliminary study, which found that 27% of families owned dogs. In this study 67% of families owned dogs, and this is greater than the reported incidence of dog ownership of 46% in the general population of the United States ("Industry Statistics & Trends," 2011). This finding may indicate that parents of children with ASD decide to own dogs for specific reasons. Examining the interactions of children with dogs in these families provides insight, and may aid in the understanding of the reasons for this prevalence.

Attachment theory provides a valuable approach to interpret the study findings, through Melson's (1990) four descriptive areas of relationships between children and their pets. The identification of interaction time in association with stronger bonding has been identified for neurotypical adults, and this same association was found in the present study. The more time children with ASD spent interacting with their dogs, the stronger their attachment and perceived relationship to their dog. Almost half of the parents with dogs described their dog as being a companion for their child, and petting their dog was strongly correlated with the time the children spent with their dogs. These similar findings among children with ASD indicates that they may spend time with their dogs for similar reasons that neurotypical individuals choose to spend time with their dogs.

The second area of attachment is affect toward pet. Children with ASD have increased rates of anxiety and mood disorders in comparison to same age neurotpical children (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000), therefore, an examination of their affect toward their pet dogs is important in this special population. In the present study, most parents (n = 43) described their children as having a positive relationship and attitude toward their pet dogs. In the four cases where parents rated their children as "*not very attached*" to their dogs, two of the dogs were identified as being very active by the parents. Parents cited the dog's behavior as the reason their child did not like the dog. One child had minimal interest in the dog, preferring to play video games. In the other case the child liked the dog, but the dog was described by both the parent and child as closely bonded to the parent. In one study, 98% of neurotypical children

described their feelings about their pets by saying “they love their pets very much” (p. 195, Triebenbacher, 1998). While most children in the present study were found to have positive feelings about their pet dogs, sensory issues may play a role in these children’s (n = 9) affect toward their dogs. These same sensory issues were cited by parents not owning dogs, however, it was unclear whether the severity of these sensitivities may have been the primary reason for choosing to not own a dog.

The third consideration of attachment concerns children’s ideas about their pets. Neurotypical children ages seven to eight years of age demonstrated a reliable ability to differentiate between the types of social support that a pet would be capable of offering in comparison with a human (McNicholas & Collis, 2001). In the present study, children rated their dogs as highly “*responsive*” to them in the respective CABS item. Several individual children, following completion of the CABS, said their dogs were “like a best friend” and 14 of the parents relayed that their dog acted as a source of stress relief for their children. Based on these findings, pet dogs may be able to provide social support for children with ASD.

The final area of attachment relates to a child’s behavior toward their pet. In the neurotypical population 52-70% of children reported spending most of their time with their pets actively engaging in play, and 88% indicated their pets liked to be shown affection in different ways, such as hugging and petting (Triebenbacher, 1998). In the present study, 94% of parents of children with dogs identified their child as engaging in active play with their pet dog. There was a positive and significant correlation between children who spent time with their

dogs and those who often petted or held their dogs. Five parents also remarked that when their child was interacting with their dog, it was in the form of "parallel play" or having their dog sit next to them, rather than in their lap. A unique finding was that 19% of the parents who owned dogs cited sensory issues, related to their dog's behavior, which was irritating to their child. These behaviors included jumping on the child, licking the child or being too noisy. One case was reported where a child living with a dog preferred to interact with his rabbit, describing his dog as too loud and active. For children with ASD, the widely known presence of extreme sensitivities to sounds, smells and some visual stimuli, may be important to families who decide to own dogs.

These sensory concerns of children during encounters with dogs outside their home were identified by 23% of parents in families that did not own dogs. Among families without dogs, many (n = 10) had other pets. One of those children was described by his parent as having a strong attachment to his rabbit. Size of dog may play a role in sensory issues and attachment for children with ASD, since children identified stronger bonds to small dogs.

It should also be noted that in three cases the children were reported to exhibit behavior requiring the intervention of the parents for the safety of the dog. No parents reported that their dog had been injured by their child, however, these parents believed their children's interactions with their dogs required monitoring. In cases where the children were described as having emotional outbursts or having a "bad day," parents (n = 7) reported the children avoided their dog and the dogs avoided the children. While no children in this study were reported to have injured their dogs, there may be potential for this problem. A

study of 843 children with ASD of varying levels of severity found that 52% had emotional outbursts and 22% had exhibited aggression toward others, when measured by occurrence of three times per week or more (Maskey, Warnell, Parr, Le Couteur, & McConachie, 2012). The consideration of their child's sensory issues, individual PB, and temperament of the dog may play an important role in the benefits of dog ownership for these children, and for the safety of the dogs.

Due to the frequency of dog bites for infants and very young children, it is recommended that families consider waiting until children are older than age four, before acquiring a family pet dog (American Veterinary Medical Association, 2012). It is advisable for parents of children to consult a veterinarian regarding the selection of a pet dog and this may be more important for families of children with ASD, to increase the likelihood of obtaining a dog with the calm temperament, which parents cited as better tolerated by their children.

In the present study a trend was identified associating increased SS and increased PB for children with ASD who lived with dogs, although none of the differences were significant. No other studies have exclusively investigated pet dog ownership, however one study investigated the SS differences among children with ASD and pet ownership found greater SS in the area of pro-social behaviors for children who acquired a dog after the age of five years, when compared to an age matched control group of children with ASD who had never lived with a pet (Grandgeorge et al., 2012). The present study found that children with ASD who lived with pets, had greater SS in "*assertion*," which is identified as a pro-social behavior and this association approached significance. It may be that

children in the present study were receiving benefits from other pets or the presence of multiple pets.

In a study of children (N = 12) with ASD, utilizing trained dogs for AAT, an increase in SS and decrease in PB was found following the introduction of a dog in a therapy session (Redefer & Goodman, 1989). It may be that children who live with dogs that are well-behaved have better SS. The present study found that the longer a family owned a dog the greater the SS and fewer the related PB for their children, after controlling for age of the child. This may have been related to other findings, such as attachment. The longer a family owned a dog, the stronger the child with ASD perceived their relationship to the dog. Children with ASD often struggle with, and are resistant to changes in their environment. In the present study, parents rated their children as "*often*" having difficulty with change in their routines (N = 70, M = 2.9, Range 1-4). Since there was no correlation between attachment and the age of the dog, or the child's age when the dog came into the family, this association may be related to the child's development of a relationship to their dog over time and becoming accustomed to having their dog in the home.

Parents of neurotypical children cite an opportunity teach their child responsibility and a child's desire to have a pet, as reasons for pet ownership (Fifield & Forsyth, 1999). Parents of children with ASD describe similar reasons for their decision to own a dog. In addition to this, parents in the present study also cited their own affection for dogs, companionship for their child and hope that a dog would be good for their child specifically because of the child's ASD, through companionship and decreased stress. They identified their children's

specific need for companionship and unconditional love related to their social difficulties with others. This included having few friends (n = 2), difficulty with social initiation (n = 7), and stress (n = 14).

In the present study, the characteristics of a dog and the parent's personal experience with dog ownership also played a role in their decision-making. Parents who owned dogs that were small (n = 22) and had a calm temperament, described their child as having fewer sensory issues related to the dog and children reported a stronger attachment those dogs. For parents who had positive past experiences regarding dog ownership, acquiring a pet dog for their child with ASD may provide benefits of comfort for the parent through their direct interaction with the dog, and through the perceived benefits they believe their child with ASD will experience. This ability to see their child like other children may also be a benefit for parents. For these reasons, the benefits may outweigh any burdens to dog ownership in those families who choose to own a pet dog.

A child's fear of do gs or sensory issues were reasons some parents cited for not owning a dog, along with costs and lack of time to care for a dog. In one study, when children with ASD were presented with an unfamiliar animal, they were found to be just as likely to approach the animal as neurotypical children, however, only 37% of children with ASD touched the animal, compared to 74% of the neurotypical children (Grandgeorge, Deleau, Lemonnier, Tordjman, & Ausberger, 2012). Children in the present study who did not live with a dog had similar responses, showing interest, but reported by parents to approach unfamiliar dogs with caution.

Parents (n = 3) who had negative personal experiences with dog ownership, or believed the burdens of a pet dog ownership outweighed any potential perceived benefits, chose not to own dogs. In one study of families with neurotyical children, allergies, lifestyle restrictions and responsibilities of care were the most common reasons described for not owning a pet (Fifield & Forsyth, 1999). Given the additional stress of parenting a child with special needs, identifying benefits from pets with fewer burdens or characteristics of dogs, which provide better benefits for children with ASD may benefit these families.

Limitations

The present study had several limitations. During recruitment, the PI was unable to reach 187 potential participants from the data-base. One hundred twenty-six of the phone numbers identified with children with ASD in the data-base, were no longer in service or had been assigned to a new individual. This may have been due to a lack of follow-up for treatment and care for the child with ASD, from the diagnostic and treatment center providing the data-base. Some children did not return after their initial diagnostic evaluation and no effort was made to update contact information, unless a child returned. Two messages were left at 61 of the phone numbers listed, upon no answer, and the potential participants never returned a call to the PI. It is unclear whether these children were no longer receiving services at this diagnostic and treatment center due to receiving services elsewhere or because their child no longer needed additional services. The children who were enrolled may have been different in level of severity of ASD symptoms.

Twenty-four potential participants, who were reached, refused participation. Of those who refused participation, the severity of their child's ASD may have played

a role in their refusal, if they thought their child would not be able to respond using the telephone. These parents may also have refused if they did not own a dog, and this may have changed the identified prevalence, in the present study. If parents did not return the potential enrollment telephone call because they did not own a dog, this could have falsely elevated the identified prevalence in the present study. It may be that parents who did not desire to take the time to participate in research have had negative experiences with dog ownership. Given the additionally demands of parenting a child with special needs, some parents may not have had time to participate in research, yet may have had beneficial experiences with dog ownership. There may have been characteristics or experiences of dog ownership among those who did not respond that were different than those who did.

Although dog ownership is common in the United States, not all individuals want to have a pet dog or enjoy interacting with dogs. It is unclear from this study that families with a child who has ASD are less likely to own a dog. In fact, a selection bias exists in the data due to the large number of parent-child dyads included in the study who owned dogs. The original intention of the PI was to have equal numbers of dog owners and non-dog owners. However, the target population was reflective of the general population of families who own dogs. The larger share of available participants owned dogs. Therefore, findings from the study cannot readily be generalized to parents and children with ASD who do not own dogs. The high prevalence of dog and pet ownership among families with children limit the availability of potential child participants who have never lived with any pet. In addition to this, the high prevalence of pet ownership among

families of children limits the ability to isolate the findings to only dogs, due the potential confounding effect of pet ownership.

Parent perceptions may have influenced the study. Four of the parents in the present study acquired a pet dog for themselves, and 18 said they "*liked*" or "*loved*" dogs. A previous study identified the mother of the household as the family member most wanting a pet (Albert & Bulcroft, 1988). Given the high prevalence of female parents in the present study (n = 61), they may have been more inclined to provide favorable descriptions of benefits, than if more fathers had responded, since six of the mothers in the present study describe their dog as most strongly attached to them.

A possible limitation was the heterogeneity of ASD among the child participants, including a wide range of severity of symptoms and behavioral problems. Due to the novelty of this investigation, it was necessary to cast a broad net to gain as much information as possible within this specialty population. The sample excluded children with a known IQ of less than 70 and those younger than the age of eight years. This was done to increase the likelihood that the participant children would be able to respond to the CABS, however, it limited the inclusion of children with potential intellectual disability, younger children and/or those who were non-verbal. Most children in this study were able to easily complete the CABS, and responded without hesitation in talking with the PI using the telephone. No known studies have been identified surveying children with ASD using the telephone. The strong correlation between the children's self-described attachment to their dogs, and the time their parents reported they spent interacting with their dogs (n = 47, r = -.331, p = .023) indicates these

children may have been able to identify similar attachment concepts to those of their parents.

Further studies comparing the same sample using telephone and in person completion of the CABS could be useful in the ability to identify the reliability of using the telephone for surveying children with ASD. The use of the telephone also limited the ability to survey children who were younger and non-verbal. These population groups may have benefited from a pet dog.

Strengths

Several strengths of this study were also present. No investigation has examined perceptions of pet dog ownership for children with ASD using a pet bonding scale completed by this special population of children. Given the SS deficits of children with ASD, including their perceptions of dog ownership provided a unique opportunity to gain insight into how children in this population perceived their relationship with their pet dog. High functioning children with ASD (72.2%), when compared to neurotypical children (94.1%), have been identified as having a similar understanding of experiencing loneliness while in the presence of peers (Bauminger, Solomon, & Rogers, 2010b). Forty-one percent of neurotypical children school aged children report having a best friend, compared to only 27% of children with ASD (Sigman & Ruskin, 1999). Additional measures of loneliness in comparison to bonding to their pet may provide information regarding the ability of pet dogs to provide companionship for these children.

Implications

The present study demonstrated that there were increased SS and PB in children with ASD who live with pet dogs. Attachment was associated with these clinical findings, and longer ownership of pet dogs was associated with increased SS and decreased PB. It may be that familiarity with their pet dog over time played a role in the association with between the presence of a dog and the child's SS and PB. Children with ASD, when compared with their neurotypical peers, have deficits in behavioral flexibility, having negative reactions to any change in their environments (Green et al., 2007). Given the negative sensory reactions described for some children that lived with dogs, it may be that familiarity was developed over time, or dogs with certain characteristics are more beneficial than others.

The common identification of sensory issues among children who lived with dogs indicates that some dogs may be more beneficial than others. Small dogs with a calm temperament may be indicated for some children with these sensitivities; however, parents will need to consider any PB that their child may have that could put a small dog's safety in jeopardy. Further investigations of the characteristics of dogs, compared with attachment, SS and PB may provide information to aid parents who choose to acquire a pet dog for their child.

Parents who owned and did not own dogs identified benefits of dog ownership, however, the burdens of dog ownership for some families were greater than the benefits. Investigations exploring the potential benefits of other pets may provide information for parents on whether or not children may have benefits from these pets, with the burden of dog ownership.

This study also demonstrated that some children with ASD may be capable of reliably reporting their attachment to their dog. Further studies to identify pet attachment instruments for use in this special population may be indicated for those children with lower functioning ASD and those who are non-verbal, to identify their reporting capabilities. The use of pet attachment scales utilizing pictures may be useful in identifying whether these groups of children are able to identify any attachment with their pets.

Bibliography

Ainsworth, M. D. (1989). Attachments beyond infancy. *The American psychologist*, *44*(4), 709–716.

Albert, A., & Bulcroft, K. (1988). Pets, families, and the life course. *Journal of Marriage and Family*, *50*(2), 543–552. doi:10.2307/352019

Allen, K., Blascovich, J., & Mendes, W. B. (2002). Cardiovascular reactivity and the presence of pets, friends, and spouses: the truth about cats and dogs. *Psychosomatic Medicine*, *64*(5), 727–739.

American Psychiatric Association. (2000). DSM-IV-TR.

American Psychiatric Association. (2012). Proposed Revision | APA DSM-5. Retrieved from http://www.dsm5.org/proposedrevisions/pages/proposedrevision.aspx?rid=94#

American Veterinary Medical Association. (2012). Dog bite prevention. Retrieved from https://ebusiness.avma.org/EBusiness50/ProductCatalog/product.aspx?ID=110

APA DSM-5 | A 09 Autism Spectrum Disorder. (2012). *American Psychiatric Association DSM-5 Development*. Retrieved from http://www.dsm5.org/ProposedRevision/Pages/proposedrevision.aspx?rid=94

Baker-Ericzn, M. J., Brookman-Frazee, L., & Stahmer, A. (2005). Stress levels and adaptability in parents of toddlers with and without autism spectrum disorders. *Research and Practice for Persons with Severe Disabilities*, *30*(4), 194–204. doi:10.2511/rpsd.30.4.194

Bar-On, R., & Cohen, S. (1995). *Mindblindness: As essay on autism and theory of mind*. Wiley Online Library. Retrieved from http://onlinelibrary.wiley.com.proxy.mul.missouri.edu/doi/10.1111/j.1469-8749.1995.tb11975.x/abstract

Bauminger, N., Solomon, M., & Rogers, S. (2010a). Predicting friendship quality in autism spectrum disorders and typical development. *Journal of Autism and Developmental Disorders*, *40*(6), 751–761. doi:10.1007/s10803-009-0928-8

Beck, L., & Madresh, E. A. (2008). Romantic partners and four-legged friends: An extension of attachment theory to relationships with pets. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *21*(1), 43–56. doi:10.2752/089279308X274056

Bowlby, J. (1961). Processes of mourning. *International Journal of Psycho-Analysis*, *42*, 317–340.

Bowlby, J. (1977). The making and breaking of affectional bonds. I. Aetiology and psychopathology in the light of attachment theory. An expanded version of the Fiftieth Maudsley Lecture, delivered before the Royal College of Psychiatrists, 19 November 1976. *The British Journal of Psychiatry*, *130*(3), 201–210. doi:10.1192/bjp.130.3.201

Bradley, E., Summers, J., Wood, H., & Bryson, S. (2004). Comparing rates of psychiatric and behavior disorders in adolescents and young adults with severe intellectual disability with and without autism. *Journal of Autism and Developmental Disorders*, *34*(2), 151–161. doi:10.1023/B:JADD.0000022606.97580.19

Bryant, B. K. (1990). The richness of the child-pet relationship: A consideration of both benefits and costs of pets to children. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *3*(4), 253–261.

Burrows, K. E., Adams, C. L., & Millman, S. T. (2008). Factors affecting behavior and welfare of service dogs for children with autism spectrum disorder. *Journal of Applied Animal Welfare Science*, *11*(1), 42–62. doi:10.1080/10888700701555550

Burrows, K. E., Adams, C. L., & Spiers, J. (2008). Sentinels of safety: Service dogs ensure safety and enhance freedom and well-being for families with autistic children. *Qualitative Health Research*, *18*(12), 1642–1649. doi:10.1177/1049732308327088

CDC - Data and Statistics, Autism Spectrum Disorders - NCBDDD. (2012). Retrieved from http://www.cdc.gov/ncbddd/autism/data.html

Chamberlain, B., Kasari, C., & Rotheram-Fuller, E. (2007). Involvement or isolation? The social networks of children with autism in regular classrooms. *Journal of Autism and Developmental Disorders*, *37*(2), 230–242. doi:10.1007/s10803-006-0164-4

Cohen, D., Plaza, M., Thompson, C., Chauvin, D., Hambourg, N., Lanthier, O., Mazet, P., Flament, M. (2001). Word identification in adults with mild mental retardation: Does IQ influence reading achievement? *Brain and Cognition*, *46*(1), 69–73.

Cohen, S. P. (2002). Can pets function as family members? *Western Journal of Nursing Research*, *24*(6), 621 –638. doi:10.1177/019394502320555386

Constantino, J. N., Davis, S. A., Todd, R. D., Schindler, M. K., Gross, M. M., Brophy, S. L., Metzger, L. M., Shoushtari, C.S., Splinter, R., & Reich, W. (2003). Validation of a brief quantitative measure of autistic traits: comparison of the social responsiveness scale with the autism diagnostic interview-revised. *Journal of Autism and Developmental Disorders*, *33*(4), 427–433.

Corbett, B., Schupp, C., Simon, D., Ryan, N., & Mendoza, S. (2010). Elevated cortisol during play is associated with age and social engagement in children with autism. *Molecular Autism*, *1*(1), 13. doi:10.1186/2040-2392-1-13

Corbett, B.A., Schupp, C.W., Simon, D., Ryan, N. Mendoza, S. (2010, September). Elevated cortisol during play is associated with age and social engagement in children with autism. *Molecular Autism*. Retrieved from http://www.molecularautism.com/content/1/1/13

Daly, B., & Morton, L. L. (2006). An investigation of human animal interactions and empathy as related to pet preference, ownership, attachment, and attitudes in children. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *19*(2), 113–127.

Davis, B. W., Nattrass, K., O'Brien, S., Patronek, G., & MacCollin, M. (2004). Assistance dog placement in the pediatric population: Benefits, risks, and recommendations for future application. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *17*(2), 130–145. doi:10.2752/089279304786991765

Davis, N. O., & Carter, A. S. (2008). Parenting stress in mothers and fathers of toddlers with autism spectrum disorders: Associations with child characteristics. *Journal of Autism and Developmental Disorders*, *38*(7), 1278–1291. doi:10.1007/s10803-007-0512-z

DeLoache, J.S., Pickard, M.B., & LoBue, V. (2011). *How Very Young Children Think About Animals. In S. McCune, S.J.A. Griffin, & V. Maholmes (Eds.), How animals affect us: Examining the influences of human-animal interaction on child development and human health, (pp. 85-99).* Washington, DC: American Psychological Association.

Eaves, L., & Ho, H. (2008). Young adult outcome of autism spectrum disorders. *Journal of Autism and Developmental Disorders*, *38*(4), 739–747. doi:10.1007/s10803-007-0441-x

Endenburg, N. (1995). The attachment of people to companion animals. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *8*(2), 83–89. doi:10.2752/089279395787156446

Endenburg, N., & van Lith, H. A. (2011). The influence of animals on the development of children. *The Veterinary Journal*, *190*(2), 208–214. doi:10.1016/j.tvjl.2010.11.020

Esteves, S. W., & Stokes, T. (2008). Social effects of a dog's presence on children with disabilities. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *21*(1), 5–15. doi:10.2752/089279308X274029

Fifield, S. J., & Forsyth, D. K. (1999). A pet for the children: Factors related to family pet ownership. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *12*(1), 24–32. doi:10.2752/089279399787000426

Fine, A. H. (2010). Handbook on animal-assisted therapy theoretical foundations and guidelines for practice. Retrieved from http://www.sciencedirect.com/science/book/9780123814531

Friedmann, E., & Thomas, S. A. (1995). Pet ownership, social support, and one-year survival after acute myocardial infarction in the Cardiac Arrhythmia Suppression Trial (CAST). *The American Journal of Cardiology*, *76*(17), 1213–1217. doi:10.1016/S0002-9149(99)80343-9

Goodson, J.L. (2005). The vertebrate social behavior network: Evolutionary themes and variations, *48*, 11–22.

Grandgeorge, M., Tordjman, S., Lazartigues, A., Lemonnier, E., Deleau, M., & Hausberger, M. (2012). Does pet arrival trigger prosocial behaviors in individuals with autism? *PLoS ONE*, *7*(8), e41739. doi:10.1371/journal.pone.0041739

Grandgeorge, M., Deleau, M. Lemonnier, E. Tordjman, S. & ausberger, M., M. (2012). Children with autism encounter an unfamiliar pet: Application of the stange animal situation test. *Interaction Studies*, *13*(2), 165–188.

Green, V. A., Sigafoos, J., O'Reilly, M., Pituch, K. A., Didden, R., Lancioni, G. E., & Singh, N. N. (2007). Behavioral flexibility in individuals with autism: Theory, assessment, and intervention. *Autism research advances*, 63–77.

Greenspan, S., & Shoultz, B. (1981). Why mentally retarded adults lose their jobs: Social competence as a factor in work adjustment. *Applied Research in Mental Retardation*, *2*(1), 23–38. doi:10.1016/0270-3092(81)90004-7

Gresham, F. M., Elliott, S. N., Cook, C. R., Vance, M. J., & Kettler, R. (2010). Cross-informant agreement for ratings for social skill and problem behavior ratings: An investigation of the Social Skills Improvement System—Rating Scales. *Psychological Assessment*, *22*(1), 157–166. doi:10.1037/a0018124

Gresham, F. M., Elliott, S. N., Vance, M. J., & Cook, C. R. (2011). Comparability of the Social Skills Rating System to the Social Skills Improvement System: Content and psychometric comparisons across elementary and secondary age levels. *School Psychology Quarterly*, *26*(1), 27–44. doi:10.1037/a0022662

Gresham, F.M., & Elliott, S.N. (2008). Social skills improvement system: Rating scales. Bloomington, MN.

Hagopian, L. P., Kuhn, D. E., & Strother, G. E. (2009). Targeting social skills deficits in an adolescent with pervasive developmental disorder. (R. Van Houten, Ed.) *Journal of Applied Behavior Analysis*, *42*(4), 907–911. doi:10.1901/jaba.2009.42-907

Headey, B. (1999). Health benefits and health cost savings due to pets: preliminary estimates from an Australian national survey. *Social Indicators Research*, *47*(2), 233–243.

Headey, Bruce, & Grabka, M. M. (2006). Pets and human health in Germany and Australia: National longitudinal results. *Social Indicators Research*, *80*(2), 297–311. doi:10.1007/s11205-005-5072-z

Huang, W., & Cuvo, A. J. (1997). Social skills training for adults with mental retardation in job-related settings. *Behavior Modification*, *21*(1), 3–44. doi:10.1177/01454455970211001

Industry Statistics & Trends. (2011, 2012). Retrieved from http://www.americanpetproducts.org/press_industrytrends.asp

Ingersoll, B., Schreibman, L., & Stahmer, A. (2001). Brief report: Differential treatment outcomes for children with autistic spectrum disorder based on level of peer social avoidance. *Journal of Autism and Developmental Disorders*, *31*(3), 343–349.

Johnson, R.A,, Mazurek, M. & Carlisle, G.K.M. (2012). Exploring potential benefits of human animal interaction for families of children with autism spectrum disorder. Manuscript submitted for publication.

Julius, H., Beetz, A., Kotrschal, K., Turner, D. & Uvnäs-Moberg, K. (in-press). *Attachment to Pets: An Integrative Vie of Human-Animal Relationships with Implications for Therapuetic Practice*. Göttingen, Germany: Hogrefe Publishing.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous child*, *2*(3), 217–250.

Kim, J. A., Szatmari, P., Bryson, S. E., Streiner, D. L., & Wilson, F. J. (2000). The prevalence of anxiety and mood problems among children with autism and asperger syndrome. *Autism*, *4*(2), 117–132. doi:10.1177/1362361300004002002

Koning, C., Magill-Evans, J., Volden, J., & Dick, B. (2011). Efficacy of cognitive behavior therapy-based social skills intervention for school-aged boys with autism spectrum disorders. *Research in Autism Spectrum Disorders*, (0). doi:10.1016/j.rasd.2011.07.011

Kurdek, L. A. (2008). Pet dogs as attachment figures. *Journal of Social and Personal Relationships*, *25*(2), 247–266. doi:10.1177/0265407507087958

Leach, D., & LaRocque, M. (2011). Increasing social reciprocity in young children with autism. *Intervention in School and Clinic*, *46*(3), 150–156. doi:10.1177/1053451209349531

Lee, L.-C., Harrington, R., Louie, B., & Newschaffer, C. (2008). Children with autism: quality of life and parental concerns. *Journal of Autism and Developmental Disorders*, *38*(6), 1147–1160. doi:10.1007/s10803-007-0491-0

Leekam, S. R., Prior, M. R., & Uljarevic, M. (2011). Restricted and repetitive behaviors in autism spectrum disorders: A review of research in the last decade. *Psychological Bulletin*, *137*(4), 562–593. doi:10.1037/a0023341

Levinson, Boris M. (1969). *Pet-oriented child psychotherapy*. Thomas,

Springfield, Ill.

Loftin, R., Odom, S., & Lantz, J. (2008). Social interaction and repetitive motor behaviors. *Journal of Autism and Developmental Disorders*, *38*(6), 1124–1135. doi:10.1007/s10803-007-0499-5

Lytle, R., & Todd, T. (2009). Stress and the student with autism spectrum disorders autism spectrum disorders strategies for stress reduction and enhanced learning. *Teaching Exceptional Children*, *41*(4). Retrieved from http://cec.metapress.com/content/21313368P4Q94416

Mader, B., Hart, L. A., & Bergin, B. (1989). Social acknowledgments for children with disabilities: Effects of service dogs. *Child Development*, *60*(6), 1529–1534. doi:10.1111/1467-8624.ep9772546

Martin, F., & Farnum, J. (2002). Animal-assisted therapy for children with pervasive developmental disorders. *Western Journal of Nursing Research*, *24*(6), 657–670. doi:10.1177/019394502320555403

Maskey, M., Warnell, F., Parr, J., Le Couteur, A., & McConachie, H. (2012). Emotional and behavioral problems in children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*, 1–9. doi:10.1007/s10803-012-1622-9

Matson, J. L., Hess, J. A., & Mahan, S. (2012). Moderating effects of challenging behaviors and communication deficits on social skills in children diagnosed with an autism spectrum disorder. *Research in Autism Spectrum Disorders*, *7*(1), 23–28.

Matson, J. L., & Shoemaker, M. (2009). Intellectual disability and its relationship to autism spectrum disorders. *Research in Developmental Disabilities*, *30*(6), 1107–1114. doi:10.1016/j.ridd.2009.06.003

McGovern, C. W., & Sigman, M. (2005). Continuity and change from early childhood to adolescence in autism. *Journal of Child Psychology and Psychiatry*, *46*(4), 401–408. doi:10.1111/j.1469-7610.2004.00361.x

McNicholas, J., & Collis, G. M. (2001). Children's representations of pets in their social networks. *Child: Care, Health and Development*, *27*(3), 279–294. doi:10.1046/j.1365-2214.2001.00202.x

McNicholas, June, & Collis, G. M. (2000). Dogs as catalysts for social interactions: Robustness of the effect. *British Journal of Psychology*, *91*(1), 61–70. doi:10.1348/000712600161673

Melson, G. F. (1990). Studying children's attachment to their pets: A conceptual and methodological review. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *4*(2), 91–99.

Melson, G. F. (2001). *Why the wild things are : animals in the lives of children*. Cambridge, Mass., Harvard Univ. Press.

Melson, Gail F. & Swarz, R., G. F. (1994). Pets as social support for families of young children. *Annual Meeting of the Delta Society*. New York.

Messent, P. R. (1983). Social facilitation of contact with other people by pet dogs. *New perspectives on our lives with companion animals*, 37–46.

Mundy, P. (1995). Joint attention and social-emotional approach behavior in children with autism. *Development and Psychopathology*, *7*, 63–63.

Mundy, Peter, & Crowson, M. (1997). Joint attention and early social communication: implications for research on intervention with autism. *Journal of Autism and Developmental Disorders*, *27*(6), 653–676. doi:10.1023/A:1025802832021

Nimer, J., & Lundahl, B. (2007). Animal-assisted therapy: A meta-analysis. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *20*(3), 225–238. doi:10.2752/089279307X224773

O'Gorman Hughes, C. A., & Carter, M. (2002). Toys and materials as setting events for the social interaction of preschool children with special needs. *Educational Psychology*, *22*(4), 429–444. doi:10.1080/0144341022000003114

Oosterman, M., De Schipper, J. C., Fisher, P., Dozier, M., & Schuengel, C. (2010). Autonomic reactivity in relation to attachment and early adversity among foster children. *Development and psychopathology*, *22*(1), 109.

Poresky, R. H. (1996). Companion animals and other factors affecting young children's development. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *9*(4), 159–168. doi:10.2752/089279396787001437

Poresky, R. H., Hendrix, C., Hosier, J. E., & Samuelson, M. L. (1987). The companion animal bonding scale - internal reliability and construct validity. *Psychological Reports*, *60*(3), 743–746. doi:10.2466/pr0.1987.60.3.743

Prothmann, A., Bienert, M., & Ettrich, C. (2006). Dogs in child psychotherapy: Effects on state of mind. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *19*(3), 265–277.

Prothmann, A., Ettrich, C., & Prothmann, S. (2009). Preference for, and responsiveness to, people, dogs and objects in children with autism. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *22*(2), 161–171. doi:10.2752/175303709X434185

Public Cmap Tools Client Software. (1998). Institute for Human & Machine Cognition. Pensacola, FL. Retrieved from http://cmap.ihmc.us/

Redefer, L. A., & Goodman, J. F. (1989). Brief report: Pet-facilitated therapy with autistic children. *Journal of Autism and Developmental Disorders*, *19*(3), 461–467. doi:10.1007/BF02212943

Reichow, B., Volkmar, F., & Cicchetti, D. (2008). Development of the evaluative method for evaluating and determining evidence-based practices in autism. *Journal of Autism and Developmental Disorders*, *38*(7), 1311–1319. doi:10.1007/s10803-007-0517-7

Reichow, B., & Volkmar, F. R. (2009). Social skills interventions for individuals with autism: Evaluation for evidence-based practices within a best evidence synthesis framework. *Journal of Autism and Developmental Disorders*, *40*(2), 149–166. doi:10.1007/s10803-009-0842-0

Richards, L., & Morse, J. M. (2007). *Readme first for a user's guide to qualitative methods*. Thousand Oaks, Calif.: Sage Publications.

Robin, M., & Bensel, R. ten. (1985). Pets and the socialization of children. *Marriage & Family Review*, *8*(3-4), 63–78. doi:10.1300/J002v08n03_06

Rogers, S. J. (2000). Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders*, *30*(5), 399–409.

Rutter, M. LeCouteur, A. & Lord, C. (2003). Autism Diagnostic Interview, Revised: ADI-R. Los Angeles, Calif. Retrieved from http://portal.wpspublish.com/portal/page?_pageid=53,70436&_dad=portal&_schema=PORTAL

Sams, M. J., Fortney, E. V., & Willenbring, S. (2006). Occupational therapy incorporating animals for children with autism: A pilot investigation. *The American Journal of Occupational Therapy*, *60*(3), 268–274. doi:10.5014/ajot.60.3.268

Sanders, J. L. (2009). Qualitative or quantitative differences between Asperger's disorder and autism? Historical Considerations. *Journal of Autism and Developmental Disorders*, *39*(11), 1560–1567. doi:10.1007/s10803-009-0798-0

Schieve, L. A., Boulet, S. L., Kogan, M. D., Yeargin-Allsopp, M., Boyle, C. A., Visser, S. N., Blumberg, S. J., et al. (2011). Parenting aggravation and autism spectrum disorders: 2007 National Survey of Children's Health. *Disability and Health Journal*, *4*(3), 143–152. doi:10.1016/j.dhjo.2010.09.002

Schopler, E. and Mesibov, G.B., E. A. (1983). Autism in adolescents and adults: Current issues in autism. *New England Journal of Medicine*, *309*(10), 618–619.

Sigman, M. & Ruskin, E. (1999). Continuity and change in the social competence of children with autism, down syndrome, and developmental delays. *Monograph of the Society for Research in Child Development*, *64*(114).

Slavin, R. E. (1986). Best-Evidence Synthesis: An alternative to meta-analytic and traditional reviews. *Educational Researcher*, *15*(9), 5–11. doi:10.3102/0013189X015009005

Smith, T., & Eikeseth, S. (2010). O. Ivar Lovaas: Pioneer of applied behavior analysis and intervention for children with autism. *Journal of Autism and Developmental Disorders*, *41*(3), 375–378. doi:10.1007/s10803-010-1162-0

Solomon, O. (2012). Doing, being and becoming: The sociality of children with autism in activities with therapy dogs and other people. *Cambridge Anthropology*, *30*(1), 109–126. doi:10.3167/ca.2012.300110

SSIS-RS, Pearson Education, Inc. (2012). Retrieved from http://psychcorp.pearsonassessments.com/HAIWEB/Cultures/en-us/Productdetail.htm?Pid=PAa3400&Mode=summary

Stevens, L. T. (1990). Attachment to pets among eighth graders. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *3*(3), 177–183.

Strain, P. S., Wilson, K., & Dunlap, G. (2011). Prevent-teach-reinforce: Addressing problem behaviors of students with autism in general education classrooms. *Behavioral Disorders-Journal of the Council for Children with Behavioral Disorders*, *36*(3), 160.

Timeline | APA DSM-5. (2012). Retrieved from http://www.dsm5.org/about/Pages/Timeline.aspx

Triebenbacher, S. L. (1998). Pets as transitional objects: Their role in children's emotional development. *Psychological Reports*, *82*(1), 191–200. doi:10.2466/pr0.1998.82.1.191

Triebenbacher, S. L. (1999a). Re-evaluation of the companion animal bonding scale. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *12*(3), 169–173. doi:10.2752/089279399787000200

Triebenbacher, S. L. (1999b). Re-evaluation of the companion animal bonding scale. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *12*(3), 169–173. doi:10.2752/089279399787000200

Tsao, L.-L., & Odom, S. L. (2006). Sibling-mediated social interaction intervention for young children with autism. *Topics in Early Childhood Special Education*, *26*(2), 106–123. doi:10.1177/02711214060260020101

United States Department of Justice. (2010). *Americans with Disabilities Act: 2010 Revised Requirements*. II. Retrieved from www.ada.gov/service_animals_2010.htm

Viau, R., Arsenault-Lapierre, G., Fecteau, S., Champagne, N., Walker, C.-D., & Lupien, S. (2010). Effect of service dogs on salivary cortisol secretion in autistic children. *Psychoneuroendocrinology*, *35*(8), 1187–1193. doi:10.1016/j.psyneuen.2010.02.004

Vidović, V. V., Sˇtetić, V. V., & Bratko, D. (1999). Pet ownership, type of pet and socio-emotional development of school children. *Anthrozoos: A Multidisciplinary Journal of The Interactions of People & Animals*, *12*(4), 211–217. doi:10.2752/089279399787000129

Volkmar, F. R., Lord, C., Bailey, A., Schultz, R. T., & Klin, A. (2004). Autism and pervasive developmental disorders. *Journal of child psychology and psychiatry*, *45*(1), 135–170.

Wild, D.L. (2012, June). *The impact of canine assistance for children with autism and the family unit*. Walden University.

Wilson, E. O. (1984). *Biophilia*. United States of America: Harvard University Press.

Yin, R. K. (2011). *Qualitative research from start to finish*. New York: Guilford Press.

Appendices

Appendix A Waiver of Documentation of Consent

INVESTIGATOR'S NAME: GRETCHEN CARLISLE
PROJECT # 1203195

STUDY TITLE: SOCIAL SKILLS OF CHILDREN WITH AUTISM SPECTRUM DISORDER WHO HAVE FAMILY DOGS

1. I would like to ask you to participate in a study that involves research.
2. Participation is voluntary and your decision not to participate will not involve any penalty or loss of benefits from the Thompson Center.
3. For this study, you will be asked to complete a short demographic survey, a survey about the social skills of your child with autism and respond to three questions about dogs for families of children with autism. If you have a family dog, your child will autism will also be asked to respond to eight questions about their relationship with that dog. It will take approximately 40-50 minutes to complete the survey.
4. The purpose of our study is to find out more about the social skills of children with autism who have family dogs.
5. We are asking approximately 70 families to participate in this study.
6. The study staff may withdraw you from the study at any time after explaining to you the reason for withdrawal.
7. If you or your child feel uncomfortable responding to the questions in the survey at any time you may stop your participation.
8. If you choose to participate, all your answers will be kept confidential. You and your child's responses will be identified by a number, your names and your responses will be kept in separate locked files.
9. There will be no cost to you.
10. There is a $10 gift card, which will be mailed to each adult after they have completed participation in this study.
11. If you have any questions regarding your rights as a participant in this research and/or concerns about the study, or if you feel under any pressure to enroll, you may contact the University of Missouri Health Sciences Institutional Review Board (which is a group of people who review the research studies to protect participants' rights) at (573) 882-3181.
12. If you have any problems or questions, you many contact me at _____.
13. I would be happy to answer any questions that you may have.

Appendix B Waiver of Documentation of Assent

INVESTIGATOR'S NAME: **GRETCHEN CARLISLE**
PROJECT # 1203195

STUDY TITLE: SOCIAL SKILLS OF CHILDREN WITH AUTISM SPECTRUM DISORDER WHO HAVE FAMILY DOGS

This is a study about the social skills of children with autism and dogs.

You are invited to be in this study because we want to see if children with autism who live with a family dog have social skills that are the same or different than children with autism who do not live with a dog.

You will be asked to answer eight questions about yourself and your family dog.

Sometimes answering questions can be stressful. If you want to take a break or stop, it is OK. You may want to start the answering questions again after a break, or not. You should tell us, or your parents if you feel bad.

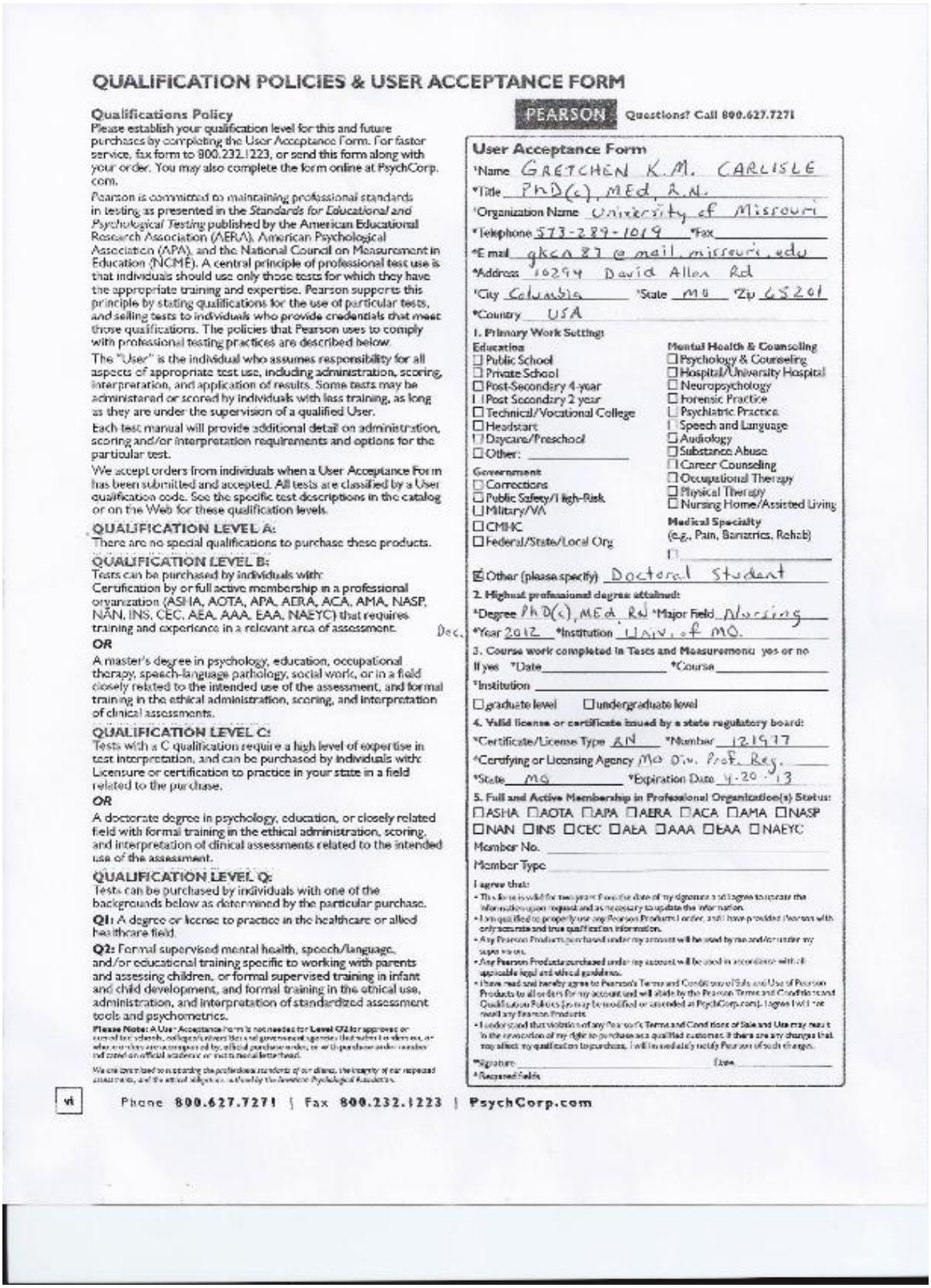
People who study the bonds of animals and humans and who study autism, may find out if having a dog helps some children with autism.

If you say you do not want to be in the study, you just have to tell us. No one will be mad at you. You can also say yes, and later if you change your mind, you can quit the study. The choice is up to you [and your parent(s).

We will do our best to make sure that your answers to these questions/your information) are/is kept a secret.

You can ask questions any time. You can ask now. You can ask later. You can talk to me or you can talk to someone else, like your parent or family doctor.

Appendix C SSiS-RS Proprietary Permission



QUALIFICATION POLICIES & USER ACCEPTANCE FORM

Qualifications Policy

Please establish your qualification level for this and future purchases by completing the User Acceptance Form. For faster service, fax form to 800.232.1223, or send this form along with your order. You may also complete the form online at PsychCorp.com.

Pearson is committed to maintaining professional standards in testing, as presented in the *Standards for Educational and Psychological Testing* published by the American Educational Research Association (AERA), American Psychological Association (APA), and the National Council on Measurement in Education (NCME). A central principle of professional test use is that individuals should use only those tests for which they have the appropriate training and expertise. Pearson supports this principle by stating qualifications for the use of particular tests, and selling tests to individuals who provide credentials that meet those qualifications. The policies that Pearson uses to comply with professional testing practices are described below.

The "User" is the individual who assumes responsibility for all aspects of appropriate test use, including administration, scoring, interpretation, and application of results. Some tests may be administered or scored by individuals with less training, as long as they are under the supervision of a qualified User.

Each test manual will provide additional detail on administration, scoring and/or interpretation requirements and options for the particular test.

We accept orders from individuals when a User Acceptance Form has been submitted and accepted. All tests are classified by a User qualification code. See the specific test descriptions in the catalog or on the Web for these qualification levels.

QUALIFICATION LEVEL A:
There are no special qualifications to purchase these products.

QUALIFICATION LEVEL B:
Tests can be purchased by individuals with:
Certification by or full active membership in a professional organization (ASHA, AOTA, APA, AERA, ACA, AMA, NASP, NAN, INS, CEC, AEA, AAA, EAA, NAEYC) that requires training and experience in a relevant area of assessment.

OR

A master's degree in psychology, education, occupational therapy, speech-language pathology, social work, or in a field closely related to the intended use of the assessment, and formal training in the ethical administration, scoring, and interpretation of clinical assessments.

QUALIFICATION LEVEL C:
Tests with a C qualification require a high level of expertise in test interpretation, and can be purchased by individuals with: Licensure or certification to practice in your state in a field related to the purchase.

OR

A doctorate degree in psychology, education, or closely related field with formal training in the ethical administration, scoring, and interpretation of clinical assessments related to the intended use of the assessment.

QUALIFICATION LEVEL Q:
Tests can be purchased by individuals with one of the backgrounds below as determined by the particular purchase.

Q1: A degree or license to practice in the healthcare or allied healthcare field.

Q2: Formal supervised mental health, speech/language, and/or educational training specific to working with parents and assessing children, or formal supervised training in infant and child development, and formal training in the ethical use, administration, and interpretation of standardized assessment tools and psychometrics.

Please Note: A User Acceptance Form is not needed for **Level Q2** for approved or [illegible] schools, colleges/universities and government agencies that submit orders on, or when ordering is accompanied by, official purchase orders, or with purchase orders [illegible] and signed on official academic or institutional letterhead.

We are committed to upholding the professional standards of our field, the integrity of our registered assessments, and the ethical obligations outlined by the American Psychological Association.

PEARSON Questions? Call 800.627.7271

User Acceptance Form

*Name GRETCHEN K.M. CARLISLE
*Title PhD(c), MEd, R.N.
*Organization Name University of Missouri
*Telephone 573-289-1019 *Fax
*E-mail gkcn87@mail.missouri.edu
*Address 10294 David Allen Rd
*City Columbia *State MO *Zip 65201
*Country USA

1. Primary Work Setting:

Education
- ☐ Public School
- ☐ Private School
- ☐ Post-Secondary 4-year
- ☐ Post Secondary 2 year
- ☐ Technical/Vocational College
- ☐ Headstart
- ☐ Daycare/Preschool
- ☐ Other:

Government
- ☐ Corrections
- ☐ Public Safety/High-Risk
- ☐ Military/VA
- ☐ CMHC
- ☐ Federal/State/Local Org

Mental Health & Counseling
- ☐ Psychology & Counseling
- ☐ Hospital/University Hospital
- ☐ Neuropsychology
- ☐ Forensic Practice
- ☐ Psychiatric Practice
- ☐ Speech and Language
- ☐ Audiology
- ☐ Substance Abuse
- ☐ Career Counseling
- ☐ Occupational Therapy
- ☐ Physical Therapy
- ☐ Nursing Home/Assisted Living

Medical Specialty (e.g., Pain, Bariatrics, Rehab)
- ☐

☑ Other (please specify) Doctoral Student

2. Highest professional degree attained:
*Degree PhD(c), MEd, RN *Major Field Nursing
*Year 2012 *Institution Univ. of MO. Dec.

3. Course work completed in Tests and Measurement: yes or no
If yes *Date *Course
*Institution
☐ graduate level ☐ undergraduate level

4. Valid license or certificate issued by a state regulatory board:
*Certificate/License Type RN *Number 121977
*Certifying or Licensing Agency MO Div. Prof. Reg.
*State MO *Expiration Date 4-20-13

5. Full and Active Membership in Professional Organization(s) Status:
☐ ASHA ☐ AOTA ☐ APA ☐ AERA ☐ ACA ☐ AMA ☐ NASP
☐ NAN ☐ INS ☐ CEC ☐ AEA ☐ AAA ☐ EAA ☐ NAEYC
Member No.
Member Type

I agree that:
- This form is valid for two years from the date of my signature and I agree to update the information upon request and as necessary to update the information.
- I am qualified to properly use any Pearson Product I order, and I have provided Pearson with only accurate and true qualification information.
- Any Pearson Products purchased under my account will be used by me and/or under my supervision.
- Any Pearson Products purchased under my account will be used in accordance with all applicable legal and ethical guidelines.
- I have read and hereby agree to Pearson's Terms and Conditions of Sale and Use of Pearson Products to all orders for my account and will abide by the Pearson Terms and Conditions and Qualification Policies (as may be modified or amended at PsychCorp.com). I agree I will not resell any Pearson Products.
- I understand that violation of any Pearson's Terms and Conditions of Sale and Use may result in the revocation of my right to purchase as a qualified customer. If there are any changes that may affect my qualification to purchase, I will immediately notify Pearson of such changes.

*Signature Date
* Required Fields

Appendix D CABS Proprietary Permission

PSYCHOLOGICAL REPORTS **PERCEPTUAL AND MOTOR SKILLS**

Box 9229 Missoula, Montana 59807 *www.AmmonsScientific.com*

August 1, 2012

Dr. Gretchen K. M. Carlisle
10294 David Allen Road
Columbia, MO 65201

Dear Dr. Carlisle:

Under the following conditions, we are pleased to grant permission to use the scale from the following article in your dissertation research. However, this is not permission to republish the scale as an appendix, in print or on-line. Please write if you have any further questions that might be related to copyright. The citation must appear at the top of the reproduced copy and must read:

Reproduced with permission of author and publisher from:

Poresky, R. H., Hendrix, C., Mosier, J. E., & Samuelson, M. L. The Companion Animal Bonding Scale: internal reliability and construct validity. *Psychological Reports*, 1987, 60, 743-746.
© Psychological Reports 1987

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Sincerely,

S. A. Ishell, Ph.D.
Editor

SAI/slp

Appendix E Parents of Children with ASD: Demographic Survey

1. What is your age? _____

2. What is your gender?
   - Male
   - Female

3. Are you:
   - Married
   - Partnered
   - Widowed
   - Divorced
   - Separated
   - Never Married

4. What is your race?
   - Caucasian
   - Native American
   - Asian
   - African American
   - Hispanic
   - Other

5. How much education have you completed?
   - No high school
   - Some high school
   - High school graduate
   - Some college
   - College degree
   - Graduate degree

6. What is your yearly total family income?
   - Under $19.999
   - $20,000 - $29,999
   - $30,000 - $39,999
   - $40,000 - $49,999
   - $50,000 - $69,000
   - $70,000 - $89,999
   - greater than $90,000

7. How many children do you have? _____

8. What diagnosis does your child have:
   - Autism
   - Autism Spectrum Disorder
   - Pervasive Developmental Disorder-Not Otherwise Specified
   - Aspergers

9. Does your child take any medications related to their ASD diagnosis?
   - Yes
   - No

10. If your child takes any medications related to their ASD diagnosis, please list.
    _____
    _____
    _____
    _____

11. Do you own any pets?
    - Yes
    - No

12. If yes, what kind?
    - Dog(s)
    - Cat(s)
    - Other (please specify)

- How many? _____
- How many? _____
- How many? _____

If your family has a dog please answer the following questions:
(If you have more than one dog, respond based on the dog that is most attached to your child with ASD.)

13. What breed is your dog?
    _____
    _

14. How old is your dog? _____

15. How long have you owned your dog? _____

16. How old was your child with ASD when you got your dog? _____

17. How much time does your child with ASD spend interacting with your dog?
    _____

18. How attached is your child with ASD to your dog?
    - Not very attached
    - Attached
    - Very attached

19. Have you or anyone in your family had formal dog training coursework?
    - Yes
    - No

20. If you had formal dog training coursework, was it with the dog you have now?
    - Yes
    - No

Appendix F Questions about Dogs for Parents of Children with ASD

1. If you have a dog(s), describe your child's interaction with the dog(s). If you do not have a dog, describe your child's interaction with dogs outside your home.

2. Describe the reasons for your family's decision regarding dog ownership.

3. Describe any benefits or barriers to dog ownership in your family.

Appendix G Enrollment and Telephone Recruitment Procedure

Prepare for Recruitment

1. Collect list of pre-randomized numbers from Dr. Pak
2. Collect list of potential participants from Thompson Center data-base
    - Include children ages 8-18 years with ASD
    - Include children with IQ >70

Prepare for Phone Calls

1. Match pre-randomized numbers to participants on data-base and create list of potential participants
2. Telephone potential participants
3. Conduct survey or schedule time for call to conduct survey.

Phone Calls

Hello, my name is Gretchen Carlisle and I'm calling from the Thompson Center and the Research Center for Human Animal Interaction. May I please speak to the parent of _____? I am working with the Research Center for Human Animal Interaction to conduct a study examining the interaction of children with autism and pet dogs. Are you the primary caregiver of _____?

If no…..may I please speak to the primary caregiver of _____?

If yes….I would like to offer the opportunity for you and your child with autism to participate in a research study. If you agree to participate, will each be asked to complete a survey measuring your child's social skills. If you have a family dog, your child with autism will also be asked to complete a short survey.

Are you interested in participating?

If no…..thank you for your time, if you have questions you can call me at the study site at _____.

If yes…..is your child with autism 8-18 years old and able to read an comprehend the written word at a second grade level reading ability?

If no…..thank you for your willing to participate. We will not be able to include you and your child in the current study. If you have further questions you can call me at the study site at _____.

If yes….thank you for your willingness to participate. I will now review the information about the study with you.

Review Consent

Would you like to participate?

If no…..thank you for your time, if you have questions you can call me at the study site at _____.

If yes…..Are you able to participate today, or is there a better time to call you?

If later…What dates and times
during the next week would you be available to complete the surveys?

Scheduled Date _____
Time _____

If you have any questions you may call me at _____.

If today…..I would like to record your response to the open-ended questions at the end of the survey, to be sure your exact words are recorded. Would it be O.K. if I record that part of the survey?
If no…..that;s O.K. I will not make an audio record of your responses. (Start survey.)

If yes…..start survey.

If the participant has a family dog, request to speak to the child with ASD, after completion of parent portion

Your child will be asked to respond to eight questions about their relationship to the family dog. Please write down the following response options your child will have, to give your child a visual aid when responding to the questions. The responses will be "always", "generally", 'often", "rarely" or "never".

To the child…..

Hello, my name is Gretchen and I'm calling from the Thompson Center to do a study to find out more about children with autism and dogs.

Administer Assent

Would you like to participate in the study?
If no….that's OK, may I speak to your parent?
If yes…..administer survey.

Thank you for your help with the study, if you have any questions you can ask now or call me later at _____.

Appendix H Application for Research Resources

THOMPSON CENTER
FOR AUTISM & NEURODEVELOPMENTAL DISORDERS

Application for Research Resources

Name: ___Gretchen K.M. Carlisle_____**Date** __July 8, 2012_____

Address: _Clydesdale Annex 2 900 East Campus Drive____**Phone:** __573/289-1019_____

Department: _Sinclair School of Nursing_____ **Email:** __gkcn87@mail.missouri.edu___

Expected Dates of Project: __July 2012 through October 2012_____

Name of Study: _Social Skills of Children with Autism Spectrum Disorder who have Family Dogs_____

Purpose of Study: __The specific aim of this study is to explicate the role of family dog ownership in the social skills of children with ASD._____

Brief Description of Study: _Pet dogs have been identified in the adult population as being social lubricants. No research has identified whether family pet dogs can provide the same benefits of increased social interaction for children with ASD. Findings from a pilot study of parents and health care providers, exploring potential benefits of animal interaction for families of children with ASD at the 2010 Autism Intervention Conference, demonstrated a need for further research based on the frequency of participants' beliefs that dogs were beneficial in these families. The hypothesis for this study is that children with ASD who live with family dogs will have better social skills than those who do not live with a dog, and children with ASD who are attached to the family dog will have better social skills than those who are not attached to the family dog. A short demographic instrument, along with the Social Skills Improvement System Rating Scale will be administered to parent participants, along with a request to respond to three open-ended questions about their child's interaction with dogs and their decision making process regarding dog ownership. Ten percent of the parents will be asked follow-up questions, based on the richness of their responses to the open-ended questions. Child participants will be asked to respond to the 8-item Companion Animal Bonding Scale.

Type of Participant Sought: A**ge** _8-18_____

Diagnosis____ASD_____

Other __IQ greater than 70 and able to respond to questions using a telephone, as determined by parent participants____

TC Research Application

Page 2

Will the study be conducted at the Thompson Center? Yes _____ No __X____

Describe space needs:_____

Who will be collecting the data?__Gretchen K.M. Carlisle, M.Ed., B.S.N., R.N._____

(Please list names and titles of all persons collecting data.)

Will data be collected on specific days of the week? **Please indicate the expected schedule for data collection.**

Telephone recruitment will be conducted from 8am-6pm on Monday through Friday and data will be collected during the time of the recruitment call or by telephone at an alternate time for the convenience of the participants.

Investigators should note the following:

1. All research studies must have current IRB approval prior to data collection.

2. All faculty, staff and students who will have contact with research participants must submit a current health screening form to the TC administrative office before the study can begin.

3. Research space may be requested weekdays (M - F, 8am – 5pm) and on weekday evenings (M-Th 5pm-8pm).

4. Research activities may be conducted only in assigned rooms on the clinic level of the TC. No research projects may be conducted on the lower level.

5. Special requests for research space on weekends will be considered, but investigators are encouraged to meet during regular business hours as much as possible. Additional requirements apply for after hours data collection:

    a. Researchers must keep a confidential log of date, time and name of participants seen after hours throughout the study.
    b. A minimum of two research assistants must be present during after-hours data collection when other family members accompany those participating in the research.
    c. The supervising faculty member will be expected to take full responsibility for the safety of the research participants and the security of the building after hours.

I have read and agree to comply with the expectations for researchers at the Thompson Center.

Faculty Member Signature: _____

TC Study Approval: _____

Comments for Investigator:

Vita

Gretchen K. Carlisle was born in Brookville, Pennsylvania. She graduated from Brockway Area High School in Brockway, Pennsylvania. She graduated from Alderson-Broaddus College in Philippi, West Virginia with a Bachelor of Science in Nursing. Gretchen completed a Dean's Certificate in Public Health at the University of Missouri in 2008. In 2010 she earned her Master's in Education and Counseling Psychology with an emphasis on Health Education and Health Promotion from the University of Missouri. She completed her doctoral program at the University of Missouri Sinclair School of Nursing in 2012.