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An Attachment Style Based Experimental Design to Maximize Dog Adoption Success

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Abstract

Evolution and domestication have brought dogs very close to humans. Research has found numerous behavioral, cognitive, neurological, and physiological similarities between the two species. Additional research has found that humans and dogs can share cross-species attachments that are comparable to mother-infant attachments. Furthermore, attachment styles in dogs are classified the same way they are in children. The statistics on the vast amount of dogs in animal shelters, too many of which are being senselessly killed, are shocking. I propose a two-part study that first assesses which attachment style pairings are most successful and which are unsuccessful based on measurements of satisfaction and oxytocin levels reflecting attachment. The second study is designed to verify these pairings by manipulating adoptions and following pairs. If particular pairings are found more successful than others and are utilized at adoption, I hypothesize an attachment style based program would produce more successful adoptions, lower the amount of dogs returned to shelters, and eventually, lower euthanization rates.

Keywords: canine, dog, cognition, behavior, physiology, evolution, adoption, human, oxytocin, shelter, euthanasia, program, satisfaction

History of the Dog

Origin

There are reports of dogs existing anywhere from 9,000 (Clutton-Brock, 1995) to 14 million years ago (Kaminksy and Marshal-Pescini, 2014) but their ancestors have been roaming the earth much longer. Hare and Woods (2013) as well as Thalmann et al. (2013) suggest the evolution of the wolf into the dog began between 12,000 and 40,000 years ago. Thalmann et al.'s study on the mitochondrial genomes of ancient canids suggests that dogs originated in Europe between 18,800 and 32,100 years ago. One side of the controversy, as Thalmann et al. report, is that genetic data suggests the process of domestication began in East Asia approximately 15,000 years ago, however, evidence exist that support the oldest doglike fossils dating back more than 30,000 years and being found in Europe and Siberia. Tracing the genetic history allows scientists to map the cognition, behavior, and biology of the dog back to its inception. When this method doesn't work due to a lack of records, damaged fossils, or inconclusive evidence, genetic testing is the next best option.

Most people believe dogs descended from the same wolves that roam the earth today but genetic tests show that dogs and contemporary grey wolves share a common ancestor from which they both evolved: the ancient grey wolf. Dogs and contemporary wolves are therefore both subspecies under the genus "canis" and Thalmann et al.'s (2014) study discovered that the ancient grey wolf is genetically distinguishable from the contemporary wolf. It was additionally found that genomes mark dogs as genetically closer to ancient wolves than they are to contemporary wolves although the contemporary grey wolf is the domestic dog's closest living relative (Thalmann et al., 2013). The next question to ask is *how:* How did the dog evolve from the ancient grey wolf; how does any animal evolve?

Natural Selection versus Artificial Selection

Darwin is one of the first and most popular names associated with research on evolution and his work is still important to the subject today. Very well known for his theory of evolution, Darwin argues that natural selection, while a slow process, is the best explanation for how species evolved and domesticated. He defines natural selection as the process by which animals become more fit to survive in their environments: a system of "descent with modification (Darwin, 1859, as cited in Bidau, 2009, p. 56)" where random genetic mutations occur and the beneficial ones accumulate as they pass through generations. He believed that when enough of these mutations built up a completely new and different organism would result. A good example of this would be the changes that occurred to the ancient wolf resulting in the domestic dog. Darwin also addressed that these processes take time, the same way artificial selection takes time. Artificial selection, such as domestic breeding, is controlled by a human who decides which traits they want to be passed to the generations ahead. Natural selection ebbs and flows with the natural environment and cohabitants with which a given species interacts. In addition to researching how natural selection was involved in evolution, Darwin also theorized on how artificial selection was relevant to domestication.

Domestication, according to Darwin, was a result of humans artificially selecting traits and breeding captive animals to display certain physiological characteristics such as size, color, speed, and build (Bidau, 2009). Later, Price and King (1968) state that domestication is "an evolutionary process involving the genotypic adaptation of animals to the captive environment (as cited in Bidau, 2009, p. 56)." In the following years Rindos (1980), Price (1984), and Gautier (1990) all provided additional support for captivity, manipulation, and "cultural control" being the core of domestication with Man holding the strings of the marionette (as cited in Bidau,

2009, p. 56). These theories maintain that domestication results from artificial selection in captivity, but in 1994, Darcy Morey introduced his "issue of intentionality (Morey, 1993, p. 336)." Morey questioned "how much of domestication process can be attributable to conscious or deliberate human decisions (as cited in Bidau, 2009, p. 57)?" He believed that the differences between domesticated animals and their antecedent, wild selves (the domestic dog and the ancient grey wolf) were all genetic (Trut, 1999). Since both artificial and natural selection result in genetic changes, hypothetically, both scenarios could have led to the ancient grey wolf evolving into the domestic dog. The mystery of how genetic and the following physiological, behavioral, and cognitive changes occur in animals through generations is not as simple as natural versus artificial selection. One scientist who embraced this complexity was Dmitri Belyaev, who, instead of asking whether domestication resulted from artificial or natural selection asked *what* was being selected.

Dmitri Belyaev was a Russian geneticist whose research rattled the way we think about domestication when he suggested that the various changes we can observe in the wolf and the dog, for example, are not the result of a physical trait being selected (as is commonly assumed) but alternately, a behavioral one. Darwin primarily discussed evolutionary changes in terms of physical attributes such as wings, bigger teeth, thicker coats, etc. The numerous researchers that write about domestication as a result of artificial selection also discuss selecting physical traits such as speed, height, coat color, weight, etc. Belyaev changed the conversation by suggesting that all the physical changes we observe in animals through evolution may not be products of selecting for those physical traits but actually by-products of selecting for a behavioral one that were simply coincident with a slew of physical changes.

Belyaev's Foxes

Belyaev was a geneticist during Stalin's rule who worked as the director for the Institute of Cytology and Genetics during a time when genetics had been banned and those connected to gene research were considered "enemies of the state (Hare & Woods, 2013, p. 69)." By 1948, genetics was officially prohibited in the USSR. Under these circumstances, Dmitri Belyaev was forced to do his research in secret, posing as a furrier who needed to study the genetic portability of coat colors that he claimed would improve the quality of the pelts. Dmitri Belyaev then ran one of the most important studies on domestication.

Using a large sample of silver foxes, most popular in the fur business, Belyaev began to breed them. He methodically selected for the behavioral trait of tameness (defined by approachability and overall friendliness toward humans). By artificially selecting for a behavioral trait in his study, Belyaev provided very compelling evidence for the argument that domestication could not only happen in a short period of time, confined to a lab but also that the selection of a *behavioral*, rather than *physiological*, trait acted as a catalyst to the physiological changes that occurred between wild and domesticated animals. Simply put, the physical changes that occurred were byproducts to the selection of a behavior.

Each season Belyaev bred the tamer foxes but kept aside a control group from the original sample. Belyaev thought tamability and level of aggression were crucial in "how well an animal would adapt to life among human beings (Trut, 1999, p. 162)." Shockingly, after only twenty generations of breeding, the experimental group of foxes began to display changes that supposedly would have taken thousands of years in the wild, if not more. In addition to displaying friendly, puppy-like behaviors with one another as well as with humans, those foxes that had been bred for the behavioral trait of "tameness" had lower levels of corticosteroids

(stress-regulating hormones) than the control group of foxes (Hare & Woods, 2013). Furthermore, the experimental foxes had higher levels of serotonin, a neurotransmitter that makes us feel good. Already, selection of a behavioral trait was resulting in hormonal changes in the foxes.

In addition to these hormonal changes there were morphological changes in appearance (Trut, 1999; Hare & Woods, 2013). Because of how embedded behavior is within biology, "selecting for tameness and against aggression means selecting for physiological changes in the systems that govern the body's hormones and neurochemicals (Trut, 1999, p. 166)." The foxes' tails started to curl, sexual maturity arrived earlier, ears became floppy, coats became splotchy, the size and shape of their skulls shrank. All of these changes (and more) were thought to be accidental responses triggered by "selection for '*tameness'* and a friendly relationship with humans (Bidau, 2009, p. 64)." What was most astounding about these changes was that the differences between the control foxes and the tamed ones was parallel to the difference between wolves and domestic dogs, respectively. While Belyaev's study was run in the confinement of his lab and therefore he could not claim natural selection, his results allowed scientists to investigate a new theory of domestication.

Domestication Theory

The story that wolves evolved into dogs when hunter gatherers took in wolf pups, raising them to live amongst humans as companions and help hunt, is wrong (Hare & Woods, 2013). Historically, the hunter gatherer theory does not make sense because there is 1) very little evidence that humans needed any help hunting or gathering and 2) the early ancestors of the dogs were aesthetically similar to the wolves which have been feared and hunted for centuries. Since hunter gatherers would have little incentive to welcome wolves into their environment,

artificially selecting traits until, eventually, the wolf was domesticated (Hare & Woods, 2013; Kaminsky & Marshal-Pescini, 2013), another version of the story has to be considered.

Using Belyaev's research, Hare and Woods (2013) speculated that domestication was more likely a process of natural selection, which still corresponds with domestication being a result of numerous genetic changes through the generations (Darwin ,1859; Kaminksy & Marhsal-Pescini, 2013). Natural selection occurs due to selective pressures throughout an animal's natural habitat and therefore changes associated with domestication take much longer to appear than they did in Belyaev's lab. Hare and Woods suggested that as humans gathered and temporarily settled on the land, certain wolves were attracted to the garbage humans produced and it was this "new food source...that led directly to the evolution of the dogs we know and love (Hare & Woods, 2013, p. 89)." What this suggests was that wolves naturally approached humans but only a particular kind of wolf would feasibly show this behavior: "only the wolves who were least fearful and non-aggressive towards humans would be able to take advantage of this new source of food (Hare & Woods, 2013, p. 89)" because largely, wolves are fearful and will avoid humans (Miklósi & Topál, 2013).

Hare and Woods (2013) hypothesized that the wolves that were thought to be approaching human camps in search of new food sources would have been *naturally* selected for their lower fear and aggression response, both behavioral traits, and once separated from the more fearful and aggressive wolves, would have started reproducing within their small subgroup, thereby self-domesticating. This process repeated over time and over generations resulting in packs of wolves who shared their "more relaxed genetic predisposition toward humans (Hare & Woods, 2013, p. 89)." Wolves sharing their foraging methods with the next generations kept the wolves close to humans and their delicious garbage. This was all by means of selecting a behavioral trait which,

as it did in Belyaev's study, gave rise to physical changes. It was only after a few generations that their coats would have become splotchy, their ears started to flop, and their tails started to curl which were all changes also seen in Belyaev's foxes and are inherent to domestication. Hare and Woods suggested that "humans did not set out to domesticate wolves," but rather that "wolves domesticated themselves (Hare & Woods, 2013, p. 90)." Though the question still remains at what point dogs were no longer wolves, it is probable that dogs came about as a response to natural selection and not artificial selection orchestrated by humans.

Artificial selection does, however play a large role in breeding modern dogs. Humans hand pick certain characteristics they favor in an animal and, using animal husbandry, crisscross selection to create a variety of breeds with varying behavioral and physiological traits. The use of artificial selection in creating manicured breeds has been heavily studied and the science behind it is clear compared to the original evolution and domestication of the dog. The next important topic in the conversation is how this theory of self-domesticating canines affected cognition.

Self-Domestication's Effect on Cognition

Before discovering Belyaev and his work with foxes, Richard Wrangham, a primatologist, was conducting studies to test his hypothesis that only humans had the ability to comprehend gestures as a means of social communication. Brian Hare, with the help of his childhood dog, proved Wrangham wrong. Oreo, Hare's dog, displayed the skill of following the direction of Hare's point when the two were playing fetch with a tennis ball. After a few tests, run out of Hare's garage, Wrangham was convinced and the exploration into canine cognition began. Hare, Wrangham, and Woods wanted to find out how dog's cognitive abilities had developed. Eventually, Hare and Wrangham's work led them to investigate Belyaev's findings and propose that dogs had self-domesticated and their domestication had caused a shift in cognition but not

until they ran numerous studies on the dog's abilities to read and respond to human gestures and cues.

Hare and Tomasello (1999) found evidence of dogs using "human local enhancement" cues such as gaze and pointing, cues that they previously thought to be specific to inter-human communication. Furthermore, they found that the dogs' ability to respond to cues was independent of how much time they had spent around humans, which suggested that extended exposure to humans was not necessary for the development of certain communicative skills. Research suggesting the innateness of humanized methods of communication in dogs led to a lot of studies focused on comparing cognitions of wolves and dogs. Miklósi et al. (2003) ran a study with domestic dogs and socialized wolves, recruited when they were 4 days old and raised by humans in environments comparable to those of pet dogs. In the first part of the experiment the experimenters use an object choice task where a piece of food is hidden in one of two places and the experimenter gestures toward the food. The dogs and wolves have to use the experimenter's gesture to find the food. The experimenter stands between the two containers and displays three gestural cues: distal pointing which, using the index finger, points to the target from a distance of 50 cm; proximal pointing which is when the gesture is closer at 5-10 cm away from the target; and touching which involved the experimenter physically touching the target object. Using these three gestural cues 20 trials were run including 20 trials from a control group (without any gestures). The results showed that while wolves are capable of learning gestures, dogs performed much better, showing an innate comprehension of the gestures. Additionally, the dogs used the experimenters' gaze to their advantage while the wolves did not. It has been found that wolves "tend to use eye contact as a threat" and thus, "avoid human eye contact (Nagasawa, 2015, p. 336)," which is one explanation of why wolves and dogs may differ in their uses of gaze.

Additional research shows that not only can dogs understand and use cues such as gaze but it seems they can also understand and focus and attention in humans. Research has suggested that dogs have a sort of theory of mind, displaying the ability to attribute mental states and perspectives to humans in their environments and use that information as a tool for social reference.

Canine Theory of Mind and Social Referencing

Virányi et al. (2004) ran a study that suggested that dogs not only can recognize social gestures but can also recognize and differentiate when and what humans are focusing on or paying attention to. Specifically, dogs are "capable of visual perspective taking (Virányi et al., 2004, p.170)." Visual perspective taking is, arguably, only present in animals that can comprehend, to some degree, that another being may see something different that what he/she sees. In order to test this, they observed dogs' response to hearing a recording of their humans giving commands which were played while the human faced either the dog, another person, or neither and was out of sight (a separate area). What they found was that the dogs in the experiment responded more to the commands when their humans were facing them than the other two scenarios. Interestingly, the dogs did show some level of response when their humans directed their commands to an empty space, potentially suggesting that the dogs could differentiate when their humans were engaged with another person versus when they were simply not facing them directly. Virányi et al. understood this to be some evidence that dogs have the ability to differentiate what a human is focusing on.

The next part of the experiment assessed how a dog may use visual perspective taking to his/her advantage. The dogs were offered two people from whom to beg for food. One person was directing his/her attention at the dog and the other was turned away. Consistently, dogs

chose the person directing their attention towards the dog, which lead the researchers to suggest that dogs can also use "visual cues of attention" to decide which human would be more likely to share food. This skill of understanding "the communicatory nature of the situations" was most likely also involved in the first part of Virányi et al.'s (2004, p.161) experiment. Both parts of the experiment show that dogs' "social cognitive skills" are more advanced than previously thought and most likely due to "unique evolutionary history (p. 161)." What Virányi et al.'s experiment does not determine is whether dogs fully grasp the difference between two cognitions which is key to the theory of mind and a good direction for further research.

The research on gesture reading in dogs lead Hare, Wrangham, and Woods to wonder whether the advanced cognitive skills being studied had developed as a byproduct of domestication, the same way the physical changes had. Hare hypothesized that, "both populations of [Belyaev's] foxes would fail to understand human gestures (Hare & Woods, 2013, p. 79)," but if he was wrong, Belyaev's tame foxes would show an increased ability to read human gestures than those in the control group. Hare and his team set out to test the foxes, aiming to develop research that, when applied to the wolf-dog conflict, would offer insight into how dogs can communicate the way they do.

Using Belyaev's foxes in Russia, Hare compared the cognitive performance of the tame foxes to dog puppies. The foxes were brought into a room and Ignacio placed herself between two cups and then "sham-baited" the cups while the foxes watched and then pointed to the baited cup. Sham-baiting is when the experimenter touches both cups even though only one of them holds food. To the researchers' surprise, the foxes succeeded and chose to the cup being indicated almost every time. They reran the tests with objects such as toys to eliminate the possibility that the foxes could smell the food. Again, all the tame foxes performed above

chance. When the control foxes, those who were not bred for tameness, were tested, however, they were too shy to do the test; the procedure had to be reorganized so as to encourage the control foxes to participate. The researchers solved their problem by using an inviting feather attached to a stick and a tape measurer that coaxed the shy control foxes to engage in the experiment. The task was that the tape measurer, which was seemingly preferred by all foxes, was gestured to with either a hand or the feather attached to the stick. While the researchers used a number of variations of the same test the results consistently showed the experimental foxes choosing the object gestured to by the human hand while the control foxes preferred to play with the toy that the feather on a stick touched. One of the variations in the test was using food as they did in the first trial run with the experimental foxes. Once the control foxes were comfortable enough to play the original game, they failed to skillfully use the gestures to find the food.

The results of the study showed that there were a number of cognitive differences between the domesticated (tame) foxes and the control group. As a "direct result of experimental domestication," which Belyaev accomplished by breeding the tame foxes, the "foxes' ability to read human gestures (Hare & Woods, 2013, p. 87)" changed drastically. Most interestingly was that the "cognitive evolution" Hare and Ignacio discovered was remarkably comparable to the differences tested and observed between dogs and wolves. The domesticated foxes and dogs both had the intriguing skill to interpret human gestures and since "gestures are a type of social information that help us guess what someone else might do (p. 56)," it may be interpreted as an evolutionarily important skill to develop. The same way some genetic mutations Darwin researched were beneficial in enhancing animals' chances of survival, experimentally or naturally selecting for tame behaviors cognitively altered Belyaev's foxes and wolves, respectively, allowing them to survive and communicate with humans. The slew of changes that

occurred during domestication brought dogs closer to humans (physical, cognitively, behaviorally, and socially) making them useful in comparative cognition studies, especially those focused on children's developing cognitions.

Dogs as a Model for Human Psychology

A number of researchers have found that dogs are comparable to children in their performance on a variety of tasks. Miklósi and Topál (2013) compared dogs and children in terms of socio-cognitive traits by referring to dogs as "human(infant)-like (Miklósi & Topál, 2013, p. 288)." These are specific skills which dogs display that have functional matches to human traits. Miklósi and Topál go further and provide findings that suggest the relationship between a dog and human fulfills the behavioral criteria for attachment which was developed based on how human infants interact and attach to their caregivers. This suggests not only that dogs can communicate desires in similar ways to children but also that they develop emotional bonds in the same way a child might connect with his/her caregiver. Attachment joins a dog and its human, encouraging the increase in communication between the two species and thereby feeding the development of socially compatible communication between people and dogs.

Miklósi and Topál (2013) summarize that while dogs and humans not only have qualities of social competence in common, the social component of canine competency can be considered as working the same way it does in humans and this similarity is why dogs can be considered "human-like" or "infant-like" even though the base mental mechanisms may be different. What is true for both infant-parent and dog-human dyads is the use of behavior as a form of communication and because dogs and humans use these non-verbal modes of communication as infants do before speech develops the two dyads are even more comparable.

Attachment Behavior

Attachment in Humans

What Is Attachment. Evolutionarily, the connection that exists between a caregiver and child is crucial for the child's survival (Bowlby, 1988). The child's safety, nourishment, and guidance will be provided by his/her caregiver in the early years of life. That attachment is considered the foundation for long-term interpersonal relationships. Some of the most significant work on attachment was conducted by John Bowlby (1907-1990). His work, namely the Attachment Theory (1969, 1988), is widely recognized and has been expanded on by a number of well known researchers such as Ainsworth, Main, Sroufe, and Grossmann. Bowlby's research suggested that children are innately prepared to form attachments (McLeod, 2007) and grow into a social and co-operative environment (Bowlby, 1988, p. 139). A lot of Bowlby's work is centered around analyzing attachment behavior and how parental figures affect those behaviors that develop early in infancy and childhood. Bowlby (1988) describes attachment behavior as "any form of behaviour that results in a person attaining or maintaining proximity to some other clearly identified individual who is conceived as better able to cope with the world (p. 341)." This behavior emerges very early in life, but is also reflected in later relationships throughout adolescence and adulthood. Furthermore, he explains that attachment is an organized system that allows for a child to keep the mother-figure in mind when she is absent, so that she might be summoned in times of distress. Bowlby thought that the maintenance of proximity to a protector is the "key survival function" of any relationship experienced throughout life (p. 1469). The bonds experienced in early infancy are by no means identical to those experienced in adult life; However, the underlying desires "for protection, comfort, and support (p. 1470)" continue to fuel the bonds. Mary Ainsworth's influential work focused on attachment in infancy and childhood. Ainsworth and colleagues first described "three principal patterns of attachment (p. 1505)" in 1971 and her work along with Main, Sroufe, Grossmann and their colleagues were "remarkably consistent and have the clearest of clinical

significance (p. 1505)" supporting Bowlby's Attachment Theory.

Patterns of Attachment in Children. The three main patterns of attachment describe are secure attachment, anxious attachment, and avoidant attachment. There is a fourth as well that is noted by its disorganized and/or disoriented behavior, although less is known about the latter and fewer children display disorganized attachment. Secure attachment is experienced by a child who feels confident his/her parent figure "will be available, responsive, and helpful should he encounter adverse or frightening situations (Bowlby, 1988, p. 1511)" which allows the individual to feel safe in his/her explorations of the world. The second pattern of attachment, anxious attachment, falls under the title of insecure attachment, and is displayed in a child who feels uncertainty in whether or not their parental figure "will be available or responsive or helpful when called upon (p. 1511)." These children tend to experience separation anxiety and often cling to their parents due to their anxiety of exploring their surroundings. The third pattern of attachment is avoidant attachment and also falls under the title of insecure attachment. These individuals have no confidence in exploring because even if he/she receives a helpful response from a parental figure when he/she seeks comfort/protection, the individual is *expecting* to be rejected so does not feel certain they have a secure base. As adults they tend to try and separate themselves from love or support and live independently from others. Fifty percent of children in the world are classified as securely attached ("Attachment Styles," 2013). In order to measure attachment styles in children the child and their caregiver must participate in Mary Ainsworth's Strange Situation Task.

Measuring Attachment in Children. A major advancement in attachment research was Mary Ainsworth's (1978) Strange Situation Task (STT), also known as Strange Situation Procedure or Strange Situation Test (later expanded on by Ainsworth, 1985; Main et al. 1985; Sroufe 1983, 1985; and Grossmann et al. 1986), which assesses attachment behaviors and classifies children as one of the

attachment types. The STT measures attachment styles by placing children in a potentially stressful situation and observing each child's reactions towards their parents. The procedure consists of eight periods each three minutes long[1]. First the infant and his/her caregiver enter a lab room with toys for the child to play with. When one minute passes a stranger enters the room and slowly begins interacting with the child. At this point the caregiver leaves their child in the room with the stranger and waits three minutes before returning. Then, again, the caregiver leaves the child alone for three minutes at the end of which the stranger enters, trying to comfort the infant. The caregiver must then reenter the room for a second time and pick up their child. As each section passes, the child's stress slowly increases and the observer codes the infant's movements for both exploratory behavior and attachment behavior (trying to be held or make contact with the parent for example) when the caregiver is and is not in the room. Based on these results, the infant is classified in one of the three groups already mentioned (McLeod, 2008). The scoring system is based on the presence or absence of four behaviors from the child directed toward his/her caregiver during the two reunion periods (period 5 & 8). The interaction behaviors are proximity and contacting seeking; contact maintenance; avoidance of proximity and contact; resistance to contact and comforting. The observer records the child's behavior every 15 seconds and scores the intensity on a scale of 1 to 7. Additional behaviors the observer records are exploratory behaviors (playing with toys, moving or looking around room, etc.), search behaviors (following mother, trying to escape from the room to reunite with mother, banging on door, etc.), and affect displays (crying, smiling, etc.). Based on these behaviors and scores, the child is classified as having one of the attachment styles (McLeod, 2008). Research has shown that attachment styles from infancy show permanence into adulthood (Bowlby, 1988; Feldman, 2012), though different sorts of assessments are used at older ages.

Developing Attachment. While Bowlby found that children were "pre-programmed to form attachments (McLeod, 2007, p. 1)" and "develop in a social co-operative way (Bowlby, 1988, p. 139),"

he elaborates that “whether they do or not turns in high degree on how they are treated (p. 139).” The style of attachment is rather “a property of the relationship (p. 1542),” between the child and his/her mother and father. Shifts in how parents treat their children can change the child’s attachment patterns within the first 2 to 3 years. Furthermore, interactions with them, how he/she feels towards his/her parents, and how the parents express they feel about him/her dictate how the child “plans his own behavior towards them (p. 1581).” Attachment styles are usually coded by how comfortable a child is exploring his/her surroundings. A child who is secure feels safe to explore and children who are less secure in their attachments tend to explore less or not at all. The most important part of exploration is that no matter how far or for how long an individual explores, there will always be a secure base to return to (p. 1469). A parent’s job is to provide the secure base.

As each attachment style is thought to be a result of certain parental behavior, Matas and colleagues (1978) conducted a study that “confirms in the clearest possible way the influence on a child’s pattern of attachment of the parent’s way of treating his or her child (Bowlby, 1988, p. 1524).” The study began within the laboratory with 2.5-year-old children who were given a challenging task that required assistance from a parental figure. The parental figure was free to interact with the child. The study found that the way the parent interacts with the child is closely correlated with the pattern of attachment the child showed eighteen months earlier (when the child was initially assessed in the lab). Children earlier assessed as having secure attachments have mothers who are “attentive and sensitive to his performance and to respond to his successes and difficulties in a way that is helpful and encouraging (p. 1530),” while a child previously assessed as insecure has a mother who is “found to be less attentive and/or less sensitive,” at times, “her responses are ill-timed and unhelpful.” Other times she pays little attention to the child’s actions or feelings, or may “actively discourage or reject his bids for help and encouragement (p. 1530).” There are particular social signals, and how parents respond to those signals,

are therefore strongly linked to the development of attachment styles.

Social Referencing and Synchrony in the Development of Attachment. A lot of research claims that eye contact is a central part of infant-mother communication and the development of attachment. Georg Simmel, a German sociologist, claimed that, "the union and interaction of individuals is based upon mutual glances," and that eye contact between two people is, "perhaps the most direct and purest reciprocity which exists anywhere (Simmel, 1969, p. 358, as cited in Weinstein & Weinstein, 1984, p. 2)." He believed that because humans can communicate without words, mutual gaze (which he defined as two people looking at each others faces at the same time) contains high levels of information and between two individuals. Research on non-verbal forms of communication such as mutual gaze also appears in research on dogs and their communication with humans. Studies have shown that non-verbal forms of communication between two humans as well as between a dog and his/her human not only affect behaviors but also physiology such as changes in hormone levels and raised heart beat or lowered blood pressure (Feldman et al., 2011).

Even though much of Simmel's work is non-empirical there is a place for it within the context of mother-infant social referencing. Simmel claimed that in a mutual glance the two individuals involved create a bond through eye contact and "each one is entrusted to the other (Weinstein & Weinstein, 1984, p. 2)." Since Simmel's work has been published researchers have designed studies looking at the relationship between mutual gaze (and other types of social referencing) and interpersonal relationships, particularly between mothers and their infants.

Dickstein and her colleagues (1984) agreed with Simmel and believed that the most foundational exhibition of social attachment between a mother and child is synchrony in gaze. Dickstein et al. studied social referencing behaviors (such as mutual gaze, attention seeking, etc) within the parent-infant dyad and the relationship they had to an infant's attachment security. They measured differences between

individual infants' "social referencing and relationships to the security of attachment (Dickstein et al., 1984, p. 507)" during the second episode of Ainsworth's Strange Situation Task. During this episode (3 minutes) the stranger enters the room and the infant must interact with him/her, possibly using his/her mother for emotional cues. Infant referencing and proximity to the mother were measured as well as the "quality of maternal utterances (p. 507)" in order to record the mothers' emotional cues to their children. Dickstein et al. found there was a negative relationship between declined referencing and proximity which meant that when a mother was not making social references with her child (such as gazing) the infant sought out closer proximity. This reaction can potentially be explained by the child's desire and need to engage in referencing with his/her mother and so, when deprived of a gaze for example, approaches the mother for attention. Dickstein et al. also found that anxious infants referenced most frequency and most persistently and avoidant infants referenced the least frequently and securely attached children in the middle. Anxious children are those who usually seek their parents' attention because they feel an insecure attachment to them, the same reason the children whose mothers were not referencing tended to seek closer proximity. These findings suggest that referencing in infants may be related to "aspects of secure base behavior."

One researcher who has completed a significant amount of analysis on the parent-infant dyad and formative processes within it is Ruth Feldman. Much of Feldman's work is aimed at understanding how behavior and attachment interplay between parent and infant and how that may explain their manifestations later in a child's life. Feldman (2012) concentrated on synchronous behavior within an attachment pair such as mother and infant researching the affiliative bonds which she defines as "*selective* and *enduring* attachments…formed on the basis of multiple genetic, hormonal, brain, autonomic, epigenetic, behavioral, and- in humans- mental processes that coordinate to establish the parent-infant bond (Feldman, 2012, p. 3)." Feldman (2012) emphasizes the mix between biology and

behavior in the infant-parent dyad. An important aspect of her work is based on a number of animal models which led her to believe that there exists "a major bio-behavioral reorganization (that) occurs in the parents' physiology and behavior that leads to heightened sensitivity to infant cues, prepares parents to the difficult task of infant care, and gives rise to the expression of the species-specific behaviors critical for infant growth and adaptation to the eco-social niche (p. 4)." Furthermore, Feldman (2012) reports that with time and experiences, the "parent and child become sensitized to the physiological and behavioral cues of the partner…leading to the formation of the selective and enduring attachment bond (Fleming et al., 1999, as cited in Feldman, 2012, p. 4)." Feldman referred to this coordination as *parent-infant bio-behavioral synchrony* and theorized that early infancy was a formative time for a child's ability to regulate emotions, manage stress, create social affiliative relations with others, and gain "the ultimate ability to provide adequate parenting in the next generation (Meaney, 2010, as cited in Feldman, 2012, p. 5)." When a parent synchronizes their behavior with their child and regulates their systems (both physiological and mental), the child's own "biological organization and emerging consciousness" are impacted. Feldman proposes that "discrete microlevel behaviors," such as gaze, have the power to "form the dyad-specific bond (Feldman, 2012, p. 5)." During the postpartum period of an infant's life it is the mother who provides approximately 70% of the behavioral cues and those maternal behaviors determine the infant's current and future "cognitive and social-emotional competencies across early childhood (Feldman & Eidelman, 2009a, as cited in Feldman 2012, p. 7)."

Feldman's *parent-infant bio-behavioral synchrony* explains the formative power of synchrony when developing the bond of attachment in the infant-parent dyad, strongly supporting Dickstein et al.'s report on the association between social referencing and child attachment. These studies also support Bowlby's (1988) claims of children being born ready to create relationships. Parent's similarly, as described by Feldman (2012), are behaviorally (and biologically) programmed to interact with their

children, shaping them (for better or worse) to exist in the social world. Research has made it clear that parents take a large role in the development of their child's attachment style and importantly the research on parental attachment styles points further back to how *they* were treated by *their* parents. Attachment styles connect back and show permanence not only within a person's life but also across the generations creating an attachment style circuit. To assess permanence of attachment style adult attachment styles must be measured and because Ainsworth's SST isn't a useful measure for adults, other instruments must be used.

Measuring Attachment in Adults. There are a number of inventories that have been designed and developed to measure attachment styles in (human) adults. Some are specific to romantic love relationships while others are geared towards attachment to/with family and friends, although, attachment styles apply to all kinds of relationships so how you function in one is similar to how you behave in another (Bowlby, 1988).

One instrument used to assess adult attachment styles is the self-report questionnaires developed by Hazan and Shaver (1987). The self-report questionnaires classify adults into Ainsworth's primary three attachment styles. The questionnaire consists of three sets of statements that each describe a style (Appendix A). Once the respondent chooses the best fitting option they must rate, on a Likert scale, how well the chosen statement fits them as an individual. This tool is straight forward but also limited by its fixed responses.

Another instrument is the Experiences in Close Relationships- Revised (ECR-R) Questionnaire. The ECR-R Questionnaire was originally developed by Brennan, Clark, and Shaver (1998) and revised by Fraley, Waller, and Brennan (2000). The questionnaire includes 36 items, and measures attachment style on two subscales: avoidance and anxiety. The respondent is instructed to answer each question based on how they experience their relationships in general and not just the one they may be

experiencing at the time (Appendix B). The ECR-R measures attachment style in both romantic and interpersonal relationships which are both helpful in assessing a person's attachment construct with respectable reliability and validity (Sibley & Liu, 2004). Attachment styles extend to all types of relationships and assessing a person's relationship with a romantic partner also contributes to discovering more about their relationships with family members and friends (Bowlby, 1988). Another assessment that followed the ECR-R and is also created by Fraley and his colleagues (2006, 2011): The Relationship Structures Questionnaire.

The Relationship Structures (ECR-RS) Questionnaire is another self-report instrument that measures a person's attachment patterns but differentiates between a variety of close relationships, unlike the ECR-R. The ECR-RS consists of 9 questions that are presented 4 times for each type of relationship (mother, father, romantic partner, and best friend) (Appendix C).

Using a combination of these questionnaires may be the best way to develop a well-rounded assessment of someone's attachment styles through a variety of their relationships. The self-report questionnaire, while limited to its discreet categories, can be very convenient because it is a direct translation from Ainsworth's Strange Situation Task classifications. Attachment styles from early childhood can be applied to adult attachment because those styles are maintained into adulthood. However, there are differences in attachment style behaviors from infancy to adulthood because the relationships we experience as children are fundamentally different than those we experience later in life.

Permanence of Attachment Style. Bowlby identified a difference in observable attachment styles from the early months of life to later years. In the early months of an infant's life, an individual displays "the component responses of what will later become attachment behavior," however the "organized pattern does not develop until the second half of the first year (Bowlby, 1988, p. 1482)."

Studies have found that patterns of attachment assessed at 12 months are highly predictive of behavior in nursery groups 3 and a half years later (Sroufe, 1985, as cited in Bowlby, 1988) and 5 years later (Main & Cassidy, 1988; Warter, 1986, as cited in Bowlby, 1988). Further research has found that the way a child is treated by his/her parents is frequently correlated with how parents, specifically mothers, describe their relationships with their own parents, thereby creating an attachment style circuit (Main, Kaplan, & Cassidy, 1985 cited in Bowlby, 1988).

While a child's attachment style remains malleable for the first few years of his/her life, with time the stability of attachment and the patterns exhibited become a part of the child and "persist [into adulthood], but are complemented by new bonds, commonly of a heterosexual nature [2] (Bowlby, 1988, p. 1468)." An important part of any relationship, sexual or not, is communication. The bonds experienced between infants and their caregivers can initially only consist of communication by means of emotional expression and the behavior that accompanies it (Bowlby, 1988). This non-verbal communication is what is frequently studied in dogs since they rely on non-verbal communication to interact with humans. While later on in a child's life, speech supplements communication, when a child's attachment is developing they use body language and behavior to communicate. Communication is only one of many parallels that can be drawn between the parent-infant and human-dog dyads.

Attachment in Dogs

Somewhere along domestication dogs developed the ability to use mutual gaze as a means of communication within the human social sphere. Nagasawa et al. (2015) suggest that both humans and dogs cognitively transformed. The argument is that the relationship between dogs and humans was tailored by co-evolution, rather than as a random product of humans' and dogs' individual evolution. Furthermore, the changes that occurred in dogs, such as the development of "human-like communication modes (Nagasawa et al., 2015, p.1)," were a by-product of their intersecting evolutions and may also

have been fueled by changes in temperament, such as lowered fear and aggression as Belyaev suggested in the 1950s. This idea suggests that the co-evolution resulted in the human social cognitive system shifting to accommodate the dog while the dog simultaneously transformed to better fit into that same system. The dual evolution Nagasawa et al. suggests brought humans and dogs closer together socially provides an explanation for how a system of attachment could have developed. The co-evolution of both humans and dogs resulted in physiological changes within their affiliative systems. These changes reorganized the neural systems that control attachment and may have "enabled cohabitation" and the "development of human-like modes of social communication in dogs (p. 1)."

A lot of evidence for dogs having evolutionarily transformed into the human social sphere comes from research on differences between the social referencing and attachment systems in dogs and wolves. The contemporary grey wolf descended from the same ancient grey wolf the dog evolved from but did not stray as far physiologically. Comparing the two sub-species provides a kind of "before and after" perspective that clearly reveals what changes occurred in dogs through their evolution from the ancient grey wolf.[3]

Social Referencing and Attachment in Dogs versus Wolves. The differences in social cueing and attachment between dogs and wolves show a divergence between how dogs behave and interact with humans now and how they may have behaved before their extensive evolution[2]. Miklósi et al. (2003) conducted a study that looked at the difference between wolves and dogs using social cues when communicating with humans. Their goal was to look at the differences in "communicative abilities of dogs and wolves" when given a challenging task.

Using two behavioral tests ("bin-opening" and "rope-pulling") Miklósi et al. (2003) observed the dogs' and wolves' reactions to an insoluble problem. First the dogs and socialized wolves were given time to learn how to maneuver the problem during six separate 10-minute-long occasions or "training

trials." Once each animal was able to successfully open the bin or pull a rope (depending on which task they were given), the animals were then given the same tasks but the bin was un-openable and the rope un-pullable, making both tasks insoluble. During the unsolvable trials, "the direction, duration, and latency of looking/gazing behavior were recorded (p. 764)." While there were no differences in the time it took both dogs and wolves to open the bin or pull the rope in the training trials, there was a discrepancy in behavior when the trick box and rope were used. During this last trial, the dogs were quicker to look back at the human and once they did look back, they spent more time gazing than the wolves did. The researchers believe that because the dogs "initialized communicative face/eye contact (p. 764)." quicker and for longer periods of time than the socialized wolves it meant that "dogs are bound to a lesser degree to the 'attracting effects of the food (p. 764)," thereby more readily available to direct all their attention to humans. They also thought that the wolves' failure in the last trial "can be attributed to their decreased willingness to look at the human (p. 764)." They further report that "preferential looking at the human" may be a "genetic predisposition" present in dogs that enables them to direct attention to and seek information from humans (p. 764). It is thought that one of the first changes that occurred in dogs during domestication was the selection of these "human-like" or more specifically, "infant-like" communicative behaviors. By seeking guidance and information from the humans when they were incapable of reaching the food, the dogs used the human experimenters as a base of security in a way that the wolves did not.

The difference in behaviors related to communication and attachment outline a clear genetic divergence between the two subspecies and those changes are "presumably the result of 10,000 years of domestication (Topál et al., 1998, p. 225)." Furthermore, the "observed behavioral changes in owner-dog dyads fulfilled the operational criteria of attachment (Gerwirts, 1972; Rajecki et al., 1978, as cited in Topál et al., 1998, p. 226)," observed between mothers and their infants. In Miklósi et al.'s (2003)

experiment the dogs used the experimenters as a secure base in an uncertain situation the way a child might use his/her mother. Topál et al. (2004) ran a study to more closely distinguish the differences in attachment between dogs and wolves.

Topál et al. (2004) designed a comparative experiment looking at the attachment behaviors towards humans in hand-reared wolf puppies, hand-reared dog puppies (who were raised by the same group of women raising the wolf puppies), and pet dog puppies (who were reared by their canine mother until 7-9 weeks of age and then moved to a human household). They hypothesized that their results would follow the domestication hypothesis, and sure enough they found "species-specific differences in attachment behaviour to humans (Topál et al., 2004, p. 1368)" between wolves and dogs. In order to measure the levels of attachment Topál et al. used a method he and his colleagues had previously published in 1998 which was adapted from Ainsworth's Strange Situation Task and applied to dogs.

Measuring Attachment in Dogs. When applying Mary Ainsworth's Strange Situation Test to dogs it had to be adjusted slightly. The canine behaviors observed throughout the SST fit into the pre-existing categories Ainsworth has outlined for children, making canine attachment even easier to apply to their relationships with humans. Considering the research revised already, it is not surprising that when assessing the dog's human-like attachment to humans we see a stark contrast with wolves and their lack of attachment to humans. Topál et al. succeeded in "examining the effect of socialization in dogs and the genetic influences," that affected "the attachment of dogs to owners (Topál et al., 1998, p. 228)," by applying human-infant research to the human-dog relationship (Appendix D). Creating a bridge between infant research and canine research further encouraged the inter-species comparisons.

Comparing Infants to Dogs. Many of the social traits observed in canines are thought to be "functional matches of respective human traits," which is why they, "are referred to as 'human (infant)-like (Miklósi & Topál, 2013, p. 288).'" The gazing behavior Miklósi and his colleagues (2003) analyzed

is viewed as a "specific social skill," that is "advantageous for dogs to display" when they are "[interacting]…with humans (p. 291)." It is equally advantageous for human infants to display such social skills in order to maintain communication, connection, and proximity to their caregiver.

Miklósi (2015), in his book on dog behavior, evolution, and cognition, reviews a variety of aspects involved in the human-dog relationship. He states that if it is assumed "the human-dog relationship is a form of filial attachment, then the dog's role is analogous to that of a human infant (Miklósi, 2015, p. 8933)." The numerous connections drawn between children and dogs made it very easy for Topál et al. (1998) to conduct his studies on human-dog attachment using Ainsworth's SST to measure their attachment behaviors.

While Ainsworth's original work and Topál's adaptations considerably advanced our ability to assess attachment in dogs and in children, it focused only on observable behavior. Attachment behaviors between animals are very important for maintaining safety and receiving guidance from those better fit to survive in the environment, but behavior is not the only measure. Research suggests that there are various physiological correlates of attachment.

Physiology of Attachment

Physiological Markers of Attachment

Bowlby's theory on attachment opened the field to a lot of behavioral research, particularly looking at micro-behaviors between mothers and their infants and their longitudinal effects, however, Bowlby's theory also suggested that a strong biological connection exists between mother and infant when bonding. Research has found physiological parallels that can be used to measure attachment between two individuals. Physiological markers of attachment can be hormonal, neurological, or autonomic, to name a few. As research has found significance in the synchronicity of behavior between caregiver and taker, there is also synchronicity in these

psychological markers making both behavior and certain physiological measurements useful when assessing the attachment between a mother and infant, romantic partners, friends, or humans and their dogs.

Physiological Synchronicity in Mother-Infant Dyad. Ruth Feldman's (2012) *bio-behavioral synchrony* theory takes into account the interactions between physiological and behavioral aspects of attachment such as an infant's physiological reaction to his/her mother's behavioral cues.

Early research conducted by Hofer (1994) suggested that even a mother's physical proximity affects an "infant's physiological systems (Hofer, 1994, p. 206)" and furthermore, "active maternal behavior," (which may include licking-and-grooming, gazing, vocalizations, etc.), "shapes Oxytocin-dependent affiliation networks and stress management systems (Meaney, 2010, as cited in Feldman, 2012, p. 13)." In order for a mother to trigger her infant's physiological responses, she must make contact although "human synchrony, which includes the modalities of gaze, affect, and vocalizations, is thought to be sufficient to induce tangible changes in the infant's ongoing physiological response (Feldman, 2012, p. 13)." What this means is that *how* a parent interacts with their infant affects that infant's physiological processes and thereby their growth into a social being. This is also true of dogs and how humans initiate contact during a reunion period (Rehn et al., 2014).

Feldman's lab ran a number of studies to test the interactive synchrony (i.e. mutual gazes, vocalizations, etc.) and biological synchrony (i.e. heart beat, oxytocin levels, etc.). Feldman (2012) took pairs of mothers and their 3-month-old children and videotaped them during face-to-face interaction while measuring their heart rhythms. They found that during social interactions, which included gazing at one another, maternal vocalizations directed toward the infant, and

affect synchrony, that the pairs' heart rates synchronized "with lags of less than 1 second (Feldman, 2012, p. 14)." Feldman believed this was evidence of bio-behavioral synchrony. These findings also exemplified the power of non-verbal synchronizations and cues between mother and infant, also present in a human-dog dyad. Feldman also performed experiments aimed at measuring hormonal responses correlated to synchronous behavior of mother and infant. One hormone in particular is crucial in attachment: Oxytocin.

Oxytocin. Oxytocin is a hormone that regulates social bonding, often referred to as the "love hormone." The oxytocin system corresponds to the hypothalamic-pituitary-adrenal axis (HPA) which regulates stress response. In a social application, Feldman (2012) suggests the system works to "enhance social affiliation through the sense of well-being associated with close bonds (Feldman, 2012, p. 383)," allowing a person to feel safe when socializing. Gordon et al. (2008) found that OT functions primarily to increase calm states, reduce stress and negative moods, as well as facilitate social behaviors such as approach that are crucial for affiliative relationships (Gordon et al., 2008).

Mutual Gaze and Oxytocin. Kim et al. (2013) set out to study the relationship between oxytocin responses in mothers and periods of mother-to-infant gaze when their children were and were not in distress. The modified still-face procedure (MSFP) (Koos and Gergely, 2001) is designed so that the mother's behavior can be examined in the absence and presence of her infant's signs of distress. They found that the maternal oxytocin response would rise when mother was gazing at the child and lower when attention was directed elsewhere, suggesting that oxytocin plays a role not only in the infant (or one who takes that role) but also in the caregiver. They also discovered that there was a higher level of maternal oxytocin when the child was exhibiting distress, than before the still-face phase had occurred. Additionally, a distinction was

made between the length of gaze and frequency gaze was directed elsewhere: "maternal peripheral oxytocin response was positively associated with the duration of mother-to-infant gaze, while negatively associated with the frequency with which maternal gaze was directed away from infants (Kim et al., 2013, p. 137)." Kim et al.'s findings not only support previous research on mother-to-infant synchronous behavior but also support Bowlby's original attachment theory that the "biological function of mother-infant attachment…(is) one of ensuring the infant's access to the mother in times of distress." Buchheim et al. (2009) also investigated oxytocin onset in response to attachment behaviors by administering oxytocin and observing how attachment behaviors changed in response.

Administration of Oxytocin. Buchheim et al.'s (2009) research looked at secure and insecure attachment patterns between caregiver and infant resulting from "repeated interactions" between the pair. Based on previous research suggesting that oxytocin promotes social approach behavior, they hypothesized that it may also "promote the experience of secure attachment in humans (Buchheim et al., 2009, p. 1420)." They were particularly interested in the intranasal administration of oxytocin that "was expected to enhance the subjective perception of attachment security in insecurely attached individuals (p. 1420)." Buchheim et al. used an adapted version of the Adult Attachment Projective Picture System (AAT) (George & West, 2001). After administering a variety of doses of oxytocin intranasally they found that one dose (24 IU of oxytocin) was enough to increase attachment security. When they administered oxytocin, the attachment security reportedly rose while the attachment insecurity decreased seemingly creating a "*momentary* state of mind change (Buchheim et al., 2009, p. 1420)" where insecure subjects felt more secure. Therefore, we can infer that when naturally produced within a person, oxytocin regulates an individual's sense of security in their affiliative relationships. While baselines vary

from one individual to the next, it can be assumed that if an infant is measured to have high oxytocin levels (Szeto et al., 2011 & Amico et al. report 1.8 +- 0.4 pg/ml as an average human baseline) when interacting with his/her parent that the infant experiences a high sense of attachment security and the same goes for parental oxytocin levels when interacting with their child. The opposite would also be true: when oxytocin levels are low, an individual experiences low levels of attachment to an individual with whom he/she is interacting. More research using oxytocin as a physiological measurement for attachment levels was published by Nagasawa et al. (2012), who identified oxytocin as being a part of the "attachment style circuit" or as him and his colleagues refer to it: the "positive loop of social bonding (Nagasawa et al., 2012, p. 6)."

Nagasawa et al.'s (2012) research drew important connections between behavior and physiological changes that occur within the same interactions, providing strong support for the *bio-behavioral* theory Ruth Feldman proposed. This research led to Nagasawa et al.'s (2015) research that found these same circuits or positive loops in the dog-human dyad. In order for Nagasawa et al. successfully tested canine and human levels of oxytocin by taking urine samples before and after interactions. While urine samples were successful for Nagasawa et al., there are a variety of different testing methods, some arguably better than others.

Measuring Oxytocin. In order to use oxytocin as a reliable measure of attachment, special procedures exist. Samples can be taken from blood, milk, serum, saliva, and urine (to name a few). The Oxytocin enzyme-link immunosorbent assay (ELISA) Kit is a secure and reliable way to measure oxytocin levels in blood, culture supernatants, milk, serum, saliva, and urine. The ELISA Kit includes GxR IgG Microtiter plate, Conjugate, Antibody, Assay buffer, Wash buffer concentrate, Standard, pNpp Substrate, and a Stop solution which can all be used to measure oxytocin levels in whichever sample is collected. Collecting method varies depending

on which sample is chosen. For saliva, a cheek swab is sufficient. Deceivingly, urine samples are not as simple as they seem. Rather than waiting for a subject to urinate, a catheter must be installed and the urine extracted from within. This is necessary because in an experiment where before and after measurements of oxytocin are going to be compared, oxytocin release and extraction is time sensitive and while a blood sample extracted directly after a desired interaction will show the change in oxytocin, urine has a lag time of one hour before changes in oxytocin level are detectable (Mitsui et al., 2011). Blood samples can be extracted using herapin vacutainers as Robinson et al. (2014) describe where they extract they extract their sample from the extradural vein. Blood is usually cited as having the highest reliability (Robinson et al., 2014) and while urine is thought to be a less reliable measure, it is reportedly more reliable than saliva.

There are a lot of controversies on the variety of methods used by scientists trying to measure oxytocin. People claim that saliva, by far the easiest and fastest to collect, does not hold significant levels of oxytocin to be a legitimate measure. Similarly, urine is thought to have skewed levels of oxytocin in comparison to plasma samples and additionally, urine sampling is deceivingly invasive, requiring installation of a catheter to extract samples at the exact right time (Horvat-Gordon et al., 2005; Mitsui et al., 2011; McCullough et al., 2013). Other sources cite that blood, or plasma samples, vary in their readings of concentrations if the sample is raw versus extracted[4]. Even with this discrepancy, plasma samples are faster, more reliable, and the extraction of blood, while it can be stressful, does not effect the levels of oxytocin within the sample collected and so, it the best sampling option available (Robinson et al., 2014). With that said, Nagasawa et al.'s (2012, 2015) research team decided to use urine extraction. This may because while there is a "time-lapse between secretion of OT into the blood and secretion of OT in urine" of one hour, urinary OT can still be a "useful biomarker (Mitsui et al., 2011, p. 242),"

for positive emotions and attachment.

Oxytocin, Reciprocal Communication, and the Positive Loop of Social Bonding in Dogs. Nagasawa et al. (2012, 2015) found oxytocin to play a large role in "reciprocal communication" as well as controlling the "positive loop of social bonding" between a mother and her infant. Oxytocin releases into the central nervous system where it enhances "sensory, physiological, and behavioral functions." It was previously discussed that maternal behavior encourages an infant to display affiliative behaviors which in turn enhance the mother's desire to express more maternal behavior towards her child thereby creating a loop (Feldman, 2012; Nagasawa et al., 2012, 2015). Now we introduce the crucial middle section of that loop: Oxytocin. A mother's "affiliative behaviors are enhanced by oxytocin" and her negative experiences such as "pain, stress endocrine, and anxiety… are diminished by oxytocin (Nagasawa et al., 2012, p. 7)." When triggered by attachment behavior, oxytocin in turn also triggers a rise in attachment behaviors, although, oxytocin appears before an infant is born. A mother's hormones change during pregnancy and oxytocin is released when stimulated by the partum hormone changes as well as the infant's affiliative behavior (Table 1). This loop was researched in mice but is a model of human mothers and their infants but most interestingly, Nagasawa and his colleagues (2015) found that the oxytocin positive loop also exists between humans and their dogs.

Nagasawa et al. (2015) not only further researched oxytocin and the extent of its involvement in our affiliative systems but also applied what we know about human relationships to the dog-human dyad, extending the connections that can be made between infants and dogs while advancing the research into human cognition using dogs as a model. Nagasawa et al. reviewed the presence and importance of gazing behavior in the human-dog relationship which,

as previously mentioned, is a communication tool used by humans and thought to have been adopted by dogs through domestication (Hoffman, 2015). Nagasawa discovered a human-dog bond is similar to a bond between two humans by testing oxytocin in the humans before and after periods of gazing with their dogs. The team found that urinary oxytocin concentrations increased in response to a dog's gaze (Table 2). In order to see how strong the relationship between oxytocin and affiliative behaviors were the team took one step further. Nagasawa et al. (2015) nasally administered oxytocin to the dogs and had them interact with their humans. The result was an increase in the dogs' gazing behavior which increased the humans' urinary oxytocin concentrations and the rest of the loop unfolds naturally (Figure 2). Their findings provided further support for the existence of an "interspecies oxytocin-mediated positive loop (Nagasawa et al., 2015, p. 1)" that is facilitated and modulated by gaze.

Research has found humans and dogs to be behaviorally, hormonally, and historically connected for a very long time. Even with this knowledge, we continue to neglect our responsibilities to protect them. In instances where people do welcome dogs into their homes, those human-dog pairs sometimes fail but it is also our responsibility to fix that and try to increase the amount of successful pairs and decrease the amount of forgotten dogs left behind.

Successful Versus Unsuccessful Human-Dog Pairs

Statistics Today

There are approximately 13,600 independent and unmonitored animal shelters in our nation. There is no institution responsible for gathering statistics on animal population or treatment in the United States so the only statistics available are estimates that vary from state to state. Based on those estimates, and according to the American Society for the Prevention of Cruelty to Animals (ASPCA), there are approximately 7.6 million companion animals, 3.9 of

which are dogs, that enter shelters each year in the United States alone. Of that 7.6 million, 2.7 million are euthanized, 1.2 million of which are dogs. Only 10% percent of animals received by shelters are spayed or neutered and a fertile, female dog produces an average of one litter a year which usually contain approximately four to six puppies. If a litter of puppies, especially in very cold or hot climates, is not rescued soon after birth the likelihood of survival is dangerously low and the same is true for the mother of the pups.

When dogs are brought into shelters, regulations of how to process the dogs, when to euthanize them, and which euthanasia methods to use vary from shelter to shelter and state to state. Overall, the rules are rather strict. There are generally two types of shelters: kill and no-kill. Kill shelters usually have a 5-day holding rule, if that, which means once a dog is brought into a shelter, if he/she is not reclaimed or adopted within 5 days he/she will be euthanized. The methods used to euthanize shelter animals vary based on funding, size of shelter, and state regulations. Some methods are more horrific than others. When there are large amounts of animals that need to be euthanized each day a gas chamber may be used where numerous dogs and cats are forced into small metal boxes where they are gassed to death. Other methods include lethal intravenous injections, breaking their necks, and shooting a bullet through the front of the skull. These methods are those that are permitted while at some shelters you can find the same cruelty reported in slaughterhouses where animals are beat to death. Humans relinquishing their pets may (and should) take these facts into consideration and make the effort to deposit their dog at a no-kill shelter.

No-kill shelters, often referred to as “Limited Admission” shelters do not accept dogs without appointments and can have long screening and adoption processes (Kelly, 2015). No-kill shelters supposedly do not euthanize the animals coming in unless the animals are sick with little

to no chance of recovery however, there is controversy on whether or not this is true. Since shelters are not regulated, it is hard to know what they do and do not do with their animals. Because no-kill shelters do not euthanize their animals space is limited. The 5-day rule (5 days after entry a dog will be euthanized if it is not adopted out) that a lot of kill-shelters enforce is to ensure that the incoming pets can steadily fill the space the "outgoing" pets vacate.

The reality is that there are a staggering amount of dogs that arrive at shelters as either returned pets, strays, hit and runs. The best outcome for a dog (or cat) that enters a shelter- especially those at kill shelters- is to be quickly and successfully adopted by someone and not return to the shelter. While approximately 2.7 million of the 7.6 million animals in shelters are adopted, 1.4 million of which are dogs, a staggering amount of these dogs are returned to the shelter. The ASPCA (Weiss, Mohan-Gibbons, & Zawistowski, 2015, p. 3034) reports that the "intake of dogs and cats into animal welfare organizations result from animal control picking up strays, good Samaritans bringing in strays they find; cruelty cases such as hoarding, puppy mill, and dog fighting cases; seizure of animals for a code violation; and owned animals relinquished by their owners (p. 3034)." Pet relinquishment has been reported to account for over a over 50% of shelter intake in some communities (Salman et al., 1998, as cited in Weiss, Mohan-Gibbons, & Zawistowski, 2015). Again, the exact numbers are nearly impossible to obtain.

The American Human Association reports that the top reason people return or give their dogs away is due to an issue with the landlord (29%), not having enough time (10%), and a divorce, death, or a behavioral issue (10%). Because these statistics are not well recorded, the numbers are frequently not agreed upon. For example, a national study found that behavior problems (*not* issues with landlords) are the most common reason for canine relinquishment (Salman et al., 2000, as cited in Weiss, Mohan-Gibbons, & Zawistowski, 2015). Unfortunately,

no matter why a dog finds him/herself in a shelter, most people see rescue animals as damaged goods with an abundance of problems making them the unattractive option when looking for a dog.

While shelters cannot afford to turn people away, it *is* possible to increase the chances of successful human-dog pairs. A few systems have already been created that are designed to increase successful adoption by performing pre and/or post-adoption assessments.

Adoption Programs

Adoption programs are systems designed to assess adoptions and improve human-dog pair relationships by assessing a match, foreseeing any substantial problems that may arise in a particular pairing, and providing any necessary support. In their paper, Neidhart and Boyd (2002) discuss ideas on how to "enhance adopted companion animal retention and owner satisfaction," They suggest that information is of the utmost importance when adopting an animal, especially one that requires as much attention as a dog. Neidhart and Boyd (2002) propose that if more information is provided to adopters before adoption as well as providing education on the various services that are available to them it may help prepare adopters to care for an animal and overcome issues along the way. Information on veterinary care and vaccinations could prevent future health problems that may impede a human from being able to keep their companion animal. It is also suggested that shelters should enforce screening methods to "dissuade people from adopting for the 'wrong' reasons or to direct them to the most appropriate companion animal." Some adoption programs currently exist and attempt to address some of the aforementioned issues. Two programs already in motion are: Meet Your Match Canine-ality program and Match-Up II Shelter Dog Rehoming Program. Some of these programs may provide both pre- and post-adoption assessments that assess potential or pre-existing matches. Some

post-adoption programs follow-up with adopters and their new companion animals to see how the relationship is progressing. The length of time these programs follow up with the adopters also may make a difference because most dogs are returned within the first 6 months (Neidhart & Boyd, 2002) to a year after adoption (New et al., 2000) while "dogs owned for two years or more [are] at decreased risk of relinquishment (New et al., 2000, p. 188)."

Any shelters trying to improve the adoption experience turn to short temperament and behavioral assessments. One example of these assessments is the ASPCA SAFER Aggression Assessment. The SAFER assessment is a 7-item test designed to predict the potential aggression of a dog and determine whether the dog will fit into a home or not (Appendix E). The assessment usually takes 10 minutes to complete making it efficient for over populated and understaffed animal shelters. Another simple tool is Valsecchi et al.'s (2011) Temperament Test (TT). The TT has been validated, has strong test-retest reliability, and also takes little time to complete. It includes 22 subtests and assesses a dog's behavior in a kennel, human sociability, docility to leash, cognitive skills, playfulness, reactivity, and intraspecific sociability (Appendix F). Both of these tests provide a prospective adopter with a glimpse into what kind of dog they would be welcoming into their home, helping them make the right decision and informing them of each dog's peculiarities. These kinds of instruments are attractive to animal shelters because they require less effort and man hours than other adoption programs do. Large animal shelters that need to have a quick adoption turnover rate in order to take in more animals need affordable and fast measurements that may positively affect their adoptions. The downsides of only using these assessments are that 1) they are usually only performed when the dogs are in the shelters, and stress could affect the way they performed in their behavioral exam and 2) these tests do not take into account who the adopter is and it is important to account for both sides of a partnership.

Adoption programs consider the adopter as well as the dog and are more involved in the process, making more of an impact. Shelters that can afford to apply longer-term programs are encouraged to do so as some have shown documented success.

The ASPCA reports that the Meet Your Match program has "decreased return rates and increased adoptions (Weiss, Mohan-Gibbons, & Zawistowski, 2015, p. 7829)." These are the overarching goals of adoption programs that usually target lifestyle of adopters to find the perfect dog for them. For example, an adopter that is very active would do best with an active dog as opposed to a dog with trouble breathing or a pre-disposition to become obese and lazy. The Match-Up II Shelter Dog Rehoming Program (Animal Rescue League of Boston, 2011, as cited in Weiss, Mohan-Gibbons, & Zawistowski, 2015) uses a dog's behavioral evaluation to determine whether he/she is a good match for an interested adopter. Dogs are scored based on "friendliness, fearfulness, excitability, aggression, ability to follow commands, and playfulness (Weiss, Mohan-Gibbons, & Zawistowski, 2015, p. 7625)." The information gathered on a dog will then be used to decide whether the dog is fit for a regular adoption, if he/she needs behavioral modification, pre-adoption counseling, or if he/she needs to be placed in a foster home or different rescue group before going through adoption.

The Meet Your Match Canine-ality behavioral assessment (ASPCA, 2011, as cited in Weiss, Mohan-Gibbons, & Zawistowski, 2015) similarly uses behavioral information to determine when, how, and if the dog will be adoptable by the general public. Adopters that come into a shelter and use the Meet Your Match program are assessed and assigned a color-coded badge that will be matched up with a dog's badge based on a behavioral assessment. The dogs in this program are judged on the same attributes as the Match-Up II Program. Both programs attempt to inform adopters of the dogs' behaviors and personalities which, according to Neidhart

and Boyd (2002), enhances satisfaction and retention. While using attributes such as behaviors and personality, have been suggested to increase successful adoptions, they are also aspects of humans and dogs that may not be constant. A normally playful dog could be terrified in a shelter and refuse to interact with staff members thereby appearing standoffish. The high stress and erratic behavior of dogs within shelters may dissipate when they get out but any assessments performed within shelters that are aimed at analyzing behavior and personality often incorrectly judge those dogs and affect their chances of adoption (Weiss, Mohan-Gibbons, & Zawistowski, 2015).

Unfortunately, yet unavoidably, the existing programs cannot eliminate all unsuccessful adoptions. Addressing and overcoming these problems in the formative period of the relationship is one of the driving forces that determine whether a person experiences satisfaction in their relationship or returns their dog to a shelter. Achieving compatibility is challenging some people search for it their entire lives. Adoption programs attempt to secure that connection between humans and dogs, nurture it by providing information and support pre- and post-adoption (depending on the program), and assess if the fuse is successful.

Compatibility

Compatibility is hard to measure between humans and especially hard to measure between humans and dogs. A compatible pair requires two individuals who are attached to their partner and are willing to work on the connection by communicating and compromising. While all of these qualities sound like descriptions of human relationships, they are equally important for human-dog pairs. The unsuccessful human-dog pairs, similar to unsuccessful inter-human relationships, often fail due to some aspect of incompatibility.

Measuring satisfaction in a relationship is difficult in any relationship but especially hard when one of the parties cannot use spoken language to express him/herself. Maclean et al. (2014) suggests that in order to measure a dog's satisfaction one must measure his/her quality of life. Objective measures such as exercise, health, food intake, socialization, etc. can provide reliable gauges as to whether a dog has a satisfactory life. Simple measures such as appropriate weight, long standing health problems, and general signs of neglect can usually be identified by veterinarians however, there are also many dogs that seldom have appointments. I have created the Canine Care Questionnaire (CCQ) which is designed to assess other important aspects to a rich quality of life for a dog such as socialization, exercise, stimulation, affection and attention, as well as the standard food intake, weight, preventative care (flee and tick medications), and general health (Appendix G). The questionnaire is filled out by the human, preferably before a veterinary appoint because it is most accurately scored by a veterinarian. The veterinarian can adjust any responses that do not correlate with his/her exam, such as marking your dog at a healthy weight when he/she is actually overweight. The CCQ is designed to take a snapshot of a human's routine with his/her dog to assess if the dog receives the attention and care that would result in a satisfied dog.

It is easier to assess human satisfaction in an adoption because humans can report how they are experiencing their relationships. Humans often adopt dogs with certain expectations of what the experience will be like. Reasons why people adopt dogs also affect satisfaction rates post-adoption. The Pet Expectations Inventory (Kidd, Kidd, & George, 1992) (PEI), is designed to assess what a person expects from their dog before adopting (Appendix H). What is missing is a post-adoption assessment to see whether those expectations were met. I have created a questionnaire that is designed to follow the PEI called the Pet Realities Inventory (PRI) by taking

the 13 statements from the PEI, which begin with "I expect", rewording them as definitive statements. If the scores are then subtracted, the PRI final score reflects the expectations not met, so the higher the score the fewer of adopter expectations were met (Appendix I).

The CCQ and the PRI are post-adoption tools that can be used to assess how a human-dog relationship is forming. As was previously mentioned, a lot of these programs problematically use variables that are vulnerable to the shelter environment. Using a measurement that displays minimal variation over time and is not sensitive to changes that occur within shelters may be a more effective way of determining successful matches pre-adoption. One measurement that research has shown forms early on and shows permanence over time is attachment style.

Rationale for Current Study

Research has shown that dogs have attachment styles the same way humans do and that those attachment styles interact throughout a relationship. Whether an individual is secure, anxious, or avoidant, his/her ability to communicate and function within a relationship varies. Which attachment styles are paired also affect how pairings evolve since both individuals participate. If communication and adaptation can occur between a pair, there are greater chances of survival and attachment style may affect how an individual communicates with a partner and furthermore particular attachment style pairings may be more successful than others.

Based on the comparative literature of infant and canine cognition and attachment behavior as well as the research that exists on canine social referencing, I hypothesize that there will be a correlation between certain attachment style pairings and measures of compatibility between dogs and their humans. Specifically, I hypothesize that in order for a pair to communicate and adapt through problems that arise, one of the individuals in the relationship has

to have a secure attachment style and provide a base from which the pair can grow. Furthermore, if the pairs found to be most compatible are enforced at adoption, I hypothesize that return rates will lower which should lower euthanization rates[5] and eventually promote more successful adoptions of shelter dogs.

The first step I propose is determine which attachment style pairings are most successful based on satisfaction within the relationship, quality of life, and oxytocin levels in both humans and dogs.

Study One

Method

Subjects. Four-hundred dog-human pairs will be recruited from Arizona's Animal Welfare League & SPCA's list of previous adoptions. Because a fundamental part of this study is measuring attachment-style pairings, recruitment will continue until 100 secure-secure pairings, 100 secure-insecure pairings, 100 insecure-secure pairings, and 100 insecure-insecure pairings exist within the sample.

Success in a pairing will be determined by the oxytocin measurements of both human and dog, as well as human self-reports on canine care and attitudes towards pets.

Dog-human pairs will be asked to participate if: 1) the adoption was finalized at least one year prior, 2) the dog has spent 95% of that time in the human's care although dog walking and daycare are acceptable, 3) the dog is not taking any temporary medication such as antibiotics, and 4) dog is at least 15 months of age and the humans, 25 years of age.

Humans will be contacted via phone and asked if they would be willing to participate in a study investigating adoption success. If the people called report still having their dogs, meet the preliminary requirements, and show interest in participation, appointments will be made for the

first round of testing.

Instruments. ***Experiences in Close Relationships-Revised (ECR-R).*** The first test is measuring attachment styles for both dog and human. I will use the Experiences in Close Relationships-Revised (ECR-R) questionnaire first described by Brennan, Clark, and Shaver (1998) and later revised by Fraley, Waller, and Brennan (2000). The ECR-R questionnaire includes 36 items that assess adult attachment style on the two subscales: Avoidance and Anxiety. A description of the measure states that generally "Avoidant individuals find discomfort with intimacy and seek independence, whereas Anxious individuals tend to fear rejection and abandonment (Fraley et al., 2000)," which coincides with John Bowlby and Mary Ainsworth's descriptions of the attachment styles.

The ECR-R questionnaire assesses attachment on two subscales in order to provide a more detailed reading of a person's attachment style. Participants taking the assessment are given short generic instructions: "The statements below concern how you feel in emotionally intimate relationships. I am interested in how you *generally* experience relationships, not just in what is happening in a current relationship. Respond to each statement by [web:clicking a circle] [paper: circling a number] to indicate how much you agree or disagree with the statement." The first 18 items of the assessment measure attachment related anxiety and the questions 19-36 measure attachment-related avoidance, although, when the questionnaire is provided for a participant the order of the questions should be randomized. The participant is asked to respond on a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Fourteen of the items are reverse scored. Once those adjustments are made, averaging a given participant's responses for questions 1-18 (before randomization) will provide the attachment-related anxiety score and averaging items 19-36 will yield the attachment related avoidance score.

The ECR-R term "romantic partners" will be replaced with "others" in this study. Additionally, changing "others" to "dog" or "dogs" would be unnecessary since permanence research suggests that the attachment style we display in one relationship is the same in another.

Topál et al.'s (1998) Strange Situation Task (SST). The room used to test the dogs will be a 6m long by 3m wide by 2.5m high rectangular room. Mimicking the setup in Ainsworth's SST, the room will also be relatively empty except for two chairs and some dog toys at the end of the room opposite the door. The procedure, lasting 14.5 minutes, includes an introductory video lasting 30 seconds as well as seven, two-minute-long episodes. The 14.5 minutes of video-recorded behavior is then analyzed.

In the first episode I will introduce the human and dog to the room and then exit. In the next episode (episode one) the human will not interact with the dog while he/she is exploring and after a knock (one and a half minutes into the episode) they will start to stimulate play with their dog for another 30 seconds. Episode two will involve a stranger entering and sitting down. The stranger will be the same person for each episode. Once 30 seconds have passed the human and the stranger will converse. After another 30 seconds the stranger will try to play with the dog and eventually the human will quietly leave the room, leaving the leash on the chair. In the third episode, the dog and the human are separated for the first time. The stranger will continue engaging with the dog, keeping him/her from going to the door. If the dog will not play the stranger will continue to pet and once one minute has passed the stranger will stop all contact and playful behavior. If the dog initiates contact, the stranger can continue.

The fourth episode will be the first reunion between human and dog. The human will walk up to the closed door and call the dog's name. Then he/she will open the door, pause, and then greet and comfort his/her dog during which the stranger will leave. Then the human will tell the

dog to “stay here” and leave the dog alone, again leaving the leash on the chair. Episode five will be two minutes of the dog being alone in the room. until episode six when the stranger enters. The dog will continue to experience separation from their human in episode six, although, the stranger will enter again and engage with the dog the same way he/she did in the third episode. After the stranger stops engaging with the dog, only petting if the dog initiates the interaction, episode seven will begin. The second, and last, reunion will happen in episode seven when the human opens the door, pauses, and then greets the dog. The human will allow the dog to respond while continuing to greet and comfort the dog during which the stranger will leave again. The footage will then be analyzed.

I will have two trained analysts looking at the dogs’ behaviors in the video recordings for the following variables: “exploration in the presence of the owner (EXPO) and in the presence of the stranger (EXPS), playing in the presence of the owner (PLYO) and in the presence of the stranger (PLYS), passive behaviors in the presence of the owner (PASO) and in the presence of the stranger (PASS), physical contact with the owner (CONTO) and with the stranger (CONTS) and in the presence of the stranger (SBYS).” The duration of these variables is added from all seven episodes. Greeting behaviors towards humans during the reunion episodes four and seven are also analyzed and are characterized by “proximity of, contact seeking by, and contact maintenance of the dogs toward the entering owners (COSO, DCONTO, and DELO) and toward the stranger (COSS, DCONTS, and DELS).” After the videos are assessed and scoring is complete the dogs will be classified along the secure versus insecure axis from Ainsworth’s original design.

Pet Expectations Inventory (PEI) and Pet Reality Inventory (PRI). The next instrument I will use is from Kidd, Kidd, and George’s (1992) study on successful and unsuccessful

adoptions. George et al. (1992) developed the Pet Expectations Inventory (PEI) to investigate what a person expects from their dog or cat. In George et al.'s study the test was administered before an adoption and 6-month follow-ups were performed.

The PEI has 13 questions with Likert-scale responses that focus on expectations of the role a pet will take in your life. For the sake of this study I also created a parallel instrument designed to measure what role your pet realistically took in your life. The Pet Reality Inventory (PRI) will ask the same questions from the PEI, reworded for proper tense, and compare the answers to the PEI. The PRI will yield a score that expresses the difference in expectations and reality. The participants can answer 7=strongly agree to 1=strongly disagree on both the PEI and PRI. I assume that people who adopt dogs do so expecting the dog to be a positive presence in his/her life and provide them will love and affection amongst other things. Therefore, I expect the scores will range from zero (someone whose reality met their expectations) to 78 (none of the reported expectations were met) rather than -78 to 78.

Canine Care Questionnaire (CCQ). In order to measure the dogs' QOLs I have created a questionnaire that asks for various information on health and life style of the dog. The questionnaire starts with basic health questions about veterinary care, medications, number of feedings per day, etc. The questionnaire also asks about exercise, socialization, and observable behaviors suggestive of deeply rooted discomfort or anxiety in a dog. Within scoring the questionnaire, there is a key to assess which behaviors and how many of them must be indicated to be enough to cause worry. If, for example, a human indicates three anxiety-related behaviors that are occurring, one point will be subtracted from the overall score.

The questionnaire takes a snapshot of the dogs' lives, making it easier for the veterinarian, who will review the information, to identify any red flags such as typical high-stress behavior or

malnutrition. Once all answers are verified with the veterinarian's medical opinion, the questionnaire will be scored.

Oxytocin (OT) Measurements. I will measure OT levels in a plasma sample that will be extracted before and after an interaction (reunion period?) between the human and his/her dog.

I will use the Oxytocin enzyme-link immunosorbent assay (ELISA) Kit. The ELISA is a diagnostic tool used in medicine and plant pathology that works with antibodies and color changes in order to identify a substance, and in this case oxytocin levels. ELISA uses a solid-phase enzyme immunoassay (EIA) within a liquid sample to identify the presence of a substance such as oxytocin. Research has found that results are more accurate if an extracted sample is used since raw samples tend to provide skewed levels of a substance (Robinson et al., 2014).

The first step to measuring oxytocin levels in plasma is to collect samples. The dogs and their humans will be separated into two familiar lab rooms that they will have previously become acquainted with. Once their baseline blood samples have been taken the dog and his/her owner will be reunited in a room similar to the one used in the SST. After a 30-minute interaction period where the human is free to engage and play with his/her dog, both of their blood samples will be taken again. I will collect all of our blood samples from the extradural vein using 10ml lithium heparin vacutainers or EDTA vacutainers. The samples will be stored, as they are, on ice until they are spun and frozen at -70 degrees celsius. Each plasma sample will undergo a solid-phase extraction using the SEP-pak C18 columns (Szeto et al., 2011) which prepares the sample to be analyzed by concentrating and purifying the plasma. Then the Oxytocin ELISA kit (Assay Designs Inc., Ann Arbor, MI USA) will be used for analysis.

Once both samples are obtained and have undergone solid-phase extraction, I will use the oxytocin extraction procedure provided in the manual for the Oxytocin ELISA kit (catalog #:

ADI-901-153A, 5x96 Well Kit) in order to analyze oxytocin levels in the plasma samples. Below are the instructions (Oxytocin ELISA Kit, n.d., p. 7), titled "Oxytocin Extraction Protocol":

For a 200mg C18 column I suggest a sample volume no greater than 3mL.

1. Add an equal volume of 0.1% trifluoroacetic acid (TFA) in water (TFA-H2O) to the sample. Centrifuge at 17000g for 15 minutes at 4 degrees celsius to clarify and save the supernatant.
2. Equilibrate a 200mg C18 Sep-Pak column with 1ml of acetonitrile, followed by 10-25mL of 0.1% TFA-H20.
3. Apply the supernatant to the Sep-Pak column and wash with 10-20mL of 0.1% TFA-H20. Discard wash.
4. Elute the sample slowly (gravity-fed) by applying 3mL of a solution comprised of 95% acetonitrile/5% of 0.1% TFA-H20. Collect the equate in a plastic tube.
5. Evaporate to dryness under argon or nitrogen gas or with the aid of a centrifugal concentrator under vacuum. Evaporation under cold temperature is recommended. Store at -20 degrees celsius.
6. Reconstitute with Assay Buffer and measure immediately. **You will need to have at least 250µL volume (upon reconstitution) per sample in order to have enough material to run duplicates (n-2 per sample).** Please note that upon reconstitution in soluble material may be observed in some samples. Care should be taken to avoid this material when adding samples to plate wells.

> Please note that recovery of peptides from extraction processes can be variable. It is important to optimize any process to obtain optimum recoveries. Extraction efficiencies can be determined by a number of methods, including the use of radioactive peptide or by spiking into paired samples and determining the recovery of this known amount of added oxytocin.

Procedure. Once I highlight the pairs that meet our requirements (listed under Subjects), they will be asked to participate in our study. They will be told that we are interested in interaction patterns between humans and their dogs and that they will be compensated with a three-month supply of their preferred dog food, a coupon for a session of grooming, as well as a free veterinary exam for their dog that will take place during the testing. Those who agree to participate will be scheduled for testing. Each human-dog pair will first come in for a tour of the facilities and the rooms they will be tested in. On the day of the tour they will also take the PEI and fill out any paperwork necessary to continue in the study. The overarching goal of having a day to tour is to acclimate the dogs to the environment. Their next appointment (not necessarily the following day) they will have most of their tests done. On the third day, scheduled at the last appointment, they will finish testing and will receive the rest of their compensation.

On the day of the tour and canine acclimation they humans will take the PEI. While they fill out the questionnaire, I will take the dog and continue to walk him/her around the premises, allowing him/her to smell the different smells and investigate the various areas and objects. The whole tour will take approximately two hours during which the participants will sign consent forms.

On the second day, they will come to the lab and be greeted by one of the researchers. They will be led to their first testing area for the day where both the human and the dog will have

their attachment style assessed. The human's style will be assessed first. They will be asked to fill out the ECR-R. They will be instructed to take however long they need and are permitted to have their pet wait by their side or an affiliated researcher will offer to take the dog for a walk outside before the next segment of testing. Before beginning, a researcher will explain the instructions and encourage the participant to reread the same instructions provided on the questionnaire.

Once the human's attachment style assessment is finished, the dog and the human will be offered water before the Strange Situation Task begins. They will then be escorted to the testing room and instructed on how to complete the SST. Once the instructions are clear, the human and the dog will enter the lab room and the SST will begin. During the episodes of separation, when the human exits the room, there will be a researcher standing outside that will cue the human when he/she should reenter. If the participant forgets an episode of the SST the researcher will clarify but otherwise, he/she will not converse with the participant.

After the SST is finished the human will be asked to fill out the CCQ that assesses his/her general care and maintenance of the animal. The questionnaire will ask for a range of information on the dog's diet, exercise, general health, socialization, and behaviors.

The participant will take this assessment at the same desk they will have taken the PEI and the ECR-R, and again, their dog can either stay with them while they fill out the questionnaire or someone will take the dog for a walk. Once the canine care questionnaire is filled out, the human will exit the room and inform a researcher standing outside. The humans will then hand their questionnaire to the researchers who will escort them to another lab where a veterinarian will examine the dog. This satisfies the compensational veterinary visit but also provides data necessary for the study. The questionnaire will be given to the specialists to review the

information before the examination begins and at the end of the exam the veterinarian will score the CCQ. The human will be asked to wait outside unless the dog has severe separation anxiety that would make it impossible to evaluate him/her without his/her human present. In that scenario, the human will be allowed to wait in the examination room with his/her dog, interjecting as seldom as possible.

Once the veterinary exam has been done and the questionnaire has been filled, the human will be informed on his/her dog's health and any and all topics that would normally be covered in a routine veterinary visit. Then the participant and their dog will schedule their next and final appointment and then be excused from testing.

When the participants arrive at the lab they will be escorted to separate but familiar rooms from the previous appointment. Samples for baseline measurements will be taken from both parties. While the sample is being prepared the human and his/her dog will be reunited for a 30-minute interaction period in the room previously used for the SST the day before. The human is free to play and interact with the dog and immediately after thirty minutes have passed their plasma samples will be extracted again and run through the ELISA Kit. Once the plasma sampling for oxytocin measurements are finished the humans will be escorted to the desk within the room where previous questionnaires had been filled out and they will complete the PRI. When they exit the room, leaving their questionnaire on the desk, they will be escorted to the exit where the pairs will then be provided with their dog food supply, their coupon for a grooming appointment, and will be thanked for their participation.

Hypotheses. I hypothesize that dog-human pairings will be most successful when at least one of either the human or dog has a secure attachment style and most successful when both the human and the dog have secure attachments. In the scenario where one of the individuals has a

secure attachment I hypothesize the pair would function best if the human is the individual with the secure attachment as in the human-dog relationship, the human has the most control. I hypothesize that pairings where neither party has a secure attachment tend to not be successful. Specifically, I hypothesize that these pairings will not correlate with various satisfaction measures being used in this study and those pairings that do correlate will only have weak or marginal correlations. Whenever an attachment pair is described as secure-secure, secure-insecure, insecure-secure, for example, this means that it is the human who is secure, secure, and insecure, respectively. The first space refers to the human and the second one, after the dash, refers to the dog's attachment style.

Hypothesis 1. I hypothesize that when comparing oxytocin levels:

- secure-secure pairs will have correlated oxytocin levels
- secure-insecure pairs will have correlated oxytocin levels
- insecure-secure pairs will have correlated oxytocin level
- insecure-insecure pairs will not have correlated oxytocin levels

Hypothesis 1a. Looking more closely at oxytocin comparisons in insecure-secure and secure-insecure pairings, I hypothesize that:

- secure-avoidant pairings will have correlated oxytocin scores
- secure-anxious pairings will have correlated oxytocin scores
- avoidant-secure pairings will have correlated oxytocin scores
- anxious-secure pairings will have correlated oxytocin scores

Hypothesis 1b. I hypothesize that when comparing oxytocin levels in insecure-insecure pairings:

- avoidant-avoidant pairings will not have correlated oxytocin levels

- avoidant-anxious pairings will not have correlated oxytocin levels
- anxious-anxious pairs' correlation will have marginally correlated oxytocin levels
- anxious- avoidant pairings will have marginally correlated oxytocin

When I compare the oxytocin gap scores between all secure-secure, secure-insecure, and insecure-secure pairings using an ANOVA, I hypothesize the results will be significant (i.e. these three groups will differ) and I hypothesize further t-tests will show that the difference in average gap scores between secure-secure and both secure-insecure as well as insecure-secure will be significant but the difference in average gap scores between secure-insecure and insecure-secure will not.

Hypothesis 2. When I compare human oxytocin score and PRI scores I hypothesize that:

- these two scores will be correlated for humans in secure-secure pairings
- these two scores will be correlated for humans in secure-insecure pairings
- these two scores will be correlated for humans in insecure-secure pairings
- these two scores will be marginally correlated for humans in insecure-insecure pairings

Hypothesis 3. When comparing human oxytocin levels and CCQ scores, I hypothesize that:

- these two scores will be correlated for secure-secure pairings
- these two scores will be correlated for secure-insecure pairings
- these two scores will be marginally correlated for insecure-secure pairings
- these two scores will be correlated for insecure-insecure pairings

Hypothesis 4. I hypothesize that when I compare dogs' oxytocin levels and CCQ scores:

- these two scores will be correlated for dogs in secure-secure pairings

- these two scores will be correlated for dogs in secure-insecure pairings
- these two scores will be correlated for dogs in insecure-secure pairings
- these two scores will be correlated for dogs in insecure-insecure pairings

Hypothesis 5. When comparing dog oxytocin scores and PRI scores I hypothesize that:

- these two scores will be correlated for secure-secure pairings
- these two scores will be correlated for secure-insecure pairings
- these two scores will be correlated for insecure-secure pairings
- these two scores will be marginally correlated for insecure-insecure pairings

Hypothesis 6. I hypothesize that when comparing CCQ scores and PRI scores:

- these two scores will be marginally correlated for secure-secure pairings
- these two scores will be marginally correlated for secure-insecure pairings
- these two scores will not be correlated for insecure-secure pairings
- these two scores will not be correlated for insecure-insecure pairings

Predicted Results

I will analyze my results using the significance value of $p<0.05$. Because human oxytocin baselines are reported as 1.8 +- 0.4 pg/ml (Amico et al., 1981; Szeto et al., 2011) and dogs' are reported at 45 +- 10 pg/ml (Nagasawa et al., 2009) all my plasma samples collected from human participants were measured and multiplied by 25 in order to scale the measurements.

Human Oxytocin and Dog Oxytocin Levels. I predict that when I run a correlation analysis of oxytocin levels in pairings of secure humans and secure dogs, the human's and the dog's levels will positively correlate (r=.9, Figure 1). I also think that oxytocin levels will correlate when a human has a secure attachment and their dog has an insecure attachment (r=.7, Figure 2), but not as strongly as the first scenario (I will have averaged all of the OT levels from

secure + insecure pairings). When it is the dog that is secure and their human that is insecure the correlation will again be a little weaker (r=.6, Figure 3). When both the human and dog in a pairings have insecure attachments I predict that they won't be correlated (*p*=ns).

I think that when a human is secure and has an avoidant dog the correlation will be weak but still significant (r=.6, Figure 4). When a human is secure and has an anxious dog the correlation will be higher (r=.7, Figure 5). Additionally, when an avoidant human is paired with a secure dog, the correlation will be weak but significant (r=.5, Figure 6), but when an anxious human has a secure dog, the correlation will be higher (r=.65, Figure 7).

When both the human and his/her dog are avoidant their OT levels will not correlate (*p*=ns). When only the human is avoidant and the dog is anxious there will be no correlation (*p*=ns). When both the human and the dog are anxious the OT levels will be marginally significantly correlated (r=.3, Figure 8). When only the human is anxious and the dog is avoidant there will be no correlation (*p*=ns).

I will run an ANOVA to compare the different oxytocin gap scores (differences between human and dog oxytocin levels) between all secure-secure, insecure-secure, and secure-insecure pairs. If the ANOVA comes back significant, which I hypothesize it will, I will know that the groups are significantly different. Then I will go back and look at the mean gap scores between the three groups and run three individual t-tests (Figure 8*)*. I predict that the gap scores between secure humans and secure dogs as well as the gap scores between secure humans and insecure dogs will be insignificant. However, I predict that the gap scores between insecure humans and secure dogs will be significant. Gap scores will not be measured between insecure-insecure pairs because they are assumed to be significant and larger than any other pairing.

Human Oxytocin and PRI Scores. I predict a strong negative correlation (r=-.8, Figure 9) between human oxytocin scores and PRI scores in secure human and secure dog pairings. When the human is secure but the dog is insecure in the relationship the correlation will be a little weaker (r=.7, Figure 10) and the same goes for when the human is insecure and his/her dog is securely attached (r=.7, Figure 11). When both are insecurely attached the correlation will be weakest (r=.3, Figure 12).

Human Oxytocin and CCQ Scores. I predict a correlation (r=.6, Figure 13) between human oxytocin levels and CCQ scores in secure humans and secure dog pairings. When the human is secure but the dog is insecure the correlation will be a little lower but still significant (r=.5, Figure 14). When the human is insecure and the dog is secure the correlation will still exist but be on the cusp (r=.4, Figure 15). When both the human and the dog have insecure attachment styles there will be an insignificant correlation between human oxytocin levels and CCQ scores (*p*=ns).

Dog Oxytocin and CCQ Scores. I predict a strong correlation (r=.9, Figure 16) between dog oxytocin levels and CCQ scores in secure human and secure dog pairings. When a secure human and insecure dog are paired, the correlation will still be strong (r=.8, Figure 17) but a little weaker than when both parties are secure. When the dog is insecure and the human is secure I predict the correlation will lower but remain significant (r=.7, Figure 18). When both parties have insecure attachment styles the correlation will be lower than the three other pairings but also remain significant (r=.5, Figure 19).

Dog Oxytocin and PRI Scores. I predict a negative correlation (r=-.7, Figure 20) between PRI scores and oxytocin scores in secure human and secure dog pairings and a slightly weaker negative correlation (r=-.6, Figure 21) in secure human and insecure dog pairings, or the

reverse (Figure 22) (insecure human and secure dog pairings). When both parities are insecurely attached the negative correlation will be weakest and only marginally significant (r=-.3, Figure 23).

PRI Scores and CCQ Scores. I predict that there will be a marginally negative correlation (r=-.4, Figure 24) between PRI scores and CCQ scores of secure human and secure dog pairings. When a human is secure but his/her dog is insecure I predict that the correlation will be the same as when both parties are secure (r=-.4, Figure 25) but when the human is insecure and the dog is secure there will be no correlation (*p*=ns). This will also be true for when both the humans and their dogs are insecurely attached.

Discussion

When both the human and dogs have secure attachments I predict that satisfaction in the relationship will be at its highest. When mutual security is present attachment markers such as oxytocin can synchronize. Alternatively, when one of the individual has an insecure attachment I predict the oxytocin levels will not be in synch and the correlation will be weaker. This pattern reflects lower relationship status.

When one of the individuals feels insecure they perceive the connection differently than his/her partner and thereby affect the overall balance. Insecurity in a relationship, even if it is only stemming from one of two individuals involved, affects equilibrium and disrupts synchronicity. Furthermore, since dogs have less agency than humans do, their impact on the relationship may be less strong. Therefore, I predict that humans have more opportunity to reassure their dogs than the reverse.

Using this same logic, when both partners are insecure I think the relationships will not be successful and have very low satisfaction rates. This, I predict, will be reflected not only in

oxytocin correlation but in the other measurements as well. If an anxious human is paired with an avoidant dog, the dog will resist attaching to the human and the human, already anxious that his/her dog may not be interested in him/her, will have his/her fears verified. The same is true of an anxious-anxious pair who may feed off of each other's insecurities. Because all people should be able to successfully adopt a dog and all kinds of dogs should be given a chance to be adopted, one of the two being insecure is acceptable. However, it is unadvisable for an insecure human to adopt an insecure dog.

With regard to specific instruments, this study has some weaknesses. The CCQ is a noisy measurement as there are a variety of reasons a human may not score 100. Firstly, a lack of information on how to care for an animal could explain some of the data. For example, humans may not know what "enough" exercise is for their dog in item 11. Adoption programs that offer information sessions are successful because information, as Neidhart and Boyd (2002) mentioned, is crucial when adopting a dog. The same as having a child, if you haven't done it before it is a learning process and will take time to master. With that said, negligence can also explain why humans that did not experience strong attachments to their dogs, shown in low OT scores and high PRI scores, also had low CCQ scores.

Strong correlations between dogs' oxytocin scores and CCQ scores exist across the pairs suggesting that regardless of attachment-style pairing, how well a dog is being cared for may directly affect their connection with their human. A low CCQ score could reflect poor nutrition, exercise, socialization, etc. which would indubitably would reflect poorly on the attachment and therefore, the dogs' oxytocin levels.

Across the board the predicted correlations indicate that secure humans paired with secure dogs result in a relationship with the highest success. After secure-secure, the next most

successful relationship is one where the human is secure and the dog is insecure with little variation between anxious and avoidant dogs. When insecure humans are paired with secure dogs the adoption is also successful and those pairs can bond and have a happy relationship. However, insecure humans paired with insecure dogs may have a significantly lower chance of having a successful relationship, which increases the likelihood relinquishment to the shelter.

Rationale for Study Two

The next step in testing my hypotheses of is a direct manipulation of dog adoptions. Manipulating what kinds of humans and dogs are paired based on the attachment provides a glimpse into what kinds of results shelters might see if they implemented my program to their adoptions. If Study Two shows successful adoptions resulting from my manipulation, then my attachment-style based pairing program will be more attractive to shelters and the incentive to apply such a program would rise. Furthermore, if the attachment style formula is successful, it will benefit any human and dog pair that is bore from the program.

Study Two

Method

Subjects. I will recruit 400 human-dog pairs from Arizona's Animal Welfare League & SPCA. I will recruit 200 secure, 100 anxious, and 100 avoidant dogs and humans (800 individuals in total). See Procedure for pair assignment information.

Instruments. I will use the Experiences in Close Relationships- Revised (ECR-R) Questionnaire, Strange Situation Task (SST), Pet Expectations Inventory (PEI), Canine Care Questionnaire (CCQ), Oxytcin enzyme-link immunosorbent assay (ELISA) Kit, and the Pet Reality Inventory (PRI) all described in Study One's methods.

Procedure. First, all the dogs within the shelter will be tested for their attachment styles with the help of professionals trained to run and score the SST.

Two recruiters will be stationed in the lobby of the shelter. When someone comes into the shelter and expresses interest in adopting a dog they will be asked if they would care to participate in a study. They will be informed that the study is aimed at improving adoption success and will require follow-up meetings and tests for up to two years. The adopters will also be informed that they will be compensated with a waved adoption fee (usually approximately $400), an additional $100 dollars, two complimentary vet appointments, three grooming coupons, and a dog starter pack including a kennel, toys, and a leash for those participants who are adopting their first dog and do not have the necessary supplies. The adopters will be further informed that if they do not feel the dog they adopted is the right fit and wish to return the dog to the shelter they will still receive all of the aforementioned compensation.

If the potential adopters agree to participate they will be escorted to a separate room where they will fill out a consent form (Appendix J). They will then complete an ECR-R. Once a person is categorized as either secure, anxious, or avoidant they will randomly be matched with a complimentary attachment style. For example, if a participant is secure he/she will be matched with either avoidant or anxious and if he/she is anxious he/she will be matched with secure, etcetera. The dogs will be organized in halls based on their attachment style. When a participant is randomly matched with a dog attachment style they will be escorted to view the dogs. In the case that someone does not find the dog they want in their assignment hallways, they will then be informed that there are more dogs they can see. At this point they will no longer be included as participants but still receive the compensation promised (if they adopt a dog).

Once a selection (within the study's parameters) is made the dog will be processed out of the shelter (a variety of adoption papers, contracts, and contact information are necessary to process an adoption). During this time the humans will fill out a PEI.

Once 400 dogs are officially adopted by their compatible partners there will be 100 secure-secure pairs, 50 secure-anxious pairs, 50 secure-avoidant pairs, 50 anxious-secure pairs, 50 avoidant-secure pairs, 25 anxious-avoidant, 25 anxious-anxious pairs, 25 avoidant-avoidant pairs, and 25 anxious-insecure pairs.

I will record the return rate (provided by the shelter) before recruitment and after each adoption is made until all 400 pairs are set, even if some of the dogs recruited earlier in the study are returned before recruitment is complete. The return rate will be averaged from the past 5 years of dogs returned to the shelter within the 18 months after adoption (information provided by shelter). The averaged rate will later be compared to the shelters return rate at the end of the study.

The first round of appointments will be scheduled 6 months after date of adoption. Reminders will be provided one week before the follow-up. The first follow-up will take two days to complete which can either be consecutive or spread apart by one week.

On the first day of their follow-up the human-dog pair will come in for one hour to sign consent forms as well as acclimate themselves to the environment. The goal is to have the dog become familiar with the smells so the next time the pair come in the lab will not be as stimulating as a novel environment. The next appointment will involve measuring OT levels in both humans and dogs.

When the pair comes in on the second day of the first follow-up they will be escorted to the room where extraction occurs. The plasma samples will be extracted, same as they were in

the first study, before the interaction period. Then the human-dog pair will enter the interaction room (same room used for the SST in the first study), spend 30 minutes interacting freely and then have their blood drawn again. Once is it confirmed that the samples will yield clear readings the human-dog pair will be provided with one of their grooming coupons and one of their veterinarian coupons and excused until their next (second) follow-up. If a sample is compromised during extraction, handling, or processing, another appointment will be made to measure oxytocin within the following week.

The second follow-up, occurring one year after adoption, consists of three days that will occur within the same two-week period. On the first day the human-dog pair will come in to re-acclimate themselves to the environment and fill out new consent forms. On the second day the humans will fill out CCQs and the dogs will undergo a veterinary examination (which will count as the second veterinary examination promised as compensation). The third day will involve oxytocin measurements collected the same way they were during the first follow-up 6 months earlier. Participants will then be provided with their second grooming coupon and excused.

The last follow-up, occurring a year and a half after adoption, will take three days scheduled within a two-week period. The first day will consist of re-acclimation and new consent forms. On the second day, the human-dog pairs will come in and the humans will fill out PRIs. That will be scored via comparisons to each participant's PEI scores collected on the day of adoption. The last day will involve oxytocin measurements collected the same way they were at the two previous follow-ups and the first study. The pairs will be given their last grooming coupon and excused from the study.

Once all pairs have had all three follow-ups the shelter's return rate will be collected and compared to the rate calculated at the beginning of the study. Any of the 300 pairs involved in

the study who no longer have their dogs when they are contacted for follow-up appointments will be asked to report why for the kennel's records. It will be noted if the dog was returned to the shelter, was given to a friend, ran away, passed away (and cause of death), or was abandoned. Additionally, if the information is available, the reason why a dog was returned (landlord, behavior, etc.). If a dog is returned for behavioral problems or other issues that may be related to incompatibility, then the pair will be marked as unsuccessful and their data adjusted accordingly. Circumstantial reasons for returning a dog such as landlord problems, moving, etc. do not reflect on compatibility (although, it could be argued that the more attached you are the less likely you would move somewhere you could not bring your dog). However, because return rates previously recorded by the shelter included returns due to any circumstances, all returns will be tallied. Our study is aimed at lowering returns due to incompatibility and if it is successful, the return rates will reflect that.

Hypotheses

Hypothesis 1. A Guttman's Scale Analysis of all the PRI scores (HS-DS vs. HS-DAnx vs. HS-DAv vs. HAnx-DS vs. HAv-DS) would reveal that secure human-secure dog pairs score the lowest (their expectations were best met), then human secure-dog anxious, followed by anxious human-secure dog and avoidant human-secure dog who are tied for third place, and last place (had the fewest of their expectations met by their relationship with their dog) would be secure human-avoidant dog pairs.

Hypothesis 1a. An ANOVA with the PRI scores from all five groups would yield a significant F-statistic. T-tests would determine that the significant differences are between:

- Secure human-secure dog and anxious human-secure dog PRI scores
- Secure human-secure dog and avoidant human-secure dog PRI scores

- Secure-human-secure dog and secure human-avoidant dog PRI scores

Hypothesis 2: A repeated measure ANOVA (rANOVA) for each individual participant at the three time points (6 months, 12 months, 18 months) would not be significant for secure human-secure dog pairings, but would be significant for anxious humans, anxious dogs, avoidant humans, and avoidant dogs. T-tests would determine at which two time points (TP) oxytocin levels vary significantly for each attachment style (both human and dog). I hypothesize OT levels:

- will be significantly difference for anxious and avoidant dogs between TP 1 and 3 (6 and 18 months) but will not be significant between TP2 (12 months) and TP3 or TP1 and TP2
- will be significantly different for anxious and avoidant humans between TP 1 and TP 3 but not be significantly different between TP2 and TP3 or TP1 and TP2

I do not think there will be significant differences in OT levels for securely attached humans or dogs over the three time points.

Hypothesis 2a. An rANOVA run for individual pairs' (secure-secure; secure-anxious; secure-avoidant; anxious-secure; avoidant-secure) gap scores (differences in OT levels within-pairs) at the three TPs will reveal that gap scores for:

- secure humans and secure dogs will not change significantly over the TPs
- secure humans and anxious dogs will change significantly over the TPs
- secure humans and avoidant dogs will change significantly over the TPs
- anxious humans and secure dogs will change significantly over the TPs
- avoidant humans and secure dogs will change significantly over the TPs

Hypothesis 2b. Individual t-tests will determine that the gap scores for:

- secure human-anxious dog pairs will be significant between TP1 and TP3 but not significant between TP1 and TP2 or TP2 and TP3
- secure human-avoidant dog pairs will be significant between TP1 and TP3 but not significant between TP1 and TP2 or TP2 and TP3
- anxious human-secure dog pairs will be significant between TP1 and TP3 but not significant between TP1 and TP2 or TP2 and TP3
- avoidant human-secure dog pairs will be significant between TP1 and TP3 but not significant between TP1 and TP2 or TP2 and TP3

Hypothesis 3. A Guttmann Analysis of CCQ scores for human secure-dog secure pairs orders the pairs so that scores for human secure-dog anxious will be at the same level but that those two pairs will have higher CCQ scores than human secure-dog avoidant and human anxious-dog secure pairs which will be tied at the same level too. Finally, human avoidant-dog secure pairs will have the lowest CCQ scores. An ANOVA will yield a significant F-value when all five pairings are compared. T-tests will reveal that:

- Secure human-secure dog and avoidant human-secure dog CCQ scores are significantly different
- Secure human-secure dog and secure human-avoidant dog CCQ scores are significantly different

Hypothesis 4. A t-test comparing the return rate at the end of the third time period and the one calculated at the beginning of adoptions, not including the dogs involved in this study, will reveal that the return rate from the end of the study will be significantly lower than the one collected before manipulating the human-dog pairings.

Predicted Results

I will analyze my results using the significance value of $p<0.05$ and the marginal significance value of $p=.05$. As was done in study 1, I will use the baseline oxytocin levels reported: as 1.8 +- 0.4 pg/ml for humans and 45 +- 10 pg/ml for dogs. Human levels will be scaled to dog levels by multiplying readings by 25. This will be done before any human OT levels are analyzed.

I will be using t-tests for between subject comparisons and repeated measure ANOVAs for within-subject comparisons (human and dog separately) at the three time points. Human satisfaction will be measured by the PRI and oxytocin levels and dog satisfaction will be measured by the CCQ and oxytocin levels.

PRI Scores. I predict that an ANOVA for PRI scores in all 5 groups (HS-DS, HS-DAnx, HS-DAv, HAnx-DS, HAv-DS) the F-value will be significant. The t-tests run in order to isolate which groups are significantly different from one another will show significant variation between human secure-dog secure and human secure-dog avoidant scores (Figure 26). I predict the tests will also show that there is marginally significant variation between human secure-dog secure and human anxious-dog secure (Figure 27) as well as human secure-dog secure and human avoidant-dog secure PRI scores (Figure 28).

Oxytocin Scores. I predict the rANOVAs run (separately) for anxious dogs', anxious humans', avoidant dogs', and avoidant humans' OT levels across the three time points will all be significant. I also predict that the t-tests will show that for all four attachment style groups the first time point (6 months) and the last time point (18 months) are significantly different (Figure 29, 30, 31, & 32).

When gap scores are collected for individual participants and then run through an rANOVA I predict that differences in gap scores between secure humans-anxious dogs will be significant along with differences in gap scores between secure humans-avoidant dogs, anxious humans-secure dogs, and avoidant humans-secure dogs.

I predict that individual t-tests to determine which two time points yielded the significantly different gap scores will show that for secure human-anxious dog pairs (Figure 33), secure human-avoidant dog pairs (Figure 34), anxious human-secure dog (Figure 35), and avoidant human-secure dog pairs (Figure 36) the significant differences will be between TP1 and TP3.

CCQ Scores. I predict that t-tests to check variance of CCQ scores between secure human-secure dog and avoidant human-secure dog groups (Figure 37) as well as secure human-secure dog and secure human-avoidant dog groups (Figure 38) will show marginally significant variation for both between-group comparisons.

Return Rates. I predict that a t-test to compare return rates at TP0 (when the adopters arrived at the shelter) and return rates at TP3 there will be a significant difference between the two (Figure 39).

Discussion

Sources describe secure individuals as emotionally and cognitively capable of feeling satisfied and trusting in a relationship. Anxious individuals are more likely to be clingy, expressing dramatic fluctuations in affect, and generally worried their partner doesn't love them. Sometimes an anxious individual's fear may manifest as withholding affection and becoming resistant in ways typical for someone with avoidant an attachment style. Avoidant individuals are illustrated as being resistant to intimacy, avoidant of attachment, and not supportive when their

partner is in distress (Selterman, 2011). Combinations of attachment styles also change the way one insecure person may feel when paired with a secure partner for example. If an anxious dog is placed with a secure human, the human can quell the dog's insecurities, assuring the dog that he/she will provide him/her with a secure base. However, if an anxious dog is placed with an anxious human, or worse, an avoidant human, the insecurities of the dog may only rise.

These descriptions outline the differences between attachment styles and how they may interact. The results above were predicted based on how the outcomes measured may have been affected by the three attachment styles and the various combinations of those attachment styles. In the first instance I predict that secure humans paired with avoidant dogs produce the highest PRI scores, thereby having the least expectations met. An avoidant dog may avoid his/her human's touch as well as not express affection toward his/her human. These are usually behaviors that are expected when adopting a dog and so the absence of these behaviors may result in the humans, who are responsible for filling out the PRI questionnaires, to feel as though their expectations have not been met. Furthermore, I predict PRI scores for secure humans with anxious dogs will not be high because while some anxious dogs may express their insecurities through avoidant behaviors, I predict that most will exhibit the clingy behavior that many humans interpret as love, thereby reporting that their expectations of adopting a dog were satisfied. Humans who have anxious or avoidant attachment styles also may report not having their expectations met even if their dog is perfectly affectionate, obedient, etc. but because the humans fill out the questionnaire, higher PRI scores may reflect some of their own insecurities It is common for anxious and avoidant individuals to misinterpret their partners' behaviors thereby poorly describing their relationships (Selterman, 2011).

Predictions on oxytocin levels and variance in levels across the three time points are also influenced by the typical characteristics of anxious and avoidant humans and dogs. Secure human-secure dog pairs do not show fluctuations in oxytocin levels because their attachment was developed primarily within the first 6 months (the first time point). Because both parties are secure, their bond will more easily form within those first 6 months together. Alternatively, pairs with either an anxious human, anxious dog, avoidant human, or avoidant dog will all take longer to develop attachments because one of the parties is insecure, thereby preventing their oxytocin levels from reaching the same heights as a secure individual. As the pair becomes more attached over time and security in the relationship rises, the oxytocin rate will also rise (Buchheim et al., 2009; Nagasawa et al., 2015) which is why time points 1 and 3 show significant variation but not time points 1 and 2 or 2 and 3.

How a person takes care of his/her dog, reflected in the CCQ score, is expected to be fully developed within the first 6 months and little variation is expected after the first time point. However, avoidant humans paired with secure dogs and secure humans paired with avoidant dogs may show some marginally significant variation because it is possible that an avoidant human pays less attention to their dog and that an avoidant dog is less responsive to a secure human's advances for play, exercise, and other activities recorded in the CCQ.

Overall, I expect that the experimental manipulation of human-dog pairings based in attachment style will be successful. While there were some reports of dissatisfaction, that is normal in any relationship. All the pairs survived through the nearly 2-year study, and after that two year mark the dogs are at a considerably lower risk being relinquished (New et al., 2000).

General Discussion

The goal of this project proposal was to design and develop an attachment based formula that increases successful adoptions and thereby decreases unsuccessful adoptions that may result in dissatisfaction or relinquishment of a pet. I hypothesize that if the formula developed in the first study and tested in the second is applied at the time of adoption it will improve adoption outcomes and consequently lower return rates in shelters which often times, when a dog is not successfully adopted out, result in euthanasia (Weiss, Mohan-Gibbons, & Zawistowski, 2015).

The first study is aimed at uncovering which human dog pairs are most successful based on measures of satisfaction in both the human and the dog as well as oxytocin levels representing levels of attachment. Taking pre-existing pairs and running analyses on attachment styles I predict to find that human-dog pairs where both individuals have secure attachment styles are most successful and those where at least one of the individuals is secure will also be successful. I predict that pairs where both the human and the dog have insecure attachment styles are most often unsuccessful. The rationale behind these predictions is derived from research on attachment styles and personal experiences with dogs and humans that allowed me to make a number of educated guesses on how certain attachment style pairings would fair.

Individuals with secure attachment styles tend to be more satisfied with their relationships feeling independent but loving towards their partner. Relationships with secure individuals tend to be "honest, open and equal (Firestone, 2013, p. 1)." When two individuals are securely attached the security and balance of the relationship are at maximum but even when one individual in a pair has a secure attachment, his/her perspective on security can still greatly affect the relationship. For example, if a securely attached human adopts an anxious dog the human can provide the dog with a secure base, reassuring the dog whenever his/her insecurities cause doubt

or fear in the relationship. The opposite is also true that when a dog is secure in the relationship but his/her human is anxiously attached, the dog's behavior can positively affect the human, assuring him/her in the worth of the bond.

Relationships where both individuals are insecure are likely to fail because the insecurities feed off of one another, exacerbating any problems that arise between the pair and making communication difficult. For example, if two individuals in a relationship are anxious the sense of anxiety may grow and neither partner would feel secure in the relationship. Even more volatile would be a relationship where one of the individuals was avoidant and the other anxious because an anxious individual "tend to be desperate to form a fantasy bond" which is an "illusion of connection that provides a false sense of security," while avoidant individuals "emotionally distance themselves (Firestone, 2013, p. 1)." Because avoidant individuals seek solitude and feel inclined to be independent and emotionally shut down they would be nearly incapable of providing support and reassurance to an anxious partner as the two individuals would often display opposite behaviors.

Most of these descriptions are meant for inter-human relationships but as Topál et al. (1998) showed by applying Ainsworth's SST to dogs, the predicted bonds are also applicable to dogs. The PRI score that captures whether a human's expectations of their dog were satisfied are predicted to reflect these attachment style dynamics. CCQ scores measuring the dogs' satisfaction based on nutrition, health, exercise and socialization as reported by the humans, seem to be affected negatively by avoidant humans and avoidant dogs who are hard to care for. Oxytocin scores follow a similar pattern as PRI and CCQ scores: secure humans with secure dogs have healthy, high oxytocin levels while secure individuals paired with avoidant partners are affected by their insecurities. The majority of insecure-insecure pairings have low outcomes

across the board. The next step would be to test whether or not enforcing proposed attachment pairings, all those excluding insecure-insecure pairings, at the time of adoption would lower return rates and the amount of unsuccessful adoptions from shelters. Study Two was designed to answer these questions.

In Study Two I proposed manipulating matches according to Study One's findings so that human-dog adoptions would be more successful. I hypothesized satisfaction outcomes will reflect happy humans and dogs as well as high levels of oxytocin by the third time point (18 months). Furthermore, I predicted that the return rates at shelters that enforce these attachment style pairings will lower and more dogs will successfully find their permanent homes rather than live in cold concrete shelters until they die. Specifically, I predicted to see fluctuations in oxytocin reflecting changes in attachment over time as pairs with insecure individuals grow and strengthen. The overall results in Study Two will reflect the best pairings from Study One and assure that if those pairs are made, and insecure-insecure pairs are avoided, the amount of dogs returned to shelters would drop. In the first study I predict we will find which combinations of attachment styles function best together and, in Study Two, taking that information and applying it to a shelters adoption processes to see whether my hypotheses would actually make an impact on successful adoptions and consequently, return rates.

It was necessary to run a two-part study to first determine which pairs function best and were most satisfied, and importantly, which pairs did not. I predict that our findings from Study One would be verified through the manipulations and outcome measurements in Study Two and that controlling which attachment styles are paired together *will* have a positive affect on shelter dog adoptions.

Research on canine cognition and behavior makes clear that dogs are more than just

companion animals. The human-dog relationship, crafted by evolution and comparable to the relationship between a mother and her infant, is a viable relationship to work on and respect. Existing knowledge connects humans and dogs behaviorally, cognitively, and hormonally and it is our responsibility to protect dogs when they cannot protect themselves. The relationship between humans and dogs is a mutually beneficial connection with reported advantages to health, emotional wellbeing, psychological stability, and the management of mental and physical illnesses (Odendaal & Meintjes, 2003). Dogs have been purposed to the blind, autistic, trauma victims, and the list goes on, proving that their place in our society reaches further than a warm companion for the couch or a partner to exercise with or teach your children responsibility.

Regulating which attachment styles in humans and dogs are paired may increase adoptions in shelters. My attachment style based program could easily be paired with a temperament and/or behavioral assessment and minor follow-ups (phone calls, emails, etc.) to remind the adopter that they have resources if they need any information or advice. These tools used together would generate more successful adoptions yielding happy humans and happy dogs. If adoptions from shelters become more reliable and successful it could spread awareness on rescuing dogs and raise public interest in adopting dogs rather than buying dogs from expensive and inhumane breeders or pet shops. The general population's opinion on rescuing dogs is a large obstacle for shelters. Many people believe shelter dogs to be generally aggressive and problematic pets to welcome into the home. Some of these impressions stem from mismatched humans and dogs which adoption programs could potentially remedy.

Adoption programs like the one I outline here and the aforementioned programs that already exist aim to eliminate unsuccessful and problematic pairings of humans and dogs that result in returns, death, and the bad reputation for shelter dogs. Another important aspect to

consider and emphasize before and after adoptions is education. Information on canine behavior, care, and cognition should be shared with potential adopters so any conflicts in the pair can be resolved quickly, preventing unnecessary relinquishments that hurt both the humans and the dogs. Behavioral problems that arise in the early stages of a dog's relationship with his/her human(s) are often times easily corrected with simple training methods. Information on these methods should also be made available so that adopters feel they have resources and support to help them resolve conflicts. I hypothesize that if a variety of these programs were joined together and enforced at the time of adoption as well as followed through with post-adoption, there would be fewer dogs being euthanized each year, more dogs finding the perfect home for them, and eventually, less demand for dogs from inhumane breeders that exacerbate the overpopulation and euthanasia of innocent dogs every day. It is our job to fix the current broken system and save the animals that have evolved to be as close to us as our children.

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Footnotes

[1] Video of the SST available here: http://www.simplypsychology.org/mary-ainsworth.html

[2] The new bonds Bowlby refers to as "heterosexual nature" are more effectively interpreted now simply as sexual and not necessarily to the opposite sex but rather to the sex of interest. Furthermore, new bonds that form in adulthood are not restricted to sexual relationships and may include more advanced friendships, business relations, etc.

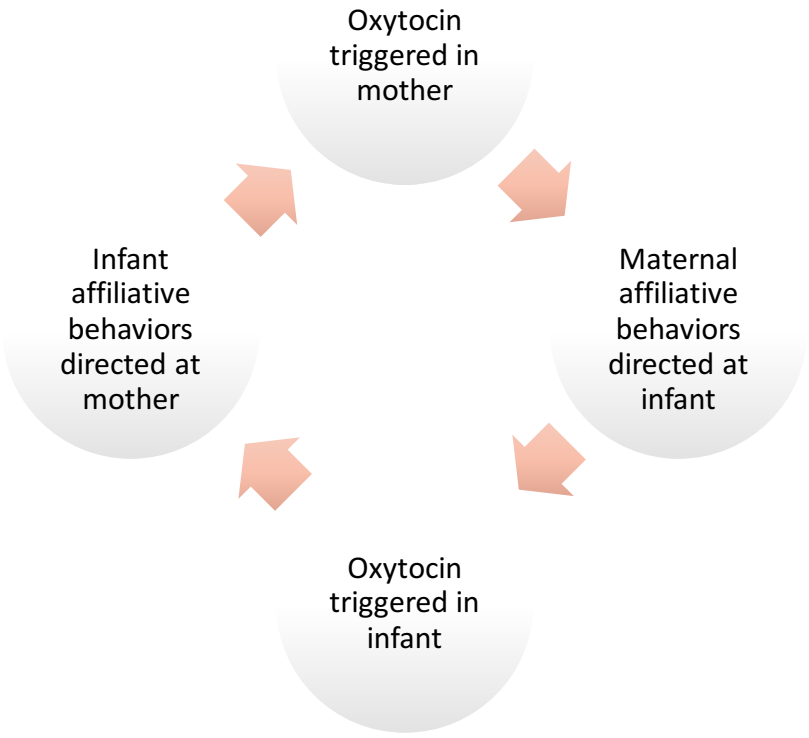
[3] While the contemporary grey wolf is not genetically identical to the ancient wolf, we can infer that their wolf-like behaviors were similar.

[4] Raw oxytocin, also known as central oxytocin, is a blood sample where other substances must also be tested for while extracted samples, also known as peripheral oxytocin, allow researchers to "eliminate interfering substances present in samples" and more accurately measure oxytocin (McCullough et al., 2013, p. 1486)

[5] If overpopulated shelters, kill and no-kill, need to make room for incoming dogs then the more dogs successfully adopted out will result in less dogs being euthanized due to a lack of people and homes that want them. Using homes as a space to put the dogs rather than gas chambers is the end goal.

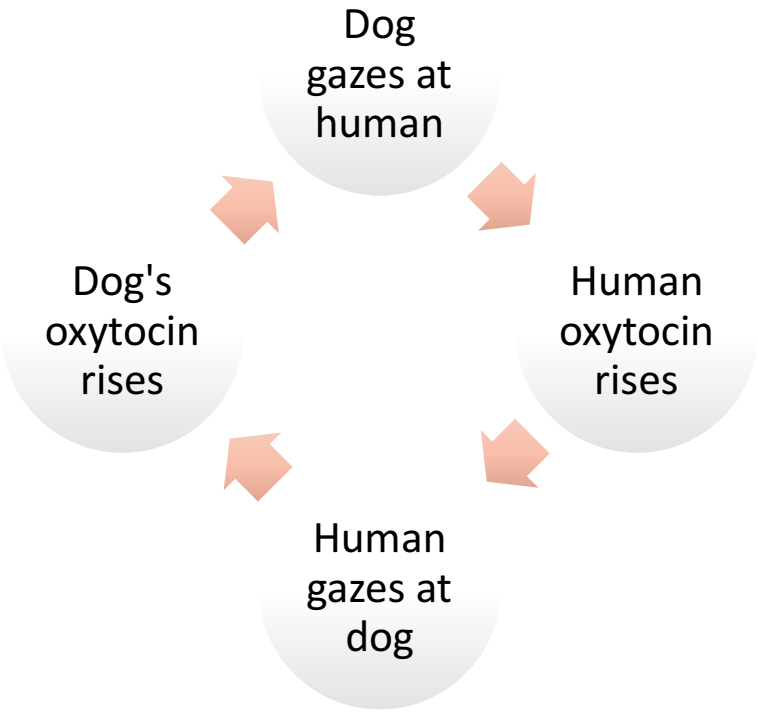
Tables

Table 1. Oxytocin and Affiliative Behavior Loop between Mother and Infant



Note: This table represents the loop that occurs between a mother and infant and beginning with a post-partum release of oxytocin in the mother. This loop can also be applied to the human and dog dyad.

Table 2. Oxytocin and Affiliative Behavior Loop between Human and Dog



Note: This table represents the loop that occurs between a dog and a human during a period of gazing. Nagasawa et al. (2008) found that the longer the gaze the higher the rise in oxytocin. Nagasawa et al. (2015) found that this loop can also be started by nasally administering oxytocin to the human or dog. Other attachment behaviors exhibited between dogs and their humans can be petting, seeking proximity, nuzzling, etc. A version of this same loop exists between mothers and infants.

Figures

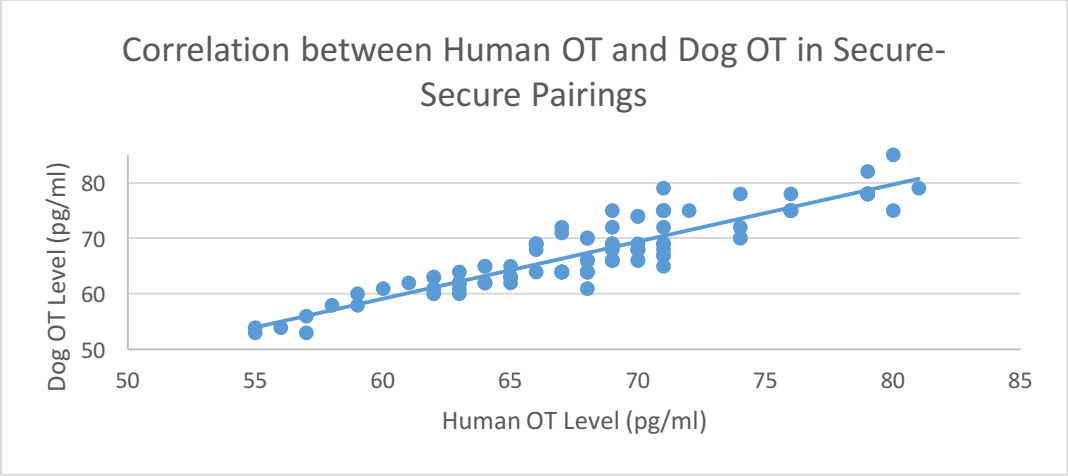


Figure 1. Human and dog OT levels are strongly correlated when both individuals within a pair have secure attachment styles (r=.9, n=100).

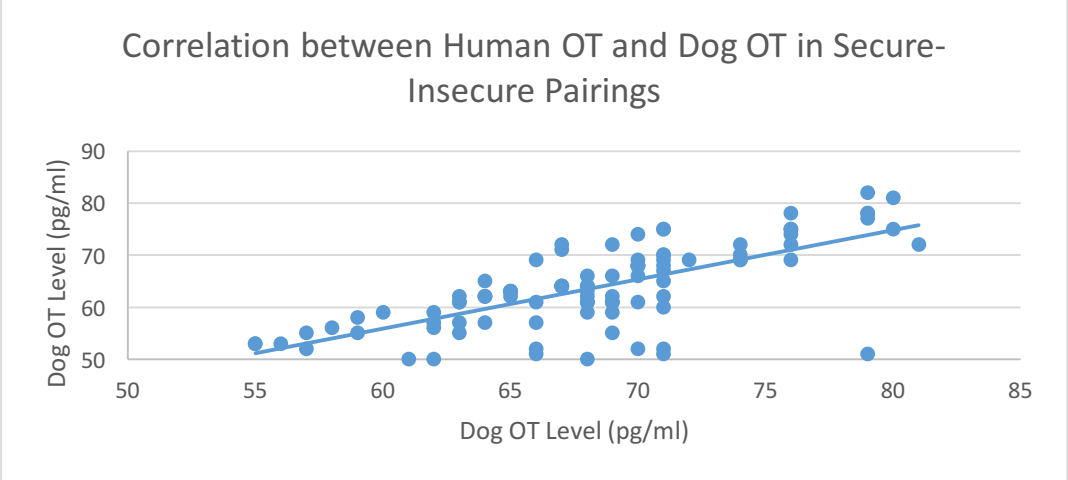


Figure 2. Human and dog OT levels are strongly correlated when a secure human is paired with an insecure dog (r=.7, n=100).

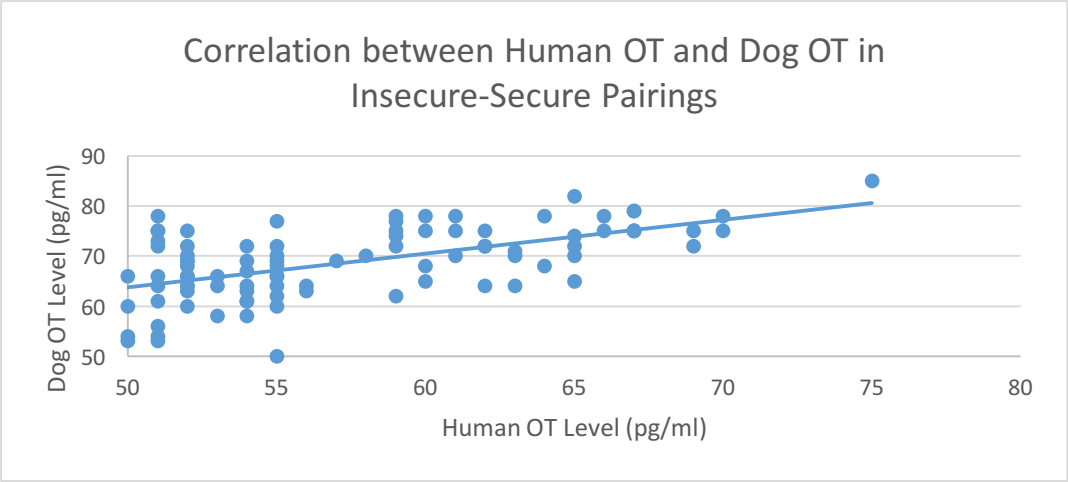


Figure 3. Human and dog OT levels are strongly correlated when an insecure human is paired with a secure dog (r=.6, n=100).

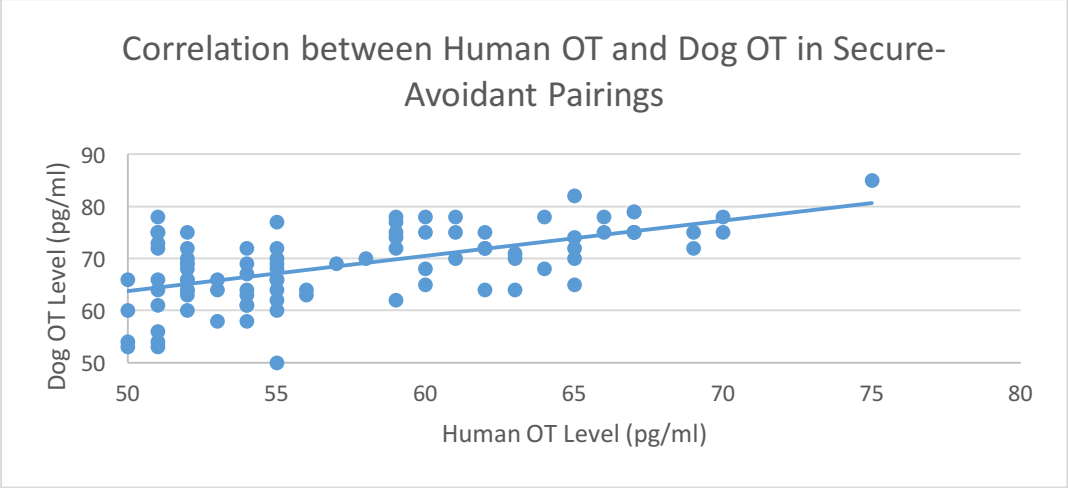


Figure 4. Human and dog OT levels are strongly correlated when a secure human is paired with an insecure dog (r=.6, n=50).

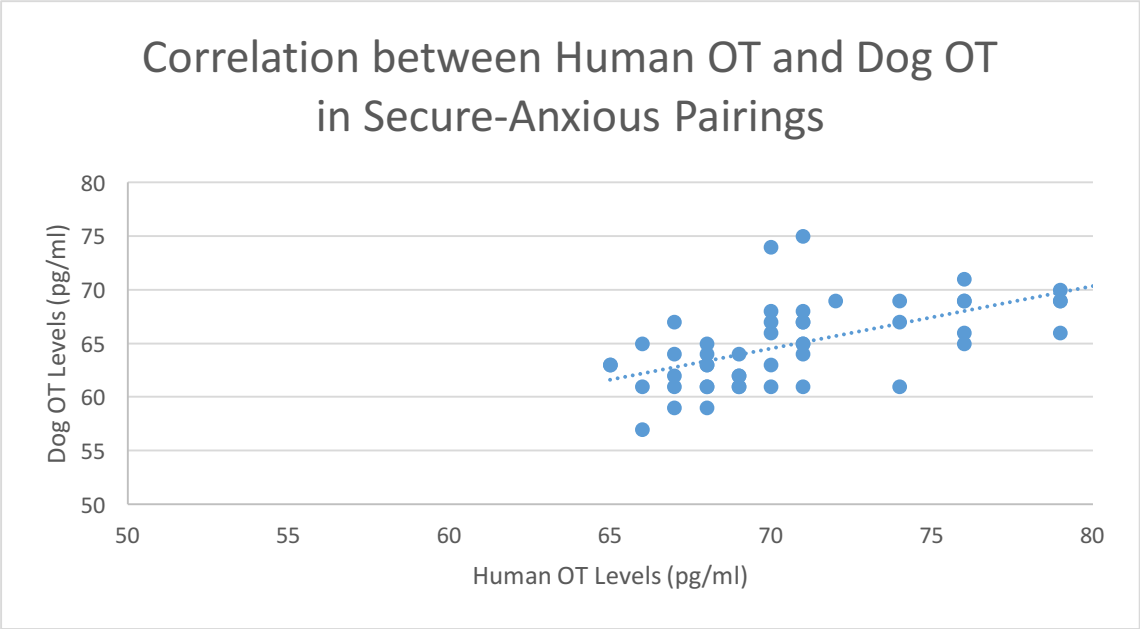


Figure 5. Human and dog OT levels are strongly correlated when a secure human is paired with an anxious dog (r=.7, n=50).

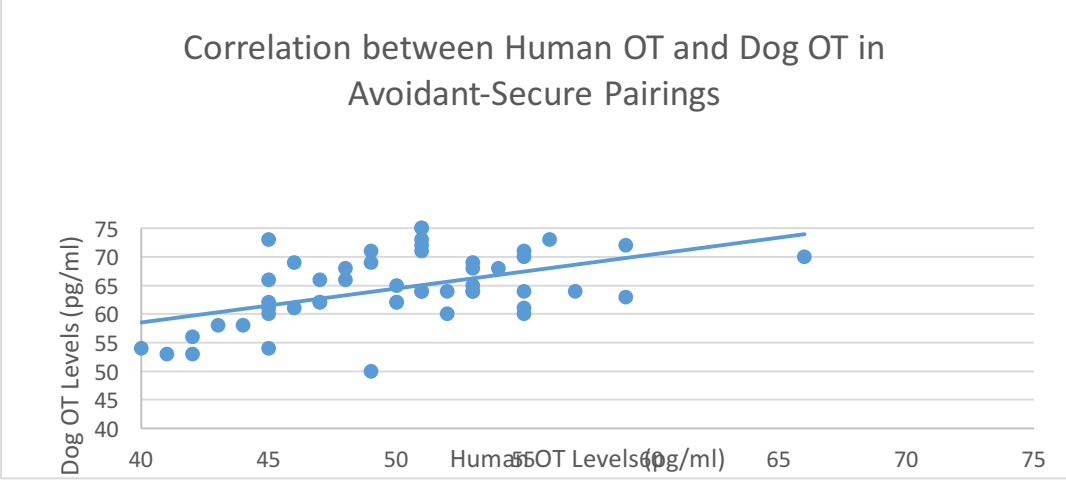


Figure 6. Human and dog OT levels are correlated when the an insecure human is paired with an avoidant dog (r=.5, n=50).

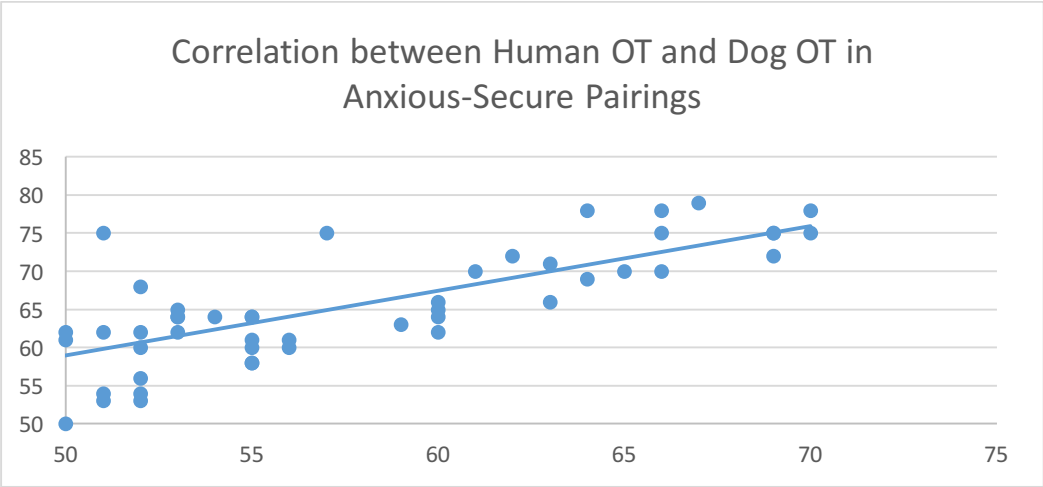


Figure 7. Human and dog OT levels are strongly correlated when an anxious human is paired with a secure dog (r=.65, n=50).

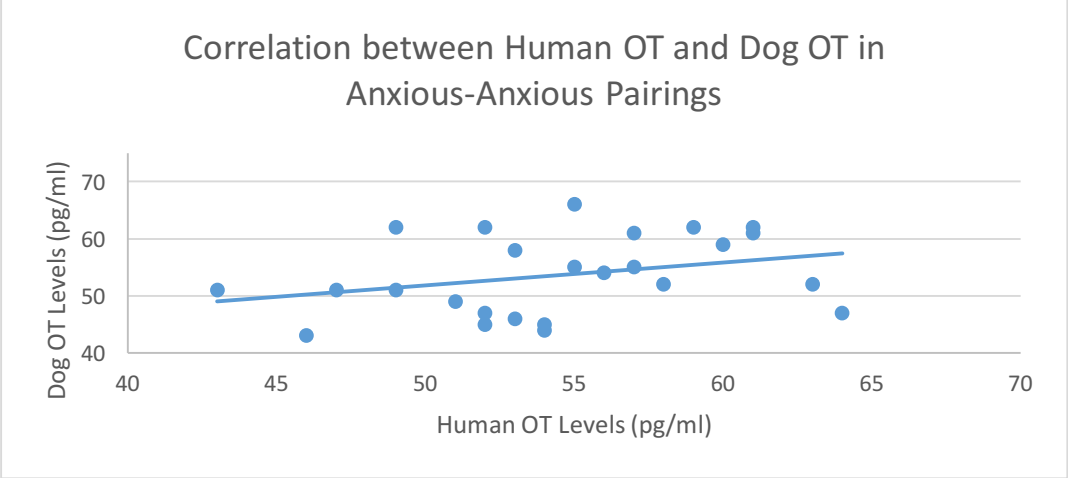


Figure 8. Human and dog OT levels are marginally correlated when both the human and dog have anxious attachment styles (r=.3, n=25).

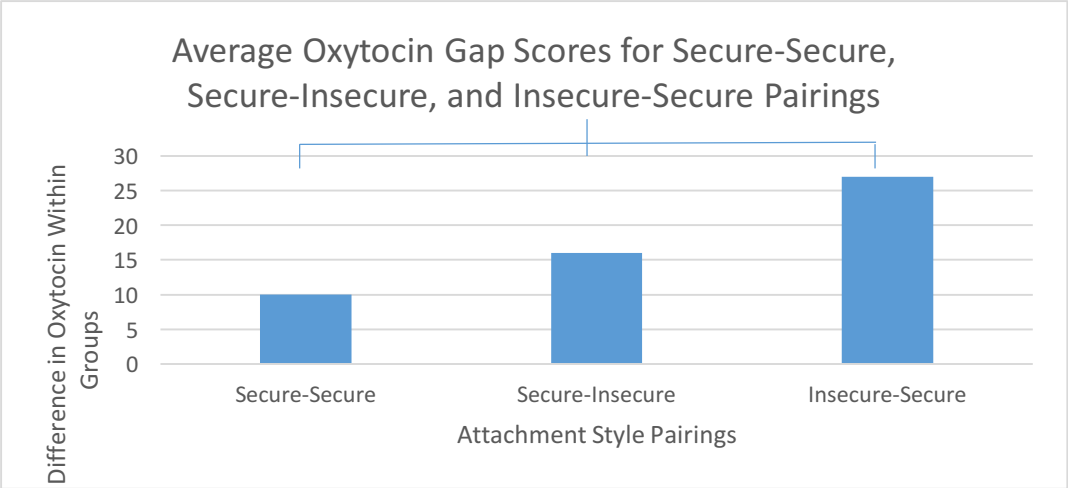


Figure 8. Above are the gap scores (avg. difference in OT within pairs) of human secure-dog secure, human secure-dog insecure, and human insecure-dog secures' OT levels. The difference between gap scores in HS-DS and HS-DI pairings will be mild. The difference between gap scores in HS-DS and HS-DI pairings will not be significant. Finally, the difference between gap scores in HS-DS and HI-DS will be significant.

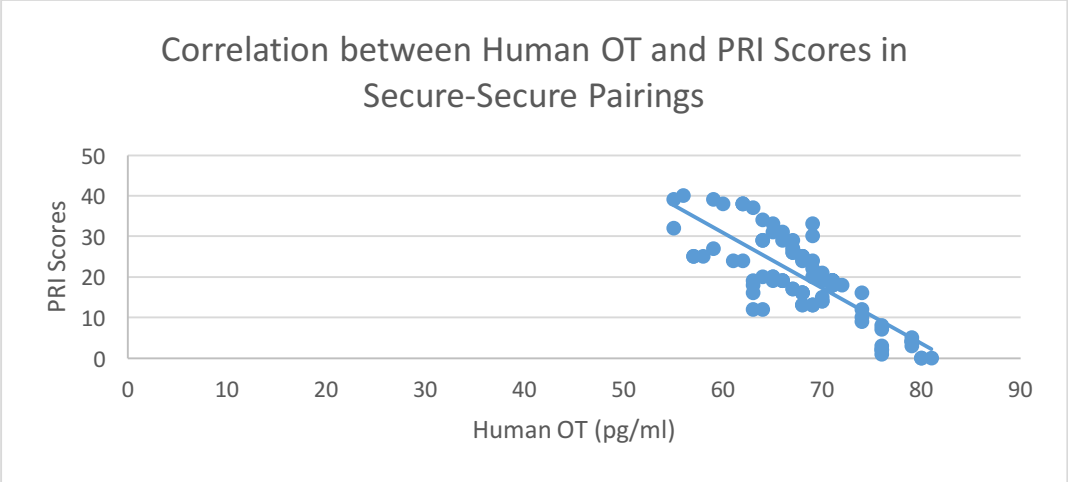


Figure 9. Human OT levels and PRI scores have a strong negative correlation when both the human and dog have secure attachment styles (r=-.8, n=100).

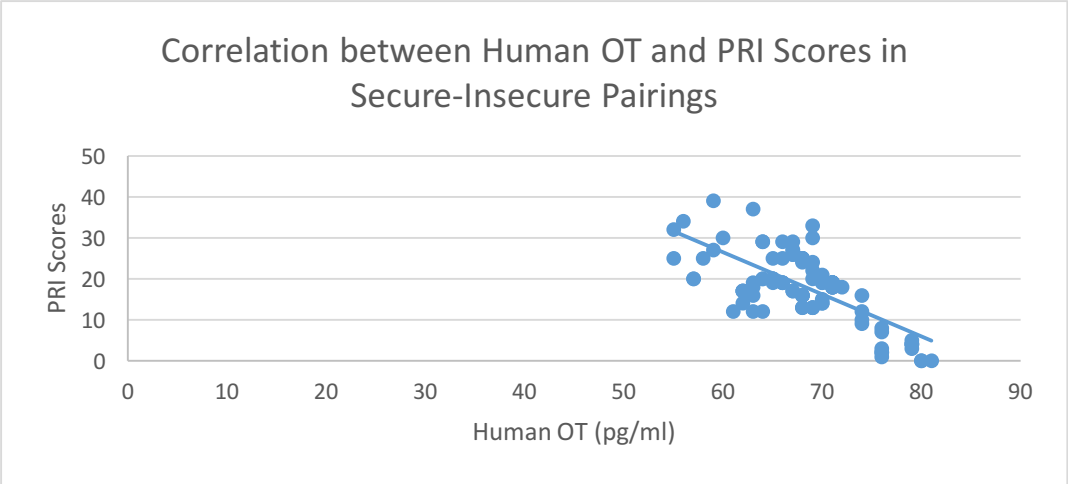


Figure 10. Human OT levels and PRI scores have a strong negative correlation when secure humans are paired with insecure dogs (r=-.7, n=100).

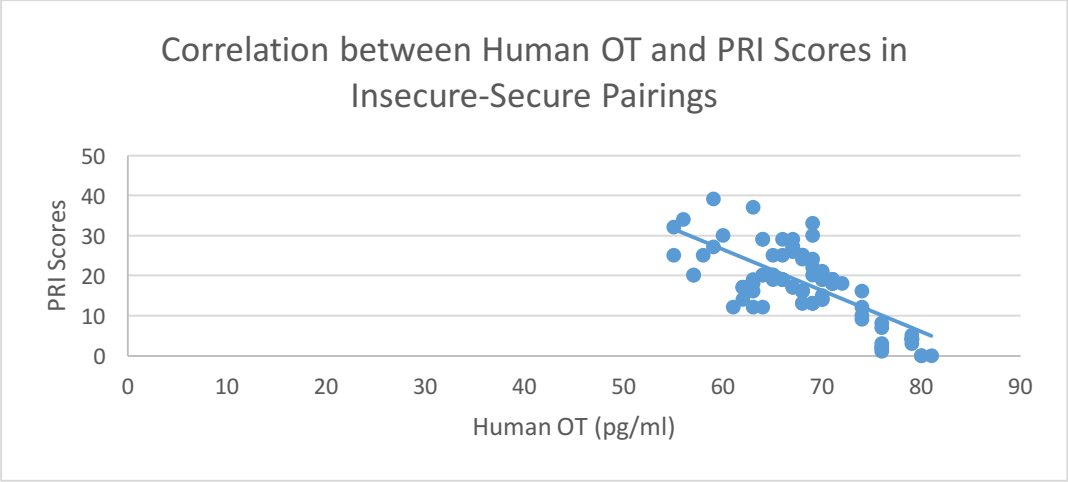


Figure 11. Human OT levels and PRI scores have a strong negative correlation when insecure humans are paired with secure dogs (r=-.7, n=100).

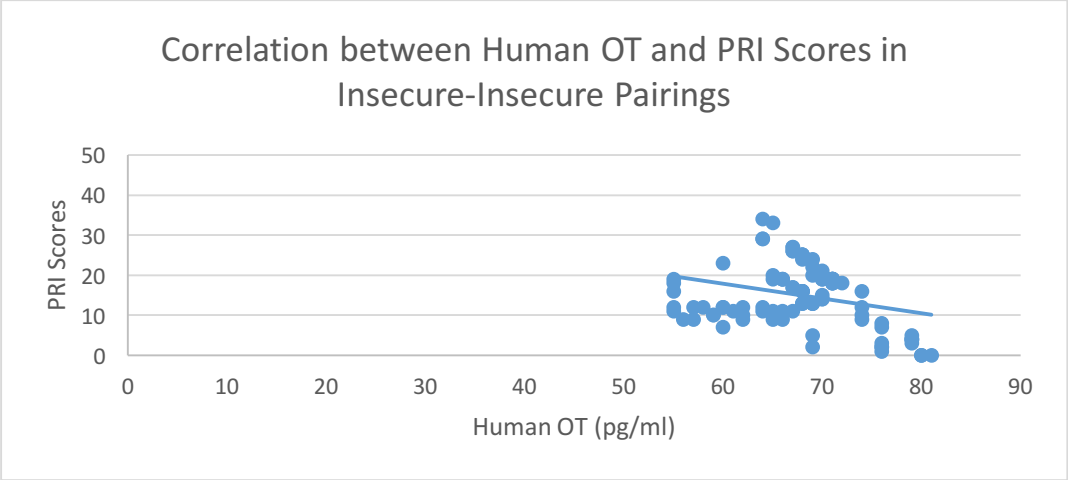


Figure 12. Human OT levels and PRI scores have a marginal negative correlation when insecure humans are paired with insecure dogs (r=-.3, n=100).

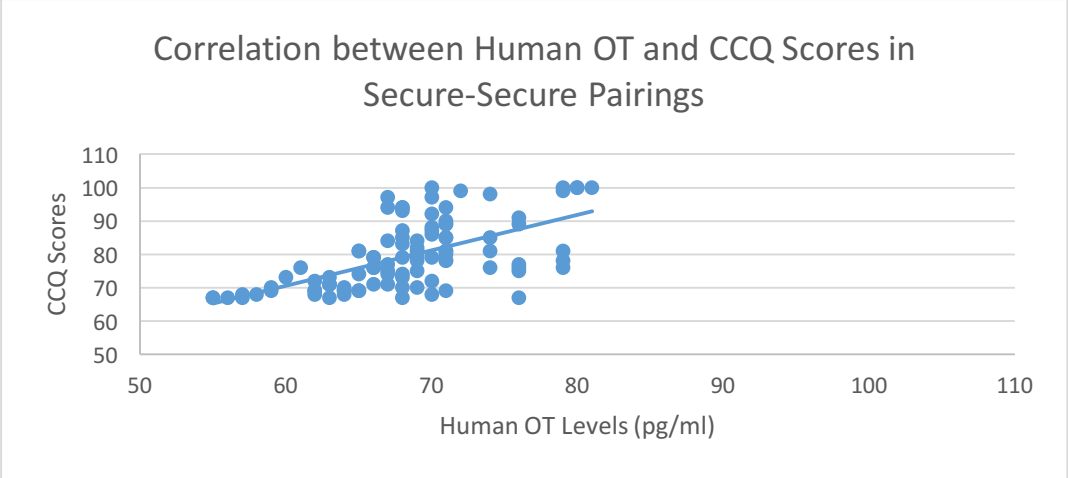


Figure 13. Human OT levels and CCQ scores are strongly correlated when both the human and dog have secure attachment styles (r=.6, n=100).

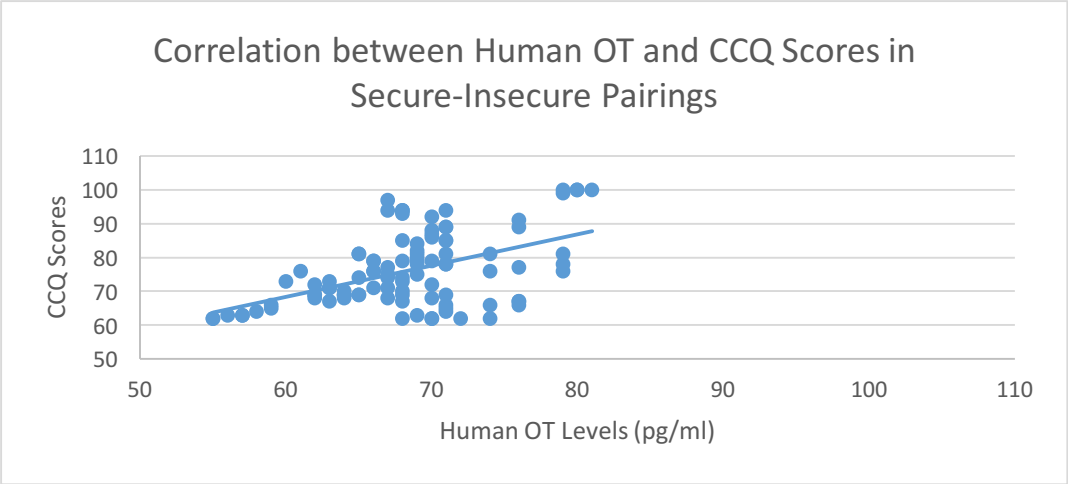


Figure 14. Human OT levels and CCQ scores are correlated when secure humans are paired with insecure dogs (r=.5, n=100).

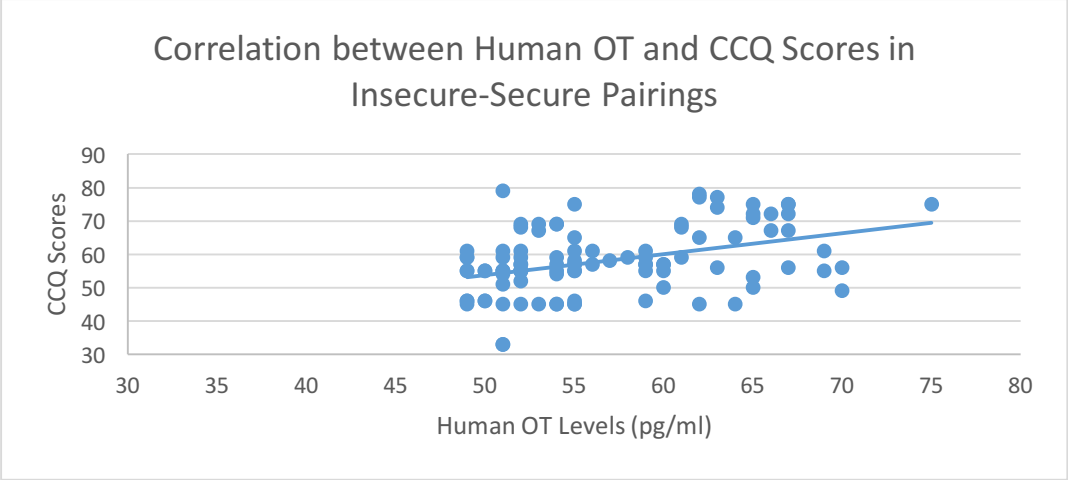


Figure 15. Human OT levels and CCQ scores are correlated when insecure humans are paired with secure dogs (r=.4, n=100).

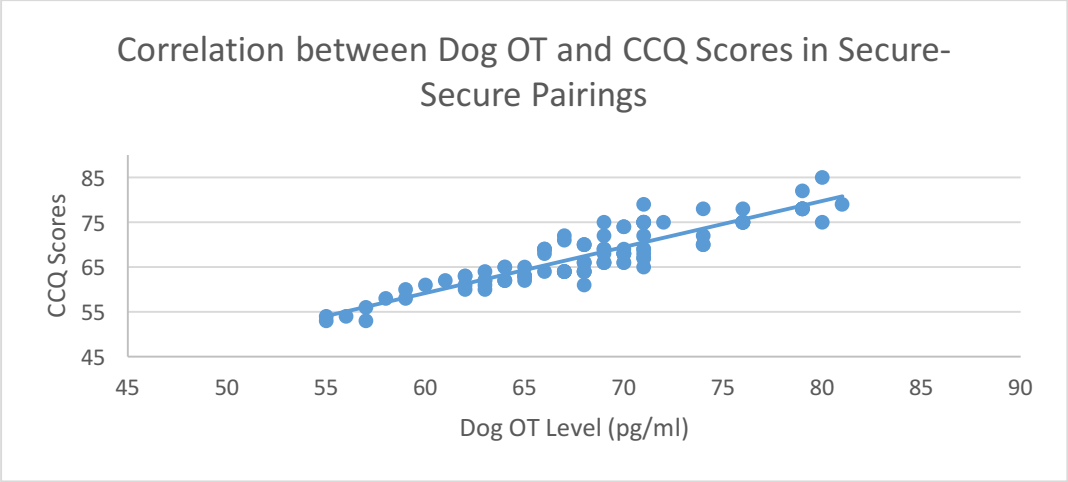


Figure 16. Dog OT levels and CCQ scores are strongly correlated when secure humans are paired with secure dogs (r=.9, n=100).

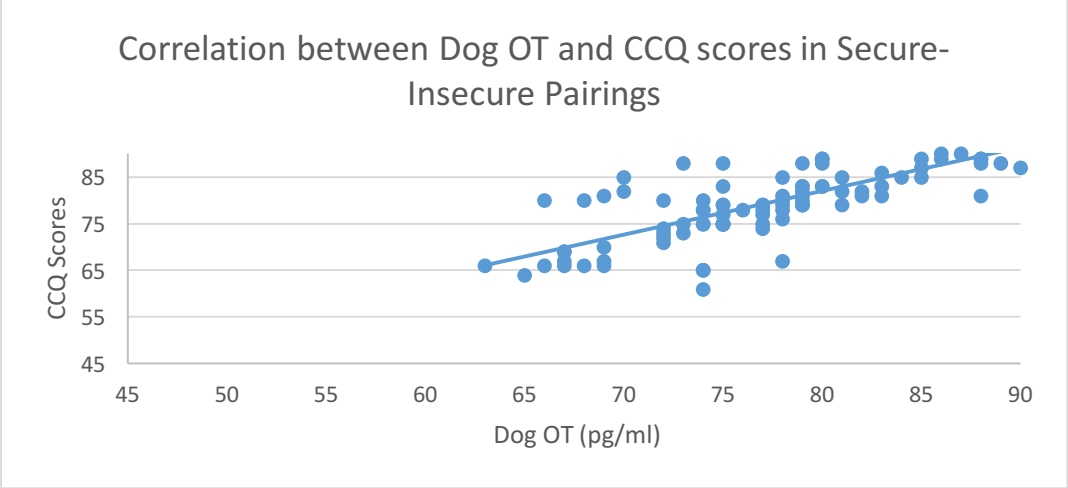


Figure 17. Dog OT levels and CCQ scores are strongly correlated when secure humans are paired with insecure dogs (r=.8, n=100).

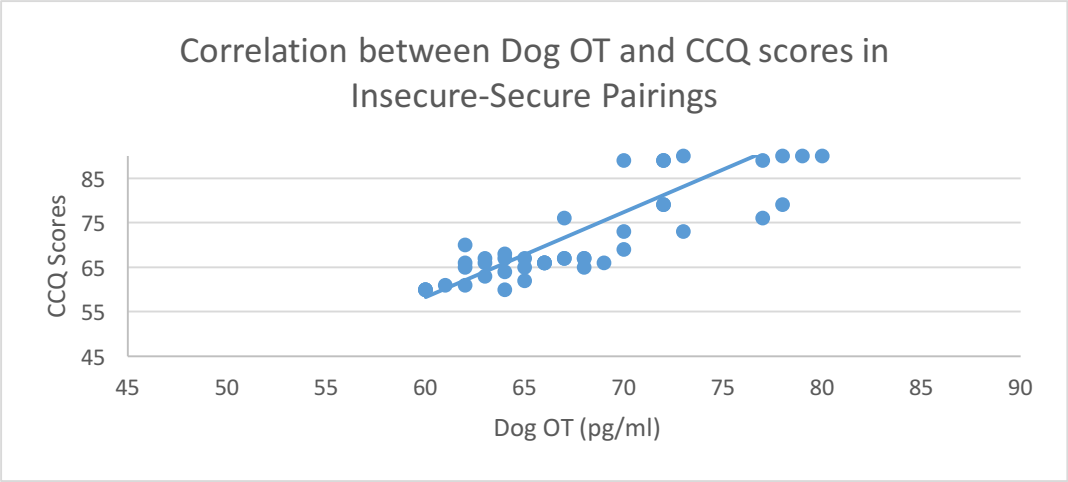


Figure 18. Dog OT levels and CCQ scores are strongly correlated when insecure humans are paired with secure dogs (r=.7, n=100).

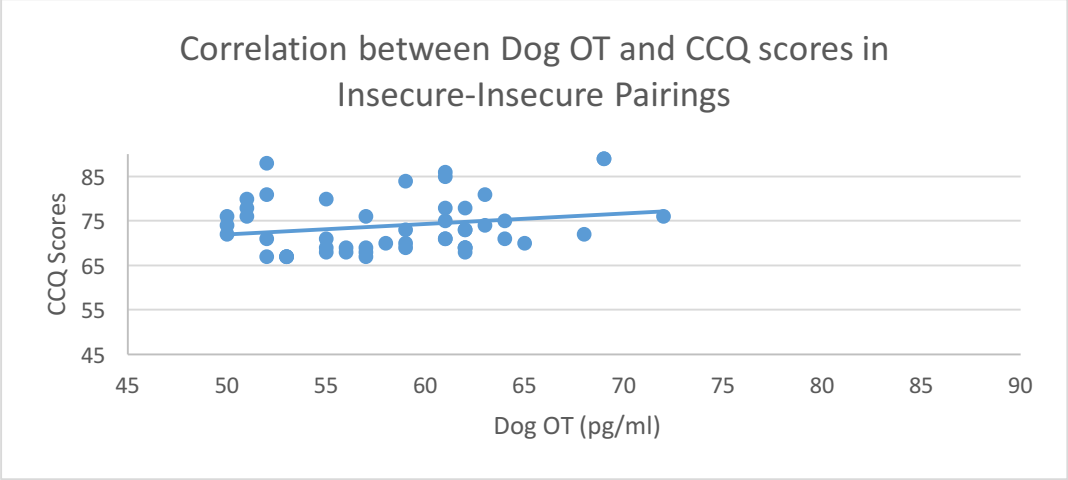


Figure 19. Dog OT levels and CCQ scores are correlated when both human and dog are insecurely attached (r=.5, n=100).

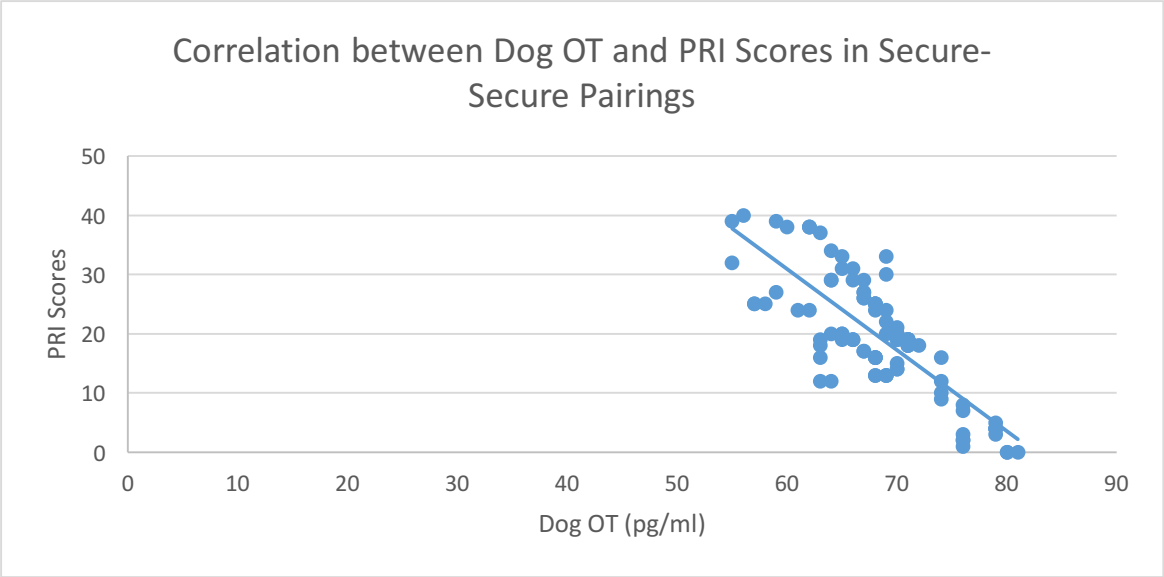


Figure 20. Dog OT levels and PRI scores are negatively correlated when both human and dog have secure attachment styles (r=-.7, n=100).

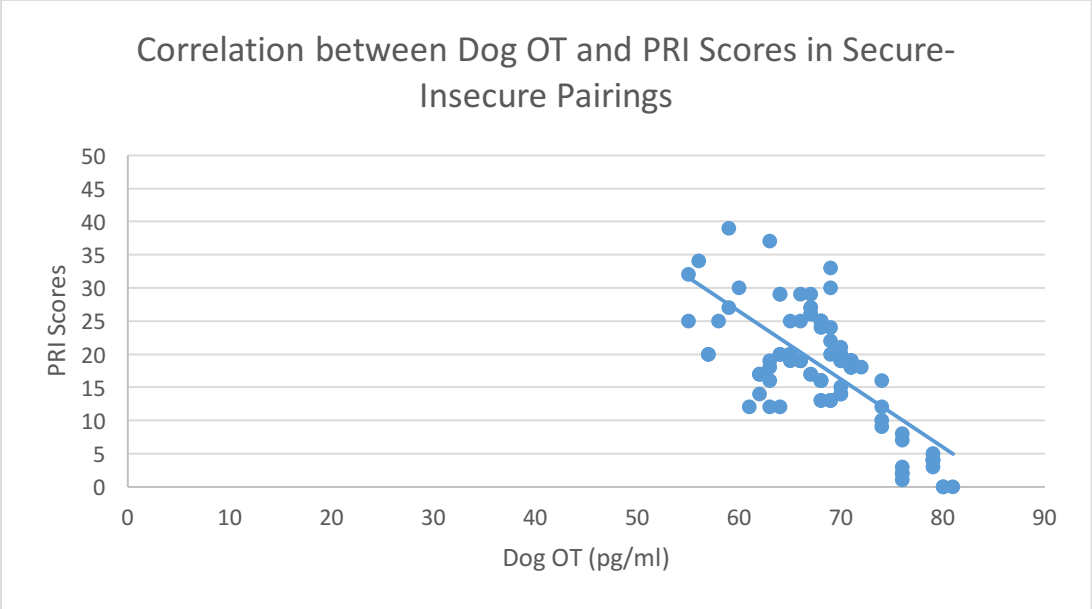


Figure 21. Dog OT levels and PRI scores will negatively correlate when a secure human is paired with an insecure dog (r=-.6, n=100).

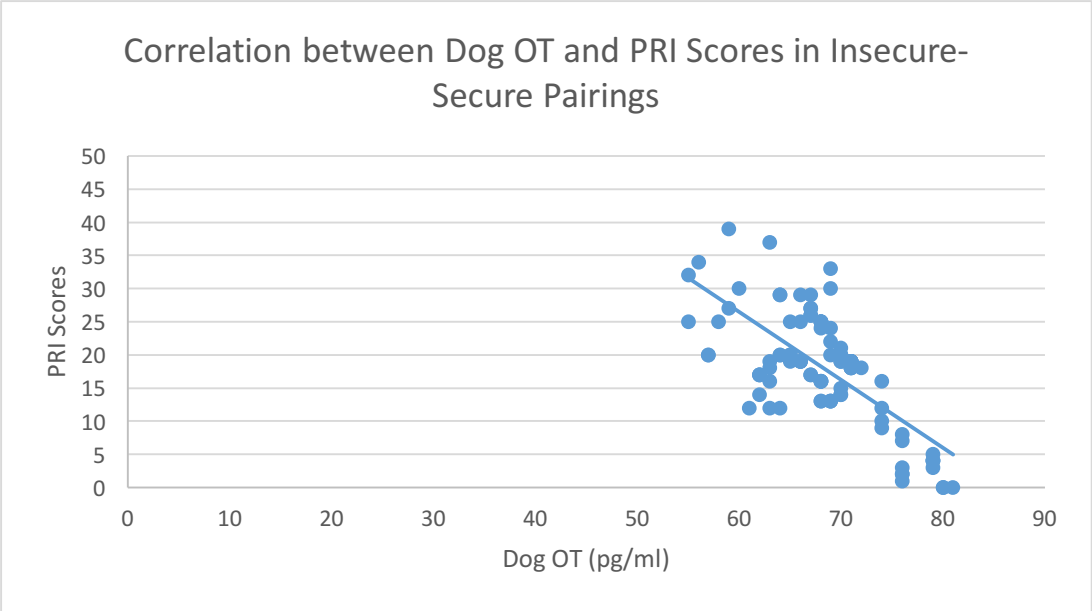


Figure 22. Dog OT levels and PRI scores will negatively correlate when an insecure human is paired with a secure dog (r=-.6, n=100).

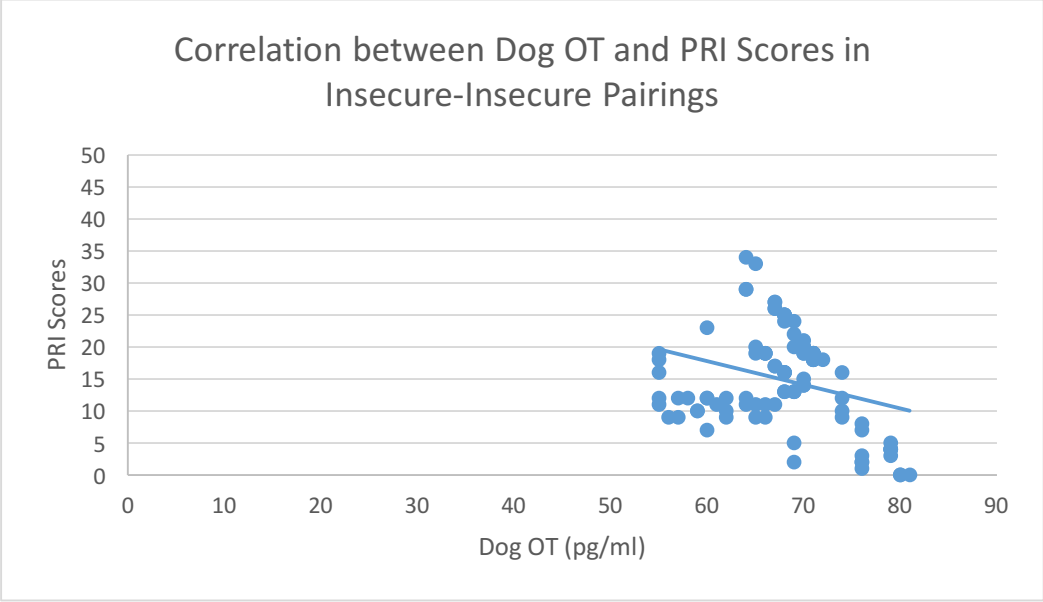


Figure 23. Dog OT levels and PRI scores will negatively correlate when an insecure human is paired with an insecure dog (r=-.3, n=100).

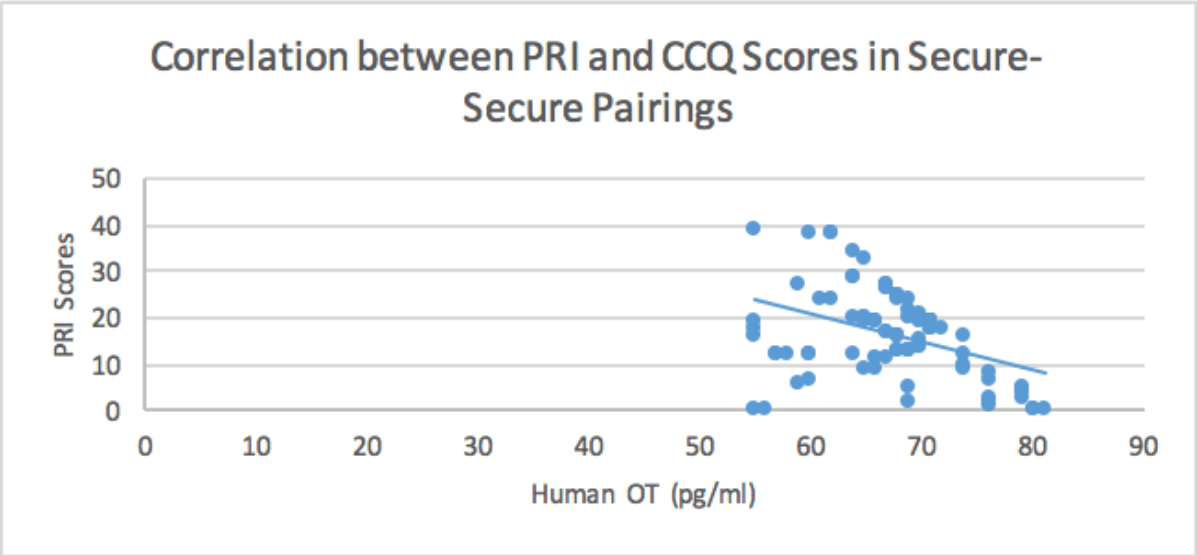


Figure 24. PRI and CCQ scores negatively correlate when both human and dog have secure attachment styles (r=-.4, n=100).

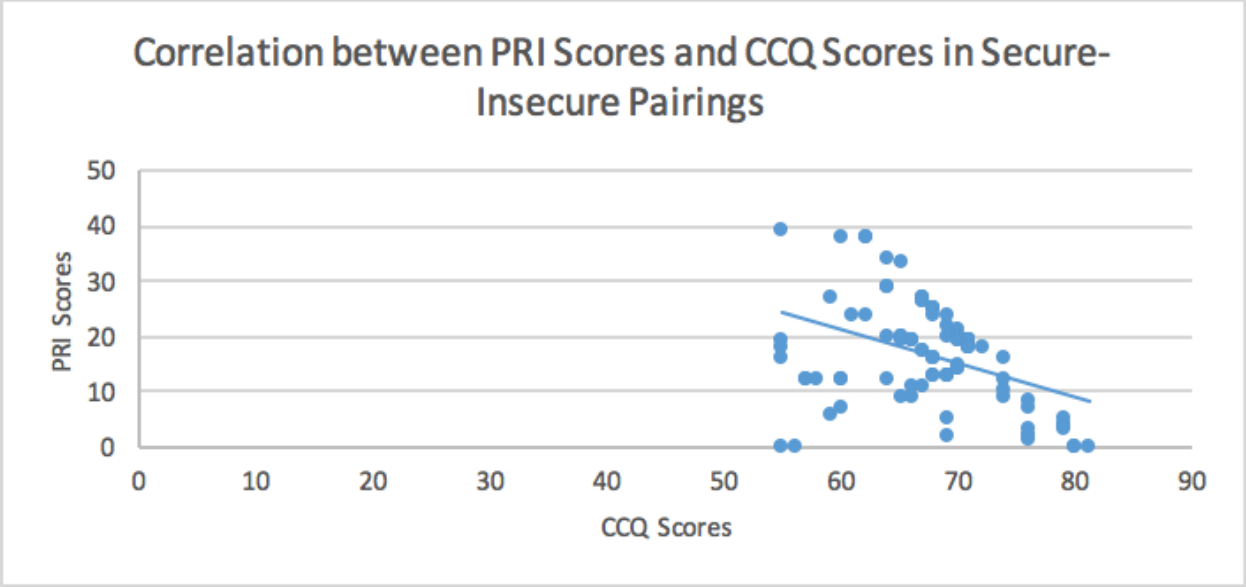


Figure 25. PRI and CCQ scores negatively correlate when a secure human is paired with an insecure dog (r=-.4, n=100).

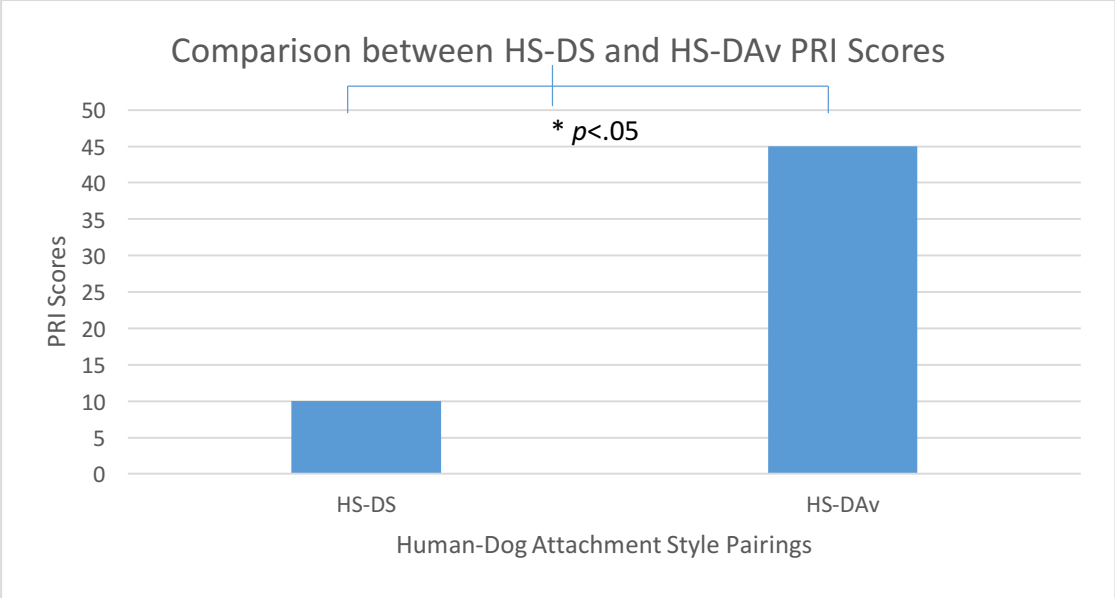


Figure 26. Secure humans paired with secure dogs have significantly lower PRI scores than secure humans paired with anxious dogs which suggests secure humans that are paired with secure dogs had more of their expectations met.

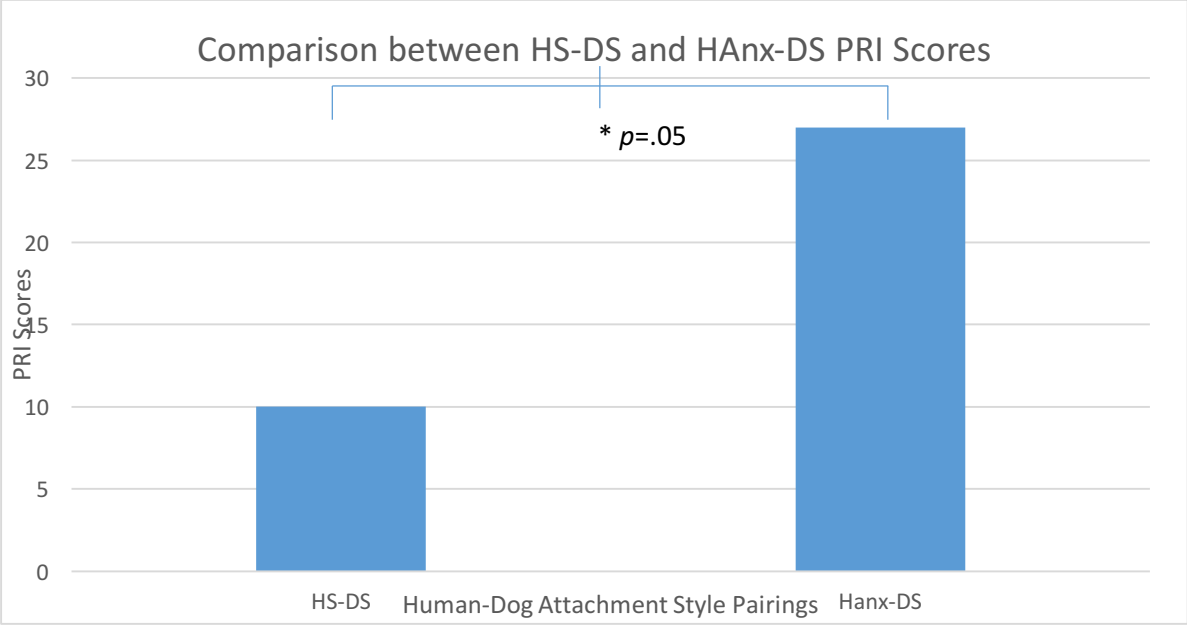


Figure 27. Secure humans paired with secure dogs have significantly lower PRI scores than anxious humans paired with secure dogs which suggests that secure humans paired with secure dogs had more of their expectations met.

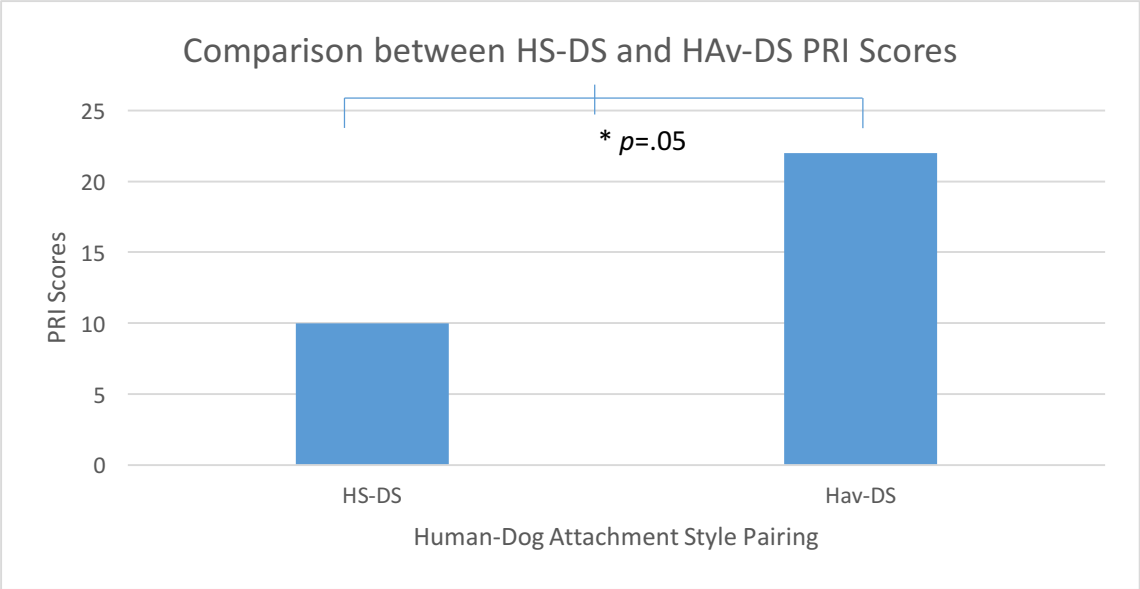


Figure 28. Secure humans paired with secure dogs have significantly lower PRI scores than avoidant humans paired with secure dog which suggests secure humans that are paired with secure dogs had more of their expectations met.

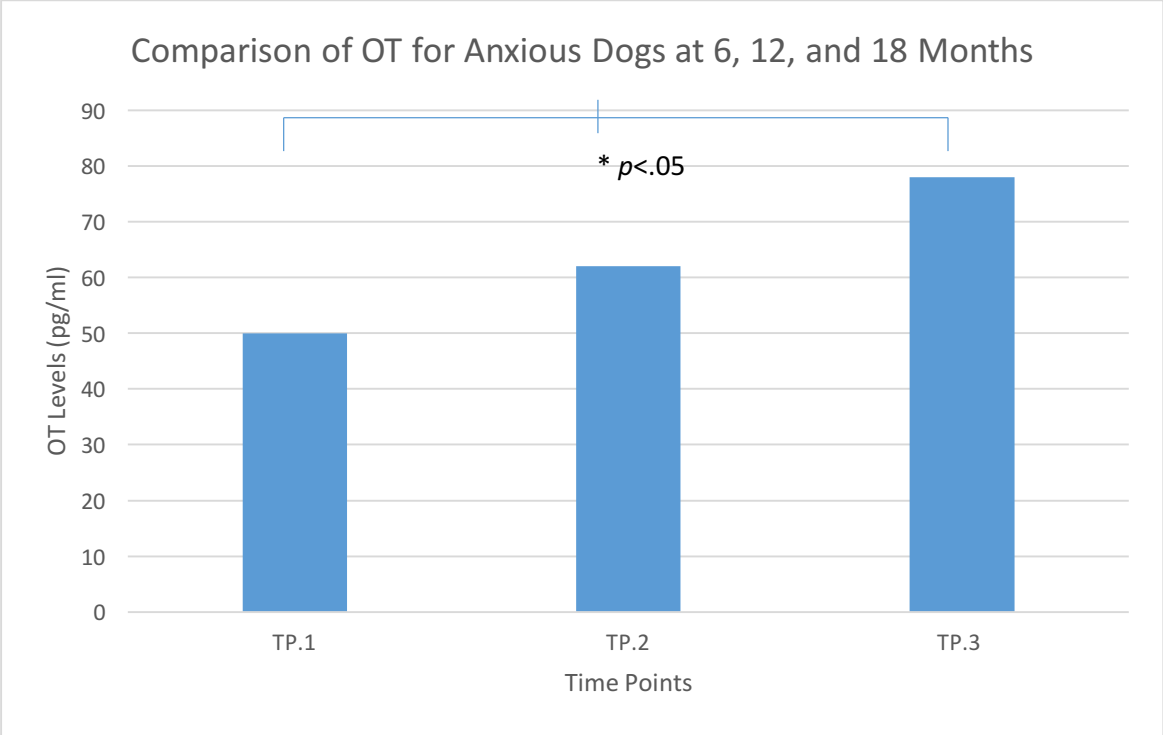


Figure 29. The difference in OT levels for anxious dogs at 6, 12, and 18 months is significant between the first TP and the second TP.

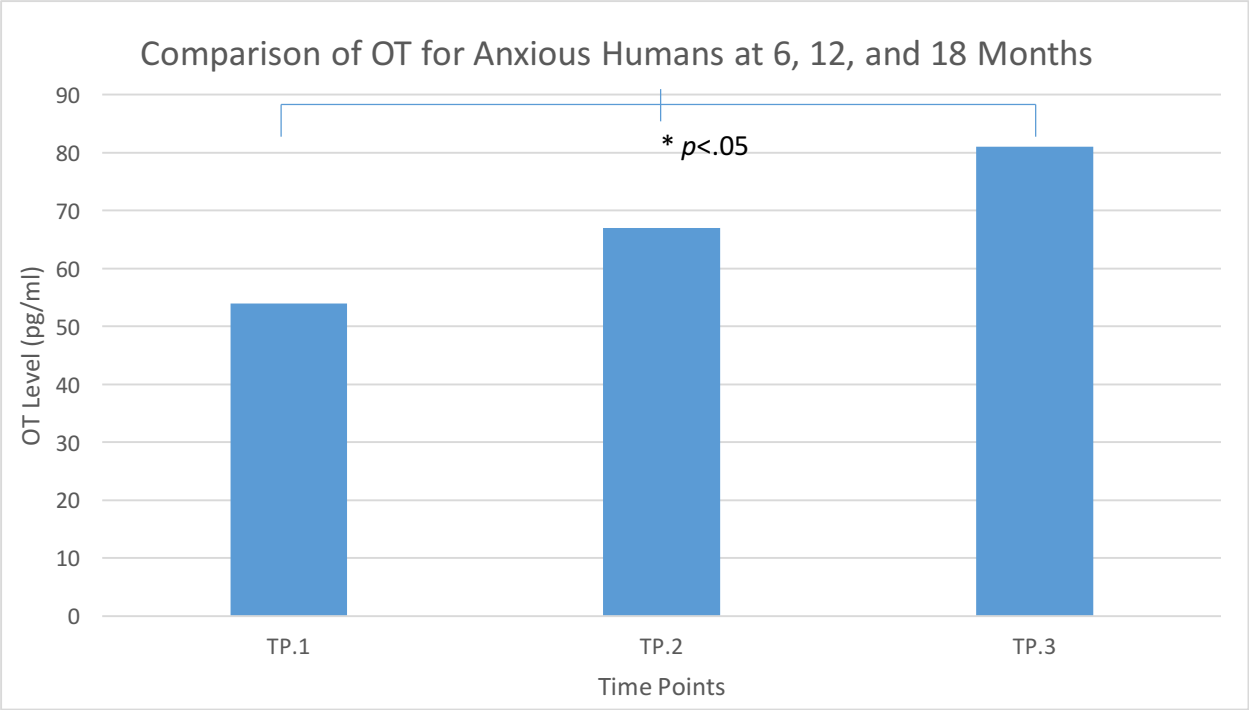


Figure 30. The difference in OT levels for anxious humans at 6, 12, and 18 months is significant between the first TP and the second TP.

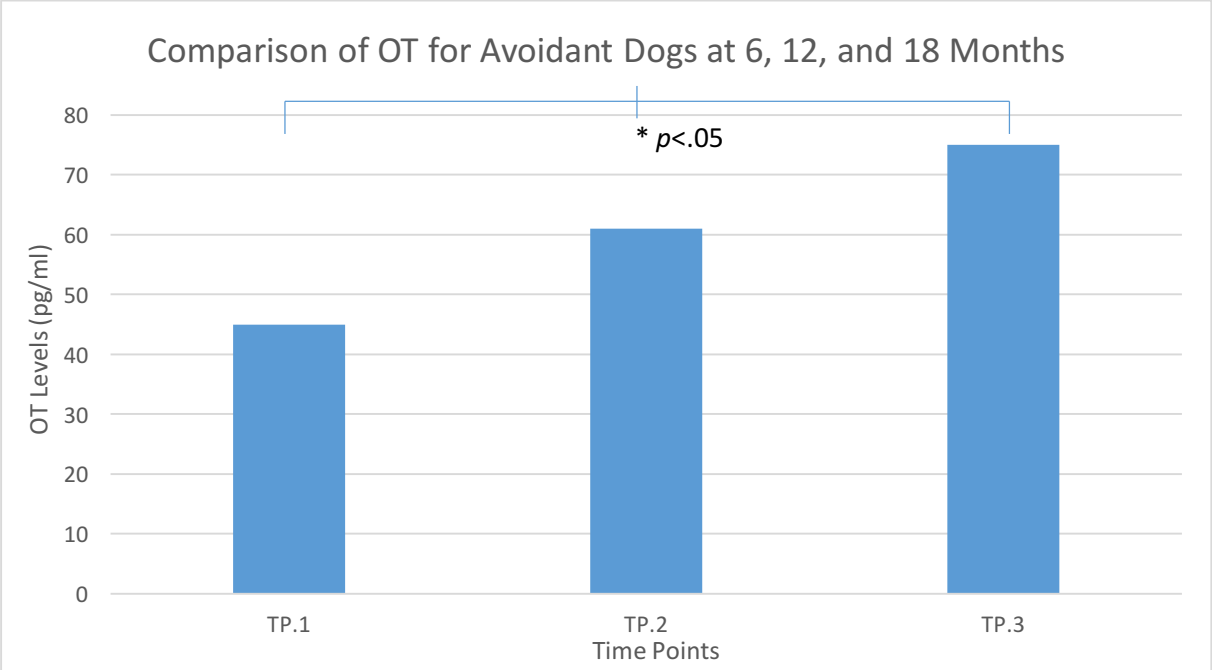


Figure 31. The difference in OT levels for avoidant dogs at 6, 12, and 18 months is significant between the first TP and the second TP.

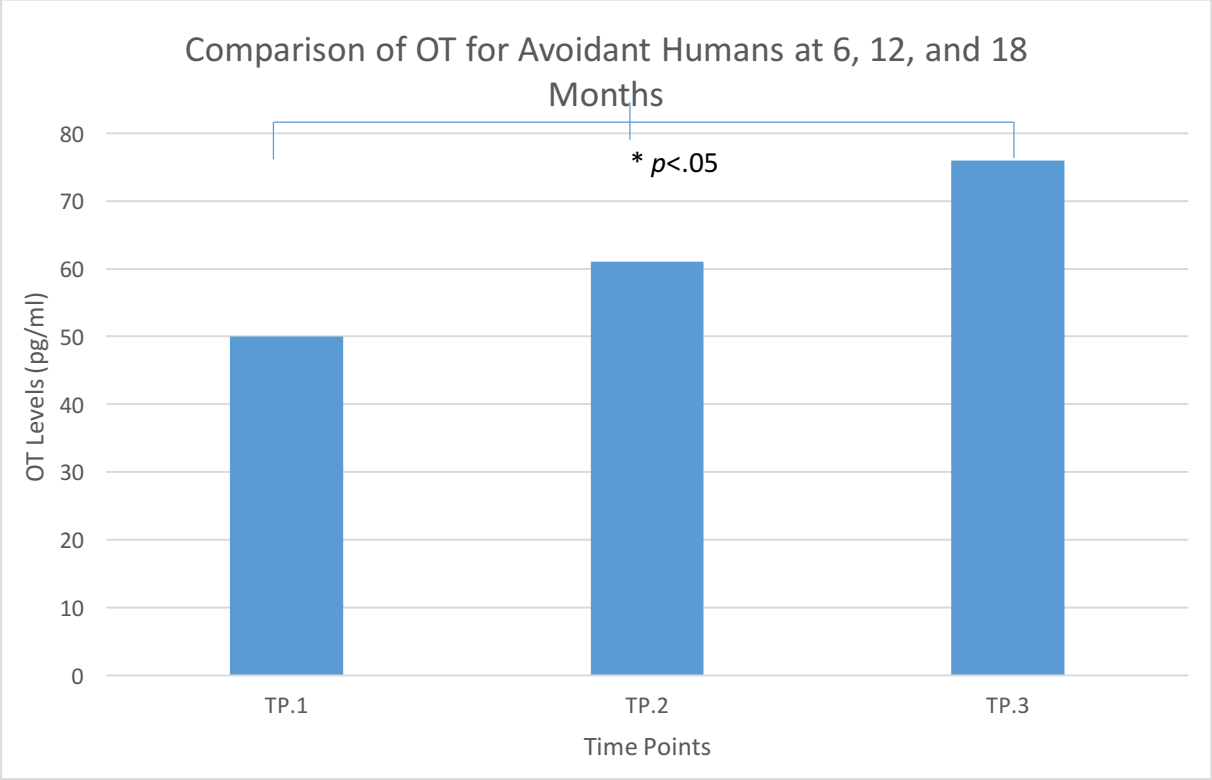


Figure 32. The difference in OT levels for avoidant humans at 6, 12, and 18 months is significant between the first TP and the second TP.

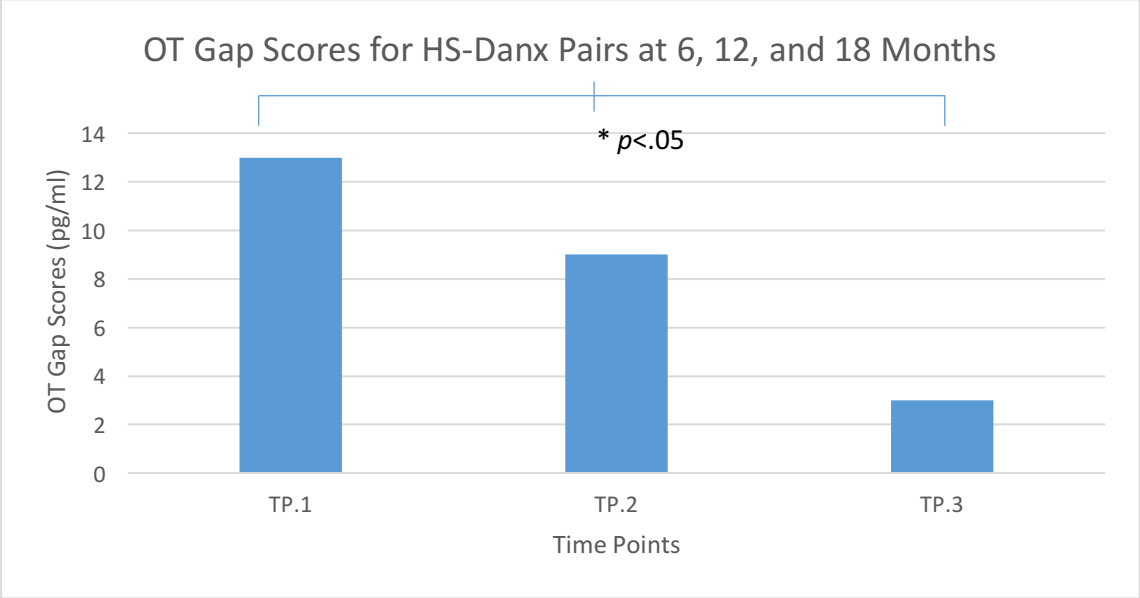


Figure 33. The difference in OT gap scores for secure humans paired with anxious dogs at 6, 12, and 18 months is significant between the first TP and the second TP.

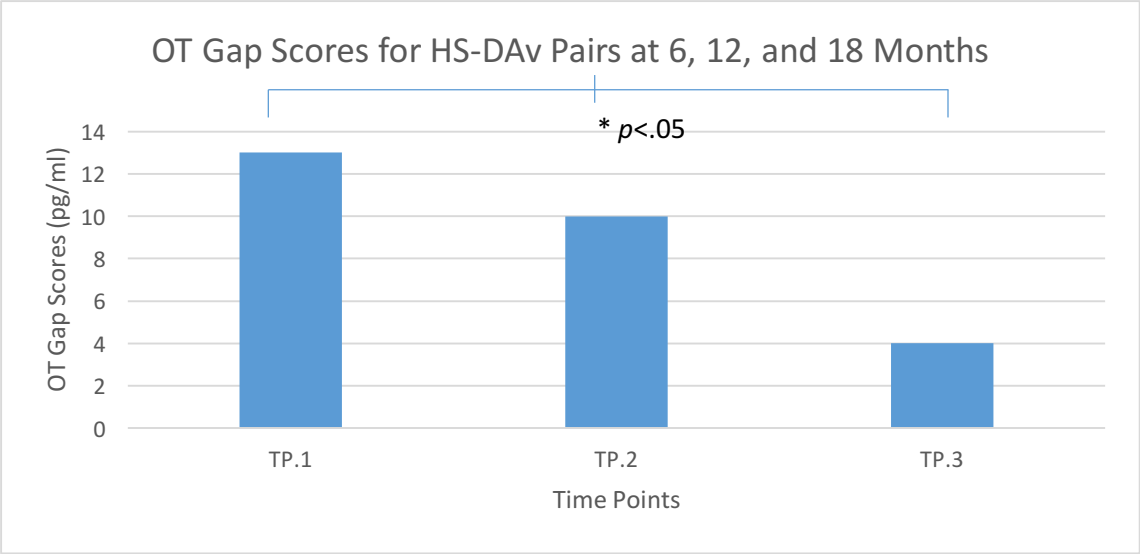


Figure 34. The difference in OT gap scores for secure humans paired with avoidant dogs at 6, 12, and 18 months is significant between the first TP and the second TP.

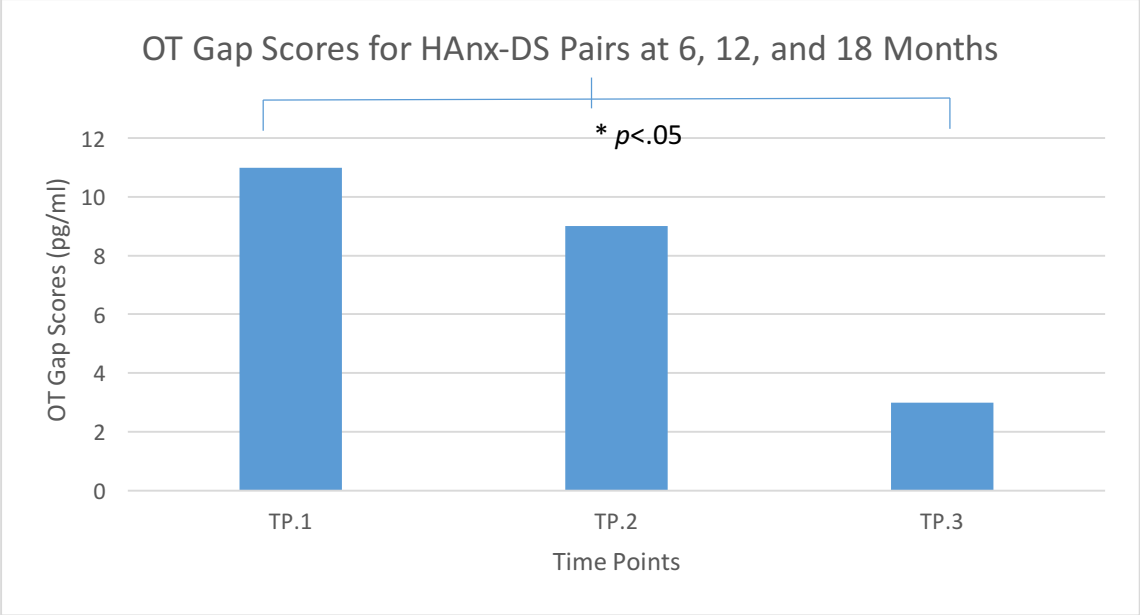


Figure 35. The difference in OT gap scores for anxious humans paired with secure dogs at 6, 12, and 18 months is significant between the first TP and the second TP.

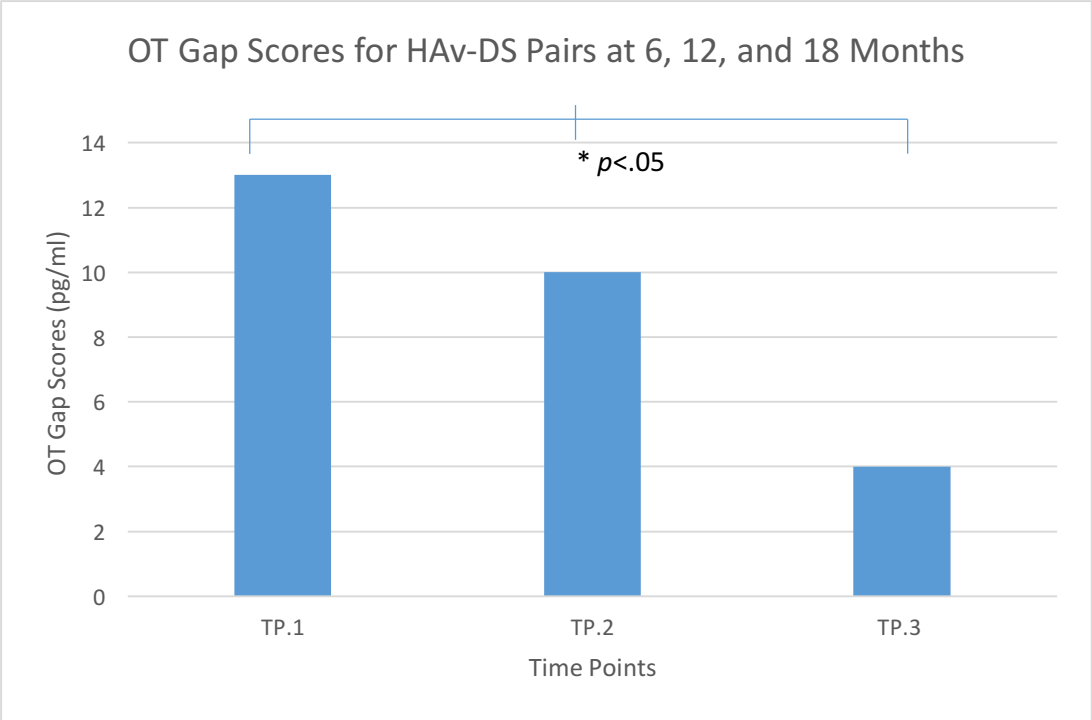


Figure 36. The difference in OT gap scores for avoidant humans paired with secure dogs at 6, 12, and 18 months is significant between the first TP and the second TP.

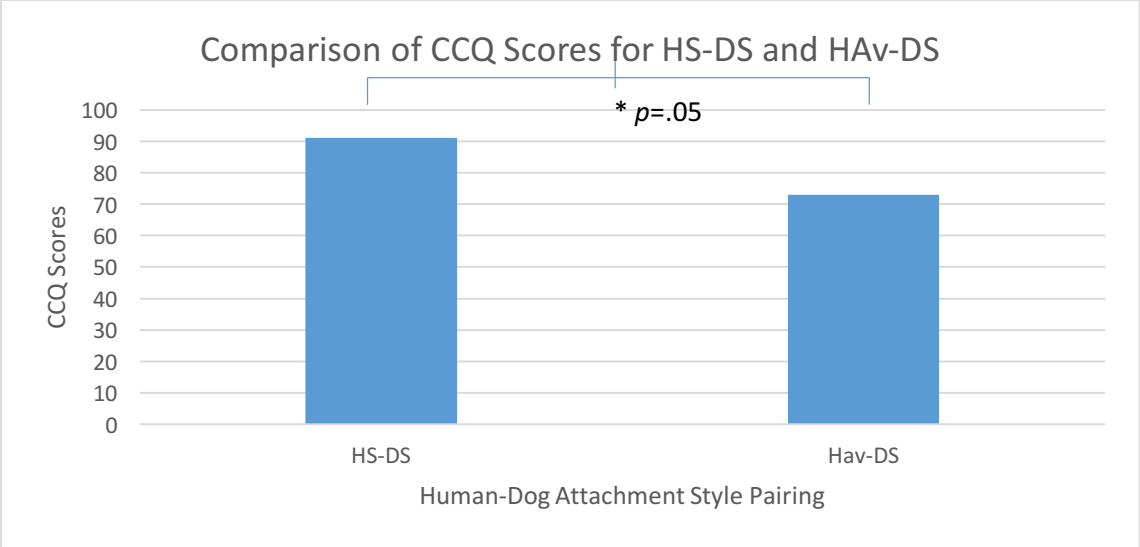


Figure 37. Secure humans paired with secure dogs have significantly higher CCQ scores than avoidant humans paired with secure dogs.

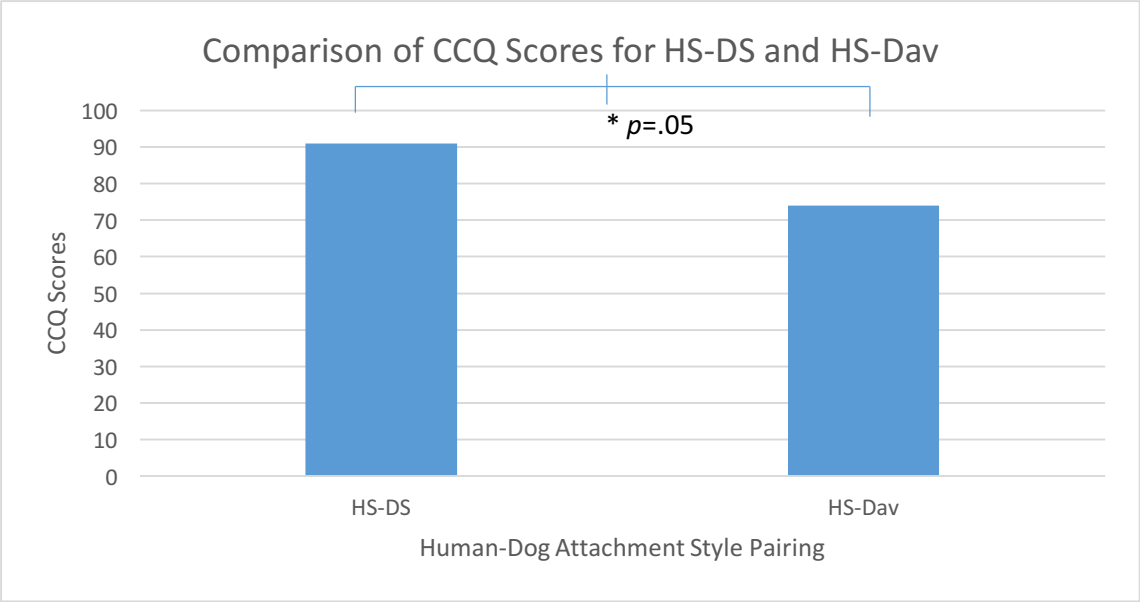


Figure 38. Secure humans paired with secure dogs have significantly higher CCQ scores than secure humans paired with avoidant dogs.

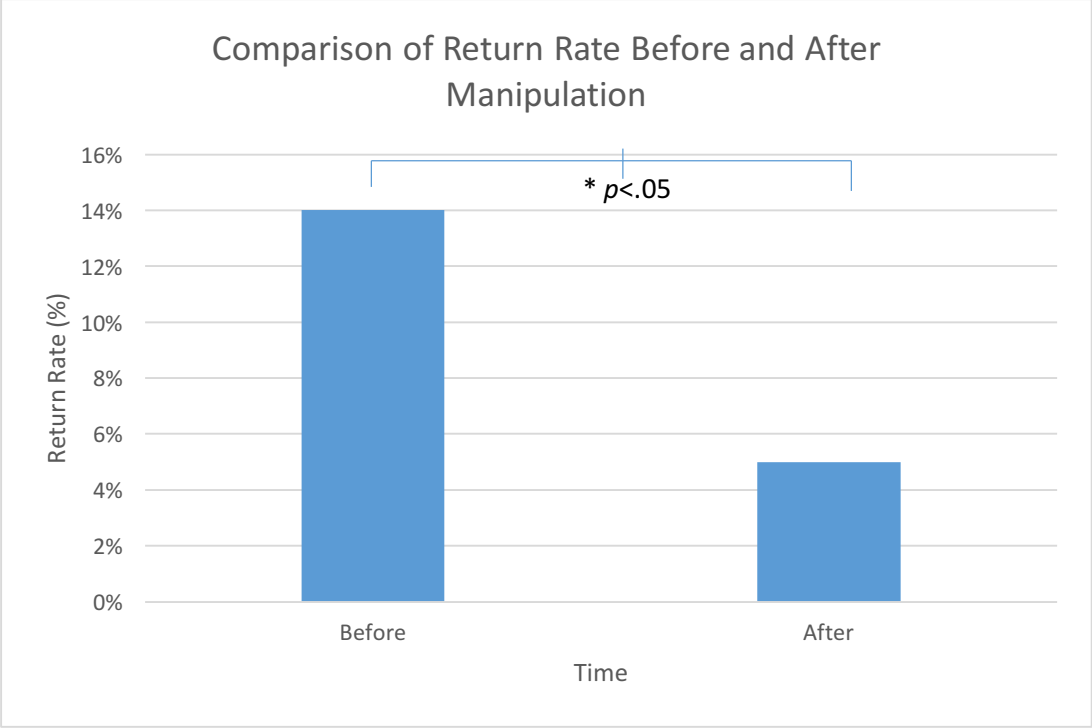


Figure 39. The return rate after Study Two is run is significantly lower than the return rate calculated at the beginning of the second study.

Appendix A

The Revised Hazan & Shaver (1987) Three-Category Measure

These questions are concerned with your experiences in romantic love relationships. Take a moment to think about these experiences and answer the following questions with them in mind.

Read each of the three self-descriptions below (A, B, and C) and then place a checkmark next to the single alternative that best describes how you feel in romantic relationships or is nearest to the way you feel. (Note: The terms "close" and "intimate" refer to psychological or emotional closeness, not necessarily to sexual intimacy.)

_____A. I am somewhat uncomfortable being close to others; I find it difficult to trust them completely, difficult to allow myself to depend on them. I am nervous when anyone gets too close, and often, others want me to be more intimate than I feel comfortable being.

_____B. I find it relatively easy to get close to others and am comfortable depending on them and having them depend on me. I don't worry about being abandoned or about someone getting too close to me.

_____C. I find that others are reluctant to get as close as I would like. I often worry that my partner doesn't really love me or won't want to stay with me. I want to get very close to my partner, and this sometimes scares people away.

Now please rate each of the relationship styles above to indicate how well or poorly each description corresponds to your general relationship style.

Style A

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

Style B

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

Style C

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

Appendix B

THE EXPERIENCES IN CLOSE RELATIONSHIPS-REVISED (ECR-R) QUESTIONNAIRE

Reference:

Fraley, R. C., Waller, N. G., & Brennan, K. A. (2000). An item-response theory analysis of self-report measures of adult attachment. *Journal of Personality and Social Psychology*, *78*, 350-365.

Description of Measure:

A 36-item measure of adult attachment style. The ECR-R measures individuals on two subscales of attachment: Avoidance and Anxiety. In general Avoidant individuals find discomfort with intimacy and seek independence, whereas Anxious individuals tend to fear rejection and abandonment.

For more information on adult attachment, visit these websites:
http://psychology.ucdavis.edu/labs/Shaver/measures.htm
http://www.psych.uiuc.edu/~rcfraley/measures/ecrritems.htm

Abstracts of Selected Related Articles:

Fraley, R. C., & Shaver, P. R. (2000). Adult romantic attachment: Theoretical developments, emerging controversies, and unanswered questions. *Review of General Psychology*.

The authors review the theory of romantic, or pair-bond, attachment as it was originally formulated by C. Hazan and P. R. Shaver in 1987 and describe how it has evolved over more than a decade. In addition, they discuss 5 issues related to the theory that need further clarification: (a) the nature of attachment relationships, (b) the evolution and function of attachment in adulthood, (c) models of individual differences in attachment, (d) continuity and change in attachment security, and (e) the integration of attachment, sex, and caregiving. In discussing these issues, they provide leads for future research and outline a more complete theory of romantic attachment.

Fraley, R. C. (2002). Attachment stability from infancy to adulthood: Meta-analysis and dynamic modeling of development mechanisms. *Personality and Social Psychology Review, 6*, 123-151.

A central tenet of attachment theory is that a person's attachment pattern in adulthood is a reflection of his or her attachment history—-beginning with the person's earliest attachment relationships. However, the precise way in which early representations might shape adult attachment patterns is ambiguous, and different perspectives on this issue have evolved in the literature. According to the prototype perspective, representations of early experiences are retained over time and continue to play an influential role in attachment behavior throughout the life course. In contrast, the revisionist perspective holds that early representations are subject to modification on the basis of new experiences and therefore may or may not reflect patterns of attachment later in life. In this article, I explore and test mathematical models of each of these theoretical processes on the basis of longitudinal data obtained from meta-analysis. Results indicate that attachment security is moderately stable across the first 19 years of life and that patterns of stability are best accounted for by prototype dynamics.

Shiota, M.N., Keltner, D., & John, O. P. (2006). Positive emotion dispositions differentially associated with Big Five personality and attachment style. *The Journal of Positive Psychology, 1*, 61-71.

Although theorists have proposed the existence of multiple distinct varieties of positive emotion, dispositional positive affect is typically treated as a unidimensional variable in personality research. We present data elaborating conceptual and empirical differences among seven positive emotion dispositions in their relationships with two core personality constructs, the "Big Five" and adult attachment style. We found that the positive emotion dispositions were differentially associated with self- and peer-rated Extraversion, Conscientiousness, Agreeableness, Openness to Experience, and Neuroticism. We also found that different adult attachment styles were associated with different kinds of emotional rewards. Findings support the theoretical utility of differentiating among several dispositional positive emotion constructs in personality research.

Scale:

The statements below concern how you feel in emotionally intimate relationships. We are interested in how you *generally* experience relationships, not just in what is happening in a current relationship. Respond to each statement by circling a number to indicate how much you agree or disagree with the statement.

	QUESTION	1=Strongly Disagree.....7=Strong Agree						
1.	I'm afraid that I will lose my partner's love.	1	2	3	4	5	6	7
2.	I often worry that my partner will not want to stay with me.	1	2	3	4	5	6	7
3.	I often worry that my partner doesn't really love me.	1	2	3	4	5	6	7
4.	I worry that romantic partners won't care about me as much as I care about them.	1	2	3	4	5	6	7
5.	I often wish that my partner's feelings for me were as strong as my feelings for him or her.	1	2	3	4	5	6	7
6.	I worry a lot about my relationships.	1	2	3	4	5	6	7
7.	When my partner is out of sight, I worry that he or she might become interested in someone else.	1	2	3	4	5	6	7
8.	When I show my feelings for romantic partners, I'm afraid they will not feel the same about me.	1	2	3	4	5	6	7
9.	I rarely worry about my partner leaving me.	1	2	3	4	5	6	7
10.	My romantic partner makes me doubt myself.	1	2	3	4	5	6	7
11.	I do not often worry about being abandoned.	1	2	3	4	5	6	7
12.	I find that my partner(s) don't want to get as close as I would like.	1	2	3	4	5	6	7
13.	Sometimes romantic partners change their feelings about me for no apparent reason.	1	2	3	4	5	6	7
14.	My desire to be very close sometimes scares people away.	1	2	3	4	5	6	7
15.	I'm afraid that once a romantic partner gets to know me, he or she won't like who I really am.	1	2	3	4	5	6	7
16.	It makes me mad that I don't get the affection and support I need from my partner.	1	2	3	4	5	6	7
17.	I worry that I won't measure up to other people.	1	2	3	4	5	6	7
18.	My partner only seems to notice me when I'm angry.	1	2	3	4	5	6	7
19.	I prefer not to show a partner how I feel deep down.	1	2	3	4	5	6	7
20.	I feel comfortable sharing my private thoughts and feelings	1	2	3	4	5	6	7

	with my partner.							
21.	I find it difficult to allow myself to depend on romantic partners.	1	2	3	4	5	6	7
22.	I am very comfortable being close to romantic partners.	1	2	3	4	5	6	7
23.	I don't feel comfortable opening up to romantic partners.	1	2	3	4	5	6	7
24.	I prefer not to be too close to romantic partners.	1	2	3	4	5	6	7
25.	I get uncomfortable when a romantic partner wants to be very close.	1	2	3	4	5	6	7
26.	I find it relatively easy to get close to my partner.	1	2	3	4	5	6	7
27.	It's not difficult for me to get close to my partner.	1	2	3	4	5	6	7
28.	I usually discuss my problems and concerns with my partner.	1	2	3	4	5	6	7
29.	It helps to turn to my romantic partner in times of need.	1	2	3	4	5	6	7
30.	I tell my partner just about everything.	1	2	3	4	5	6	7
31.	I talk things over with my partner.	1	2	3	4	5	6	7
32.	I am nervous when partners get too close to me.	1	2	3	4	5	6	7
33.	I feel comfortable depending on romantic partners.	1	2	3	4	5	6	7
34.	I find it easy to depend on romantic partners.	1	2	3	4	5	6	7
35.	It's easy for me to be affectionate with my partner.	1	2	3	4	5	6	7
36.	My partner really understands me and my needs.	1	2	3	4	5	6	7

Scoring:
(adapted from http://www.psych.uiuc.edu/~rcfraley/measures/ecrritems.htm)**:**

Scoring Information: The first 18 items above comprise the attachment-related anxiety scale. Items 19 – 36 comprise the attachment-related avoidance scale. *In real research, the order in which these items are presented should be randomized.* To obtain a score for attachment-related *anxiety*, please average a person's responses to items 1 – 18. However, because items 9 and 11 are "reverse keyed" (i.e., high numbers represent low anxiety rather than high anxiety), you'll need to reverse the answers to those questions before averaging the responses. (If someone answers with a "6" to item 9, you'll need to re-key it as a 2 before averaging.) To obtain a score for attachment-related *avoidance*, please average a person's responses to items 19 – 36. Items 20, 22, 26, 27, 28, 29, 30, 31, 33, 34, 35, and 36 will need to be reverse keyed before you compute this average.

Appendix C

Experiences in Close Relationships- Relationship Structures Questionnaire

Fraley et al. 2011

Overview

The Relationship Structures (ECR-RS) questionnaire is a self-report instrument designed to assess attachment patterns in a variety of close relationships. The same 9 items are used to assess attachment styles with respect to 4 targets (i.e., mother, father, romantic partner, and best friend). The items were written in a way that allows them to be used for a variety of interpersonal targets (not just romantic relationships) and for a variety of age groups. If desired, the 9 items can be used to target only one kind of relationship and, therefore, this instrument can be used as a 9-item version of the ECR-R.

In our research, the ECR-RS has proven to be quite useful. The test-retest reliability (over 30 days) of the individual scales are approximately .65 for the domain of romantic relationships (including individuals who experienced breakups during the 30-day period) and .80 in the parental domain. Moreover, research from our lab indicates that the scales are meaningfully related to various relational outcomes (e.g., relationship satisfaction, likelihood of experiencing a breakup, the perception of emotional expressions), as well as to one another. You can learn more about general measurement issues in adult attachment (e.g., whether to classify people or use dimensions, how to analyze these kinds of data) via some of the publications listed below or here.

Scoring information

Relationship-specific attachment

Two scores, one for attachment-related avoidance and the other for attachment-related anxiety, should be computed for each interpersonal target (i.e., mother, father, partner, friend). The avoidance score can be computed by averaging items 1 - 6, while reverse keying items 1, 2, 3, and 4. The anxiety score can be computed by averaging items 7 - 9. These two scores should be computed *separately* for each relationship target.

General or global attachment

[Note: See update below] To create relationship-general or global attachment scores, simply average the scores computed above across domains. The global avoidance score would be the mean of avoidance with mother, avoidance with father, avoidance with partner, and avoidance with friend. Similarly, the global anxiety score would be the mean of anxiety with mother, anxiety with father, anxiety with partner and anxiety with friend. This particular method, however, weights each realtionship domain equally. This may or may not be advisable, depending on your interests. An alternative is to administer the 9 RS items separately with the instruction for people to rate them with resepct to "important people in their lives," leaving the target purposely vague.

Questionnaire items

1. It helps to turn to this person in times of need.
2. I usually discuss my problems and concerns with this person.
3. I talk things over with this person.
4. I find it easy to depend on this person.
5. I don't feel comfortable opening up to this person.
6. I prefer not to show this person how I feel deep down.
7. I often worry that this person doesn't really care for me.
8. I'm afraid that this person may abandon me.
9. I worry that this person won't care about me as much as I care about him or her.

Instructions used for each relationship domain

A. Please answer the following questions about your mother or a mother-like figure.

B. Please answer the following questions about your father or a father-like figure.

C. Please answer the following questions about your dating or marital partner. Note: If you are not currently in a dating or marital relationship with someone, answer these questions with respect to a former partner or a relationship that you would like to have with someone.

D. Please answer the following questions about your best friend.

Appendix D

Strange Situation Test to measure attachment behavior in dogs.

Topál et al. 1998

Experimental Episodes of the Strange Situation Procedure

Introductory episode (30 s). The observer introduces the owner and dog to the experimental room and leaves.

Episode 1 (2 min): owner and dog. The owner is a nonparticipant while the dog explores. After 1.5 min, a signal (a knock on the wall) is given to the owner who stimulates play.

Episode 2 (2 min): stranger, owner, and dog. A stranger enters and sits down. After 30 s, she initiates conversation with the owner. At the 2nd-min mark, the stranger approaches the dog and tries to stimulate playing. At the end of this episode, the owner leaves as unobtrusively as possible, but the dog's leash remains on the chair.

Episode 3 (2 min): stranger and dog. This is the first separation episode. The stranger's behavior is geared to that of the dog. During the 1st min, the stranger tries to engage the dog and keep him or her out of the door by playing. If the dog is not ready to play, the stranger tries to engage the dog by petting. At the 2nd min-mark, the stranger stops playing. If the dog initiates petting, it is permitted.

Episode 4 (2 min): owner and dog. This is the first reunion episode. The owner approaches the closed door and calls the dog. The owner opens the door and pauses a moment to allow the dog to respond. The owner greets and comforts the dog. Meanwhile, the stranger leaves. After 2 min, the owner leaves and says to the dog
"stay here." The leash is left on the chair.

Episode 5 (2 min): dog alone. This is the second separation episode.

Episode 6 (2 min): stranger and dog. This is a continuation of the second separation. The stranger enters and gears her behavior to that of the dog. During the 1st min, the stranger tries to engage the dog and keep him or her out of the door by playing. If the dog is not ready to play, the stranger tries to engage the dog by petting. At the
2nd min-mark, the stranger stops playing. Petting is permitted if it is initiated by the dog.

Episode 7 (2 min): owner and dog. This is the second reunion episode. The owner opens the door and pauses a moment before greeting the dog, giving him or her an opportunity to respond spontaneously. Then the owner greets and comforts the dog. Meanwhile, the stranger leaves.

To conduct the Strange Situation Test in a standard manner, we gave several instructions (see Appendix) to the stranger (who was the same woman in all cases). The owners did not know anything about the real goals and the hypotheses of the study in advance; they were informed that this study was to examine the exploratory behavior of the dogs in a strange situation.

Instructions to the Stranger

1. In leaving during reunion episodes, the stranger must be unobtrusive and never interfere with the reunion (i.e., say nothing to the owner or dog, do not move between them, and leave quietly). If necessary, the stranger can wait to exit.
2. The stranger should never position herself between the dog and the owner, especially during reunions.
3. The stranger should never sit in the owner's chair.
4. When playing, the stranger should take her cue from the dog and do something similar.
5. In Episodes 3 and 6, if the dog is upset, the stranger should try to reassure it by petting and then distract it with toys.
6. At the end of Episodes 3 and 6, the stranger should never be
to the Stranger
playing or interacting with the dog so that the dog is not distracted when the owner returns.
7. In Episode 2, if the owner is not in her or his chair, the stranger may remind the owner to move to the chair.
8. The stranger must learn to remain calm in the presence of very distressed dogs and must not feel distressed if she cannot calm the dog.

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Behavioral Variables Observed in the Strange Situation Test

1. Exploration: activity directed toward nonmovable aspects of the environment, including sniffing, distal visual inspection (staring or scanning), close visual inspection, or oral examination; EXPO and EXPS.
2. Playing: any vigorous, toy- or social partner-related behavior, including running, jumping, or any physical contact with toys (chewing, biting); PLYO and PLYS.
3. Passive behaviors: sitting, standing, or lying down without any orientation toward the environment; PASO and PASS.
4. Physical contact; CONTO and CONTS.
5. Stand by the door: the time spent close to the door (<1 m) with the face oriented to the exit; SBYO and SBYS.
6. The score of contact seeking; that is, the sum of the following scores: approach initiation (+1); full approach, characterized by physical contact (+2); any sign of avoidance behavior (-1); COSO and COSS.
7. Delay of contact seeking: the amount of time (in s) from the moment of the opening of the door to the first sign of approaching behavior; DELO and DELS. (If approach was not recorded, DELO or DELS was considered to be the duration of full episode, or 120 s.)
8. Duration of physical contact while greeting; DCONTO and DCONTS.

Note. EXPO = exploration in the presence of owner; EXPS = exploration in the presence of stranger; PLYO = playing with owner present; PLYS = playing with stranger present; PASO = passive behavior in presence of owner; PASS = passive behavior in presence of stranger; CONTO = physical contact with owner; CONTS = physical contact with stranger; SBYO = standing by door with owner present; SBYS = standing by door with stranger present; COSO = contact seeking with entering owner; COSS = contact seeking with entering stranger; DELO = delay of contact seeking with owner; DELS = delay of contact seeking with stranger; DCONTO = duration of physical contact while greeting entering owner; DCONTS = duration of physical contact while greeting entering stranger.

Appendix E

Taken from Valsecchi et al. (2011)

Appendix

Temperament test description: subtest label, tester behavior, and scoring

1. Observation from a distance: the observer, hidden from dog's view, stands at a distance between 2 and 3 m from the kennel for a period of 30 seconds recording the dog's location inside the kennel.

Score:

- The dog is at the front, near the wire mesh = 3
- The dog is in the center of the kennel = 2
- The dog is in a corner of the outdoor area = 1
- The dog is out of sight, in its shed/hut = 0

2. Stereotypical behavior: in the following 30 seconds, the observer records the presence of stereotypies (repetitive pacing, repetitive circling, repetitive jumping on the fence, etc.).

Score:

- No = 1
- Yes = 0

3. Kennel approach: the observer quietly approaches the kennel with a neutral posture, avoiding direct eye contact, and stops a few centimeters from the fence. The subject's proximity to the tester and its body postures were recorded. Postures and behaviors were labeled for simplicity as: friendly (tail wagging, nonaggressive barking, exuberant, and/or calm approach seeking contact with the observer), neutral (i.e., the dog holds still, showing neither threatening nor friendly behaviors), fearful (a crouched posture, including ears, and tails held low, avoiding eye gaze, shaking, whimpering), or threatening (barking, growling, lunging towards the mesh, stiff posture, piloerection, etc.).

Score:

- Friendly and calm dog, approaching the tester asking for contact = 9;
- Friendly dog, still, inside the kennel, not asking for contact = 8
- Approaching exuberant and excited dog, hyperactive = 7
- Neutral dog, calmly approaching the tester = 6
- Neutral and still dog, only looking at the tester or barking = 5
- Neutral dog avoiding contact, moving away from the tester = 4
- Fearful dog, approaching the tester in low posture = 3
- Fearful dog, still, in the center of the kennel= 2
- Fearful dog avoiding the tester, moving away, and/or hiding in its shed/hut =1
- Aggressive and threatening dog = 0

4. Side-on crouch: the observer crouches down, side-on (so as to appear completely nonthreatening) a few centimeters from the kennel mesh and avoids staring at the dog. This posture is held for 30 seconds, during which the observer talks calmly to the dog ("good boy," "good girl," and "nice dog").

Score:

- Friendly and confident dog, approaches the tester asking for contact = 3
- Neutral or less confident dog, only barking = 2
- Fearful dog = 1
- Threatening and aggressive dog = 0

5. Stroking the dog through the wire mesh: the observer, crouching down a few centimeters from the mesh, looks toward the dog and attempts to stroke it for 30 seconds.

Score:

- Friendly and confident dog, approaches the tester asking for contact = 3
- Neutral or less confident dog, only barking = 2
- Fearful dog = 1
- Threatening and aggressive dog = 0

6. Entering the kennel: the observer walks into the kennel and closes the door. For 30 seconds the observer stands still, arms held loosely along the side, ignoring the dog completely, taking care not to cross its' eye gaze.

Score:

- The dog approaches the tester = 2
- The dog stands still = 1
- The dog goes away from the tester = 0

7. Physical contact: the observer stands still in the kennel, bends forward slightly, calling the dog in a gentle, relaxed manner. If there is no response, the observer may hold his/her hand out toward the dog, palm-side up, and even seek physical contact. The dog's behavior in the subsequent 30 seconds is recorded.

Score: (same scoring as subtest 3)

8. Reaction on seeing a leash and wearing a collar: the observer stands next to the dog and shows the leash for 30 seconds. The leash is held loose, allowing the dog to approach, smell, and look at it. The observer notes whether the dog is scared, calm, or exuberantly friendly when seeing the leash. A collar, which is attached to the leash, is put onto the dog by the observer. Scores refer to how easily the observer succeeds in this operation. If the dog is very excited, the observer can try to calm it by talking in gentle tones.

Score:

- The dog is confident and it is easy to put the collar on = 2
- The dog is either extremely excited and unmanageable, or reluctant and it is laborious to put the collar on = 1
- The dog reacts aggressively and it is impossible to put the collar on = 0

9. Walking on leash: the observer walks the dog from its kennel through a corridor toward the test area. The dog's behavior is noted in terms of general attitude on leash. The test lasts between 30 seconds and 1 minute depending on shelters structure.

Score:

- The dog is used to being on a leash and is easy to handle = 2
- The dog is scared, flattens itself, and wants to go back in to the kennel =1
- The dog is unmanageable on leash and pulls strongly = 0

10. Handling: the observer takes the dog into the test area and leaves the dog off leash, free to explore the area for 2 minutes. A record is made as to whether the subject explored the area or remained near the experimenter; because all dogs were explorative, exploration was not considered as variable in the analysis. Afterward, the dog is put on leash and the tester starts the manipulation, following 12 steps: stroking the dog on head, back, hind legs, and belly; gently pulling its ears and tail, lifting first a front and then a back leg; brush its back and side, apply a muzzle for a few seconds. Finally, the observer holds the dog with both arms around its body, and lifts it briefly. Observation time is 15 seconds after each contact; the test lasts for approximately 3 minutes.

Score: for each step of the manipulation the dog reaction was evaluated as follows:

- Calm or confident with human contact = 2
- Freeze, crouched posture, mouth licking, but not aggressive = 1
- Growling or aggressive = 0

Altogether, this subtest achieves a maximum score of 24.

11. Attention test: the dog is on leash, the observer stands in front of the dog, shows it a titbit of food, holds the food in his/her closed hand, with the hand held up to the chest. The dog is expected to follow the hand movement and hold its gaze on the hand for a minimum of 3 seconds.

Score:

- The dog holds the gaze for 3 seconds = 1
- The dog either jumps to the hand or walks away = 0

12. a. "*Come*" command: the dog is off leash, the observer stands a minimum of 5 m from the dog, and calls the dog with a calm voice for approximately 30 seconds. If the dog is reticent, the observer may kneel down and call the dog once more holding his/her hand out, palm up.
    b. "*Sit*" command: the dog is off leash, the observer crouches down in front of the dog and shows him a titbit, then moves the titbit up above its head, and gives it to the dog if it sits or makes a move to sit on his hind quarters. The observation time is approximately 30 seconds.

Score:

(a) the dog goes toward the tester after being called = 1

the dog does not follow the command = 0

(b) the dog sits after the command = 1

the dog does not follow the command = 0

13. Problem solving: the dog is off leash, the observer gives a titbit of food to the dog to evaluate its interest in the food reward; the observer approaches the dog,

shows a second titbit, and making sure that the dog is still watching, places it under an up-side-down bowl. The observer moves away and notes whether the dog explores the object and attempts to retrieve the titbit within 30 seconds.

Score:

- The dog accomplishes the task = 3
- The dog interacts with the box but does not accomplish the task = 2
- The dog is interested in the food but looks at the tester not interacting = 1
- The dog is not interested in the food or in the task = 0

14. Squeaky toy: the dog is off leash, the observer shows the squeaky toy to the dog and manipulates it so that it squeaks, then throws it gently toward the dog.

Score:

- The dog plays with the toy = 3
- The dog approaches the toy stretching very cautiously = 2
- The dog is not interested in the toy = 1
- The dog is scared = 0

15. Ball: the dog is off leash, the observer shows the dog a 5 cm diameter red ball, allowing it to sniff it. She/he then throws it along the ground. The observer notes the dogs' tendency to follow the ball, retrieve it, and give it back. If the dog is reluctant to give the toy back, the observer notes potentially offensive behaviors, such as piloerection and growling. If the dog does not play with the ball on the first throw, the test is repeated one more time.

Score:

- The dog plays with the ball = 1
- The dog does not play with the ball = 0

If the dog retrieves the ball, does it give it back?

- yes = 2, no = 1, no and it growls = 0

16. Food bowl subtraction: the dog is on leash for tester safety, the observer gives the dog a bowl full of dry-food and stands back for approximately 2 m. The dog is allowed to approach the food, and after it has eaten a couple of mouthfuls, the researcher approaches the dog directly, pretending to take the bowl away. The dog's reaction is recorded as either: peaceful, aggressive, or anxious (if it starts eating faster, keeping an eye on the researcher, pushing the head into the bowl and protecting it with its front paws).

Score:

- The dog keeps on eating and ignores the tester = 3
- The dog looks anxious and eats faster = 2
- The dog is not interested in food = 1
- The dog growls to the tester = 0

17. Approach of an unknown dog of opposite gender: a standard neutered dog is presented to the tested dog at a distance of 2 m. Both the dogs are on leash. The dog's reaction is recorded.

Score:

- The dog is attentive, confident, and friendly = 2
- The dog is uninterested to opponent = 1
- The dog assumes a stiff dominant posture and growls = 0

18. Contact with an unknown dog of opposite gender: if the tested dog does not show aggressive intent, the 2 subjects are allowed to make contact, for approximately 1 minute. The tested dog's reaction is recorded.

Score:

- The dog is playful and friendly = 4
- The dog sniffs calmly and is confident = 3
- The dog is afraid and submissive = 2
- The dog is on alert and stiff posture = 1
- The dog is threatening and aggressive = 0

19. Approach of an unknown dog of the same gender: similar to point 17

20. Contact with an unknown dog of the same gender: similar to point 18

21. Reactivity: the observer stands at approximately 1 m from the dog, taking care not to make direct eye contact. With a toy gun she/he produces a rapid sequence of sudden and unusual sounds. The researcher records the dog's behavioral reactions and how many repetitions are needed to habituation. If the subject does not habituate within 10 repetitions, the stimulus is removed to avoid stressing the animal. After the dog has calmed down, the observer stands at approximately 1 m from the dog and suddenly opens an umbrella repeating the action a maximum of 10 times as before. Tester records the dog's reaction and how many repetitions are needed to habituation.

Score:

- The dog is interested and explores the stimuli = 3
- The dog is indifferent and has no reaction = 2
- The dog is fearful and runs away = 1
- The dog has an aggressive reaction = 0

If the dog does habituate to the stimuli within 10 repetitions, an extra point is added:

- habituation = 1, no habituation = 0

22. Returning to the kennel: the tester returns the dog on leash to the kennel and records the subject's reaction.

Score:

- The dog enters the kennel immediately = 2
- The dog is reluctant to enter = 1
- The dog refuses to enter and pulls back strongly = 0

Appendix F

SAFER™ worksheet

ASPCA®

shelter name _____ date M M D D Y Y

assessor _____ observer _____

dog's name _____ age _____ coat color _____

sex ❑ male ❑ neutered male ❑ female ❑ spayed female

breed _____

date entered shelter M M D D Y Y

dog ID number _____

item 1 – look:

	Dog leans forward or jumps up to lick the Assessor's face with tail wagging, ears back and eyes averted. **[Enter "1"]**
	Dog's eyes are averted, with tail wagging and ears back. He allows head to be held loosely in Assessor's cupped hands. **[Enter "1"]**
	Dog holds gaze with soft eyes, soft body. He allows head to be held loosely in Assessor's cupped hands. Dog holds gaze for three full seconds. **[Enter "1"]**
	Dog's eyes are averted. His ears are back, his tail is down, and he has a relaxed body posture. Dog allows head to be held loosely in Assessor's cupped hands. **[Enter "1"]**
	Dog's eyes are averted. His body posture is stiff and fearful, his tail is low and not moving. He allows head to be held loosely in Assessor's cupped hands. **[Enter "2"]**
	Dog pulls out of Assessor's hands each time without settling during three repetitions. **[Enter "2"]**
	Dog jumps on the Assessor, consistently rubs his shoulder on the Assessor, and will not allow Assessor to conduct the assessment. **[Enter "3"]**
	Dog holds eye contact while remaining motionless with ears forward. His body is stiff and becomes stiffer as assessment progresses. **[Enter "4"]**
	Dog freezes and/or growls or tries to bite. **[Enter "5"]**

If aggression is noted, use the checklist below to evaluate the dog's response. You can use this information to help best guide the behavior team regarding potential behavior modification and management (see guide for protocols).

❑ Body stiff	❑ Eyes hard	❑ Vocalizes	❑ Exposes teeth
❑ Freeze	❑ Ears back	❑ Dog growls	❑ Snaps no contact
❑ Tail up	❑ Ears forward		❑ Attempts to bite
❑ Tail down			

Behaviors observed before, during or after the item:

item 2 – sensitivity:	
	Dog leans into the Assessor, eyes soft or squinty, soft and loose body, open mouth. **[Enter "1"]**
	Dog stands still and accepts the touch, his eyes are averted, and his tail is in neutral position with relaxed body posture. Dog's mouth is likely closed for at least a portion of the assessment item. **[Enter "1"]**
	Dog displays high energy and movement, but it is directed toward getting closer to the Assessor. His body is soft, likely panting, may jump up between attempts to lick Assessor. **[Enter "2"]**
	Dog is active and focused on the Assessor and all other stimuli available. His body is soft, likely panting, likely to display high movement between attempts. **[Enter "2"]**
	Dog stands still and accepts the touch, his eyes are averted, his tail is between his legs, body stiff, mouth closed, lip long, ears likely back, may lip lick. **[Enter "2"]**
	Dog repeatedly turns toward the Assessor's hand, with loose body and open mouth, mouths the hand, but does not apply pressure. Or, dog licks hands while lips are long. **[Enter "2"]**
	Dog is not fearful and is struggling to get away. The dog is not focused and is in constant movement, unconnected to the Assessor. **[Enter "3"]**
	Dog stands tall and square. His tail perpendicular to spine, mouth closed for the majority of assessment item. **[Enter "3"]**
	Dog repeatedly turns toward the Assessor's hand with a very fast head movement. If able, he muzzle punches the hand. His body is stiff and he has a closed mouth with a short lip. **[Enter "4"]**
	Dog freezes, growls or tries to bite. **[Enter "5"]**

If aggression is noted, use the checklist below to evaluate the dog's response. You can use this information to help best guide the behavior team regarding potential behavior modification and management (see guide for protocols).

❑ Body stiff	❑ Eyes hard	❑ Vocalizes	❑ Exposes teeth
❑ Freeze	❑ Ears back	❑ Dog growls	❑ Snaps no contact
❑ Tail up	❑ Ears forward		❑ Attempts to bite
❑ Tail down			

Behaviors observed before, during or after the item:

item 3 – tag:	
	Dog assumes play position and joins the game. Or dog indicates play with huffing, soft 'popping' of the body, etc. Dog might jump on Assessor once play begins. **[Enter "1"]**
	Dog stands with his tail low and wagging, and comes toward the Assessor in a friendly manner when the Assessor ceases moving. **[Enter "1"]**
	Follows at end of leash, body soft, or low and a bit fearful. **[Enter "1"]**
	Dog is fearful but unresponsive when touched. Approaches the Assessor when the game ends. Dog is likely crouching, may have long lip or lip lick. **[Enter "2"]**
	Dog is not fearful but is unresponsive to the Assessor, and approaches the Assessor at the end of the game (may need coaxing to approach). He is focused on stimuli other than the Assessor. **[Enter "2"]**
	Dog repeatedly turns quickly away when touched, or repeatedly spins toward the touch, and repeatedly tries to exit. Dog may be crouching, tail is tucked, mouth closed, body stiff. **[Enter "3"]**
	Dog responds with his tail high, ears forward, mouth likely closed for at least half of the assessment item, body stiff and body checks the Assessor. Dog is often focused on other stimuli in the room. **[Enter "3"]**
	Dog panics with vocalization combined with tail tuck, yelping and repeatedly trying to exit. (If dog settles after 1st or 2nd tag, choose 1st "3" scoring option). **[Enter "4"]**
	Dog stands his ground while not cornered and barks at the Assessor with ears forward, body stiff, mouth closed and lips pursed when not barking. **[Enter "4"]**
	Dog growls or tries to bite. **[Enter "5"]**

If aggression is noted, use the checklist below to evaluate the dog's response. You can use this information to help best guide the behavior team regarding potential behavior modification and management (see guide for protocols).

❑ Body stiff	❑ Eyes hard	❑ Vocalizes	❑ Exposes teeth
❑ Freeze	❑ Ears back	❑ Dog growls	❑ Snaps no contact
❑ Tail up	❑ Ears forward		❑ Attempts to bite
❑ Tail down			

Behaviors observed before, during or after the item:

Note: If the dog's behavior upon the first attempt matches any of the response choices higher than a "2", you should use the rear flank.

item 4 – squeeze:

if paw is used:

First Attempt	Second Attempt	
		Dog gently pulls back his paw. Dog may lick hand. **[Enter "1"]**
		Dog does not respond at all for three seconds. His eyes are averted and his ears are relaxed or back. **[Enter "1"]**
		Dog gently pulls back and whimpers. **[Enter "2"]**
		Dog gently places his open mouth over the Assessor's hand without applying pressure. **[Enter "2"]**
		Dog closes mouth, becomes stiff. **[Enter "3"]** Note: If this behavior occurs on the first attempt, use the flank instead.
		Dog is soft in body and eye, and moves his legs/body so that the Assessor is unable to hold the paw **[Enter "3"]** Note: If this behavior occurs on the first attempt, use the flank instead.
		Dog yelps repeatedly or screams. **[Enter "3"]** Note: If this behavior occurs on the first attempt, use the flank instead.
		Dog head flips while pulling back paw. **[Enter "3"]** Note: If this behavior occurs on the first attempt, use the flank instead.
		Dog reaches toward the Assessor's hand on the second attempt while moving his paw away when the Assessor attempts to lift it. The dog will not allow the Assessor to assess second time. **[Enter "4"]** Note: If this behavior occurs on first attempt, use the flank instead.
		Dog growls. **[Enter "4"]** Note: If this behavior occurs on the first attempt, use the flank instead.
		Dog freezes and/or tries to bite. **[Enter "5"]** Note: If this behavior occurs on the first attempt, use the flank instead.

if rear flank is used:

First Attempt	Second Attempt	
		Dog sits, mouth open or lip long. **[Enter "1"]**
		Dog does not respond at all. **[Enter "1"]**
		Dog gently places his open mouth over the Assessor's hand without applying pressure. **[Enter "2"]**
		Dog closes mouth, begins to purse lips and becomes stiff. **[Enter "3"]**
		Dog head flips while moving hip away. **[Enter "3"]**
		Dog growls. **[Enter "4"]** Note: If this behavior occurs on the first attempt stop the assessment. Proceed to the Food and Toy Behavior items if additional information is desired.
		Dog tries to bite. **[Enter "5"]** Note: If this behavior occurs on the first attempt stop the assessment. Proceed to the Food and Toy Behavior items if additional information is desired.

If aggression is noted, use the checklist below to evaluate the dog's response. You can use this information to help best guide the behavior team regarding potential behavior modification and management (see guide for protocols).

❑ Body stiff	❑ Tail down	❑ Ears forward	❑ Exposes teeth
❑ Freeze	❑ Eyes hard	❑ Vocalizes	❑ Snaps no contact
❑ Tail up	❑ Ears back	❑ Dog growls	❑ Attempts to bite

Behaviors observed before, during or after the item:

note **If the dog does not eat, try another type of food. If necessary, reassess at a later point.**

item 5 – food behavior:

	Dog lifts head and ceases eating when you reach to pull the bowl away or push him out. **[Enter "1"]**
	Dog calmly allows the food to be moved, follows the dish, but does not interfere with the dish's movement. Dog's body is soft and loose, eyes soft, tail neutral. He lifts his head when hand is pushed against his cheek. **[Enter "1"]**
	Dog follows the dish with his tail down, body likely a bit stiff. Dog lifts head after a bit of pressure from hand to cheek. **[Enter "2"]**
	Dog follows the dish, his tail between his legs, ears are forward. His body is stiff. Dog does not lift his head from the bowl when hand is applied to his cheek. **[Enter "3"]**
	Dog gulps food, begins to eat faster and with bigger bites, body stiff. He does not lift head when hand is applied to cheek. **[Enter "3"]**
	Dog freezes and/or growls. **[Enter "4"]**
	Dog tries to bite. (Use chart on the worksheet to identify level of bite attempt/bite.) **[Enter "5"]**

If aggression is noted, use the checklist below to evaluate the dog's response. You can use this information to help best guide the behavior team regarding potential behavior modification and management (see guide for protocols)

❑ Body block	❑ Ears back	❑ Paws in bowl	❑ Snaps at hand (no contact)
❑ Body stiff	❑ Ears forward	❑ Urinates in bowl	❑ Repeated contact bite
❑ Freeze	❑ Eyes hard	❑ Bites bowl	❑ Leaves bowl to bite hand
❑ Tail up	❑ Exposes teeth		❑ Bites up Assess-a-Hand®
❑ Tail down	❑ Vocalizes		

Behaviors observed before, during or after the item:

! note **Recommend using 2 non-food toys (rope, squeaky, etc.) and then 1 unbasted rawhide item. Enter number for each item in that part of the column.**

item 6 – toy behavior:

Toys only	Rawhide (if used)	
		No interest. **[Enter "1"]**
		Dog settles down close to chew, will relinquish toy or rawhide to you. **[Enter "1"]**
		Dog settles close, keeps a firm grip and is loose and wiggly. He does not place his body between you and the toy/rawhide. **[Enter "1"]**
		Dog takes toy away, keeps a firm hold. His body is between you and the toy or rawhide, and he is loose and wiggly. No growling or stiffness. **[Enter "2"]**
		Dog takes toy/rawhide away, keeps a firm hold. His body is stiff. **[Enter "3"]**
		Dog freezes and/or growls. **[Enter "4"]**
		Dog attempts bite (use chart on worksheet) **[Enter "5"]**

If aggression is noted, use the checklist below to evaluate the dog's response. You can use this information to help best guide the behavior team regarding potential behavior modification and management (see guide for protocols)

❑ Body block	❑ Ears back	❑ Paws on toy	❑ Snaps at hand (no contact)
❑ Body stiff	❑ Ears forward	❑ Urinates on toy	❑ Repeated contact bite
❑ Freeze	❑ Eyes hard		❑ Leaves toy to bite hand
❑ Tail up	❑ Exposes teeth		❑ Bites up Assess-a-Hand
❑ Tail down	❑ Vocalizes		

Behaviors observed before, during or after the item:

! note **Be sure to take your observational "snapshot" in the first few seconds of the approach. Dogs do not have to touch.**

enter name and sex of dog-to-dog helper dog.

name_____ sex ❑ male ❑ female

item 7 – dog-to-dog behavior:

	Dog approaches the helper dog in play position. His mouth is open. **[Enter "1"]**
	Dog approaches the helper dog submissively (head low, tail low, ears back, lip long). **[Enter "1"]**
	Dog approaches helper dog with tail at spine level, body not stiff, ears relaxed, lip long or neutral. **[Enter "2"]**
	Dog does not approach the helper dog. Turns body to side in relation to other dog, or exits. **[Enter "2"]**
	Dog approaches the helper dog, body soft, tail well above spine level, ears forward. **[Enter "2"]**
	Dog approaches the helper dog by rushing in with his tail high, stiff body, head tall, and ears erect. **[Enter "3"]**
	Dog charges the helper dog while growling or attempting to bite. **[Enter "4"]**

If aggression is noted, use the checklist below to evaluate the dog's response. You can use this information to help best guide the behavior team regarding potential behavior modification and management (see guide for protocols).

❑ Freeze	❑ Eyes soft	❑ Vocalizes	❑ Exposes teeth
❑ Body soft	❑ Eyes hard	❑ Dog growls	❑ Snaps no contact
❑ Body stiff	❑ Ears back		❑ Attempts to bite
❑ Tail up	❑ Ears forward		
❑ Tail down			

Behaviors observed before, during or after the item:

	Look	Sensitivity	Tag	Squeeze 1	Squeeze 2	Food	Toy	Rawhide	Dog
1									
2									
3		P	P	P	P	P	P	P	
4	R	R	R	R	R	R	R	R	P
5	S	S	S	S	R	R	R	R	

For each item, mark an 'x' in the box that intersects with the score for that item.
(Ex.: If the Sensitivity item has a score of "2", put an "x" in the box where row "2" and "Sensitivity" intersect.)

Legend:

P = Potential behavior modification and/or management

R = Behavior modification and/or management strongly recommended

S = STOP item for safety reasons. Behavior modification and/or management strongly recommended. Move to food if SOP suggests

General observations and recommendations:

Appendix G

Canine Care Questionnaire
created by Claire Weinman, 2015

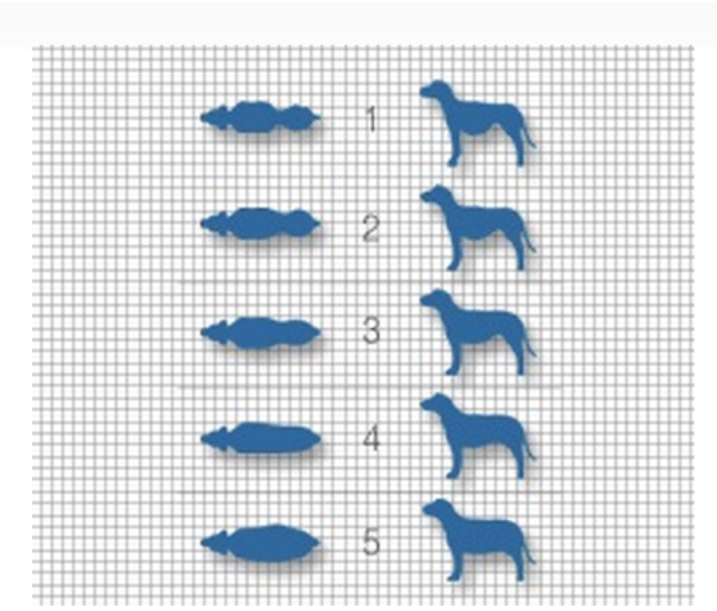
Please answer the following four questions.

Age of Dog: _____

Size of dog:

a. small- 20 lbs or less full grown
b. medium- 21 to 50 lbs full grown
c. large- more than 50 lbs

Select shape that best describes your dog:



Breed Type:

a. Herding and Sporting Dogs (*consists of pointers, retrievers, setters, spaniels*)
b. Terriers (*consists of, but not limited to, bull terrier, Irish terrier, parson Russell terrier, Norwich terrier, dandie dinont terrier, Bedlington terrier, wheaten terrier*)
c. Hounds (*consists of, but not limited to, beagle, dachshund, greyhound, blood hound, deerhound, and saluki*)
d. Toy Breeds and Brachycephalic Dogs (*consists of, but not limited to, miniature pinschers, Italian greyhounds, Chihuahua, Chinese crested, bulldogs, pugs, small poodles, Maltese*)

Purpose

The following questions are designed to capture daily life routine between you and your dog as well as unusual behavior or erratic events that make have effected or continue to effect your dog. The following questions are not designed to scrutinize the way you care for your dog. The purpose of this questionnaire is to provide a more detailed background to the specialists involved in this experiment.

Instructions

Please take your time and answer the following 20 questions thoughtfully. The following items can be answered by selecting 1 (strongly disagree) through 5 (strongly agree). You have an unlimited amount of time to complete the following questions.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
1. My dog is at peak health	1	2	3	4	5
2. My dog goes to the vet at least once a year, sometimes twice.	1	2	3	4	5
3. My dog is NOT up to date on vaccinations	1	2	3	4	5
4. I give my dog flee and tick preventatives every month.	1	2	3	4	5
5. I give my dog heartworm preventatives every month.	1	2	3	4	5
6. My dog is rarely groomed.	1	2	3	4	5
7. I take good care of my dog's teeth, nails, and coat.	1	2	3	4	5
8. I leave my dog outside when I am not home.	1	2	3	4	5
9. My dog spends most of the day by him/herself.	1	2	3	4	5
10. My dog spends 4 hours or less by him/herself during the day.	1	2	3	4	5
11. My dog gets enough exercise.	1	2	3	4	5
12. My dog gets walked at least three times a day.	1	2	3	4	5
13. My dog engages in exercise (walks, playing, running) for at least an hour a day.	1	2	3	4	5
14. I rarely play with my dog.	1	2	3	4	5
15. My dog plays with other dogs.	1	2	3	4	5
16. My dog is well behaved.	1	2	3	4	5

17. My dog frequently displays at least two of the listed destructive behaviors.*	1	2	3	4	5
18. My dog is given food twice a day.	1	2	3	4	5
19. My dog eats the right amount of food a day.	1	2	3	4	5
20. My dog is overweight.	1	2	3	4	5

* Digging; chewing on or destroying things; begging; ignoring me when I tell him to come; pulling on the leash; misbehaving when left alone; whining for attention; barking constantly; jumping up on people; nipping; mouthing; or play biting; wetting or soiling indoors; showing aggression to people or other animals *

SCORING:
Scoring will be done by the veterinarian performing the exam. Judging the proper amount of exercise for a dog will take into consideration breed and health. Susan O'Dell's guidelines for exercise, as divided by breeds, will be used during assessment.

Higher scores will represent higher quality of care and supposed quality of life for the dog. Not all low scores will reflect poorly on the owner as health of the dog is often independent but can greatly affect a dog's quality of life.

Questions **3, 6, 8, 9, 14, 17,** and **20** are reverse scored. Questions **15, 17** and **19** depend on the dogs affect towards other dogs, breed, and the bad behaviors selected. These questions will be assessed and directly scored by the veterinarian who is permitted to ask additional questions to owners if he/she needs more information.

After adjusting reversed scores, scores will be divided into three groups: High Quality of Life, Medium Quality of Life, and Mediocre/Low Quality of Life. If a person scores between an 82 and 100 they will fit into the High QOL category. Medium QOL includes scores 62 to 81. Mediocre QOL includes scores 20 to 61.

Assessing exercise: Susan O'Dell, DVM
For a general guideline to exercise, dogs can be divided up by their breeds, or breed mixes, and what they were originally bred to do. However, remember to tailor your program to your dog's needs.

Herding and Sporting Dogs

Both groups have very high exercise needs and should get at least 60-90 minutes of higher intensity exercise daily, twice daily is even better. These are working dogs so are easily bored, so make them work their brains! Intersperse training sessions with physical workouts to keep the routine fresh and interesting for both you and your dog.

Terriers

From the little Cairn to the larger Airedale, these dogs are generally bouncy and charismatic pooches. Although they have significant exercise requirements, these dogs are smaller than the herding and sporting members, and can get a fair amount of daily exercise around the yard. But they should get a minimum of 60-minutes exercise daily.

Hounds

This is a very diverse group that encompasses the sight hounds and scent hounds. Sight hounds like Greyhounds may have lower exercise needs, they are sprinters that release energy in quick bursts. Allow them a couple of harder sprint workouts per week. Scent hounds have higher exercise needs, similar to the herding and sporting dogs.

Toy Breeds and Brachycephalic Dogs

Many breeds fit into this category, including Poodles, Chihuahuas and Maltese. Even though these cuties are smaller than the rest, they still need exercise! They have a propensity toward obesity and often do not get the level of daily activity that they require. They can, however, get a significant amount of exercise in a much smaller area.

These squash-faced dogs, like the Pug and Bulldogs, were not created for marathon running. A shortened muzzle and wrinkly face might be irresistible, but they impede airflow and put these dogs at risk for overheating and oxygen deprivation.

Weather Considerations

Weather conditions are an important consideration for all dogs, not just the Brachycephalics. Dogs too can be victims of frostbite or heat stroke. If you live in the snowy areas make sure you clean your dogs' paws after an outing to remove snow and salt buildup. Dogs with thin hair coats may benefit from a nice dog coat or hoodie in the colder months. In the summertime, paws can also be damaged on hot asphalt or abrasive surfaces like the sandy shore. During any weather, it's important to keep your dog hydrated. Bring along a compact dog travel bowl and fill it from your own water bottle.

Suggested Activities

Physical activities: There are a variety of different ways to wear out the over-energized dog. Fetch is a fabulous way to exhaust a dog with minimal output of your own energy and using a tennis racket gets even greater canine wear down. Swimming is a fantastic way to reap the benefits of exercise without the dangers of repetitive impact. You may also want to start out with a dog life vest, especially if you are far from shore, it is important to always use a vest when boating with your dog.

Mental exercises: A good brain game can be almost as tiring as a long hike. Some dogs enjoy a food toy. These toys require the dog to knock the toy around to make food fall out of small holes. They can be filled with small, low calorie treats or even pieces of kibble. If your dog is scent driven, she may enjoy searching for bits of food or treats hidden throughout the house.

Appendix H

Pet Expectations Inventory

Pet Expectations Inventory

Type of pet being adopted: CAT DOG OTHER Specify _____

CHILDREN (list by sex and age only):

PETS PRESENTLY OWNED (if any):

DOG(S) _____How long owned? _____ CAT(S) _____How long owned? _____

I. Please answer the following questions about the role you expect the pet to take in your life by circling the appropriate number below the question. Please complete all items. Do not leave questions unanswered.

	Strongly Agree						Strongly Disagree
A. I expect the pet to be a companion for me.	7	6	5	4	3	2	1
B. I expect the pet always to be there for me.	7	6	5	4	3	2	1
C. I expect to talk to my pet.	7	6	5	4	3	2	1
D. I expect my pet to make me feel better when I am sad or discouraged.	7	6	5	4	3	2	1
E. I expect to stroke and cuddle my pet.	7	6	5	4	3	2	1
F. I expect my pet to love me.	7	6	5	4	3	2	1
G. I expect my pet to be a source of laughter.	7	6	5	4	3	2	1
H. I expect my pet to be an interesting topic of conversation with friends and relatives.	7	6	5	4	3	2	1
I. I expect to play with my pet.	7	6	5	4	3	2	1
J. I expect my pet to protect me.	7	6	5	4	3	2	1
K. I expect to teach my pet tricks.	7	6	5	4	3	2	1
L. I expect to confide in my pet.	7	6	5	4	3	2	1
M. I expect my pet to be a living thing for me to love.	7	6	5	4	3	2	1

Kidd, Aline H.; Kidd, Robert M.; George, Carol C. Veterinarians and successful pet adoptions. *Psychological Reports*, 71 1992:551–7.
The Pet Expectations Inventory is published on pages 556–57.

Appendix I

Pet Realities Inventory

Pet Realities Inventory

Type of pet adopted: CAT DOG OTHER Specify _____

DOG(S) _____ How long owned? _____ CAT(S) _____ How long owned? _____

I. Please answer the following questions about the role your pet takes in your life by circling the appropriate number below the question. Please complete all items. Do not leave questions unanswered.

	Strongly Agree						Strongly Disagree
A. My pet is my companion.	7	6	5	4	3	2	1
B. My pet is always there for me.	7	6	5	4	3	2	1
C. I talk to my pet.	7	6	5	4	3	2	1
D. My pet makes me feel better when I am sad or discouraged.	7	6	5	4	3	2	1
E. I stroke and cuddle my pet.	7	6	5	4	3	2	1
F. I think my pet loves me.	7	6	5	4	3	2	1
G. My pet makes me laugh.	7	6	5	4	3	2	1
H. My pet is an interesting topic of conversation with friends and relatives.	7	6	5	4	3	2	1
I. My pet and I play with one another.	7	6	5	4	3	2	1
J. My pet protects me.	7	6	5	4	3	2	1
K. I teach my pet tricks.	7	6	5	4	3	2	1
L. I confide in my pet.	7	6	5	4	3	2	1
M. I consider my pet a living thing for me to love.	7	6	5	4	3	2	1

Appendix J

Informed Consent

Investigators: Claire Weinman

Study Title: An Attachment Style Based Experimental Design to Maximize Dog Adoption Success

This study is being conducted as a part of my thesis requirement for Bard College Psychology Program.

I am asking you to participate in a research study. Please take your time to read the information below and feel free to ask any questions before signing this document.

Purpose: The purpose of this study is to increase successful adoptions and lessen the number of dogs euthanized each year.

Procedures: You will be asked to participate over the next two years during which you will be asked to fill out questionnaires, interact with your dog, and have blood drawn.

Compensation: Waived adoption fee, $100, 2 veterinary visits, 3 grooming coupons, and an adoption starter-pack including a kennel, toys, and a leash.

Risks to Participation: There are no substantial risks involved in participation.

Benefits to Participants: Your dog adoption may be more successful resulting in higher satisfaction and a longer lasting relationship because of your participation in this study. Your participation could help improve future human-dog relations thereby benefiting the human and the dog involved in a successful pairing. Furthermore, your participation may take a hand in saving dogs' lives.

Alternatives to Participation: Participation is voluntary. You can withdraw from the study at any time without penalty.

Confidentiality: During this study, information will be collected about you for the purpose of this research. This includes attachment style, oxytocin levels, and how satisfied you are with your dog. Your data will be identified by your attachment style. Any personal information within your file is not necessary or relevant to this study and will not be released or published in any capacity.

Your research records may be reviewed by federal agencies whose responsibility is to protect human subjects participating in research, including the Office of Human Research Protections (OHRP) and by representatives from Bard College's Psychology Department.

Questions/Concerns: If you have questions related to the procedures described in this document please contact me at claireweinman@gmail.com

If you have questions concerning your rights in this research study you may contact the Institutional Review Board (IRB), which is concerned with the protection of subjects in research project. You may reach the IRB office Monday-Friday by calling 312.467.2343

Participant:

I have read the above information and have received satisfactory answers to my questions. I understand the research project and the procedures involved have been explained to me. I agree to participate in this study. My participation is voluntary and I do not have to sign this form if I do not want to be part of this research project. I will receive a copy of this consent form for my records.

_____
Name of Participant (print)

_____
Signature of Participant

Date: _____

_____
Name of the Person Obtaining Consent (print)

_____
Signature of the Person Obtaining Consent

Date: _____