From the Institute for Anthropology at the University of Vienna, Austria

Investigating Humans and Companion Dogs Working as Teams in Animal-Supported Therapy:

Description of their Personality and Analysis of Work-Related Strains on the Basis of Cortisol Measurement in Saliva

Doctoral Thesis by Mag. Dorit Haubenhofer

Dissertation zur Erlangung des akademischen Grades 'Doktor/in der Naturwissenschaften',

eingereicht von Mag. Dorit Haubenhofer, unter der wissenschaftlichen Betreuung von

A.O.Univ.Prof. Mag.rer.nat. Mag.phil. Dr.rer.nat. Sylvia Kirchengast.

Vienna, August 2005

Table of Contents

Preface

An individual's life may be measured using objective or subjective techniques. The objective approach includes all kinds of techniques which are important for obtaining uncommitted indications that are easily reproducible and comparable. A subjective measurement design on the other hand considers individual differences and special backgrounds.

In this survey we do not only provide a combination of both scientific approaches, we even apply them on two different species, *Homo sapiens sapiens* - us, and *Canis familiaris* - dogs. We have designed a longitudinal, both inter-and intra-individual methodology to investigate the personality of humans and their dogs that work together as teams in animal-supported therapy, as well as their work-related stresses measured on the basis of salivary cortisol concentrations.

Our results are presented in five different chapters, each one representing a manuscript for an international journal. Although all journals insist on special guidelines for their authors and we abide by these guidelines for submitting the manuscripts, we have chosen a uniform format for the presentation of this Doctoral Thesis following the guidelines of the American Psychological Association (APA). The 1st manuscript is submitted to the journal *Anthrozoös*, the 2nd to the journal *Personality and Individual Differences*, the 3rd to the journal *Work and Stress*, the 4th to the journal *Animal Welfare*, and the 5th to the journal *Biological Rhythms*.

The lists of references are included at the end of each manuscript. References from other parts of the Thesis than the five manuscripts are given in an own chapter at the end of the Thesis.

Complementary Theoretical Background

1. Historical Background of the Human-Animal Bond

Through the entire traceable history of human race animals have been playing important roles regarding to the origins and treatment of all kinds of diseases (Serpell, 2000).

Examples of very old belief systems are the *Animism*, common among hunting and gathering societies (Campbell, 1984) and the *Shamanism*. Shamans are people who maintain much more intense relationships to several animal species (called guardian spirits) than ordinary people and even have the capacity to control them. A shaman can enter a state of ecstasy (by meditation, monotonous drumming or dancing, or the use of drugs) and then divest himself of his body and become one with his guardian spirit (Serpell, 2000).

These old animal belief systems have exerted great influence on younger religions, for example in ancient Egypt and Greece. The former religion was dominated by shamanic images of half-human, half-animal gods and goddesses (e.g. dog-headed Anubius, who led the souls of the dead through the underworld, and was the physician of the gods and guardian of the mysteries of mummification and reincarnation). In the second religion, gods were not that often represented by animals, but could transform into them. Dogs again played an important role in the cult of Asklepios, the God of Medicine. His shrine in Epidaurus was a kind of ancient health resort, to which many suffering people pilgrimaged hoping to be healed. One part of the healing process was an early stage of animal-supported therapy. The treatment included several techniques of purgation followed by periods of (drug-induced?) sleep within the main body of the shrine. During their sleep the God visited the patients, either in human form or (more often) transformed into a dog or a snake and licked over the wounds or harmed parts of the body. It is most likely that the dogs that lived around the shrine were especially

trained to lick over the patients' bodies (Dale-Green, 1966). Another example is Cerberus, half monster, half dog, with three heads and protector of the door into the underworld. Also the Germanic underworld, empire of Hel, was guarded by a dog (Brackert and Van Kleffens, 1989). Even in early Christianity, traces of ancient shamanism were common. Most of the early saints and holy men were not only healers, but kept very close relationships to animals, and many, according to the legends, could even transform into animals. One example is St. Francis of Assisi, who could pacify wild wolves. The healing capacities of dogs by touching or licking wounds show up in the Christian era, too. The saints St. Roch, St. Christopher, St. Bernard and several others had reputation as healers and were usually associated with dogs.

Another way of using dogs was the application of big breeds in war by ancient Persians, Greeks, Romans, and Celts, or as protectors for kings and rich people. The dog became the guardian of house and yard, working animal for hunters and shepherds, and companion animal of the rich, especially women and children (Brackert and Van Kleffens, 1989).

In the medieval Europe the Inquisition was established to work against animal-belief systems. Ancient nature cults and rites were systematically rooted out. Followers of these belief systems were demonized as witches and together with their animals (mostly cats, dogs, birds, mice, rats, pigs, or goats) taken to Court of Inquisition and executed. Thousands of animals were hanged, strangled, slain, decapitated, drowned, and burned. Brackert and Van Kleffens (1989) mention in their book that in those cases animals were not considered to be really responsible, but were equated with Evil itself.

On the other side stayed especially dogs within the lives of humans, both as hunting and working dogs for men and companion dogs for rich women and children. In such cases positive characteristics were ascribed to them, like watchfulness, fearlessness, cleverness, and faithfulness.

Nevertheless it came to a rigid separation between human and non-human that also continued during later epochs of Renaissance and Enlightment. In the era of Enlightment the basis was constructed for the legitimation of a hardly restricted instrumentalization of animals (Binder et al., 2004). Man saw himself as creation's crowning glory and raised himself above all other creatures and debased them to servants. The dog was the only animal species that again was granted a special position, due to the varied duties he had to fulfil. Because of the alienation of himself from nature and nativeness, man realized that he had lost a part of himself and wanted to complete himself again by bringing nature and animals back into his life. However, this re-orientation occurred in another way, because the harmonization was based only on a functional and practical level. Creatures and nature were just of interest, since they could facilitate and enrich human life that had started to become empty by an overemphasis of the mind. This was the beginning of a new career of the dog that has been continuing until today: The dog has become the anthropomorphized confidant of his owner. What is now beloved is not the dog's animal nature, but his adaptability, which helps to reduce the border between humans and animals and therefore transforms the animal into a human-like partner (Brackert and Van Kleffens, 1989).

The idea that the contact to animals could have a positive effect on the development of children and the general well-being of adults arose in the 18th century. Especially male children should be taught first principles of ethics like kindness, sense of responsibility towards life and nature, or gentility (Grier, 1999). In the 18th and 19th century pet animals became common in institutions for mentally ill people. One example is an institution in England that incorporated 'rabbits and poultry' within their therapy programs to facilitate the development of the clients' self-control and readiness to take on responsibility (Brickel, 1980).

By the end of the 18th and during the following century man lost his rank as the pride of creation and the theories of evolution placed him again between all other animals.

But until now he has not been able to accustom himself. The enormous degree of animal- and especially dog-keeping can still be identified as an attempt of compensation to what was lost centuries ago and exchanged for impersonal and mechanical conditions of living (Brackert and Van Kleffens, 1989). Also today's science reinforces the human-animal bond by entering it from this new direction. Crucial were the studies of researchers like James H. S. Bossard in the 1940s and 1950s, Boris Levinson in the 1960s and 70s, and Erika Friedmann and Aaron Katcher in the 1980s, who discussed the positive effects of companion and therapeutic animals (especially dogs) on humans not in a metaphysical or psycho-spiritual way of light, but by offering medically logical and reasonable causes (Bossard, 1944, 1950; Friedmann et al., 1980; Levinson, 1962, 1970).

Since that time the number of articles written and studies made has exploded. It would be not possible to name all scientists and authors, who have worked within the field of animal-supported therapy at this place. A great summary offers the book 'Animal-Assisted Therapy: Theoretical Foundations and Guidelines for Practice', edited by Aubrey Fine (Fine, 2000).

2. So why are Dogs Human's Best Friends?

In 1984, Wilson developed the hypothesis of *biophilia*, an innate interest in life. He said that as a result of co-evolution with other animal species, humans had a biologically based attraction for nature and its creatures and would therefore tend to attune selectively to animal presence and behavior. Animals would serve as sentinels, conveying information about the environment. For example, the presence of animals at rest or in a non-agitated state would signal well-being and safety, because no danger was around (Melson, 2000).

But why do dogs take such important roles in our lives? Kusztrich lists a number of possible reasons: First of all dogs do not have to be tied up to stay with their attachment figure, or at familiar places. They have obtained a high degree of hygiene and cleanness. Additionally their size of the body is big enough to play an important role for humans as individuals, but small enough for our houses and cars. They share our day and night rhythms and accept us as their figure of authority. Reciprocal affection and trust are especially important for them and us. We are able to build up a very complex and intense level of verbal and non-verbal communication with them (Kusztrich, 1988).

Odendaal named this phenomenon *attentionis egens* (lat.), which describes the need for attention on a normal, basic emotional level as the precondition for successful social interaction typical for many social living species. He claims that the success of human-companion animal interaction may probably be based on a two-way fulfilling of *attentionis egens*. Animals suitable for companion animals are most often highly social animals that can at least fulfil the need for attention of their human owners (Odendaal, 2000). In his research he has found out that during human-dog interaction, e.g. stroking, the dog experiences the same physiological effects as the human (e.g. relaxation, decrease of blood pressure, ...). These physiological changes may be linked to a feeling of well-being in the dog and not only in the human, and this is exactly what the *attentionis egens* theory proposes.

Several studies suggest that dogs have a greater effect on human health and well-being than other animals, for example cats. In a paper by Serpell (1991) dog owners maintained a decrease in minor health problems over the 10-month duration of the study, cat owners did not. Dog owners used to walk more regarding to frequency and duration of walking. Siegel (1990) suggests that dog and cat ownership might have different associations with health status. It does appear that owning a dog encourages people to exercise more, whereas a cat or

another pet encourages the owner to spend more time at home. Siegel concludes that owning a dog provides a stress buffer, whereas owning other types of pets does not.

The opinions of the experts differ when it comes to the question whether some dogs are more likely to be good therapy dogs than others. Granger and Kogan (2000) say that the type of dog selected depends only on its temperament, level of training, and setting in which it will work. They think that small and large dogs work well with different populations, as do both pure and mixed breeds.

3. Ethical Considerations Concerning Animal-Supported Therapy

Although animals have been living under service of man for many thousand years, only in the last 100 years laws have been adopted to protect animals used for draft or companionship, and only in the last 30 years, protection has been extended to animals used in research (Beck, 2000).

The IAHAIO, the 'International Association of Human-Animal Interaction Organizations', was founded in 1990 and is one of the largest American umbrella organizations to gather together national associations and related organizations interested in advancing the understanding and appreciation of the link between animals and humans. Their goals are to promote new research, the educational and practical development in the field of human-animal interaction, to provide a forum for sharing ideas and information between IAHAIO-member organizations, and to educate policy makers at local, national and international levels about the benefits of human-animal interaction.

For this purpose holds the IAHAIO meetings at regular intervals to establish fundamental guidelines and resolutions. The three most important declarations were designed in Geneva, Prague, and Rio de Janeiro (Homepage IAHAIO).

(A) The Geneva Declaration (1995), including resolutions related to human-animal interactions, prescribes:

(1) To acknowledge the universal non-discriminatory right to pet ownership in all places and reasonable circumstances, if the pet is properly cared for and does not contravene the rights of non-pet owners.

(2) To take appropriate steps to ensure that the human environment is planned and designed to take the special needs and characteristics of pets and their owners into account.

(3) To encourage the regulated presence of companion animals in schools and school curricula, and to work to convince teachers and educators of the benefits of this presence through appropriate training programs.

(4) To ensure regulated access of companion animals to hospitals, retirement- and nursing homes, and other centres for the care of people of all ages who are in need of such contact.

(5) To officially recognize those animals that are specifically trained to help people overcome the limitations of disabilities as valid therapeutic interventions; to foster the development of programs to produce such animals; and to ensure that education about the range of capabilities of these animals is included in the basic training of health and social service professions.

(B) The Prague Declaration (1998), including guidelines related to animal-assisted activities and therapy:

(1) Only domestic animals which have been trained using techniques of positive reinforcement, and which have been, and will continue to be, properly housed and cared for, are involved.

(2) Safeguards are in place to prevent adverse effects on the animals involved.

(3) The involvement of assistance and/or therapy animals is potentially beneficial in each case.

(4) Basic standards are in place to ensure safety, risk management, physical and emotional security, health, basic trust and freedom of choice, personal space, appropriate allocation of program resources, appropriate workload clearly defined roles, confidentiality, communication systems and training provision for all persons involved.

(C) The Rio de Janeiro Declaration (2001) on pets in schools:

(1) Programs about companion animals should, at some point, allow personal contact with such animals in the classroom setting. Depending on school regulations and facilities, these animals will

a) be kept, under suitable conditions, on the premises, or

b) be brought to school by the teacher, or

c) come to visit, in the context of a visiting program, together with their owners, or

d) accompany, as a service dog, a child with special needs.

(2) Any program involving personal contact between children and companion animals must ensure

a) that the animals involved are safe (specially selected and/or trained), healthy (as attested by a veterinarian), prepared for the school environment (e.g. socialized to children, adjusted to travel in the case of visiting animals), properly housed (either in the classroom or while at home), and always under supervision of a knowledgeable adult (either the teacher or the owner), and

b) that safety, health and feelings of each child in the class are respected.

(3) Prior to the acquisition of classroom animals or visitation of the class by program personnel with companion animals that meet the above criteria, both school authorities and parents must be informed and convinced of the value of such encounters.

(4) Precise learning objectives must be defined and should include

a) enhancement of knowledge and learning motivation in various areas of the school curriculum,

b) encouragement of respect and of a sense of responsibility for other life forms,

c) consideration of each child's expressive potential and involvement.

(5) The safety and well-being of the animals involved must be guaranteed at all times.

One may always keep in mind that all animals adopted for animal-supported service have their behavior modified or curtailed to some degree. At the very least they need to be tamed and taught certain non-natural skills through formal education. Therapeutic animals often do not show a behavior typical for their species. This is a great difference between therapy animals and other sporting, working, or pet animals, which are normally allowed to act typically for their species (Coppinger et al., 1998).

4. Positive Effects of Animal-Supported Therapy and 'Normal' Companion Animals

In general, the therapeutic value of an animal may be understood as an extension of the positive effects 'normal' pet keeping can have on the owner.

(A) Cardiovascular diseases: Companion animals can have positive emphasis on the survival rate among patients who were hospitalized after heart attacks, myocardial infarctions, or angina pectoris. Only 5.7% of the pet owners compared to 28.2% of the patients who did not own pets died within 1 year of discharge from a coronary care unit (Friedmann et al., 1980). Other studies deal with the possible protection from developing coronary heart diseases by pet ownership. Among 5.741 people attending a screening clinic in Melbourne, Australia, risk

factors for coronary heart diseases were significantly greater among the 4.957 non-pet owners than among the 784 pet owners (Anderson et al., 1992).

(B) Diseases of the elderly: Animals play a positive role for elderly people living alone (Siegel, 1990). Studies investigating the effects of animal-supported therapy for institutionalized elderly have shown positive results in increased attention, improved psychological well-being, appropriate interpersonal interaction and social awareness, improvements in life satisfaction, socialisation, communication, concentration, sensory skills, cardiovascular system, musculoskeletal system, and a decrease in depression, also for people suffering from Morbus Alzheimer (Baun and McCabe, 2000; Fick, 1993; Haughie et al., 1992; Kongable et al., 1989).

(C) People with psychiatric diseases: An animal can act as a link in the conversation between therapist and client by offering the client a sense of comfort and allowing him to relax during the therapeutic situation (Corson and Corson, 1980). A therapist who conducts therapy with an animal present may appear less threatening and, consequently, the client may be more willing to reveal him- or herself. Additionally, can the therapist observe how the client relates and interacts with the animal.

(D) People in long-term facilities: Therapies that enhance social, psychological, and physical well-being are necessary to combat the negative effects that often accompany relocating to a facility. Animals offer the possibility for interaction, sensory, motor, and cognitive stimulations, and offer the residents something to looking forward to (Granger and Kogan, 2000).

(E) People suffering from chronic or terminal diseases: People with a terminal illness deal with their illness more easily when others around them are seen as supportive and are able to remain emotionally and physically close. Death makes most people, even caretakers, feel uncomfortable so they start to send signals that increase the patients' anxiety and fear levels,

an animal does not. Additionally provides an animal which they can care for a feeling of being needed (Granger and Kogan, 2000).

(F) People suffering from motor disorders, physical pain or harm, problems in sensory perception, or speech disorders: Animals can easily be integrated within physiotherapeutic, logopedic, or ergotherapeutic programs (Schrack, 2004).

(G) Number of doctor contacts: Studies show that pet owners have fewer doctor contacts and fewer patient-initiated medical contacts than non-pet owners (Siegel, 1990).

(H) Increase of general well-being: Serpell (1991) showed that adopting a pet can be associated with improved health status for people who do not suffer from special diseases. Only one month after adopting a pet decreases of minor health problems like headaches, painful joints, hay fever, difficulties to concentrate, sleeping difficulties, palpitations or breathlessness, constipation, trouble with the ears or eyes, worrying over every little thing, a bad back, indigestion or other stomach trouble, nerves, sinus trouble or catarrh, colds and flu, persistent cough, general tiredness, faints or dizziness, kidney or bladder trouble, and trouble with feet could be recognized.

(I) Reduction of stress: Friedmann et al. (1983) showed in their studies that animals can have a stress-reducing influence on children during performance requirements. Allen et al. (1991) documented in their study how humans exposed to a transient stressor such as performing a challenging arithmetic problem, showed a reduction of stress in the presence of their dog, but not when in the presence of a close friend.

(J) Reduction of loneliness and depression: Factors that may lead to loneliness – disabilities, loss of employment, diminished financial reserves, change in family structure and family member roles, availability of health care, lack of competitive levels of education – are no longer only problems of the aging (Duncan, 1995). Animals offer their warm and accepting

companionship whenever it is needed, while family members or friends may be busy with other things or unreachable.

(K) Increase of socialisation: Visits with animal-supported activities improved social interactions among residents and staff in a psychiatric facility for elderly women (Haughie et al., 1992) and the social interactions of clients suffering from Morbus Alzheimer (Kongable et al., 1989). Animals stimulate people to socialize with their fellow men, often with the animal as topic of conversation.

(L) Motivating effects: Animals also have the ability to inspire and motivate people to engage in constructive activities that they would not have otherwise. For example, dogs motivate their owners to take walks, as was documented in a study by Serpell (1991). Similarly, elderly people in Southern California who kept dogs reported to spend 1.4 hours per day outdoors with the animal (Siegel, 1990).

(M) Calming and consolatory effects: Fritz et al. (1995) suggested that people suffering from Morbus Alzheimer had fewer aggressive and anxious outbursts if they had regular exposure to a companion animal than patients without pets.

(N) Help within the family system: A companion animal is always happy to interact with its owners and offers its attention to them. The animal may also fill a void in the family of a member that has physically or emotionally left. Additionally may pets facilitate the communication and interaction among human family members. Within the family unit, pet ownership may be a source of social support because the pet provides a sense of continuity over family life cycle, especially during major life events, both positive and negative (Levinson, 1972).

(O) Children with severe ADHD (attention deficit/ hyperactivity disorder), conduct disorder, developmental disorders including autism, and a variety of functional disorders can be treated effectfully using education structured around the care of animals and nature study. The

children help to care for the animals, learn about the animals, interact with them, play with them, and demonstrate them to children in other classes or adults in senior centers or hospitals. Such children increased in their capacities of concentration and learning, and decreased in the symptoms of their disorders (Katcher and Wilkins, 2000).

(P) Positive impact on the development of children: Companion animals can serve as playmates and social companions. When children are involved in the care-taking of an animal, they learn important skills and develop positive attitudes related to the care for another living being. Additionally, they have to develop a certain degree of regularity and arrangement. They learn to accept the characteristics and needs of the animal, which increases their tolerance, empathy, and understanding of other individuals. An animal may also facilitate the friendship between human children. Considering the animal as an example, cycles of life can be explained to the child, like sexuality, birth, and death. Finally, an animal may provide comfort and strength during situations of loss, like removal, death of friends of family members, or divorce of the parents (Bergler, 1986).

(Q) Emotionally and/ or developmentally disordered children (e.g. children suffering from speech disorders, introverted children, autistic, spastic or schizophrenic children, children with physiological or psychological problems, abused and maltreated children): At the University in Southampton, UK, a dog was brought into contact with children suffering from Down-Syndrome (Limond et al., 1997). When they had contact to the dog they showed higher levels of concentration, they answered more often on questions, and initialized activities and statements more often by themselves than a control-group. Hergovich et al. (2002) showed that the presence of a dog in the classroom supported the development of autonomous activities, and the teachers said that the children showed an increased level of social integration and were less aggressive than the pupils from a control-class.

Although animals can have many different positive effects on human health and well-being one may not forget that this cannot be taken as a general solution for all people who are in need. The effects of a particular animal can always be positive or negative, varying with the person and the context. Responses to animals are a highly individual matter, depending on the person's previous life experiences with animals, the person's current health and responsibilities, and the species and breeds of animals. In general, most people are drawn to species they have previously enjoyed and are more likely to respond to animals if they owned one in their early childhood (Kidd and Kidd, 1989).

5. The Organization 'Tiere als Therapie' ('Animals as Therapy') in Austria

The organization provides following definition about animal-supported therapy: '*Animal-supported therapy includes all procedures that shall lead to positive effects regarding to the experience and behavior of humans, using animals in a very directed manner. This applies for both physical and psychological diseases. The therapeutic human-animal team acts in this connection as one unit. Therapeutic elements are emotional nearness, warmth and the absolute acceptation by the animal. Additionally, different techniques are used from the fields of communication and interaction, as well as basal stimulation and learning psychology* ' (Gatterer, excerpt translated, Homepage 'Tiere als Therapie').

Furthermore, the organization defines a therapy dog as a '*well socialized dog that is equipped with both adequate obedience and outstandingly high tolerance threshold towards humans and other animals. It is trained by authorized inspectors within the scope of a special personality test for multifarious interpersonal functions. Regular veterinary checks and annual additional tests are accomplished to detect possible changes in the animal's nature.*

The animal forms a unit with its owner that always works together. Excessive demands of the animals by applying them too often or too long have to be avoided, and the possibility to reduce work-related stress has to be given' (Widder, excerpt translated, Homepage 'Tiere als Therapie').

The organization was founded by the biologist Dr. Gerda Wittmann in the year 1991, who brought the idea of animal-supported therapy in 1987 to Austria after a long stay in Australia (Homepage 'Tiere als Therapie'). Since August 1997 has the organization its registered office at the University of Veterinary Medicine in Vienna. The board of directors is made up of animal physicians, human physicians, biologists and people, who organize and realize the program. Additional to the head office in Vienna there are two branch offices in Lower Austria (South and West), and one in Upper Austria, Salzburg, Vorarlberg and Styria. Beyond the Austrian borders exist branch offices in Germany, Italy and Slovenia.

'Tiere als Therapie' does not only support scientific surveys within the field of animal-supported therapy, it also trains humans and their animals to become active members of the organization. Volunteers are either those, who do this training as additional qualification within their own job (e.g. physio-, ergo-, and logotherapists, teachers, kindergarten teachers, social consultants, social workers), or they visit institutions like old peoples´ homes, nursing homes, rehabilitation centers, homes for disabled people, schools, psychiatric institutions, or homes for disabled or maladjusted children in their leisure time. Basic principle is that the animals should not replace human contact, but act rather as co-therapists and mediators between curator and patient. The main objective is to remove or at least to reduce physical, psychological or social obstructions by incorporating animals and to get a better integration of disabled, sick or old people into our society (Homepage 'Tiere als Therapie').

6. Personality and its Relation to Perception of Stress

It can be assumed that people who decide to offer voluntarily unpaid therapeutic aid together with their animal match a certain profile of personality. Already Allport (1961) mentioned that individuals actively select their own way of living that suits their temperament, values, and philosophy of life. He claimed that single members liked or disliked different aspects of their culture, or internalized them differently, which led to the development of diverse individual owning and a unique personality.

Many different ways of investigating personality have been developed, both in humans (Allport, 1961; Costa and McCrae, 1985, 1992) and other animal species (Gosling and John, 1999), thus it is widely accepted, that humans are not the only species that own a personality.

These days' most widely accepted, represented, researched and argued model of human personality is called 'Five-Factor Model', or simply the 'Big Five', derived from factor-analytic studies over the past 40 years. It is a hierarchically structured model which defines five basic and global factors. These five traits are called *Neuroticism*, *Extraversion*, *Openness (to Experience)*, *Agreeableness*, and *Conscientiousness*, whereas each one consists of several facets: *Neuroticism* comprises the facets anxiety, tension, self-pity, impulsivity, irrational thinking, depression, low self-esteem, insecurity, defensiveness, tension, worry, depression, hostility, impulsiveness, self-consciousness, and vulnerability. *Extraversion* includes warmth, gregariousness, being full of energy, being social, enthusiasm, outgoingness, talk-activity, assertiveness, activity, excitement-seeking, and positive emotions. *Openness* is made up of openness to fantasy, intelligence, unconventionality, insightfulness, flexibility, imagination, curiosity, creativity, originality, aesthetics, feelings, actions, ideas, and values. *Agreeableness* consists of altruism, compliance, cooperation, likeability, being generous, forgivingness, kindness, sympathy, modesty, straightforwardness, tender-mindedness, and trust. And *Conscientiousness* is composed of achievement-orientation, reliability, dependability,

efficiency, organization, planfulness, responsibility, thoroughness, hardworkingness, striving, competence, deliberation, dutifulness, order, and self-discipline (Costa and McCrae, 1992).

Latest papers again emphasize the important role of values related to work and thus support the notion of Allport from 1961. The basic assumption is that a person will be happier, more motivated, satisfied, and committed when the individual's values are congruent with those emphasized at the place of employment, and that people prefer vocations where they are able to work in line with their values (Berings et al., 2004). Enterprising vocational interests are mainly predicted by high *Extraversion*, whereas social vocational interests are more likely predicted by *Openness*. *Conscientiousness* was an overall predictor of job performance (people exhibit work values that are advantageous in most organizations, like structure, rationality, autonomy, influence, competition, innovation), whereas *Extraversion* was a positive predictor of performance in entrepreneurial jobs (this trait predicts people-oriented values, like influence, teamwork, community, creativity, and innovation). *Agreeableness* predicted values related to the quality of social interactions, like teamwork and community, or a disapproval of competition and earnings. *Neuroticism* positively predicted stress avoidance, need for structure and preference for stability, and was negatively correlated to rationality, but positively to competition and earnings. Knoop (1994) claimed that so called 'intrinsic work values' (e.g. exercising responsibility, doing meaningful work, job status, recognition for work well done) had an inverse relationship with stress. That means that people with a strong sense of achievement, recognition, responsibility, etc., should experience less stress. The presence of 'extrinsic work values' (benefits like vacation and pension, job security, convenient hours of work, good working conditions, satisfaction with supervisor and co-workers, promotions) on the other hand would not lead to stress reduction.

For many years the team around the Swedish scientist Svartberg has been working on the field of personality in dogs. In one study they investigated 15.329 dogs from 164 breeds

during different situations including meeting strangers, play-tests, and several potential fear- and aggression evoking stimuli (Svartberg and Forkman, 2002). As results five personality dimensions could be filtered out that seem to exist an all dog breeds: *Playfulness*, *Curiosity/ Fearlessness*, *Chase-proneness*, *Sociability,* and *Aggressiveness*, plus one higher-order dimension similar to a *Shyness-Boldness axis*. This factor describes a behavioral dimension, which goes from playful, active, and friendly behavior to fearlessness combined with low interest in play, chase and meet strangers (Svartberg, 2002). The analyses within breed groups showed that these factors are general for dogs and not due to specific selection pressures in a few dog types. This indicates that these traits have survived differences in selection pressures during domestication.

In another paper by this scientific the consistency of such personality traits in dogs was investigated, that could be linked back to stability in the behavior of individual dogs and not to consistency in breed-characteristic behavior (Svartberg et al., 2005). Adult dogs of different breed and sex were exposed to the same personality test three times with an average of 30 and 35 days between each test. The results showed that the traits *Playfulness*, *Sociability*, *Chase-proneness*, and the general trait *Boldness* were consistent over the three series. *Curiosity/ Fearlessness* increased, while *Aggressiveness* decreased. This indicates the persuasibility of these two traits by repetition of situations (habituation to repeated exposure), whereas the other traits appear more stable and not sensitive to novelty.

7. Definitions of Stress

There exist several different models explaining what stress really is.

Hill-Rice (2000) provides in her book 'Handbook of Stress, Coping and Health – Implications for Nursing Research, Theory, and Practice' a survey of today's most common models:

(A) The answer-based theory by Walter B. Cannon: In 1915 he defined stress as a non-specific reaction of the body towards any kind of demand. He characterized a reaction on stress as an action of fight or flight. Hans Selye seized this theory and completed it with many studies. Today he is to be considered the pioneer of this theory. He understood stress as an answer to harmful stimuli or environmental stressors, and defined it as a non-specific corporal answer to harmful impacts (stressors). That means that in his eyes stress was an answer of the organism to its environment. He developed a general model of physiological reactions towards stress, which he named GAS (General Adaptation Syndrome). Typical for the GAS are (Selye, 1957):

(1) It is a defending answer and independent from the nature of the stressor.

(2) It consists of three phases – alarm, resistance, and exhaustion.

(3) If it lasts too long or is too strong this may lead to so called adaptational diseases.

Today Selye's views are considered as being outdated. Modern studies in the field of the answer-based stress-theory believe that stress is specific to situation and stimulus, and subject of an individual answer. That means, they define stress as a dependent variable, namely as the disruption that is caused by a harmful influence or stressor (Hill Rice, 2000).

(B) The stimulus-based theory attaches stress to psychological experiences (Holmes and Rahe, 1967; Masuda and Holmes, 1967). In this model the appearing stimulus treats changes or events in the person's life (for example marriage, loss of a beloved person, pregnancy, vacation, divorce, retirement, ...) as the stressor on which the person answers. Thus here stress is really an independent variable. The theoretical main conclusion is that too many great or small changes during life – no matter if they are pleasant or not - may increase the liability to diseases.

(C) The transactional-based theory suggests that unpleasant experiences are dynamic (Lazarus, 1966). In this model stress does not exist as an 'event', but is the result of a

transaction of a person with the environment. Thus stress is not measurable like a single variable, but contains a set of cognitive, influencing and coping variables. The main connection between human-environmental transactions is the valuation:

(1) Primary valuation: A person's evaluation about which positive and negative items a situation contains. The individual measures the possible effects of all demands and resources on the own well-being.

(2) Secondary valuation: Includes the considerations, which possibilities of coping or behavioral pattern are available to deal with the problem. One always has to keep in mind that coping a situation only includes to 'deal' with it, not to 'control' or 'overcome' it.

(3) Re-evaluation: Contains a renew measurement of all primary and secondary valuations during the ongoing development of the situation. What was frightening before may now seem challenging or irrelevant.

(D) A fourth model of stress – not described in the book written by Hill Rice – deals with a definition of stress from a cultural point of view: Meyerson (1994) supports the notion that stress acts as a cultural symbol of duality, because it represents the individual as product and agent of his or her social condition. In some cultural contexts, people interpret stress and burnout as an individual problem, whereas in other cultural contexts it is seen as a social phenomenon. Additionally she suggests that stress operates differentially across occupations as a cultural claim for status and legitimacy. She argues that members of occupations that lack other sources of status and legitimacy will more likely claim to experience stress than members of powerful occupations. Variation in the amount of stress claimed among occupations may also be due to different cultural assumptions about what stress means, differences in the legitimacy of feeling stressed, and differences in norms about acknowledging and claiming stress across occupations.

8. Stress-Symptoms in Humans and their Work-Related Sources

There is no life without stress, because not only massive diseases or intensive corporal and/ or emotional harms cause stress, but even most daily situations, every activity, and all emotions. However, 'being stressed' does not mean automatically something bad; our body needs stress to survive (Selye, 1957).

There exist long lists of symptoms that are typical for the state of 'being stressed' (Hill Rice, 2000; Kusztrich 1988). Some of the most common indications are:

(A) Dysfunction in production of insulin, changes in the level of blood sugar, diabetes,

(B) increased cell growth and cancer,

(C) enlarged production of gastric and intestinal juices, sickness, intestinal mumbling, hypersensitive stomach, ulcer in the gastrointestinal tract, and other gastrointestinal problems,

(D) abnormalities, irregularities, or absence of menstruation in women, sexual problems,

(E) headache, dizziness,

(F) shortness of breath, asthma,

(G) muscle tension, muscle pain,

(H) heart-beating, cardiovascular harms, damage of vessels, changes in heart beating rate, hypertension, eclampsia,

(I) rheumatism, arthritis,

(J) inflammation of skin or eyes, skin problems, allergies,

(K) kidney disorders,

(L) decrease of mental and corporal abilities, which appears in fatigue, difficulties of falling asleep or sleeping through the night, loss of appetite or hunger, loss of body weight, lack of concentration, depression, difficulties in solving problems, making decisions, and in the ability of getting the daily work done, or behavioral changes like crying, smoking, drinking alcohol or other kinds of drug abuse.

Stress at work, its reasons and origins, and its methods of abatement or – even better – prevention has become an important topic in today's scientific literature. Many articles deal with the implications of stressful surroundings at the working place and discuss possible negative effects on human well-being.

Most articles that deal with this topic name the combination of high job demands and low decision latitude and low job control (combined with a low socioeconomic status) as one of the greatest sources of work-related stress and its resultant diseases. This so called 'demand-control model' was first introduced by Karasek (1979) and deals with the combination of high psychological job demands and low job decision latitudes and the effect on disease risk that may follow from the interaction between these two components. Many surveys have been made to underline this theory.

Kunz-Ebrecht et al. (2004) mention strains caused by a low socioeconomic status in relation to work-related stress. They claim that a lower socioeconomic status is associated with a range of biological risk factors, including adverse lipoprotein profiles, increased central obesity, impaired glucose tolerance, insulin resistance, raised levels of fibrinogen, abnormalities of cardiac rhythm, and procoagulant blood clotting profiles. They guess that these changes are caused by changes in the secretion of cortisol.

9. Stress-Symptoms in Dogs

Similar to humans exist great individual differences among dogs in what they sense as stressful and by which outcomes they show it. Some very typical signs for stress in dogs are (Nagel and Reinhardt, 2003):

(A) Loss of appetite (also a very common and typical stress-symptom),

(B) disorders of the gastrointestinal tract, like diarrhea or vomitus (probably one of the most typical stress-related symptoms),

(C) allergies (towards food, mites, fleas, pollen and grasses, insecticide), or skin problems like eczema or pruritus,

(D) hardened muscles or increased tonicity, shivering or shaking (adrenalin provides a tension of the muscles as part of the 'fight or flight syndrome'; if these tensions cannot be relaxed by movement hardened muscles and cramps can be the result; other signs are the obvious erection or vibration of the vibrissae on the head of the dog, and ruffling up the neck hair, shown during situations of stress, insecurity, pleasure and other great emotions),

(E) sudden loss of hair, dandruff, or bad condition of the hair,

(F) changes in the color of the eyes or blood-shot eyes,

(G) restlessness and nervousness (permanent pacing around or pulling on the leash, the dog seems jumpy and agitated; the dog can hardly relax and pays lots of attention to sounds; immoderate barking, whimpering, and whining may be other signs, as well as hectically snapping without biting, chattering of teeth, or biting into the leash; the eyes may be wide opened and focused on the topic that stresses the dog; panting, running nose and sweating paws, salivating profusely, hanging the tongue out of the mouth, licking over the snout, lifting the paw, lowering the body position), and over-reactions (the dog reacts anxious or aggressive during situations and events that would normally not have troubled him; demolition of objects),

(H) showing calming down signals,

(I) defecation and urination, due to an increased secretion of adrenalin and an additional activation of the sympathetic nervous system,

(J) riding up (males and females) and excavation of parts of the penis in male dogs (these behaviors are not always sexually motivated or a sign of dominance),

(K) hyper-sexuality/ hypo-sexuality (stress can lead both to an over-reaching or reduced sexual drive; in female dogs, modified sexual cycles can appear),

(L) exaggerated personal hygiene (the dog may lick its body that intensively that wounds appear on these parts of the body, especially legs, tail, or genitalia; the pain leads to the release of endorphins – so called 'felicity hormones' – which act analgetic and increase the mood), or unpleasant body smell or halitosis (arising from the increased production of gastric acid during stress) and unhealthy appearance (the whole dog seems weak and ill, its eyes are cheerless and it is in an atonic posture with pendulous tail),

(M) stereotypes in movements or sounds over a long period of time, lacking any reasonable explanation for this behavior (typical stereotypes in dogs are running in circles or pacing around, hunting the own tail, monotonous barking or excessive licking), or showing displacement activities (the dog shows behaviors that are untypical or unreasonable in a special situation), or even

(N) bad concentration, forgetfulness, or even passiveness (the dog behaves more reluctant and disimpassioned).

10. Physiological Explanations of Stress

If one wants to understand the physiological events in an organism during stress, one thing has to be explained first: There exist two different kinds of stress-reactions, on one side a quick adaptation to sudden situations (the 'fight and flight syndrome'), and a slow adaptation to longer lasting situations ('general adaptation syndrome'):

(A) Fight and Flight Syndrome (Von Faber and Haid, 1995): If environmental conditions become suddenly minatorial, an adaptation to this new situation happens in a matter of seconds. The adrenal glands medullae release instantly adrenalin and noradrenalin, hormones that cause the 'fight and flight syndrome'. That means, the body is transferred into a state of

either fight or flight: Blood pressure and pulse increase, the central blood vessels dilate and the peripheral blood vessels become narrow, the bronchial tubes dilate (for a better provision of oxygen), glycolysis increases (which leads to an increase of blood sugar), greater tension of muscles, increase of the lipolysis in fat tissue (for more free fatty acids), increase of the blood circulation in the brain, total inhibition of the gastrointestinal tract, release of augmented renin (blood pressure), glucagon (blood sugar), and thyroxin (greater effect of catecholamines in heart, muscles, and liver), and decrease of insulin (inhibition of blood sugar dropping effect). This serves to an optimal supply of the skeletal muscles and maximal input of energy.

(B) General Adaptation Syndrome (Von Faber and Haid, 1995): The body protects himself against longer lasting strains by releasing a greater number of glucocorticosteroids (mainly cortisol) from the adrenal glands cortex. Reason may be a series of harmful effects, like heat, coldness, hunger, thirst, radiation, infection, corporal or emotional injury. The most important physiological changes are: Hypertrophy in the adrenal glands cortex (leads to an increase of glucocorticosteroids), atrophy of the thymo-lymphatic system (causes lymphocytopenia and inhibition of inflammation), mobilization of amino-acids in the muscles (catabolic process), and gluconeogenesis in the liver (for stabilisation of blood sugar). FSH and LH are inhibited in the anterior pituitary gland, which causes a deactivation of the gonads. Although processes like lymphocytopenia, decomposition of proteins in the skeletal muscles, and the deactivation of the gonads may first seem unfavorable, these are all measures to ensure the survival of the organism over a longer period.

11. The Physiological Tasks of Cortisol

Cortisol is a hormone produced in the adrenal glands and absolutely essential for survival (Griffin and Ojeda, 1996; Hadley, 1996). Its correct chemical name is Δ_4-Pregnen-3,20-dion-11 β, 17 α, 21-triol (Von Faber and Haid, 1995). It is considered to be a major indicator of

altered physiological states in response to stressful stimulation in most mammals, including humans and dogs (Kirschbaum and Hellhammer, 1989).

It is produced in the adrenal glands, which are situated above the kidneys, weigh 6-8g and produce two different kinds of cortical hormones. One group is mainly involved in the metabolism of carbohydrates, the other in the metabolism of mineral nutrients. They are called glucocorticosteroids and mineralocorticosteroids. The most important glucocorticosteroids are cortisol and corticosterone, the most important mineralocorticosteroid is aldosterone (Von Faber and Haid, 1995). Anatomically the adrenal glands consist of two different parts, the *cortex* (90% of the tissue) and the *medulla* (10% of the tissue). The *cortex* is built from mesodermal tissue and consists of three zones beyond a fibrous capsule: The outer zone is the *Zona glomerulosa* (releases mainly the steroid hormone aldosterone), the middle zone is called *Zona fasciculata* (releases mainly the steroid hormone cortisol), and the innermost zone is the *Zona reticularis* (releases mainly the steroid hormone dehydroepiandrosterone). All steroid hormones of the cortex descend from cholesterol. The *medulla* is build from neuroectodermal tissue and produces catecholamines (mainly epinephrines).

The control over the secretion of cortisol and glucocorticosteroids in general happens by a negative feed-back loop, the so called hypothalamus-anterior pituitary gland-adrenal gland axis. The hypothalamus secernates several stimulating hormones to the anterior pituitary gland, mainly CRH (corticotropin-releasing hormone), but also vasopressin and PACAP (pituitary-adenylatic-cyclase-activating peptide) (Griffin and Ojeda, 1996). Stimulated by this hormones increased levels of ACTH (adrenocorticotropic hormone) are released in the anterior pituitary gland. ACTH causes a stimulation of the *Zona fasciculata* in the *cortex* of the adrenal glands and therefore the increased secernation of glucocorticosteroids. They themselves induce a feed-back mechanism and inhibit the synthesis of POMC (pro-

opiomelanocortin), a pro-hormone of ACTH. A second, even faster inhibition affects directly the hypothalamus, where the CRH-secretion is decreased. During stressful situations the production of glucocorticosteroids can be increased for about 10 times.

Cortisol has many ways to help the body to survive long periods of stress and to regulate the reactions on inflammations (Griffin and Ojeda, 1996; Hadley 1996).

(A) Catabolic and anabolic effects: The main-catabolic effect of cortisol is the conversion of proteins in skeletal muscles and connective tissue into glucose and glycogen. This so called gluconeogenesis includes both the decomposition of already existing protein and the decrease of the synthesis of new protein.

(B) Metabolism of carbohydrate: Cortisol does not only increase the production of glucose during the gluconeogenesis, but also decreases the consumption of glucose in body cells.

(C) Metabolism of protein: Cortisol inhibits the use of new amino-acids for constructing protein everywhere in the body except in the liver. Stores of protein are dismantled, muscular tissue reduced. Amino-acids are brought to the liver where they are needed for gluconeogenesis.

(D) Metabolism of fat: Cortisol enlarges the mobilization of fatty acids and glycerol from the adipose tissue and makes them available for gluconeogenesis in the liver. Like in the case of proteins, fatty tissue is not only reduced, but also the build-up of new tissue inhibited. Cortisol also stimulates the appetite and absorption of additional fat in the body.

(E) Circulating function: Cortisol is needed to ensure the integrity of blood vessels and the volume of body fluids. Without cortisol abnormal vascular dilatations occur, which leads to a decline of blood pressure. The kidneys need cortisol as protection against declines of the globular filtration. Cortisol is also essential for a normal level of sodium-revertive resorption and potassium-excretion.

(F) Immunosuppressive effect: Cortisol inhibits an overreaction of the immune system to inflammations, injuries or foreign bodies. Thereby swelling and amount of harmed tissue are reduced and the healing processes of the wound accelerated. This function includes a stabilisation of lysosomal membranes (no proteolytic enzymes are released anymore), a decrease of capillary permeability (thus less cells and plasma reach the inflamed areas), a suppression of phagocytosis by white blood cells, and a suppression of lymphocytes from the thymus (by inducing apoptosis within the lymphocytes). This leads to a decline in the number of antibodies. Cortisol also inhibits the synthesis of several key-proteins for the abatement of inflammations.

(G) Central nervous system: Besides the negative feedback-loop on the hypothalamus-pituitary gland axis of ACTH cortisol also influences our senses and emotions. When lacking of cortisol senses like tasting, hearing, and smelling are accentuated.

(H) Effects on development: Cortisol is needed for the maturation of several fetal organs, intestinal enzymes and the function of the lungs.

(I) Other effects of glucocorticoids: They have great impact on bones, the metabolism of potassium and are essential for skeletal growth. If they are in permanent overflow they have destructive effects on mostly all destinated organs. They also stimulate the production of PTH (parathyroid-hormone) in the parathyroid glands. Last but not least they suppress the gonadal production of estrogen and testosterone.

12. Former Studies about this Topic

Although the first analysis of the question whether working in animal-supported therapy could become a health hazard for animals already started during the late 1980s, only the top of the iceberg has been analyzed yet. Iannuzzi and Rowan have published a paper in which

they line out the potential for animal abuses associated with fatigue and burnout for animals that live in institutions (Iannuzzi and Rowan, 1991).

In her paper Heimlich (2001) deals with the consequences of an animal-supported therapy on her own companion dog that she used in therapy. She claims that after eight weeks of therapeutic work the animal had already started to show first signs of stress, like excessive panting, frequent urination, and both ear and urinary tract infections. The dog was treated with antibiotics and afterwards sent back to the therapy program, during which it appeared tired and exhausted. Further veterinary investigations determined that the dog was suffering from Cushing's Syndrome, also known as canine hyperandrenocortisism (HAC). This is a hormonal disorder that results in chronic elevation of circulating blood cortisol concentrations and is often the result of chronic stress (Tilley and Smith, 1997). After this diagnosis the dog was removed from the therapeutic program, but will suffer from the illness for the rest of its life. Although one cannot say for sure that the dog developed the illness because of the therapeutic use, this possibility cannot be excluded. There are several other alternatives how Cushing's Syndrome may be caused, like adrenal cortex tumors, prolonged administration of cortisone drugs, or (most commonly) because of an abnormality of the pituitary gland.

We want to underline that this is a very extreme example, in which not only the consequences of chronic stress on a dog are shown, but also the great irresponsibilities and malpractices of the handler. By subjecting the dog to veterinary investigations before starting the therapeutic work and by ending it as soon as symptoms of stress appeared, the dog could have been prevented from greater health problems.

At the 10th International Conference of the IAHAIO, Suthers-McCabe and Albano from the Center for Animal Human Relationships at the Virginia – Maryland Regional College of Veterinary Medicine in Blacksburg, Virginia, presented a poster about the evaluation of stress responses of horses during equine-assisted therapy. They sampled plasma cortisol of horses

before and after therapy sessions. Furthermore, each horse was videotaped during the therapy sessions to observe possible behavioral changes that may indicate stress. Data were gathered during four different programs, two for mental health patients and two for physically and/ or mentally handicapped. Blood was drawn from 28 horses (19 geldings, 9 mares) of approximately 15 different breeds. The animals were aged from 5 to 26 years. The results indicated that 82% of all therapy horses did not suffer from significant physiological stress. This study has not been published in a journal yet (Suthers-McCabe and Albano, 2004).

Also during the 10th International Conference of the IAHAIO in Glasgow from October 6th-9th, 2004, Ferrara et al. presented a poster from a study of the University in Rome, Italy, in which the welfare of dogs during animal-supported therapy was evaluated. They observed 9 therapy dogs of different breed (seven Golden Retriever, one Golden Retriever-Labrador Retriever crossbreed, one crossbreed) 173 hours before, during, and after therapy sessions by 'focal-animal' and 'all-occurrences' sampling methods. From the data they constructed an echogram that consisted of 136 behavioral patterns that were grouped in 15 hyper-categories. They concluded that the 9 dogs observed did not show stressed behavior or stereotypes due to anxiety or hard work during animal-supported therapy and contrary even showed affiliative and playful behavior more frequently during work than before or after it. They also found out that the dogs looked at their handler (owner) more often that to other humans present during therapeutic sessions, which implies a very good relationship between dog and owner. The study has not been published yet in a journal (Ferrara et al., 2004).

Problem Formulation

It may seem amazing that although the whole topic of animal-supported therapy deals with the well-being of living creatures not more attention is paid to the needs and wishes from those who make everything possible. Even though there exist already some empirical studies about the well-being of the non-human part of the therapeutic teams, no consideration at all has been paid on the human part. This is the first study that deals with both humans (owners) and their dogs as teams in animal-supported therapy.

Following questions and aims are considered:

(A) What are the country-specific characteristics of therapeutic service with dogs in Austria, compared to the original model transferred from the USA?

(B) Do the participating humans and dogs show personality traits that may be typical for individuals working in animal-supported therapy?

(C) Are the personality tests used here comparable to the traits of the 'Big Five' among the dog owners, respectively 'Big Four' among the dogs?

(D) How do humans that work together with their dogs in animal-supported therapy describe both their own life and work and that of their dog? Comparing subjective and objective results, do the dog owners calculate their own position and the one of their dog correctly?

(E) Which levels of salivary cortisol have humans and dogs that work together as teams in animal-supported therapy? Are there any differences between levels of salivary cortisol collected at days without and with therapeutic work?

(F) Do duration and number of settings per week show any effects? Do different types of institutions respectively clients have various effect on the teams' stress levels? Do we get different results from settings where the teams visited their clients in institutions and from

settings where they were visited (e.g. therapists, teachers)? And are there differences in the results gathered from teams that already have a more work experience as those, that have just started?

(G) Do the parameters sex, age and domicile have any effects? Do sterilization and breed of the dogs play any role? Or do we get different results depending on different life circumstances like type of occupation and presence of children in the family among humans, and daily routine among the dogs?

(H) How does the daily secretion of salivary cortisol look like in humans and dogs? And is there a difference in daily cortisol secretion due to work-related stress in both humans and dogs?

With the results of this project, we offer the possibility to optimize the work of the teams and provide information about which type of team is most suitable for a special kind of patient/ institution and therefore help to maximize the success of animal-supported therapy.

Complementary Background of the Methods

Important to us was an inconspicuous design of the survey to avoid any situations during which the participating humans and dogs felt being tested and observed. This was one major aim of our survey for reducing biases caused by the collection of the data to a minimum. It also illustrates, why we did not subject the dogs to standardized personality tests but let their owners characterize them. Brought into unfamiliar situations, results could differ from their normal range. Besides that we can assume that the relationships within these therapeutic human-dog teams are very intense (Haubenhofer, 2003) and that therefore the dog owners can describe the personality of their dogs very well.

1. Saliva Samples

Saliva samples were taken from all participating humans and dogs to evaluate the concentration of the steroid hormone cortisol, which can be detected in saliva very well.

For analysis we used a special kind of non-radio-active enzyme-immunoassay. An enzyme-immunoassay (EIA) works nearly the same way as a radio-immunoassay. The only difference is that an enzyme is used in place of a radio-active isotope for conjugation to the evaluated hormone: The enzyme-conjugated hormone and the non-conjugated hormone (from the sample) compete for binding sites on the fixed antibody. After the incubation-period both enzyme-conjugated hormones and non-conjugated hormones that have not found a binding site are removed and afterwards the enzymatic activity of the remaining conjugated hormones is evaluated using a photometer. This enzymatic activity is proportional to the concentration of the non-conjugated hormones (Von Faber and Haid, 1995).

The special method used in this study is called 'double-antibody biotin-linked enzyme-immunoassay' (Figure 1). In contrast to the 'direct enzyme-immunoassay' is the steroid-specific antibody not directly on the bottom of the microtitre-plate, but linked to a coating antibody (mostly extracted from rabbits, therefore called 'anti-rabbit antibody'), which is fixed on the bottom of the microtitre-plate. On its other side links the steroid-specific antibody to the steroids from the sample (non-conjugated hormones), respectively to the biotin-labelled steroids (enzyme-conjugated hormones).

Both sample steroids and biotin-labelled steroids compete for the free spaces on the steroid-specific antibody. In case of a high concentration of sample steroids only a few biotin-labelled steroids can link to the antibody and vice versa.

This competition takes place during the over-night incubation in a refrigerator (4-8 ° Celsius). After about 16 hours of incubation streptavidin-peroxidase is added, that links only to biotin-labelled steroids.

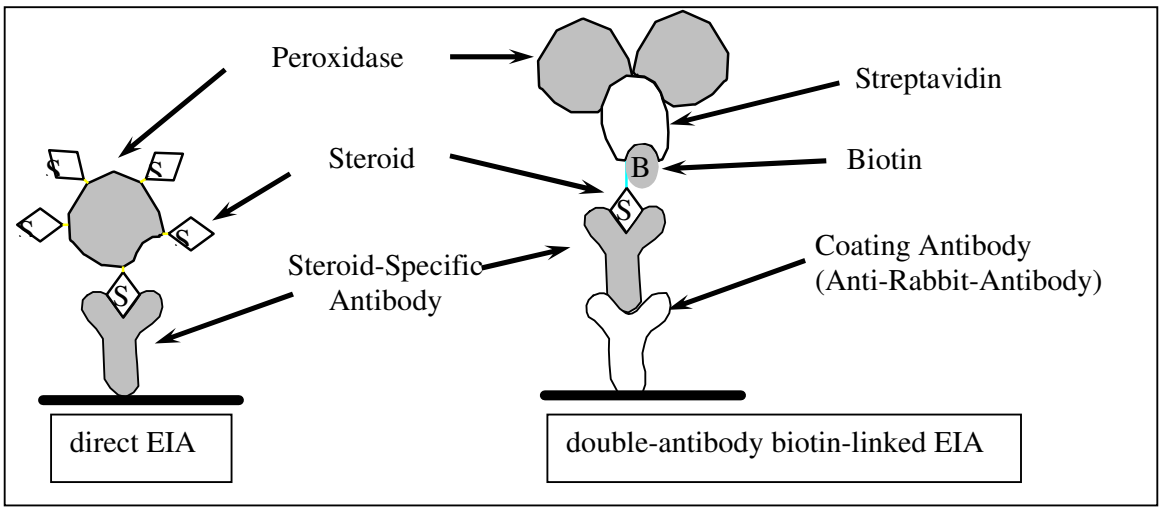
Finally, the reaction is stopped by adding sulfuric acid (H_2SO_4).

In a photometer (an automatic reader of microtitre-plates, using a reference-filter of 620nm and a measurement-filter of 450nm), which is connected to a computer (with a special software), the results are calculated.

The advantage of this special kind of EIA is that it works more precisely than the 'direct EIA' and that it can still be used with very low concentrations of sample steroids.

It was developed and applied in many cases at the Institute for Biochemistry at the University for Veterinary Medicine in Vienna. An accurate description of the method can be found on the CD 'Enzyme- Immunoassay' by Möstl and Palme from the Institute for Biochemistry at the University for Veterinary Medicine in Vienna (Möstl and Palme, 2002).

Figure 1: Model of the differences between 'direct EIA' and 'double-antibody biotin-linked EIA'.



Original model in Möstl, E. and Palme R., 2002. Enzyme Immunoassay. CD from the Institute of Biochemistry, University of Veterinary Medicine, Vienna, Austria. Figure modified by Haubenhofer.

2. Protocol-Forms

Parallel to the collection of the saliva samples the dog-owners recorded all their activities before each sampling point, both at the control-days and at the days of therapeutic settings. These forms were named

(A) 'Control-Protocol, Control-Days 1-3' (App 1),

(B) 'Therapy-Protocol' (App 2), and

(C) 'Control-Protocol, Control-Days 4-6' (App 3).

This information was used to detect any discrepancies within the set of data from the salivary samples and to be able to reconstruct the circumstances before every sampling point. However, we did not add this multitude of information as detached results to our analyses.

3. Questionnaires

We used two different types of questionnaires in our survey:

(A) A self-administered questionnaire to obtain background information about the participating teams (App 4) providing

(1) general information about the dog-owners (name, sex, date of birth, place of domicile, vocational education since elementary school, today's vocation, place of employment, marital status, and number of children),

(2) general information about the dog/ the dogs (name, breed, date of birth, sex, sterilization),

(3) information about the dog-owners' everyday's life (this part evaluated whether the participants assessed their lives as stressful and exhausting or not),

(4) information about the dogs' everyday's life (about whether the owners assessed their dogs' life as cumbered or not),

(5) information about the teams' training at the organization 'Tiere als Therapie' (when, where, type of training course, whether they favored it, whether they had pictured the therapeutic work the way they sensed it now, why they had decided to do it),

(6) information about the time between their training and today (working areas, changes concerning emotions and handling between this time and now, which working areas they preferred and why), and

(7) information about the current working areas (which ones and why, how often, how long they had been there and how long they wanted to stay there in the future, existence of any problems or concerns on the part of the institutions, description of the working atmosphere, typical sequence of actions during a therapeutic unit, effects of the work on the dog-owners and the dogs, whether they liked their work, how they felt before and after a therapeutic unit, how they thought their dog/ their dogs felt before and after a

therapeutic unit, actions to prepare for a therapeutic unit and to rejuvenate afterwards, how long they wanted to continue their work in the future).

(B) A standardized personality test: The personality test used here was the so called IPS, 'Inventar zur Persönlichkeitsdiagnostik in Situationen' ('Inventory for Personality Diagnostics in Situations') by Schaarschmidt and Fischer (1999). The IPS has been designed for adults only. It is a multi-dimensional procedure of personality diagnostics that is used for self-assessment in three fields of daily life requirements: Socio-communicative behavior, performance behavior, and health and recreation behavior. Thus this test pays special attention to the requests in the socio-communicative area, it is especially recommendable for those occupation-groups, who are particularly exposed in this respect (e.g. teachers, nursing stuff, or as we think people working in animal-supported therapy).

(C) A standardized questionnaire about the detection of stress-symptoms in dogs: The original name of the form is 'Umfrage zu den Lebensbedingungen von Hunden und Stress-Symptome' (Survey about the Living Conditions from Dogs and Stress-Symptoms). It was invented and standardized by the pharmacist and dog trainer Martina Nagl, and Clarissa von Reinhardt, who runs her own dog training school. Both women live and work in Germany. During the last years they have been focusing on stress and the detection of stress in dogs. They designed this questionnaire and published the results in a book (Nagel and Von Reinhardt, 2003).

In this questionnaire we used the answers to get additional background information about the dogs and the relationship to their owners. The test is divided into two parts.

(1) The first part provides several general questions about the dog and his daily life:

a) Breed, sex, age now, age when dog was adopted.

b) Where is the dog during day/ night, how many hours does he sleep/ rest within 24 hours, how long is he alone, does he like being alone, how long and often can he have a

walk, is he then at the leash or free, has he contact to other dogs, does he then show fearful or aggressive behavior?

c) Do you/ children play with the dog, do you go in for dog sports, how many hours is the dog active during day?

d) How often is he ill, does he suffer from allergies/ skin diseases/ diarrhea/ vomitus?

(2) The second part of the test contains 15 questions about typical stress-symptoms in dogs (e.g. hyperactivity, nervousness, aggressiveness, stereotype behavior, displacement activities, lack of concentration, amyostasia, muscle hardening, panting, short-weight, barking, urinating very often) and whether the dog-owners have detected them yet in their dogs.

Manuscript 1: Austrian Way of Therapeutic Service with Animals

Abstract

In this review we describe some further developments within the field of therapeutic animal service in Austria starting from the original American model. As examples we use the biggest non-profit organizations of each country, the Delta Society in the USA and 'Tiere als Therapie' in Austria. We introduce the new definition 'animal-supported therapy' as a suitable umbrella term for all kinds of animal use to enhance a person's health. And we work out the differences in training, examination and criteria for humans and their animals who work in this domain. Finally, we define a schedule of eight basic articles, which cover all needs of animals working in therapeutic service.

Introduction

The thought of including animals into the progression of a person's mental and/ or physical improvement of health is definitely not new. In ancient Greece dogs already played an important role in the cult of Asklepios, the God of Medicine. His shrine in Epidaurus was a kind of ancient health resort, to which many suffering people pilgrimaged hoping to be healed. The treatment included several techniques of purgation followed by periods of (drug-induced?) sleep within the main body of the shrine. During their sleep the God visited the patients transformed into a dog or a snake and licked over the harmed parts of their body. It is

most likely that the dogs that lived around the shrine were specially trained to do so (Dale-Green, 1966).

However, started definitions by experts, settlement in well structured organizations, and statistical evaluations by scientists only in the 20th century. Pioneer work was done by scientists like James H. S. Bossard in the 1940s and 1950s, Boris Levinson in the 1960s and 70s, as well as Erika Friedmann and Aaron Katcher in the 1980s (Bossard ,1944, 1950; Levinson, 1962, 1970; Friedmann et al., 1980; Katcher et al., 1983), all of them living and working in the USA. Hence it is not surprising that definitions and guidelines for this field of research were primarily compiled in the USA. This has led to some difficulties, because these American definitions and guidelines are suited for the place in which they were created. But in the meantime the thought of therapeutic service with animals and its scientific investigations have been spread out over the whole world. Both definitions and guidelines have mainly been inherited without adapting them to local conditions of law, health systems, training and working in the domain of therapeutic service.

In the following we want to give an example of such country-based variations by comparing the original American model and a modified model here in Austria. We have chosen the main organization of each country, the Delta Society in the USA, and the organization 'Tiere als Therapy' in Austria (which means 'Animals as Therapy', and which we will abbreviate TAT). It was founded by an Austrian biologist in the year 1991, who brought the idea of animal-assisted activity (AAA) and therapy (AAT) back from a stay in Australia (Homepage 'Tiere als Therapie'). This underlines the roots of the Austrian model lying in the model of the New World.

Within this paper we will pay main attention on the dog (*Canis familiaris*) as therapeutic agent. Although other animal species are in use as well, the dog ranks at a special position within this group. There are a number of causes for this assumption. Dogs attach very closely

to their human partner, however they still express friendly behavior towards other humans (Hart, 2000). They accept us as figure of authority, they have obtained a high degree of hygiene and cleanness, their size of the body is big enough to play an important role for humans as individuals, but small enough for our houses and cars. They share our day and night rhythms and we are able to build up a very complex and intense level of verbal and non-verbal communication with them (Kusztrich, 1988). Their tremendous and evident willingness to work with human partner and wish to please that person is enhanced by their sensory and muscular capacities that exceed human abilities (Hart, 2000). They are unaffected by time of the year, weather, climate, temperature, and other outer influences. Several studies suggest that dogs have a greater effect on human health and well-being than other animals, for example cats (Lago et al., 1983a, 1983b; Ory and Goldberg, 1983; Garrity et al., 1989; Siegel, 1990; Serpell, 1991). Nevertheless it has to be pointed out that dogs may be a less-than-suitable species in particular programs for several reasons, like allergies, phobias, infection risks, size, or costs (Fredrickson and Howie, 2000).

Variations of Definitions in the Austrian and the American Model

In the USA strictly separated terms are in use to define special kinds of animal use in therapeutic service. The Delta-Society, one of the biggest international non-profit organizations for human-animal bonds (founded in 1977 in Portland, Oregon) has set up clear differentiations between the terms AAA and AAT: They characterize AAA as casual 'meet and greet' activities that involve pets visiting people. It is not about a special therapy program designed for one particular client, does not contain special treatment goals for each service. It is therefore more flexible and is usually not under the supervision of a skilled professional (e.g. physician, physiotherapist). AAT on the other side strives for special goals, is supervised by a professional, and is both documented and evaluated (Homepage 'Delta Society').

Other types of animals in therapeutic service are not clearly defined by the Delta Society.

TAT, Austria's leading non-profit organization, provides following definition: '*Animal-supported therapy includes all procedures that shall lead to positive effects in both experience and behavior of humans, using animals in a very directed manner. This applies for both physical and psychological diseases. The therapeutic human-animal team acts in this connection as one unit. Therapeutic elements are emotional nearness, warmth and the absolute acceptation by the animal. Additionally, different techniques are used from the fields of communication and interaction, as well as basal stimulation and learning psychology* ' (excerpt translated from the Homepage 'Tiere als Therapie').

Both definitions agree that the basic effect is a human's physical and/ or mental increase of health by the use of animals in a more or less well organized and structured setting.

But there exists also fundamental differences between these definitions. First, the American definition describes concretely the design of the whole program (differentiation by means of therapeutic goals, supervision, documentation and evaluation). The Austrian definition underlines rather the techniques used (emotional nearness, warmth, acceptation, communication, interaction, basal stimulation, learning psychology).

Another great difference may have its origin in a different understanding of the word 'therapy'. When investigating the definitions of this word on American web-pages the most commonly used explanation is '*treatment*', or - at least a bit more detailed - '*treatment of a (physical or mental) disease*' (Homepage 'Google', keyword 'therapy'). But this is not the original meaning of the word 'therapy'. The term originates from the Greek word '*therapeía*', which means '*service*', and '*therapeúein*', which means in the first place '*serve*', and only in a further description '*care, heal*' (Homepage 'Duden'). The Austrian definition leans back on this basic explanation of the term 'therapy': A human-animal team works together as a unit to serve a client, and only as a following step to care for him/ her and heal him/ her. Nothing is

said about the type of treatment. This implies that a detailed design and procedure is not given, and therapy is not something that has to be supervised and evaluated by a professional, but whatever serves for the client. One person may already be positively influenced by the sheer presence of an animal, while another one needs special training modules with the animal to reach certain goals of improvement. According to this, terms should be availed that identify the degree of animal use during a therapeutic setting. Instead of 'animal-assisted activities' and 'animal-assisted therapy' due to the American model we recommend the terms 'animal-assisted therapy' for treatments in which the human member of the therapeutic unit plays the major role (e.g. physiotherapy, logotherapy, or ergotherapy with a non-human assistant), and 'animal-supported therapy' for service in which the animal is at least equally involved in the treatment process as its handler. We have settled for this differentiations between the terms '*assisted*' and '*supported*' because they emphasise more effectively the difference in the use of animals to improve a humans (mental or physical) health than a differentiation into the terms '*activity*' and '*therapy'*. The term '*assisted'* derives from the Latin word '*assistere'*, which means '*standing near by, to back*' and means directly translated '*to help another person at his/ her order*' (Homepage 'Duden'). The term *'support'* does not include this submissive undertone. It rather arouses the impression that the human part of the team relies on the animal and that they are both at least equally important members of one unit.

In the Austrian definition AAA and AAT cannot be separated any more and include not only AAA and AAT in the American way of definition, but also all other types of therapeutic use of animals, like therapy with horses, dolphins, or the extensive field of pedagogy service with animals. Thus in the rest of the paper we will use the term '*animal-supported therapy*' (or simply AST) due to the Austrian definition as an umbrella term for all types of programs using animals in therapeutic service.

Selection of Volunteers and their Animals for Animal-Supported Therapy

The USA and Austria also differ due to the selection and training of human-animal teams.

The Delta Society has provided rules and guidelines for both training and testing of such teams.

(A) Training: Their 'Pet Partners Team Training Courses' are made up of safe visits in hospitals, nursing homes, classrooms, and other facilities by the human-animal team (Homepage 'Delta Society'). The theoretical part of the training may be done instructor-led at a work-shop (usually a fast-paced day long 8 hours hands-on course) or as a home-study format (including a student guide and a video). Topics include:

(1) Selecting and preparing animals for visits,

(2) identifying and decreasing stress in animals,

(3) animal health and safety,

(4) special needs of client groups,

(5) interacting with special people,

(6) facility health and safety codes, and

(7) patient confidentiality.

Also essential is a health screening of the animal by the animal's veterinarian. The animal has to be healthy and free from parasites, disease, infections, and illnesses. Both precision of the implementation and medical appraisals are left to the veterinarian. Prescribed by state law are only rabies immunization and absence from internal and external parasites.

(B) Examination: The final exams consist of two parts – the 'Pet Partners Skills Test' (PPST) and the 'Pet Partners Aptitude Test' (PPAT).These tests simulate the types of social and physical stresses most frequently encountered in an AAA and AAT situation. The team is

evaluated for its ability to cope with the challenges of each situation and its ability to respond to the situation using calm, non-aggressive communication (Fredrickson and Howie, 2000). Team evaluations are performed by Delta-licensed team evaluators.

The PPST shows whether the animal can be controlled by the handler and follows basic commands. During the PPST, the handler is assessed on how he/ she interacts with the evaluator, the evaluator's assistants, the animal, and the environment around him/ her. There are following tasks:

(1) Accepting a friendly stranger (team greets a stranger appropriately), and being petted by this person,

(2) general appearance and grooming (appropriate appearance/ animal welcomes being groomed and examined by a stranger,

(3) going out for a walk (handler's control of the animal),

(4) walking through a crowded corridor,

(5) reaction to distractions (animal has to stay confident during distracting situations),

(6) sit on command, down on command, and stay in place,

(7) come when called, and

(8) reaction to a neutral dog (number 6-8 only for dogs).

The PPAT has been designed to simulate conditions that may occur on a visit. During the PPAT, the handler is assessed on how well he/she interacts with the evaluator and evaluator's assistants as they simulate being on a visit (e.g. comments, eye contact, smiling, head nodding, directing the animal to interact, or other verbal and nonverbal methods of communicating). Unlike during obedience competitions, the team does not have to perform the exercises with precision to pass the evaluation and the handler is encouraged to talk to the animal during the entire evaluation. There are following tasks:

(1) Overall exam of the animal by a stranger,

(2) exuberant and clumsy petting,

(3) restraining hug,

(4) approach and interaction with a staggering, gesturing stranger,

(5) angry yelling by a stranger,

(6) bumping from behind into the animal by a stranger,

(7) crowded and petted by several people at the same time,

(8) ignoring of a toy left on the floor by the animal,

(9) animal has to take a treat politely and gently, and

(10) overall assessment of the team.

(C) Additionally there exist several criteria that have to be fulfilled by every human handler (Fredrickson and Howie, 2000). They need excellent knowledge about following topics:

(1) Their role and responsibility in AAA/T interactions,

(2) the rationale behind requirements for the animal,

(3) animal stress and animal advocacy,

(4) techniques for AAA/T interactions with people with various disabilities or diseases,

(5) conversation and listening skills,

(6) how to demonstrate appropriate social skills (eye contact, smiles, confident posture, conversation) needed for interacting with people in AAA/T,

(7) demonstrate pleasant, calm, and friendly reaction to and attitude towards the animal in all situations,

(8) being the animal's advocate in all situations, effectively read the animal's cues (stress, excitement,...), act accordingly, and protect and respect the animal's needs,

(9) how to prepare for, conduct, and conclude a visit, combined with their documentation,

(10) facility administrative procedures and policies,

(11) infection control and techniques for preventing injuries, and

(12) liability issues.

(D) Finally, the Delta Society stipulates criteria for the handler-animal teams (Fredrickson and Howie, 2000). They have to

(1) demonstrate appropriate treatment of people and animals, and

(2) maintain confidentiality.

The organization TAT has established modified methods and standards regarding to training and evaluation.

(A) Training: Besides adequate veterinary-medical investigations (see below) the training consists of a theoretical part for the handler and a practical part for both handler and animal to a total extent of at least 40 hours. The whole education is designed on the method of positive reinforcement. The theoretical part is made up of different lectures given by experts in the fields of psychology, pedagogy, physiotherapy, geriatrics, and animal science (behavior, animal husbandry, training, and first aid).

Training for dogs is special and split up into three modules that build on each other.

(B) Examination: After the third module the teams can take the final exams, consisting of a theoretical part for the handler about the topics of the lectures, and a practical part for the dogs. A dog has to be at least 18 months old by the time of the exam. The animal ought to take the exam calm and secure, it shall not show any signs of fear, nervousness, distrust or aggression, but take much pleasure in getting into contact and being touched by humans. In case of snarling, baring the teeth, aggressive barking, snapping, biting or other aggressive behavior the exam has to be stopped immediately and the dog may not try it again. The handler may talk to the dog during the exam in a soft voice, encourage to dog between each part of the exam with treats or play, and can ask for a short brake once during the exam.

The practical part of the final exams includes following tasks:

(1) Social behavior in a group of dogs in an enclosure, plus stop of these actions and come on command,

(2) reaction towards other dogs of the same/ opposite sex (other dog walks by and is fed),

(3) greeting and overall examination of the animal by a stranger to control its status of care and its acceptance of physical contact,

(4) taking a treat gently out of the hand of a stranger, even when the stranger primarily hides the treat in his/ her hand for a few seconds,

(5) leaving the animal alone in a room together with a stranger for at least 2 minutes,

(6) situation with contact of increasing intensity (gentle stroking, intense stroking, hugging and lifting of the animal),

(7) confrontation with unfamiliar movement patterns (e.g. persons in wheelchairs/ with crooks, who gesture heavily and shout loudly),

(8) stepping over the on the floor lying animal and bumping from behind into the animal,

(9) crowded and petted by several people who talk loudly and gesture,

(10) sudden, loud noise from behind,

(11) obedience of the dog (walking on loose leash, sit on command, down on command),

(12) interactions with a stranger (stay on command and come on command, walking with a stranger, playing with a stranger, come on command while playing with a stranger/ being fed by a stranger),

(13) taking a treat out of the dogs mouth, removing a bone (or similar) while the dog is occupied with it, and an

(14) overall assessment of the dog's personality during the exam.

At this point the association underlines that typical reactions of animals on single parts of the exam are accepted, even expected (e.g. alarm reaction on sudden noises). What they count for

is a fast reassurance after the identification of the source (Ausbildungsrichtlinien des Vereins 'Tiere als Therapie', 2005).

After they have passed the final exam, the new therapeutic teams have to attend five assistance-services in different institutions under the direction of experienced therapeutic teams. Only then they get their TAT-certificate and are allowed to work as an independent team in animal-supported therapy having the dog at the leash during therapy. For service without leash additional qualifications have to be completed. The same is true for handlers who want to do their service with two or (with special permission) three dogs.

Owners of other animal species solely have to attend the theoretical training part and the theoretical exam. Their animals are - like dogs - precisely checked by a veterinarian, and tested in special capability-examinations, but do not have to attend the practical training courses (Homepage 'Tiere als Therapie').

Following criteria for humans and animals have to be granted (Homepage 'Tiere als Therapie'):

(C) Criteria for the handler are:

(1) Social basic attitude without 'helper syndrome',

(2) capacity for teamwork,

(3) being able to comply by the rules,

(4) optimal understanding of his/ her animal,

(5) permanent check on the animal,

(6) capability to put oneself in the client's position,

(7) gain insight into the workflows on the visited institutions,

(8) specialised knowledge of stress-signals of his/ her animal and knowledge about how to reduce stress after a therapy unit, and

(9) attendance of a TAT-first-aid course for humans and animals (main topics are old people and children).

(D) Criteria for the handler-animal team are:

(1) Optimal teamwork between handler and animal,

(2) great harmony within the team,

(3) additional checks in regular intervals to ensure the accomplishment of the team's health and behavioral standards, and

(4) four hours of continuing education every year (e.g. two workshops).

(E) All animals must combine:

(1) Excellent health (health certification not older than 3 months),

(2) analgesia,

(3) well-cared for appearance,

(4) complete vaccination,

(5) total absence from ecto- and endoparasites,

(6) well-tempered and calm nature,

(7) environmental and social safety,

(8) self-confidence and reliability (in both untroubled and stressful situations towards patients, children, unknown persons, other animals of the same species and other animal species),

(9) reliability in cases of unknown sounds, situations and optical stimuli, and

(10) much pleasure in getting into contact and being touched by humans.

(F) Additional criteria for therapy dogs are:

(1) Absolute affability and tolerance towards humans,

(2) optimal conditioning and socialization towards contacts with humans of every age,

(3) very intense bond to its owner,

(4) absolute tolerance towards other dogs (even same-sex) and other animal species,

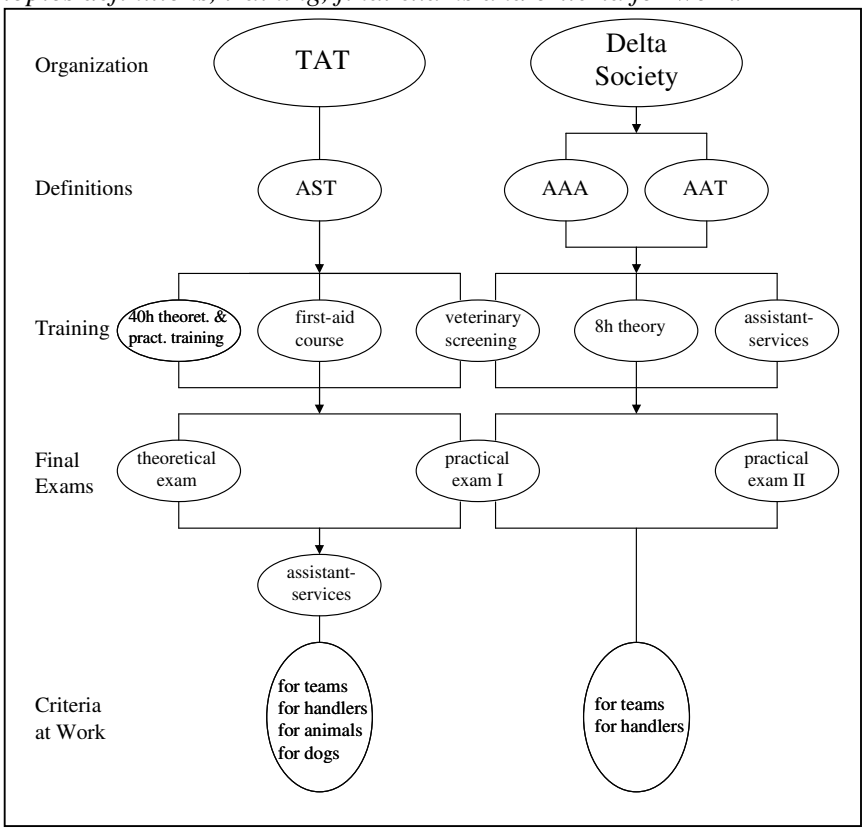
(5) obedience on the level of the first companion dog title (no exam necessary),

(6) great ability to work under pressure and resistance to stress (aggression may never be shown), however

(7) fearful, timid, insecure and aggressive dogs are not appropriate.

Now let us shortly sum up the differences between training courses, final exams, and demands on handler and animal in the USA and in Austria (Figure 1.1).

Figure1.1: Model of the differences between the Delta Society and TAT regarding to the topics definitions, training, final exams and criteria for work.



TAT = organization 'Tiere als Therapie'; AST = animal-supported therapy; AAA = animal-assisted activities; AAT = animal-assisted therapy.

Ad (A) Training: In Austria training as a home-study format is not possible. A team has to attend the whole training at one of the training centers. This point and the longer theoretical education result in our opinion in a more intensively and more detailed knowledge of the

handler. Lectures are not held by members of the organization, but by professionals of the particular topic. That offers the possibility to go more into detail. Another difference is that in Austria the assistance-visits to institutions are not done during the training, but after the final exams. Thereby the teams can be involved more intensively into the therapeutic setting, but are still under the supervision of a well versed team. Also the animal's health screening seems to be more strictly in Austria than in the USA, where more responsibility for evaluation is placed on the veterinarian. Analgesia of the animal is not mentioned at all, and rules for vaccination are differently organized in each US state (except rabies immunization). In Austria the veterinarian has to use and a special pre-printed form by TAT for the dog's health certificate, which he/ she has to fill out, rubber-stamp, and sign.

Ad (B) Examination: In both the USA and Austria the final exams include two parts. In Delta Society these concern two practical parts with different main focuses. The first one tests the obedience of the dog and the control of the handler over the dog, the second one simulates a visit in an institution and evaluates the team's appearance and behavior there. Much attention is paid on the reactions and behavior of the handler, not only towards his animal, but also towards the evaluator and his/her assistants (e.g. eye contact, smile). A disadvantage in our eyes could be that several parts of the PPST and the PPAT are very similar (e.g. petting, contact to a stranger, crowded area). That leads to a reduction of the tasks to their whole extent. In Austria the first part of the final exams is a theoretical test in written form for the handler (about the lectures), something which does not exist at Delta Society. The second part is a practical test for the dog and for the team as a unit. We have to claim that the final exams practiced in Austria consist of more single tasks. One great disadvantage is that at Delta Society no tasks are given containing jealousy about food or toys. We think that the task about ignoring a toy lying on the floor is not a good choice because dogs often react totally different on toys and some of them are not interested in them at all. Treats and jealousy about

food are much better indicators for a dog's obedient and non-aggressive personality because food is a more basic parameter than a toy. Another task we missed in the final exams of the Delta Society is the 'confrontation with unknown movement pattern' (wheelchairs, crooks), things that are often in use in health care institutions. The tasks 'leaving the dog alone with a stranger' and 'sudden noise from behind' do not exist either.

What is not evaluated that concretely in Austria is the handler's behavior towards the evaluators, something which is very important during the exams of the Delta Society.

We conclude that the practical tests in Austria are especially suited to test the abilities of the dogs. In the USA more attention is paid on the handler's behavior. The appearance of the team as a unit is similarly handled.

Differences also appear when we compare the guidelines for handlers, animals, and teams given by the two organizations in the USA and Austria. A general problem of some guidelines of the Delta Society is their cursorily formulation (e.g. reaction to distractions – which distractions do they mean?).

Ad (C) Criteria for the handler: The Delta Society provides many guidelines for the handler, especially due to organizational questions, guidelines which we do not find in the articles of TAT. In both countries great emphasis is paid on the handler's optimal understanding of the animal, clients, and visited institutions. What we miss in the guidelines of the Delta Society is a prescribed first aid course for the handler.

Ad (D) Criteria for the handler-animal team: The guidelines of the Delta Society describe how the team should appear in an outward direction, TAT prescribes rather the teams appearance inwards. Furthermore in the Delta-guidelines nothing is said about instructions for teams that already work in AST. In Austria, every team has to do a refresh exam every year, including a new health screening form from the veterinarian and the vaccination pass. Excremental analysis is obligatory twice a year. Female dogs may not work during their heat,

and every handler has to attend at least two workshops a year for advanced training or 4 hours of adequate training each year.

Ad (E) and (F) Criteria for therapeutic animals, especially dogs: These very detailed articles in Austria do not exist in the guidelines of the Delta Society.

For certain, standards in training and examining human-animal teams that work in therapeutic service are not the only parameters that show country-specific differences. The very same applies for guidelines created for the safety and protection of therapeutic animals.

We always have to remember the fact that all animals adopted for AST service have their behavior modified or curtailed to some degree. Therapeutic animals often do not show a behavior typical for their species. This is a difference between therapeutic animals and other sporting, working, or pet animals, who are usually allowed to act species-like (Coppinger et al., 1998).

Ethical Considerations in the USA

The International Association of Human-Animal Interaction Organizations (IAHAIO) is an American umbrella organization founded in 1990 of national and international organizations dealing with human-animal interactions. The Association's secretariat is based at the Delta Society (Homepage 'IAHAIO').

The IAHAIO holds meetings at regular intervals, and during three of them fundamental resolutions/ guidelines have been established, which we shortly want to present.

(A) At the General Assembly, held in Geneva on September 5th 1995 five basic resolutions have been adopted to ensure an harmonic relationship of companion animals in human lives (for further information see Homepage 'IAHAIO').

(B) At the General Assembly held in Prague in September 1998, four basic guidelines have been adopted to ensure the quality of life of both therapeutic animals and their patients. These guidelines say that

(1) only domestic animals which have been trained by techniques of positive reinforcement, and which are properly housed and cared for are involved,

(2) that the animals need safeguards to protect them,

(3) that each involvement of an animal is beneficial, and that

(4) basic standards exist that ensure general rights and safety for all persons involved (Homepage 'IAHAIO').

(C) At the General Assembly in Rio de Janeiro in September 2001, five basic guidelines have been adopted to ensure the quality of life of companion animals in schools (for further information see Homepage 'IAHAIO').

Ethical Considerations Suggested here

Although we think that these three declarations represent a good basis for human-animal bonds, we have to mention that they are not all-embracing in their protection of animals working in therapeutic service. We have therefore defined a schedule of eight basic articles, which covers all needs of these animals:

(A) All animals have to be selected carefully by professionals to reduce possible problems or risks down to a minimum. Every animal has to be free from pain, injury, and disease.

(B) All animals have to be trained properly by positive reinforcement and regularly controlled for the maintenance of their standards.

(C) All animals have to be kept appropriate for the species and accommodated with food, water, shelter, hygiene, social interaction (with humans and non-human attachment figures), relaxation, space to move, breaks, leisure time, safe refuges, exercise, and veterinary care.

(D) Every animal needs one or several persons (due to the animal's species) who are responsible for it and supervise their correct treatment.

(E) All animals need to be safe from any abuse and danger – both physical and mental - from any individual at all times.

(F) Interactions with clients must be structured as to maintain the animal's capacity to serve as a useful therapeutic agent.

(G) After a therapeutic session has ended, both client and the members of the therapeutic team must have benefited from the experience mentally and/ or physically.

(H) The animal needs an appropriate place to live when it becomes old or unable to work for any other reason.

We want to conclude our review with the notion that country-specific adaptations of therapeutic programs are indispensable. Whenever it comes to guidelines or prescriptions for individuals, culture-based differences are pre-assigned. Certainly it is not our business to denunciate the one or the other country-specific model. We just want to outline that every model is deeply positioned within the individual cultural requirements of a country and therefore not directly transferable to other countries. What may be working well within one cultural environment may be useless within another one, depending on the given history, customs, and needs. However, this fact calls for a certain flexibility of a transferred therapeutic program, because otherwise it will never fulfil all demands made upon it.

References

Ausbildungsrichtlinien des Vereins 'Tiere als Therapie' (2005). Aufliegend im Büro des Vereins.

Bossard, J.H.S. (1944). The mental hygiene of owning a dog. Mental Hygiene 28: 408-413.

Bossard, J.H.S. (1950). I wrote about dogs. Mental Hygiene 34: 345-349.

Coppinger, R., Coppinger, L., and Skillings, E. (1998). Observations on assistance dog training and use. Journal of Applied Animal Welfare Science 1: 133-144.

Dale-Green, P. (1966). Dog. Rupert Hart- Davis: London (UK).

Fredrickson, M., and Howie, A.R. (2000). Guidelines and Standards for Animal Selection in Animal-Assisted Activities and Therapy Programs. In A. Fine (Ed.) *Handbook on Animal-Assisted Therapy – Theoretical Foundations and Guidelines for Practice*, pp. 99-114. Academic Press, Elsevier Science: San Diego (USA).

Friedmann, E., Katcher, A.H., Lynch, J.J., and Thomas, S.A. (1980). Animal companions and one- year survival of patients after discharge from a coronary care unit. Public Health Reports 95: 307-312.

Garrity, T.F., Stallones, L., Marx, M.B. and Johnson, T.P. (1989). Pet ownership and attachment as supportive factors in the health of the elderly. Anthrozoös 3: 35-44.

Hart, L.A. (2000). Understanding Animal Behavior, Species, and Temperament as Applied to Interactions with Specific Populations. In A. Fine (Ed.) *Handbook on Animal-Assisted Therapy – Theoretical Foundations and Guidelines for Practice*, pp. 81-97. Academic Press, Elsevier Science: San Diego (USA).

Homepage 'Delta Society' www.deltasociety.org (March 10th - 20th, 2005).

Homepage 'Duden' www.duden.de (March 14th, 2005).

Homepage 'Google' www.google.at (March 10th, 2005).

Homepage 'IAHAIO' (International Association of Human-Animal Interaction Organizations) www.iahaio.org (March 11th – 15th, 2005).

Homepage 'Tiere als Therapie' (Animals as Therapy) www.tierelastherapie.org (March 10th – 20th, 2005).

Katcher, A.H., Friedmann, E., Beck, A.M. and Lynch, J.J. (1983). Looking, talking and blood pressure: The physiological consequences of interaction with the living environment. In A.H. Katcher and A.M. Beck (Eds.) *New perspectives on our lives with companion animals*, pp. 351-359. University of Pennsylvania Press: Philadelphia (USA).

Kusztrich, I. (1988). Haustiere helfen heilen – Tierliebe als Medizin. Genf: Ariston Verlag.

Lago, D.J., Connell, C.M. and Knight, B. (1983a). A companion animal program. In M.A. Smyer and M. Gatz (Eds.) *Mental health and aging: Programs and evaluations*, pp. 165-184. Sage Publication: Beverly Hills (USA).

Lago, D.J., Knight, B. and Connell, C.M. (1983b). Relationships with companion animals among the rural elderly. In A.H. Katcher and A.M. Beck (Eds.) *New perspective on our lives with companion animals*, pp. 303-317. University of Pennsylvania Press: Philadelphia (USA).

Levinson, B.M. (1962). The dog as co- therapist. Mental Hygiene 46: 59-65.

Levinson, B.M. (1970). Pets, child development and mental illness. Journal of the American Veterinary Medical Association 157: 1759-1766.

Ory, M. and Goldberg, E. (1983). Pet ownership and life satisfaction in elderly women. In A.H. Katcher and A. Beck (Eds.) *Preventing the harmful consequences of severe and persistent loneliness*, DHHS Publication No. ADM 84-1312, 13-46. National Institute of Mental Health: Rockville (USA).

Serpell, J.A. (1991). Beneficial effects of pet ownership on some aspects of human health and behavior. Journal of the Royal Society of Medicine 84: 717-720.

Siegel, J.M. (1990). Stressful life events and use of physician services among the elderly: The moderating role of pet ownership. Journal of Personality and Social Psychology 58 (6): 1081-1086.

Manuscript 2: Personality of Human-Dog Teams Working in Therapeutic Service with Animals

Abstract

In this survey we analyzed the personality of 11 humans and their 15 dogs working together as teams in animal-supported therapy. We used a personality test especially designed for humans working in a socio-communicative domain, and let the owners describe the personality of their dogs. The aim of this survey was the detection of personality traits typical for humans, respectively dogs working voluntarily in a social area and to compare the personality tests used here to the common way of personality investigation by the 'Big Five' for humans and 'Big Four' for dogs. Our results showed that the humans had significantly good results for single traits of their socio-communicative behavior and health-and-recreation behavior. These traits are comparable to the dimensions Agreeableness and Extraversion of the 'Big Five'. Similarly did the dogs reach high levels within the dimensions Affection and Energy, which can be compared to the traits of the 'Big Five' for humans mentioned above. These results lead us to the conclusion that humans and dogs that work in animal-supported therapy do not only own a personality slightly varying from the majority of the population, but also have similar personality pattern.

Introduction

Today's most widely accepted model of human personality is called 'Five-Factor Model' (FFM), or simply the 'Big Five'. It has derived from factor-analytic studies over the past 40 years (for review John and Srivastava, 1999) and is a hierarchically structured model which defines five global factors of human personality, named *Neuroticism*, *Extraversion*, *Openness* (*to Experience)*, *Agreeableness*, and *Conscientiousness*. Every dimension includes several facets: *Neuroticism* comprises anxiety, self-pity, impulsivity, irrational thinking, depression, low self-esteem, insecurity, defensiveness, tension, worry, hostility, impulsiveness, self-consciousness, and vulnerability. *Extraversion* includes warmth, gregariousness, being full of energy, being social, enthusiasm, outgoingness, talk-activity, assertiveness, activity, excitement-seeking, and positive emotions. *Openness* is made up of openness to fantasy, intelligence, unconventionality, insightfulness, flexibility, imagination, curiosity, creativity, originality, aesthetics, feelings, actions, ideas, and values. *Agreeableness* consists of altruism, compliance, cooperation, likeability, being generous, forgivingness, kindness, sympathy, modesty, straightforwardness, tender-mindedness, and trust. And *Conscientiousness* is composed of achievement-orientation, reliability, dependability, efficiency, organization, planfulness, responsibility, thoroughness, hardworkingness, striving, competence, deliberation, dutifulness, order, and self-discipline (Costa and McCrae, 1992).

Although there are still critics who raise their voice against this model (Becker, 1999; Block, 1995) it is frequently used, and domains like cross-cultural studies (McCrae and Costa, 1997), relationship satisfaction (White et al., 2004), work-family conflict (Kinnunen et al., 2003), career decidedness (Lounsbury et al., 1999), job satisfaction (Furnham et al., 2002), health and stress (Lochbaum et al., 2004), or changes of personality through life span (Roberts and DelVecchio, 2000; Soldz and Vaillant, 1999) have already been analyzed using this model.

Individual differences in behavior have also been found in nonhuman species, among them many traits related to social behavior (Armitage, 1986). We subscribe to the view that not only anatomical and physiological traits have considerable continuity between mammals due to the evolutionary theory, but also emotions and personality (Costa and McCrae, 1988).

The most commonly used method of personality evaluation in animals is to rely on the judgement of humans who are well acquainted with the target animals. This method is well established in scientific literature (Gosling et al., 2003; Morris et al., 2002). Gosling et al. (2003) tested whether personality differences exist between dogs and humans and whether these differences can be judged in dogs as accurately as in humans. Personality judgements of humans and dogs were compared on three accuracy criteria – internal consistency, consensus, and correspondence. Results showed that on all three criteria judgements of dogs were as accurate as judgements of humans. These findings are consistent with the evolutionary continuity hypothesis and suggest that personality differences do exist and can be measured in animals other than humans. In a review by Gosling and John (1999) indications for the 'Big Five' were found in dogs. They claim that *Conscientiousness* does not appear as an independent personality dimension in dogs, as it does in humans and chimpanzees, which suggests that this is an evolutionary young personality pattern. They developed a four-dimensional model ('Big Four') analogous to the five human factors: *Energy* (analogous to human *Extraversion*), *Affection* (analogous to human *Agreeableness*), *Emotional-Reactivity* (analogous to human *Neuroticism*), and *Intelligence* (analogous to human *Openness*).

Nevertheless we have to advise against any anthropomorphization of the dog (*Canis familiaris*), which descended from a common ancestor of the wolf (*Canis lupus*). Both are social living hunters who are specialized on chasing prey. However, the dog has connected his life to humans, the wolf has not. Dogs are able to learn communicational signals from a human very quickly and differentiated, and they are suited for cooperation with humans, with

specializations within every breed. Furthermore they can easily be trained via motivation and rewards (Feddersen-Petersen, 2004).

For this paper investigated the personality of humans and dogs working in animal-supported therapy (Haubenhofer and Kirchengast, in prep.). More precisely, we analyzed

(A) the personality traits of the participating humans and if they could stand for the picture of a person working voluntarily in a social area; we hypothesize yes (1st hypothesis),

(B) the personality pattern of the dogs and whether they fulfilled the criteria for the personality of a dog working in animal-supported therapy (like e.g. lack of aggressiveness); again, we hypothesize yes (2nd hypothesis),

(C) and whether the personality tests used here are comparable to the traits of the 'Big Five' among the dog owners, respectively 'Big Four' among the dogs; again, we hypothesize yes (3rd hypothesis).

Material and Methods

1. Subjects

In the context of a greater survey personality data were collected from dog owners and their dogs that worked together as teams in animal-supported therapy. All teams were members of the organization 'Tiere als Therapie' (that means 'Animals as Therapy') in Vienna, Austria. The organization was founded in the year 1991 and trains people and their animals that want to work in animal-supported therapy. They do this either as additional qualification within their own job (physio-, ergo-, and logotherapists, teachers, kindergarten teachers, social consultants, social workers, etc.), or they visit institutions like old peoples´ homes, homes for disabled persons, or schools in their leisure time (Homepage 'Tiere als Therapie').

Altogether, 11 humans and their 15 dogs participated in this study. Ten of the dog owners were female, one male. Their year of birth ranged from 1939 to 1977. Four of them lived in

urban, seven of them in rural areas. All of them had an occupation based upon a social area – therapists, advisors, teachers or physicians (two already in retirement pension). Nine of them were married or lived in a steady relationship, one was single and one widowed. Six of them had children, most of them already grown up. Only one woman had four children less than 18 years of age.

Among the dogs was one Bernese Mountain Dog, three Border Collie, one Bouvier des Flandres, one Dachshund-crossbreed, two Golden Retriever, one Great Pyrenees, three Labrador Retriever, one Pointer-crossbreed, and two Puli. All dogs were born between 1996 and 2003. Twelve of them were female (one sterilized) and three male (one sterilized).

All teams attended the organization 'Tiere als Therapie' between the years 2000 and 2003, thus were already experienced teams and acquainted with their work.

2. Methods

Two different types of questionnaire were used. The first one was a standardized personality test, the other one a self-administered questionnaire.

(A) Standardized personality test:

The personality test used here is called IPS or 'Inventar zur Persönlichkeitsdiagnostik in Situationen' ('Inventory for Personality Diagnostics in Situations'). It was developed by Schaarschmidt and Fischer (1999; Kemter, 2000).

This test is especially designed for adults working in employments that make major demands on socio-communicative behavior (e.g. teachers, nursing staff, or – as we propose - people working in animal-supported therapy). It includes questions about three fields of daily life requirements - socio-communicative behavior, performance behavior, and health and recreation behavior. Additionally the participants' judgement about their satisfaction/

dissatisfaction is evaluated to analyze the levels of inner equilibrium and positive self-perception.

To be able to relate the results of the IPS to the dimensions of the 'Big Five' we assigned each trait to the dimension it matched best.

(1) Requirements on the socio-communicative behavior:

a) Activity in a familiar, communicative situation (*activity*), analogous to the 'Big Five' dimension *Extraversion* in a positive correlation,

b) Self-assertion during communication (*self-assertion*), analogous to the 'Big Five' dimension *Extraversion* in a positive correlation,

c) Confrontation tendency during situations of conflict (*confrontation-tendency*), analogous to the 'Big Five' dimension *Agreeableness* in a negative correlation,

d) Implementation in a leading position (*implementation*), analogous to the 'Big Five' dimension *Agreeableness* in a negative correlation,

e) Considerateness due to social responsibility (*considerateness*), analogous to the 'Big Five' dimension *Agreeableness* in a positive correlation, and

f) Sensitivity due to social frustration (*sensitivity*), analogous to the 'Big Five' dimension *Neuroticism* in a positive correlation.

(2) Requirements on the performance-behavior:

a) Commitment during high standards of performance (*commitment*), analogous to the 'Big Five' dimension *Conscientiousness* in a positive correlation,

b) Persistence tendency in situations of rearrangement (*persistence*), analogous to the 'Big Five' dimension *Openness* in a negative correlation,

c) Stability during stressful demands (*stability*), analogous to the 'Big Five' dimension *Neuroticism* in a negative correlation,

d) Self-confidence during exams (*self-confidence*), analogous to the 'Big Five' dimension *Neuroticism* in a negative correlation,

e) Willing to tackle career and risks at one's occupation (*career*), analogous to the 'Big Five' dimension *Openness* in a positive correlation, and

f) Optimism during daily demands (*optimism*), analogous to the 'Big Five' dimension *Neuroticism* in a negative correlation.

(3) Requirements on health and recreation behavior:

a) Ability to relax at the end of a working-day (*relaxation*): It is more difficult to assign this trait to one dimension of the FFM. We think that it fits best to the 'Big Five' dimension *Extraversion* in a positive correlation,

b) Regenerating actively during leisure time (*regeneration*): Again it is difficult, again we think that it fits best to the 'Big Five' dimension *Extraversion* in a positive correlation, and

c) Health care due to warning signals (*health-care*), analogous to the 'Big Five' dimension *Conscientiousness* in a positive correlation.

(4) Degree of satisfaction with the answers given:

a) In the field of socio-communicative behavior (*a-satisfaction*),

b) In the field of performance behavior (*b-satisfaction*), and

c) In the field of health and recreation behavior (*c-satisfaction*).

(B) Self-administered questionnaire:

This form provided general information about the dog owners (sex, date of birth, place of domicile, today's vocation, marital status, number of children) and her dogs (breed, date of birth, sex, sterilization). Additionally, it offered a list of personality traits from which the dog owners could choose those traits that were in their opinion most applicable for a description of their dogs' personality.

3. Statistical Analysis

The standardized questionnaires were evaluated by the computer program of the IPS itself. This program provides a detailed characterization of each participant's personality, by listing the reached values of all traits. Additionally, the computer program compares the results of each individual to reference profiles of a standardized control-population. We used Kolmogorov-Smirnov Tests for parametric distribution combined with Lilliefors-Significance Correction and Shapiro-Wilk Tests. Then we combined the individual results of every trait with the standardized reference means of the control-population listed in the manual of the IPS using One-Sample-T Tests to investigate whether the levels of each trait reached by the participants differed from the character traits of the majority of the population. All results were reduced to one decimal place, and statistically compared to a $\alpha = 0.05$.

The data of the dogs were evaluated following the example of the hypothetical analyzing four-factor-model of Gosling and John (1999).

Results

First we evaluated the general mean for all traits out of the data of all participating humans to evaluate an overall profile of the personality of humans working in animal-supported therapy. All traits fitted the requirements of a parametric distribution ($p \leq 0.332$ to $p \leq 0.994$).

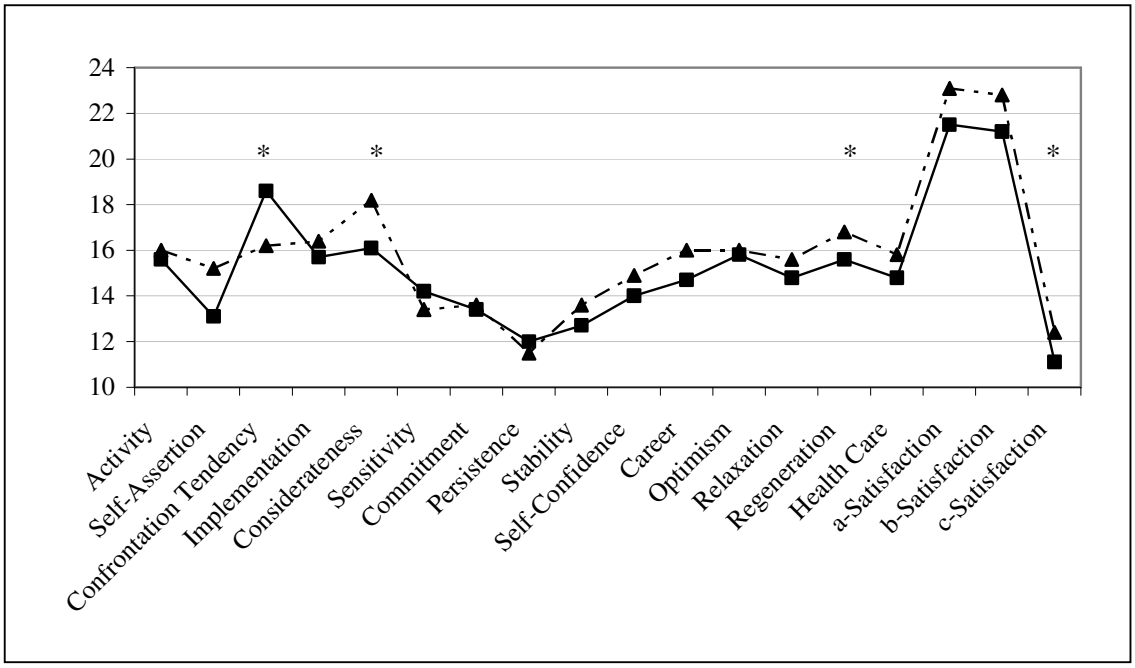
Like presented in Table 2.1 the means of the participants differed from the standardized means of a standardized control-population as presented in the IPS. They were similar only for the traits 'activity', 'commitment', and 'optimism'. The traits 'self-assertion', 'implementation', 'considerateness', 'stability', 'self-confidence', 'career', 'relaxation', 'regeneration', 'health care', and all three satisfaction scores lay above the standardized levels; the traits 'confrontation tendency', 'sensitivity', and 'persistence' lay beyond the standardized levels.

Table 2.1: Mean and standard deviation for all behavioral traits (a1-d3), for all participants and the standardized control- population.

	Participants		Standardized Control-Population	
Traits	Mean	SD	Mean	SD
Activity	16.0	2.8	15.6	2.8
Self-Assertion	15.2	3.8	13.1	3.2
Confrontation Tendency *	16.2	2.9	18.6	4.0
Implementation	16.4	2.6	15.7	2.5
Considerateness *	18.2	1.4	16.1	2.1
Sensitivity	13.4	2.4	14.2	2.8
Commitment	13.6	3.5	13.4	3.1
Persistence	11.5	2.9	12.0	3.0
Stability	13.6	3.1	12.7	3.0
Self-Confidence	14.9	3.9	14.0	2.9
Career	16.0	4.6	14.7	3.6
Optimism	16.0	1.5	15.8	2.5
Relaxation	15.6	2.1	14.8	2.7
Regerenation *	16.8	1.9	15.6	2.5
Health Care	15.8	2.4	14.8	2.8
a-Satisfaction	23.1	3.9	21.5	3.5
b-Satisfaction	22.8	4.4	21.2	3.6
c-Satisfaction *	12.4	1.8	11.1	2.1

SD = standard deviation. Statistically significant differences of traits between the general means of the participants and the standardized means of the control- population marked with a *.

Figure 2.1: Graphical illustration of the general means of the participants (dashed line) and of the standardized means of the control- population (continuous line) for all traits.



Statistically significant differences of traits between the general means of the participants and the standardized means of the control- population marked with a *.

As we compared the levels of the traits from the participants to the standardized levels provided in the manual of the IPS we could find statistically significant differences for only four traits. The traits 'activity' ($p \leq 0.607$), 'self-assertion' ($p \leq 0.07$), 'implementation' ($p \leq 0.366$), 'sensitivity' ($p \leq 0.228$), 'commitment' ($p \leq 0.877$), 'persistence' ($p \leq 0.506$), 'stability' ($p \leq 0.292$), 'self-confidence' ($p \leq 0.423$), 'career' ($p \leq 0.327$), 'optimism' ($p \leq 0.632$), 'relaxation' ($p \leq 0.178$), 'health care' ($p \leq 0.158$), as well as the degrees of satisfaction with the first two groups of traits ($p_{\text{socio-communicative behavior}} \leq 0.164$; $p_{\text{performance behavior}} \leq 0.208$) did not show any statistically significant differences to the standardized levels of the IPS-manual. Yet we found statistically significant differences for the traits 'confrontation tendency' ($p \leq 0.014$; statistically lower than the standardized level), 'considerateness' ($p \leq 0.001$; statistically higher that the standardized level), 'regeneration' ($p \leq 0.044$; statistically higher that the standardized level), and 'satisfaction with the health-and recreation behavior' ($p \leq 0.028$; statistically higher that the standardized level) (Figure 2.1).

Assigning each trait of the IPS to one dimension of the 'Big Five' we may describe our participants as following: They scored high in the dimensions of *Openness*, due to the high mean of the trait 'career' (beyond the standardized mean), and the low levels of the trait 'persistence' (below the standardized mean). They also reached high marks for the dimension *Conscientiousness,* due to the high levels of the means for the traits 'commitment' (above the standardized mean) and 'health-care' (also above the standardized mean). The traits assigned to the dimension of *Agreeableness* created also a very positive picture of the participants. They ranked low for the trait 'confrontation tendency' (mean below the standardized mean), but high for the traits 'implementation' and 'considerateness' (both means beyond the standardized means). Furthermore reached the participants high levels for the dimension *Extraversion* due to the high means of the trait 'activity', 'self-assertion', 'relaxation', and

'regeneration' (all of them higher than the standardized means of these traits). Finally, the participants completed their good marks within the dimension *Neuroticism*, where they ranked lower than the standardized mean for the trait 'sensitivity', but higher for the traits 'stability', 'self-confidence', and 'optimism'.

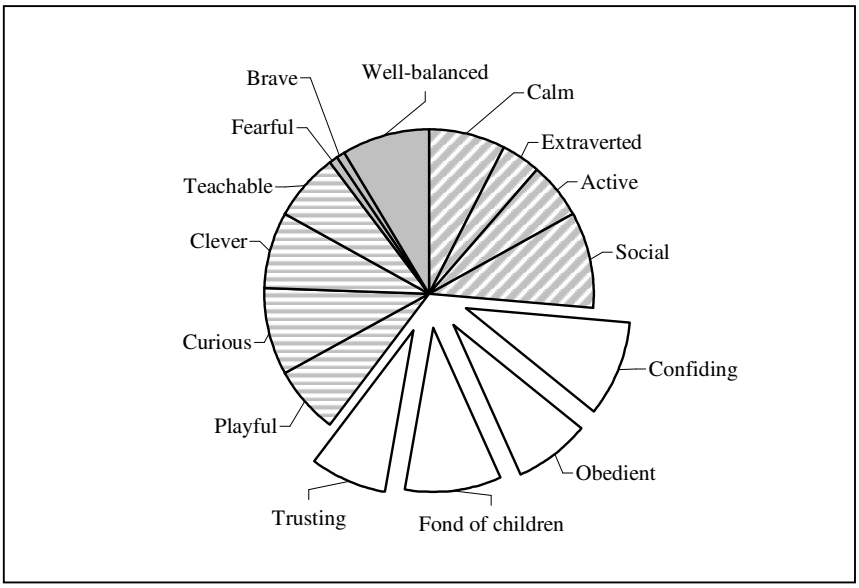
Then we started an investigation of the dogs' characters as their owners had described them separating the single traits into the 'Big Four', the four dimensions of personality defined by Gosling and John (1999).

Table 2.2: Frequencies of the dogs' character traits defined by their owners and separated into the 'Big Four'.

Energy		Affection		Intelligence		Emotional-Reactivity	
Trait	Entries	Trait	Entries	Trait	Entries	Trait	Entries
Calm	8 (53%)	Confiding	10 (67%)	Playful	7 (47%)	Timid	0 (0%)
Extraverted	4 (27%)	Obedient	8 (53%)	Curious	9 (60%)	Fearful	1 (7%)
Active	6 (40%)	Fond of children	10 (67%)	Clever	8 (53%)	Brave	1 (7%)
Social	10 (67%)	Trusting	8 (53%)	Teachable	7 (47%)	Well balanced	9 (60%)

Stated are the frequencies and percentages of entries for each trait (n = 15).

Figure 2.2: Pie chart including all personality traits from the dogs named by their owners. Grouped into the 'Big Four'



Diagonal line = Energy, white = Affection, horizontal line = Intelligence, grey = Emotional-Reactivity). Greatest dimension (Affection) highlighted by its exploded slices.

Within the class *Energy* (analogous to human *Extraversion*) most entries were done for the traits 'social' and 'calm', followed by 'active' and 'extraverted'. All traits of the class *Affection* (analogous to human *Agreeableness*) ranked high, headed by 'confiding' and 'fond-of-children', and followed by 'obedient' and 'trusting'. Even the traits of the class *Intelligence* (analogous to human *Openness*) were named rather often – especially 'curious' and 'clever', but also 'playful' respectively 'teachable'. *Emotional-Reactivity* (analogous to human *Neuroticism*) was also very consistent in its results. None of the dogs was defined as being 'timid', only one dog as being 'brave' respectively 'fearful', but many owners characterized their dog as being 'well-balanced' (Table 2.2 and Figure 2.2).

Discussion

Our first aim was to characterize the personality of participating humans and to investigate whether these results may be typical for people, working voluntarily in animal-supported therapy. We can support this hypothesis. The participants scored very well in all areas compared to the standardized mean levels of the majority of the population. They can be pictured as persons, who are lively and active, open-minded, sociable, communicatively skilful, restrained, compliant, assertive, considerate, understanding, cooperative, emotionally stable and robust, willing to make an effort and to hand-on problems, willing to change, self-assured, relaxed, dauntless, ambitious, confident, zestful, willing to perform, responsible, and furthermore more satisfied with all answers given than the average.

However, statistically significant differences could only be calculated for the traits 'confrontation tendency' (statistically lower than the standardized level), 'considerateness', 'regeneration', and 'satisfaction with the health-and recreation behavior' (all means statistically higher that the standardized means). Thus we may assume that these peculiarities in personality define a person working voluntarily in animal-supported therapy. First, these

persons appear especially low in their confrontation tendency and therefore very restrained, compliant, and peaceable. Additionally they seem considerate, understanding, and cooperative, plus actively and intensively looking for regeneration during their leisure time. Furthermore, it is interesting that they were statistically significant more satisfied with their answers given due to their health-and recreation behavior than the majority of the population. This may be the result of a healthier life style of people keeping a dog than people keeping other or non animals. In one study (Serpell, 1991) did dog owners maintain a decrease in minor health problems over a duration of 10-months, cat owners did not. Siegel (1990) suggests that dog and cat ownership might have different associations with health status. It does appear that owning a dog encourages people to exercise more, whereas a cat or another pet encourages the owner to spend more time at home. Additionally, Siegel suggests that owning a dog provides a stress buffer, whereas owning other types of pets does not.

Another reason may be that people who get regularly in touch with aging, disease and even death start to listen to their body more carefully and care for themselves better than others.

Another aspect of these results is that all statistically significant differences origin from the socio-communicative, respectively the health-and recreation behavior of the IPS. There were no statistically significant differences within the performance behavior between the participants of this survey and the majority of the population. We might suggest that these people do not only live healthier than people without dogs, but also have special skills within their socio-communicative behavior. Whether this is a result of their work in animal-supported therapy or only a typical accompaniment due to the fact that they all work within social areas cannot be answered at this place and could surely be topic of further investigation.

Our second intent was the description of the dogs' personality working in therapeutic service and to investigate whether these traits fitted the ideal picture of a therapy dog. We can accept

this hypothesis as well. The owners described their dog's personality rather uniformly. More than 50% of all owners characterized their dogs as being social, confiding, fond-of-children, curious, well-balanced, calm, obedient, trusting, and clever. This illustrates a clear picture of how dogs are that work in animal-supported therapy, or rather how a dog's personality has to be for this kind of therapeutic service. Unfavorable are dogs that are too lively or brave, nor on the other side too shy or fearful. Any individual that tends towards an extreme in its personality it not expedient. What is needed are dogs with a well-balanced, calm nature, but still social and what we call here 'affective' and 'intelligent' (following the definitions of Affection and Intelligence given above).

Svartberg (2002) points out that there are relationships between personality traits in working dogs and the probability to succeed in a certain training. Dogs that have finished their training and have therefore reached a certain level of skills, however, did not show any differences any more. We suggest that this is also true for dogs used in animal-supported therapy. Haubenhofer (2003) suggests in her Master's Thesis that dogs already have to possess all personality pattern essential for a therapy dog when they start with their training. Consequently, all dogs that work successfully in animal-supported therapy should have similar personalities, because otherwise they would not have made it through the training.

Our results correspond well with the personality-criteria of the organization 'Tiere als Therapie' for dogs that work in animal-supported therapy (Homepage 'Tiere als Therapie'). All animals must combine

(A) well- tempered and calm nature,

(B) environmental and social safety,

(C) self- confidence and reliability in every situation,

(D) much pleasure in getting into contact and being touched by humans,

(E) optimal conditioning and socialization towards contacts with humans, other dogs (even same-sex) and other animal species of every age,

(F) very intense bond to its owner,

(G) obedience, and

(H) great ability to work under pressure and resistance to stress. And they underline that fearful, timid, insecure and aggressive dogs are not appropriate.

Finally we tried to compare our results with the 'Big Five' dimensions in personality among humans, respectively the 'Big Four' dimensions in personality among dogs. The dog owners reached positive levels within all dimensions. The statistically significant good levels of the traits 'confrontation tendency', 'considerateness', and 'regeneration' fall now into the dimensions *Agreeableness*, respectively *Extraversion*. These two behavioral traits – comparable to *Affection* and *Energy* among dogs – can be defined as the predominant personality dimensions of humans and dogs working together as teams in animal-supported therapy. We already know that high *Agreeableness* is associated with helping others (Schutte et al., 2003). And they underline the already established hypothesis that these dimensions are evolutionary stable parameters both in humans and in dogs (Svartberg et al., 2005).

Certainly is the small sampling size of this survey a great problem. The reason is that these data were collected in the context of another survey and are therefore an additional supplement to a greater project. We were encouraged to publish our results by the fact that other papers have to deal with the same problem. One example is the article of Morris et al. (2002), where they analyzed the personality of horses with a sampling size of ten animals.

Thus we want to conclude our paper with the notion that human-animal teams that work voluntarily in animal-supported therapy are individuals with a very characteristic personality due their values and life style and may therefore be an interesting target of investigation for scientists working in the domain of social behavior and psychology.

References

Armitage, K.B. (1986). Individuality, social behavior, and reproductive success in yellow-bellied marmots. Ecology 67: 1186-1193.

Becker, P. (1999). Beyond the Big Five. Personality and Individual Differences 26: 511-530.

Block, J. (1995). A contrarian view of the five-factor approach to personality description. Psychological Bulletin 117: 187-215.

Costa, P.T. Jr. and McCrae, R.R. (1988).Personality in adulthood: A six-year longitudinal study of self-reports and spouse ratings on the NEO Personality Inventory. Journal of Personality and Social Psychology 54: 853-863.

Costa, P.T. Jr. and McCrae, R.R. (1992). Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO FFI) professional manual. Psychological Assessment Resources: Odessa (USA).

Costa, P.T. Jr. and McCrae, R.R. (1994). Set like plaster? Evidence for the stability of adult personality. In T. F. Heatherton and J. L. Weinberger (Eds.) *Can personality change?*, pp. 21-40. American Psychological Association Books: Washington DC (USA).

Feddersen-Petersen, D. (2004). Hundepsychologie – Sozialverhalten und Wesen, Emotionen und Individualität, 4. Edition. Franck-Kosmos Verlag: Stuttgart (Germany).

Furnham, A., Petrides, K.V., Jackson, C.J. and Cotter, T. (2002). Do personality factors predict job satisfaction? Personality and Individual Differences 33: 1325-1342.

Gosling, S.D. and John, O.P. (1998, May). Personality dimensions in dogs, cats, and hyenas. Paper presented at the annual meeting of the American Psychological Society, Washington DC (USA).

Gosling, S.D. and John, O.J. (1999). Personality dimension in nonhuman animals: a cross-species review. Current Directions in Psychological Science 8: 69-75.

Gosling, S.D., Kwan, V.S. and John, O.P. (2003). A dog's personality: A cross-species comparative approach to personality judgements in dogs and humans. Journal of Personality and Social Psychology 85 (6): 1161-1169.

Haubenhofer, D.K. (2003). Höhe der Stressbelastung von Mensch und Hund während der Ausbildung für die Arbeit im Bereich der tiergestützten Therapie. Master's Thesis at the Institute for Anthropology, University of Vienna (Austria).

Haubenhofer, D.K. and Kirchengast, S. (in prep.). Austrian Way of Therapeutic Service with Animals. For Anthrozoös.

Homepage 'Tiere als Therapie' ('Animals as Therapy') www.tierelastherapie.org (March 29th, 2005).

John, O.P. and Srivastava, S. (1999). The Big Five trait taxonomy: History, measurement, and theoretical perspectives. In L.A. Pervin and O.P. John (Eds.) *Handbook of personality: Theory and research*, pp. 102-138. Guilford Press: New York (USA).

Kemter, P., 2000. Inventar zur Persönlichkeitsdiagnostik in Situationen. In: E. Fay (Ed.). *Tests unter der Lupe III*. Pabst: Lengerich (Germany).

Kinnunen, U., Vermulst, A., Gerris, J. and Mäkikangas, A. (2003). Work-family conflict and its relations to well-being: the role of personality as a moderating factor. Personality and Individual Differences 35: 1669-1683.

Lochbaum, M.R., Lutz, R.S., Sell, S., Ready, A. and Carson, T. (2004). Perceived stress and health complaints: an examination of the moderating roles of personality and physical activity. Perceptual and Motor Skills 99 (3): 909-912.

Lounsbury, J.W., Tatum, H.E., Chambers, W., Owens, K.S. and Gibson, L.W. (1999). An Investigation Of Career Decidedness In Relation To "Big Five" Personality Constructs And Life Satisfaction. College Student Journal 33 (4): 639-646.

McCrae, R.R. and Costa, P.T. Jr. (1997). Personality trait structure as a human universal. American Psychologist 52: 509-516.

Morris, P.H., Gale, A. and Duffy, K. (2002). Can judges agree on the personality of horses?. Personality and Individual Differences 33: 67-81.

Roberts, B.W. and DelVecchio, W.F. (2000). The rank-order consistency of personality traits from childhood to old age: A quantitative review of longitudinal studies. Psychological Bulletin 126: 3-25.

Schaarschmidt, U. and Fischer, A.W. (1999). IPS - Inventar zur Persönlichkeitsdiagnostik in Situationen. Swets and Zeitlinger, Swets Test Services: Frankfurt/ Main (Germany). Computerversion im Rahmen der Wiener Testsystems. Schuhfried Ges.m.b.H.: Wien/ Mödling (Austria).

Schutte, N.S., Malouff, J.M., Segrera, E., Wolf, A. and Rodgers, L. (2003). States reflecting the Big Five dimensions. Personality and Individual Differences 34: 591-603.

Serpell, J.A. (1991). Beneficial effects of pet ownership on some aspects of human health and behavior. Journal of the Royal Society of Medicine 84: 717-720.

Siegel, J.M. (1990). Stressful life events and use of physician services among the elderly: The moderating role of pet ownership. Journal of Personality and Social Psychology 58 (6): 1081-1086.

Soldz, S. and Vaillant, G.E. (1999). The Big Five Personality Traits and the Life Course: A 45-Year Longitudinal Study. Journal of Research in Personality 33: 208-232.

Svartberg, K. (2002). Shyness-boldness predicts performance in working dogs. Applied Animal Behaviour Science 79: 157-174.

Svartberg, K., Tapper, I., Temrin, H., Radesäter, T. and Thorman, S. (2005). Consistency of personality traits in dogs. Animal Behaviour 69: 283-291.

White, J.K., Hendrick, S.S. and Hendrick, C. (2004). Big Five personality variables and relationship constructs. Personality and Individual Differences 37: 1519-1530.

Manuscript 3: Subjectivity vs. Objectivity in Animal-Supported Therapy

Abstract

We investigated the discrepancies between subjective perception of stress and levels of salivary cortisol measured in humans and dogs that worked in animal-supported therapy. The dog owners described their own condition subjectively and estimated the condition of their dogs. Additionally we collected saliva samples during control-days and therapy-days to evaluate the levels of the 'stress-hormone' cortisol.

The dog owners described their own life being more stressful than the life of their dogs, but therapeutic work more stressful for the animals than for themselves. They characterized themselves being happy and relaxed before therapy, and satisfied and happy afterwards, and valued their dogs as being excited and full of anticipation before therapy, but as well satisfied and happy afterwards. Hormone analyzation showed that both humans and dogs had higher levels of cortisol at therapy-days; however, the humans had higher levels before therapy, dogs lower levels. Cortisol concentration increased with the duration of therapeutic settings in humans, but decreased in dogs. Levels did not correlate with the number of settings in humans, but did very well in dogs. Evaluation of daily stresses, levels of exhaustion and resistance against stress did only partly correlate with cortisol concentration.

We can conclude that subjective estimation of situations and objective measurements do not always go conform and should therefore both be considered in scientific surveys.

Introduction

One typical development of modern scientific research is its enormity of specialization, not only within single scientific fields, but also due to the scientific approach. The strict separation between subjectivity and objectivity of an individual's (mentally and/or physically) condition is a good example (Meissner, 2001). It is usual in natural sciences that the main attention is paid on the objective measurement of observable and quantifiable parameters. It is beyond all questions that this is important for obtaining uncommitted indications which can easily be reproduced and compared. Yet an individual is turned into a number and an accumulation of single data. The subjective measurement design, rather common within the humanities and psychological fields of science considers individual differences, special backgrounds, and the personality of the participants. These techniques turn the number back into an individual, but thus are hardly comparable with results from other studies.

Smith (1999) emphasizes that the estimated dichotomy between subjectivity and objectivity is a false one and that a scientist cannot design a concept of objectivity without designing a concept of subjectivity at the same time. The author defines objectivity as the perception or experience of the external, and subjectivity as the perception or experience of the internal. The analyzation of results using both subjective and objective methods is especially important when we think of a number of papers which present a variation in the results depending on whether subjective or objective methods were used (Foreman and Henshaw, 2002; Wang, 2005).

Thus we support this notion we used combined techniques of subjective and objective evaluation to answer the question, how humans and their dogs (*Canis familiaris*) sense their work in animal-supported therapy individually and how these subjective perceptions are related to objective measurements of the 'stress hormone' cortisol in the same participants. It is widely known that all kinds of unusual or extraordinary situations, activities and emotions

may lead to physiological and psychological signs of stress in living beings (Beerda et al., 1998; Herbert and Cohen, 1993). Whether a situation is sensed as stressful depends always on many factors, both in humans and in dogs: Perception and handling of stimuli, information processing of outside influences, and interior factors like genetic disposition and individual experiences in the past (Feddersen-Petersen, 2004). Nagl and Von Reinhardt (2003) mentioned for dogs, amongst others

(A) deficit of sleep, corporal or mental exhaustion,

(B) hectic atmosphere, cruelty, anger, and aggression in the social environment,

(C) wrong handling, and

(D) too much attention and affection that lead to a lack of dormancy and privacy.

These causes are all stimuli than might occur during therapeutic settings.

For humans job-related stress is a typical example for increased secretion of cortisol. Surveys done among people working in the area of health-care have shown that dealing with very ill patients can lead to increased cortisol levels (Yang et al., 2001).

The intention of our study was to find answers on following questions.

(A) How do humans that work together with their dogs in animal-supported therapy describe both their own life and work and that of their dogs? Comparing subjective and objective results, do the dog owners calculate their own position and that of their dogs correctly? We hypothesize they do (1st hypothesis).

(B) Which levels of salivary cortisol do humans and dogs have that work together as teams in animal-supported therapy? Are there any differences between levels of salivary cortisol collected at days without and with therapeutic work? We hypothesize that levels of salivary cortisol collected at days of therapeutic settings are higher than at control-days (2nd hypothesis).

(C) Do duration and number of settings per week show any effects? Our hypothesis is that those participating humans and dogs that have had settings of longer duration (3rd hypothesis) and those that have had more settings within the three months of investigation (4th hypothesis) show higher levels of salivary cortisol.

Material and Methods

1. Subjects

Thirteen teams participated in this study consisting of 13 humans and 18 dogs. Among the dog owners were 12 female and one male person. Their year of birth ranged between 1937 and 1977.

All dogs were born between 1996 and 2003 and were of different breed. Fifteen dogs were female (four sterilized), three male (one sterilized). None of the dogs had pathological allergies, skin-diseases, vomitus, diarrhea or any other chronic disease.

All teams were members of the Austrian organization 'Tiere als Therapie' (which means 'Animals as Therapy'). This is the biggest non-profit organization in Austria, in which humans and their animals are trained for later work in the field of animal-supported therapy and animal-supported pedagogy. This kind of therapeutic service can be defined as the sum of procedures that shall lead to positive effects in both experience and behavior of humans, using animals in a very directed manner. More information about this organization can be found at their Homepage.

2. Methods

To reduce biases it was especially important for us was to keep those stresses down to a minimum that arise automatically when an individual is being evaluated. Thus we did not

subject the dogs to standardized personality tests but let their owners characterize them. Brought into unfamiliar situations results could have been differing from their normal range. Furthermore has the method of humans describing animals they know an established reputation in scientific research (Gosling et al., 2003; Morris et al., 2002). Thus the relationship within these therapeutic human-dog teams is very intense (Haubenhofer, 2003) we can assume that the dog owners can estimate the position of their dogs very well.

Saliva samples were taken from all participating humans and dogs to evaluate the concentration of the steroid-hormone cortisol, which can be detected very well in saliva. Cortisol is one main glucocorticoid and essential to outlive long periods of stress and to regulate the reactions on inflammations (Griffin and Ojeda, 1996). Several scientists point out that blood sampling itself might be a stressor (Beerda et al., 1996). Saliva cortisol concentrations have been shown to be well correlated with plasma concentrations in different species, including humans (Kirschbaum and Hellhammer, 1989) and dogs (Beerda et al. 1996; Vincent and Michell 1992). It has also been shown that saliva cortisol is a useful method to investigate the concentrations of both acute (Beerda et al., 1998) and chronic (Beerda et al., 1999) stress in dogs. Hence the analyzation of salivary cortisol has already become an established method of stress evaluation, both for humans (Fujiwara et al., 2004; Kunz-Ebrecht et al., 2003, 2004; Schlotz et al., 2004; Yang et al., 2001) and dogs (Beerda et al., 1997, 2000).

We devised a type of longitudinal study especially suited for the requirements of our survey.

In a self-administered questionnaire we asked for information about

(A) The dog owners' everyday's life: Eight questions about whether the participants assessed their lives as stressful and exhausting or not.

(B) The dogs' everyday's life: Seven questions about whether the owners assessed their dogs' life as cumbered or not.

(C) The therapeutic work of the teams: Eight questions about the effects of therapeutic work on the dog owners and the dogs, how they felt before and after therapies, how they thought their dog felt before and after therapies.

Additionally we collected saliva samples from both humans and dogs for the analysis of their cortisol levels. First control data were collected on six non-consecutive days without therapeutic work three times a day. After this a period of three consecutive months started, during which saliva samples were taken from the dog owners and their dogs always immediately before and after one therapeutic unit. This period continued from March 2004 until February 2005.

For the collection of the saliva samples so called 'Salivette tubes' (number 51.1534, Sarstedt, Wiener Neudorf, Austria) were used, little plastic tubes containing a cotton swab similar to those applied by dentists. The cotton swabs were put into the cheek pouches of the participating humans and dogs and left there until they were saturated with saliva (usually 30 seconds). Then the plastic tubes were placed on ice in a deep-freezer until the beginning of the analysis. Kobelt et al. (2003) point out that within the first 4 minutes after the beginning of handling a dog no changes in saliva cortisol concentration can be measured. That means that up to 4 minutes saliva samples can be collected without biasing the data by handling itself.

3. Data Evaluation and Statistical Analysis

After all teams had finished the collection of their data the 'Salivette tubes' were brought to the Institute for Biochemistry at the University of Veterinary Medicine in Vienna. There they were defrosted sequentially and centrifuged for about 10 minutes at 1.500g.

For the analysis of the saliva samples we used a special kind of non-radio-active immunoassay called 'double-antibody biotin-linked enzyme-immunoassay'.

This method works more precisely than the 'direct enzyme-immunoassay' and can therefore still be used for very low concentrations of sample steroids. It was developed and applied in many cases at the Institute for Biochemistry at the University for Veterinary Medicine (Palme and Möstl, 1997). The applicability of this special method for the evaluation of samples from dogs was shown in the Doctoral Thesis by Patzl (1990). Later Haubenhofer modulated the analysis procedure within her Master's Program to make it suitable for the evaluation of saliva from humans (Haubenhofer, 2003).

Samples that contained not enough saliva for at least one double-analysis (100 µl) were separated and not used for any evaluation.

For statistical analysis the Computer Software SPSS was used. For the analysis of the questionnaires we chose descriptive statistical methods. Graduated answers (e.g. range of hectic in life from 'yes', 'rather yes', 'rather no', to 'no') were analyzed using One-Way ANOVA and Bonferroni – Post-Hoc Tests. Saliva samples were both descriptively analyzed and correlatively using Kolmogorov-Smirnov Tests for parametric-distribution combined with Lilliefors-Significance-Correction and Shapiro-Wilk Tests, Mann-Whitney-U-Tests for unrelated samples, and Wilcoxon-Sign-Rank Tests for related samples. A value of $p \leq 0.05$ was considered statistically significant. Two decimal places were given for most cortisol data, except those lower than the third decimal place. Percentages were rounded to whole numbers.

Results

1. Subjective Description of the Teams' Life and Work

First we analyzed how the dog owners perceived their life and therapeutic work subjectively, and how they assessed life and work of their dogs.

The participating dog owners pictured the lives of their dogs more positively than their own. More than 50 % of the participants described their own life as positive, full of activities,

eventful and interesting. Four qualities indicating stress were named in the upper half of the list – 'full of activities', 'eventful', 'straining', and 'exciting'. Furthermore, the qualities 'hardly encumbering', 'not hectic', and 'hardly straining' were only named by a few persons. The qualities 'encumbering', 'sapping', and 'negative' were only chosen for the description of work-days, 'hardly straining' and 'uneventful' only appeared in the list of days off. The qualities 'boring', 'calm', and 'too long' were not mentioned at all. The days of the dogs were characterized more positively. More than one third of all dog owners described them as being calm, positive, full of activities (the only quality assuming stress), hardly encumbering, interesting, and joyful. Most negative qualities ranked in the lower half of the list or were not mentioned at all. The quality 'encumbering' was only named once for work days, and 'exhausting' was only named twice for days off. However, the qualities 'boring', 'hectic', 'negative', and 'sapping' were not mentioned at all (Table 3.1).

Table 3.1: Frequency list for the qualities of life description of dog owners and dogs (work-days and days off combined).

Dog owners		Dogs	
Qualities	Frequencies (%)	Qualities	Frequencies (%)
Positive	22 (85 %)	Calm	18 (50 %)
Full of activities	17 (65 %)	Positive	16 (44 %)
Eventful	16 (62 %)	Full of activities	14 (39 %)
Interesting	14 (54 %)	Hardly encumbering	14 (39 %)
Joyful	12 (46 %)	Interesting	13 (36 %)
Straining	12 (46 %)	Joyful	12 (33 %)
Pleasant	11 (42 %)	Eventful	11 (31 %)
Exciting	10 (39 %)	Not hectic	10 (28 %)
Too short	10 (39 %)	Pleasant	9 (25 %)
Hectic	8 (31 %)	Exciting	5 (14 %)
Hardly encumbering	5 (19 %)	Hardly straining	4 (11 %)
Not hectic	5 (19 %)	Uneventful	4 (11 %)
Exhausting	4 (15 %)	Straining	3 (8 %)
Encumbering *	2 (8 %)	Exhausting °	2 (6 %)
Sapping *	2 (8 %)	Too long	2 (6 %)
Hardly straining °	1 (4 %)	Encumbering *	1 (3 %)
Negative *	1 (4 %)	Boring	0 (0 %)
Uneventful °	1 (4 %)	Hectic	0 (0 %)
Boring	0 (0 %)	Negative	0 (0 %)
Calm	0 (0%)	Sapping	0 (0 %)
Too long	0 (0 %)	Too short	0 (0 %)

Qualities listed by their frequency (number and percent), those with the same frequency alphabetically. Qualities that appeared only during work-days are marked with *, qualities that appeared only during days off are marked with °.

We also asked the dog owners about the effects of their therapeutic work on themselves and on their dogs. We found variations between how the dog owners assessed the effects of their therapeutic work on themselves and on their dogs. They named both positive and negative effects on themselves (interesting, but straining, exciting, but joyful), whereas all positive effects ranked in the upper half of the list, and the lower half of the list was only made up by stress-assuming effects. Contrariwise, were the qualities characterizing the effects of therapeutic work on the dogs across the board negative except the quality 'power dispensing'. Among the humans, the qualities 'nerve-wracking' and 'stressful' were not mentioned at all, among the dogs this applied for the qualities 'exciting', 'interesting', 'joyful', nerve-wracking', and 'short' (Table 3.2).

Table 3.2: Frequency list of effects therapeutic work has on dog owners and dogs.

Dog owners		Dogs	
Qualities	Frequencies (%)	Qualities	Frequencies (%)
Interesting	8 (62 %)	Straining	10 (77 %)
Straining	8 (62 %)	Stressful	4 (31 %)
Exciting	6 (46 %)	Bodily encumbering	4 (31 %)
Joyful	6 (46 %)	Power dispensing	3 (23 %)
Emotionally encumbering	4 (31 %)	Long	2 (15 %)
Power dispensing	3 (23 %)	Sapping	2 (15 %)
Bodily encumbering	2 (15 %)	Emotionally encumbering	1 (8 %)
Long	1 (8 %)	Exciting	0 (0 %)
Sapping	1 (8 %)	Interesting	0 (0 %)
Short	1 (8 %)	Joyful	0 (0 %)
Nerve-wracking	0 (0 %)	Nerve-wracking	0 (0 %)
Stressful	0 (0 %)	Short	0 (0 %)

Qualities listed by their frequency (number and percent), those with the same frequency alphabetically.

Then we asked how the dog owners felt, respectively the dogs were estimated to feel before and after a therapeutic setting.

Concerning the qualities before their therapeutic settings the first three qualities on the dog owners' list were positive ('happy mood', 'relaxed', 'unwinded'), and were then followed be a list of stress assuming qualities that were not named more often than 3 times at most. The

quality 'irritated' was not mentioned at all. The description of the dogs' estimated mood was ambivalent. Some dogs appeared excited, full of anticipation and even strained, others seemed to be in a happy mood, unwinded, and relaxed. However, the qualities 'irritated' and 'stressed' were not mentioned at all. After therapeutic settings the humans felt mostly satisfied, in a happy mood, relaxed, and released, but also bodily sapped. The dogs also appeared satisfied and in a happy mood, relaxed, and released, but also bodily strained and tired. Never mentioned were the qualities 'emotionally sapped', 'irritated', and 'overstrained' (Table 3.3).

Table 3.3: Frequencies of emotions of dog owners and dogs before and after therapeutic settings

	Dog owners		Dogs	
	Qualities	Frequencies (%)	Qualities	Frequencies (%)
Before Therapy	Happy mood	8 (62 %)	Excited	7 (54 %)
	Relaxed	7 (54 %)	Full of anticipation	7 (54 %)
	Unwinded	6 (46 %)	Happy mood	6 (46 %)
	Full of anticipation	3 (23 %)	Unwinded	5 (39 %)
	Excited	2 (15 %)	Relaxed	4 (31 %)
	Nervous	2 (15 %)	Strained	4 (31 %)
	Strained	2 (15 %)	Nervous	1 (8 %)
	Stressed	2 (15 %)	Neutral	1 (8 %)
	Neutral	1 (8 %)	Irritated	0 (0 %)
	Irritated	0 (0 %)	Stressed	0 (0 %)
After Therapy	Satisfied	11 (85 %)	Satisfied	9 (69 %)
	Happy mood	7 (54 %)	Happy mood	6 (46 %)
	Bodily sapped	5 (39 %)	Bodily strained	5 (39 %)
	Relaxed	5 (39 %)	Relaxed	5 (39 %)
	Released	5 (39 %)	Released	5 (39 %)
	Emotionally sapped	2 (15 %)	Tired	4 (31 %)
	Joyful	2 (15 %)	Joyful	3 (23 %)
	Tired	2 (15 %)	Stressed	2 (15 %)
	Irritated	1 (8 %)	Emotionally sapped	0 (0 %)
	Overstrained	1 (8 %)	Irritated	0 (0 %)
	Stressed	1 (8 %)	Overstrained	0 (0 %)

Qualities listed by their frequency (number and percent), those with the same frequency alphabetically.

2. Levels of Salivary Cortisol in Humans and Dogs

From the humans a total of 742 samples were collected, whereas 87 samples had to be separated out due to the absence of saliva or vitiations of the samples. This resulted in a sample size of n = 655 with a range of 0.028 nmol/L^{-1} to 159.81 nmol/ L^{-1} of cortisol. The total median was at *median* $_{humans}$ = 13.78 mol/ L^{-1}. A frequency list of all salivary samples is shown in the *Appendices* of the Doctoral Thesis (App 5).

In sum only 557 samples collected from the dogs were valid, while 586 samples had to be sorted out and could not come to evaluation (reason was less than 100 µ of saliva). From these 557 valid samples, three more samples were taken out because they showed levels of salivary cortisol that there unnaturally high for dogs (111.79 nmol/ L^{-1}, 127.9 nmol/ L^{-1}, and 279.28 nmol/ L^{-1}). An injury of the gums may have been the reason for this, because in blood levels of cortisol are higher than in saliva. That means that 554 data from the dogs came to evaluation. The total median of all dogs was at the level of *median* $_{dogs}$ = 1.96 nmol/ L^{-1} salivary cortisol, with a range from 0.003 nmol/ L^{-1} up to 91.62 nmol/ L^{-1}. A list of all frequencies is shown in the *Appendices* of the Doctoral Thesis (App 6).

We calculated a non-parametric distribution for all data ($p \leq 0.001$).

a. Comparison of the Samples Collected at Control-Days and Days of Therapeutic Settings

It applied for both dog owners and dogs that data collected during control-days were on the average lower than data collected at therapy-days (Table 3.4). The total median of all control-days from the humans was 12.43 nmol/ L^{-1} of salivary cortisol, with an interquartile-range of 15.325 nmol/ L^{-1}; the total median of all control-days from the dogs was at 1.72 nmol/ L^{-1}, have an interquartile-range of 1.32 nmol/ L^{-1} cortisol in saliva.

Besides this we found a great difference between the results of the dog owners and their animals when we compared the data collected before therapeutic settings with those collected afterwards. The dog owners showed higher concentrations of cortisol in saliva before their settings (interquartile-range 15.04 nmol/L^{-1}) than afterwards (interquartile-range 10.67 nmol/L^{-1}); however, the dogs had lower levels of salivary cortisol before their therapeutic work (interquartile-range 3.08 nmol/L^{-1}) than afterwards (interquartile-range 3.61 nmol/L^{-1}) (Table 3.4).

For both humans and animals these differences were statistically significant ($p_{humans} \leq 0.001$; $p_{dogs} \leq 0.041$).

Additionally we evaluated statistically significant differences between the levels of salivary cortisol collected at control-days and days of therapeutic settings among both dog owners and dogs ($p_{humans} \leq 0.005$ and $p_{dogs} \leq 0.001$).

Table 3.4: Levels of salivary cortisol in nmol/L^{-1} (median, quartiles) at control-days, respectively before/ after therapeutic settings from humans and dogs

	Dog owners			Dogs		
	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
Control-days *	12.43	6.59	21.92	1.72	1.19	2.51
Before Therapy *	16.11	10.53	25.57	2.06	1.17	4.25
After Therapy *	12.68	7.62	18.29	2.18	1.03	4.64

Percentile 25 = quartile 1; Percentile 75 = quartile 3. Statistically significant differences marked with a *.

b. Comparison of Therapeutic Settings with Different Duration

The shortest settings lasted one hour, the longest went up to eight hours. These data represented settings where the dog owners involved the dog into their own occupation (therapists and teachers).

Among humans the levels of salivary cortisol increased in connection to the duration of the settings. We investigated the variation of these data and found statistically significant differences between the time spans of 1 and 5 hours ($p \leq 0.01$), 1 and 6 hours ($p \leq 0.003$), 1

and 7 hours ($p \leq 0.001$), 2 and 5 hours ($p \leq 0.001$), 2 and 6 hours ($p \leq 0.001$), as well as 2 and 7 hours ($p \leq 0.001$). Among the dogs was only one statistically significant difference between 1 and 2 hours ($p \leq 0.039$). All other differences were not statistically significant. And we saw that the levels of salivary cortisol did not increase in connection to the duration of the settings, but decreased again when the duration became extremely long (6 to 8 hours) (Table 3.5).

Table 3.5: Levels of salivary cortisol in nmol/L^{-1} (median and quartiles) for all groups of duration of the therapeutic settings in hours. Results presented for dog owners and dogs

	Dog Owners			Dogs		
Duration	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
1-2 Hours	12.9	7.07	19.61	1.93	0.88	4.17
2-3 Hours	13.36	9.27	17.64	2.48 *	1.29	15.53
5-6 Hours	29.24 *	21.4	43.37	2.62	1.91	3.44
6-7 Hours	40.58 *	22.54	73.58	1.76	1.27	2.95
7-8 Hours	56.13 *	29.89	81.82	2.58	1.45	4.46

Percentile 25 = quartile 1; Percentile 75 = quartile 3. Medians indicating statistically significant high levels are marked with a *.

We also evaluated whether those participants who had had therapeutic settings of different durations showed different levels of salivary cortisol depending on the duration of the setting. Among the dog owners we could find statistically significant differences for only one person, among all other humans the duration of the setting did not influence the levels of salivary cortisol. However, the dog owner with statistically significant differences showed higher levels of salivary cortisol during therapeutic settings of one hour duration than of two hours ($median_{1\ hour}$ = 10.54 nmol/ L^{-1}; $median_{2\ hours}$ = 12.93 nmol/ L^{-1}). Among the dogs no statistically significant results could be found at all.

c. Comparison of the Number of Therapeutic Settings

The teams conducted between 9 and 50 settings within the three months of investigation. Among the humans the number of settings was not clearly connected to the levels of salivary

cortisol. We found plenty of statistically significances between these different levels, but no trend into one direction could be found.

Similar were the results among the dogs with a range of 9 to 19 settings within the three months of investigation. However, showed the dogs with 25, 30, respectively 50 settings within this time span across the board statistically higher levels of salivary cortisol during their therapeutic settings than the other dogs (all $p \leq 0.003$ to $p \leq 0.001$). Dogs that had done 9 to 19 therapeutic settings did – like the humans – show partly statistically significant differences, but these did not show any trends (Table 3.6).

Table 3.6: Levels of salivary cortisol (median, quartiles) in nmol/ L^{-1} separated into the number of settings for both humans and dogs

	Dog Owners			Dogs		
Settings	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
9	12.32	7.33	18.03	1.47	1.04	--
10	10.49	8.02	17.71	2.16	1.23	2.74
13	13.92	9.28	20.03	0.28	0.09	0.99
14	7.79	3.9	13.61	1.86	1.36	2.49
16	13.56	10.15	21.2	1.82	0.8	2.95
17	8.81	4.35	14.23	0.28	0.04	1.56
19	27.21	19.78	49.83	1.79	1.37	2.17
25	40.25	27.31	62.09	3.15 *	2.19	6.75
30	17.36	11.88	23.96	3.31 *	1.97	7.53
50	11.33	5.18	15.46	8.9 *	2.78	22.72

Percentile 25 = quartile 1; Percentile 75 = quartile 3. Percentile 75 for a number of 9 settings missing due to a lack of valid data. Those medians from dogs with 25, 30, and 50 settings, which describe statistically significant higher levels of salivary cortisol than levels from dogs with less settings, are marked with a *.

3. Comparison of Subjective and Objective Data

Finally we compared answers given in the questionnaire with the measured levels of salivary cortisol to detect differences between subjective and objective perception of stress.

First we investigated whether the levels of perceived hectic and exhaustion in the dog owners' life stood in relation to their levels of salivary cortisol (Table 3.7).

For both hectic in life and degree of exhaustion increased the levels of salivary cortisol as the answers tended from yes to no. This applied for control-days and days of therapeutic settings.

On control-days significant differences between the single answers given for the quality 'hectic in life' could be calculated (ANOVA $p \leq 0.047$). By investigating this result more precisely we found out that this was only true for the differences between the answers 'rather yes' and 'no' (Bonferroni $p \leq 0.042$). On days of therapeutic settings we found highly significant differences (ANOVA $p \leq 0.001$), namely between the answers 'rather yes' and 'rather no' (Bonferroni $p \leq 0.001$), respectively between the answers 'rather yes' and 'no' (Bonferroni $p \leq 0.001$).

The quality 'degree of exhaustion' provided similar results for the control-days. Significant differences could be calculated (ANOVA $p \leq 0.032$), but jet only for the differences between the answers 'rather yes' and 'no' (Bonferroni $p \leq 0.041$). However, for days of therapeutic settings no statistically significant differences could be calculated.

Table 3.7: Levels of human salivary cortisol (median, quartiles) in nmol/L^{-1} during both control-days and therapy-days separated into the qualities life hectic and frequency of exhaustion.

		Control-Days			Therapy-Days		
Qualities	Frequencies	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
Hectic in Life	Yes (0)	--	--	--	--	--	--
	Rather yes (5)	10.33	4.92	16.6	11.33 *	5.83	15.83
	Rather no (5)	11.99	6.71	23.56	15.36 *	10.36	33.26
	No (3)	18.15 *	7.96	26.32	17.93 *	13.37	25.28
Often Ex-hausted	Yes (0)	--	--	--	--	--	--
	Rather yes (1)	9.92	2.18	14.59	13.23	8.56	23.7
	Rather no (11)	11.99	6.23	21.73	13.73	8.16	23.0
	No (1)	20.76 *	9.41	30.67	17.04	12.17	21.29

Number of entries in parenthesis. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Results of answers 'yes' missing due to a lack of frequencies. Medians indicating statistically significant differences are marked with a *.

Finally, we compared the subjective estimation of the humans about their dogs to the levels of salivary cortisol in the animals. This part included the questions whether the dog owners ascribed high, middle, or low levels of daily strains to their dogs, and whether they assessed their dogs being high, middle, or little resistant against these stresses (Table 3.8).

Table 3.8: Levels of salivary cortisol (median, quartiles) in nmol/ L^{-1} from the dogs separated into the degree of daily stresses and resistance against stress for control-days and therapy-days.

Days	Daily Stresses	Median	Percentile 25	Percentile 75
Control-Days	High (2)	1.94	0.5	2.84
	Middle (5)	1.74	1.31	2.54
	Low (11)	1.62	0.96	2.41
Therapy-Days	High (2)	0.08 *	0.003	1.26
	Middle (5)	2.37 *	1.29	5.72
	Low (11)	2.17 *	1.14	3.46
	Resistance against Stress			
Control-Days	High (12)	1.93	1.31	2.63
	Middle (5)	1.36	0.89	2.32
	Low (1)	1.47	1.25	1.79
Therapy-Days	High (12)	2.08 *	1.19	3.52
	Middle (5)	2.99 *	1.34	9.17
	Low (1)	0.28 *	0.09	0.94

Number of entries in parenthesis. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Medians indicating statistically significant differences are marked with a *.

Regarding to the question about daily stresses, our results showed that cortisol levels decreased from the answers 'high' to 'low' at control days, but increased at therapy-days. While the differences from the control-days did not show any statistically significant differences, we found them for the days of therapeutic settings (ANOVA $p \leq 0.001$). These significances applied for the differences between the answers 'high' and 'middle' (Bonferroni $p \leq 0.026$), as well as for the answers 'middle' and 'low' (Bonferroni $p \leq 0.003$).

Concerning the question about the resistance of the dogs against these daily stresses results showed that dogs that were estimated of being highly resistant provided the highest levels of salivary cortisol at control-days; similarly astonishing was that dogs that were estimated of being least resistant against stress showed the lowest levels of salivary cortisol at days of therapeutic settings. While again the differences of the control-days did not show any statistically significant differences, we found some for the therapy-days (ANOVA $p \leq 0.001$). The differences between the answers 'high' and 'middle (Bonferroni $p \leq 0.001$), and 'middle' and 'low' (Bonferroni $p \leq 0.001$) were highly significant.

For the purpose of more detailed information about the levels of salivary cortisol for each human and dog we created frequency lists additionally sorted into the groups 'all days', 'control days' and 'therapy-days', which are shown in the *Appendices* in the Doctoral Thesis (humans App7; dogs App 8).

Discussion

The first aim of our survey was to provide a description how persons that work together with their dogs in animal-supported therapy sense their life and therapeutic work, respectively that of their dogs. As we found out appeared life of their dogs more relaxed to the humans than their own. However, they did not seem to be unhappy or depressed within this situation, because 84.6 % characterized their life as positive and only one as negative (during work-days). They can be pictured as persons who have an eventful and sometimes straining life, but still estimate it as being interesting and joyful. The animals' life appears mostly calm and relaxed, positive, interesting and joyful, but can also be related to stress by an immoderation of activities. Additionally was the trend of separation between work-days and days off more clearly for humans than for dogs. The dog owners attached the qualities 'encumbering', 'sapping', and 'negative' only to work-days, while 'hardly straining' and 'uneventful' could only be found for days off. Among the dogs the qualities 'encumbering' could be found once for work-days, and 'exhausting' twice for days off. This may be the case for dog owners who attended many leisure time activities with their dog, like for example agility or obedience training.

There was also a difference in the descriptions of therapeutic work. Thus all persons did the therapeutic work voluntarily, positive (interesting, joyful, power dispensing) and negative qualities (straining, exciting, encumbering) were at least balanced. Therapeutic work for the dogs appeared instead mainly straining, stressful, and encumbering. However, all dog owners

emphasized that they would not do this kind of work if they were not absolutely sure that their dogs liked it as well. This ambivalence between positive and negative feelings became even more distinct at the question about how the teams felt before and after therapy. Before therapeutic settings both positive (happy mood, relaxed) and negative (full of anticipation, excited) expectations shaped the image of those involved. Most owners described themselves as being relaxed, happy and unwinded before their work. Reasons for strains before therapeutic settings could be stressful arrivals at the place of therapy (packing all things together needed for therapy and going to the institution) and worries about how the setting and the clients would be. After work most persons characterized themselves as being satisfied, happy, relaxed and released, though sometimes also sapped and tired. In the questionnaires they mentioned that during work many trivia had to be concerned and that therapy demanded great quantities of concentration.

Before therapy, dogs were described as being happy, but first of all excited and full of anticipation. After their work they appeared satisfied, relaxed, released and happy, but like their owners also strained and tired. Those negative effects on the dogs were explained by (1) the great number of clients often visited, (2) the sometimes even rude manners of clients when touching the animals, and (3) the high levels of physical and mental strains. Most dogs preferred to rest then and some owners said that visits sometimes may be too long and intensive for the dogs.

If we now start a comparison with the data of salivary cortisol we have to illustrate some theoretical information about stress and its relation to the hormone cortisol first.

Cortisol is the most important glucocorticoid for most mammals. In humans, about 8-25 mg of cortisol are secernated every day. One can notice an increase of secernation 3-5 hours before waking up with a great peak in the morning about one hour after waking up. During the rest of the day the cortisol concentration decreases again to reach its minimum a few hours

after falling asleep again(Griffin and Ojeda, 1996). Some scientific studies represent the opinion that dogs also have daily variations in their secretion of cortisol, like humans (Beerda et al., 1999). However, more often represented in specialized literature is the opinion, that dogs loose their daily variations of cortisol secretion at a juvenile age and from then on show a constant secretion of cortisol during the whole day (Haubenhofer et al., 2005). Increased levels of cortisol are secernated when an individual meets situations of longer lasting strains and it is considered to be a major indicator of altered physiological states in response to stressful stimulation.

On this note we can now start to discuss our hypothesis. We were right in our assumption that levels of salivary cortisol collected at days of therapeutic settings were higher than at control-days (2nd hypothesis). That means that therapeutic work represented a stressful situation for both dog owners and dogs. Only the reasons for these strains seem to vary. While the humans showed statistically significant higher levels before therapeutic settings, it was other ways round among the dogs. It seems that the dog owners were stressed by the arrival and worries about the following setting and satisfied and released afterwards so that no difference in the levels of salivary cortisol could be found between the data collected after settings and those collected at control-days. The dogs seemed to be excited before settings and exhausted afterwards. In their different studies about the detection of acute and chronic stress in dogs Beerda et al.(1997) claim a mean level of 3.6 +/- 0.4 nmol/ L^{-1} as a basal cortisol level for Beagles during non-stressed conditions, and 37.4 +/- 8.2 nmol/ L^{-1} during stressful situations. Additionally they underline the great individual variation between the dogs, especially when being stressed. Compared to these data we can assume that the dogs participating in our study were really stressed during their therapeutic work, as we remember that the levels of salivary cortisol even reached 91.62 nmol/ L^{-1} at maximum. On the basis of these data we disprove the hypothesis of Ferrara et al. (2004, not published). The scientists exhibited a poster at the 10th

International Conference of the IAHAIO in Glasgow from October 6th-9th, 2004, in which the welfare of dogs during animal-supported therapy was evaluated. They observed 9 therapy dogs of different breed 173 hours before, during, and after therapy sessions by ethological sampling methods. They concluded that the 9 dogs observed did not show either stressed behavior or stereotypes due to anxiety or hard work.

Our third hypothesis was that settings of longer durations would lead to higher levels of salivary cortisol. This was only true for the dog owners, not for the dogs. The reason becomes clear when we look at the time flows of short, respectively long therapeutic settings. Independent of the duration of the setting is the dog owner always in action. The same is true for dogs during shorter settings which are typical for visits in institutions. Visits in old-peoples' homes, hospitals, and schools do normally not last longer than a few hours, because afterwards the daily routine as to be restarted. Very long settings (6-8 hours) are only possible when animal-supported therapy is involved into the work of the dog owner (e.g. therapists or teachers, who take their dogs with them). Yet the dog owner is the only one who needs to work through this whole time span, the dog always has periods of leisure time during which it can rest. Thus it comes clear why only the levels of salivary cortisol in humans increased connected to the duration of the settings.

Contrary were our results regarding to the number of visits. We assumed that teams with more settings within the three months of investigation would also show higher levels of salivary cortisol. This held true only for the dogs. From a certain number of settings per week the periods of relaxation seemed to become too short for the animals and they reached a kind of chronic stress (in our study was the border at 25 settings within three months or more than 2 settings per week). Maybe the dog owners could become more used to their work than dogs, or they found better ways of compensation, or they benefited more from their work than dogs

did. As we have already mentioned above, did the dog owners characterize the effects of therapeutic work on themselves more positively than on their dogs.

This leads us to the last question outstanding. As we just said did the dog owners estimate their situation regarding to the number of the settings correctly. But there were also differences between subjective and objective results which indicate that our 1st hypothesis can only be supported in parts. We found a trend among the humans that work-days were more straining and unpleasant than days off, which can be supported by the data of salivary cortisol. Still the dog owners did not claim such a tendency for their dogs in the questionnaires, but it clearly existed within the data of salivary cortisol. Referring to the questionnaires the dog owners were relaxed before and satisfied after settings, which they defined generally with both positive and negative qualities. Indeed, data of salivary cortisol show that humans are stressed before therapeutic settings, but no longer afterwards. Furthermore, they said that the therapeutic work in general was stressful for their dogs and that the animals were excited before and satisfied after settings. Saliva cortisol analysis showed that the dogs were as well stressed before and even more after therapeutic settings.

More nonconformities between subjective and objective results where, that those humans who characterized their life as hectic and themselves as often exhausted showed the lowest levels of salivary cortisol. Those dogs that were estimated with great daily stresses showed indeed higher levels of salivary cortisol, but only during control-days, and the lowest levels of salivary cortisol at days of therapeutic settings. However, those dogs that were characterized as highly resistant against stress had the highest levels of salivary cortisol at control-days, and those dogs that were estimated of being least resistant against stress showed the lowest levels of salivary cortisol at therapy-days. One possible explanation of these results may provide the survey of Hennessy et al. (2001). They investigated behavior and plasma cortisol levels in both puppies and juvenile/ adult dogs admitted to a public animal shelter. They found out that

dogs with greater endocrine reaction to the shelter (higher cortisol levels) did not turn out to be those animals with the worst behavior after adoption, but even other way round. The conclusion was that animals with lower cortisol levels during the time in the shelter were not burdened with lower levels of stress. During long-lasting or chronic times of stress the organism may adapt to this way of living and cortisol levels are reduced. This so called 'burnout- syndrome' can also be found in humans (Pruessner et al., 1999). This explanation could also count for our survey.

Certainly is the small sampling size a limitation of this study. Still we think that the design of this study in its longitudinal structure and the great number of samples collected compensate for this problem.

Thus we can conclude that the work in animal-supported therapy is at least partly stressful for humans and their dogs, even though the reasons may be different. Important are affection for their work for the dog owners and long enough periods of relaxation for the dogs both during and between the settings. And we would recommend that the dog owners try a detached view on them and on their dogs to be able to detect prevent stressful situations. Additionally, we want to point out that subjective perception of stress and changes in physiology due to stress do not always go conform and should therefore both be considered in scientific research.

References

Beerda, B., Schilder, M.B., Janssen, N.S. and Mol, J.A. (1996). The use of saliva cortisol, urinary cortisol and catecholamine measurements for a noninvasive assessment of stress responses in dogs. Hormones and Behavior 30: 272–279.

Beerda, B., Schilder, M.B., Van Hooff, J.A. and De Vries, H.W. (1997). Manifestations of chronic and acute stress in dogs. Applied Animal Behaviour Science 52: 307-319.

Beerda, B., Schilder, M.B., Van Hooff, J.A., De Vries, H.W. and Mol, J.A. (1998). Behavioural, saliva cortisol and heart rate responses to different types of stimuli in dogs. Applied Animal Behaviour Science 58: 365-381.

Beerda, B., Schilder, M.B., Van Hooff, J.A., De Vries, H.W. and Mol, J.A. (1999). Chronic stress in dogs subjected to social and spatial restriction. II. Hormonal and immunological responses. Physiology and Behavior 66: 243-254.

Breeda, B., Schilder, M.B., Van Hooff, J.A., De Vries, H.W. and Mol, J.A. (2000). Behavioural and hormonal indicators of enduring environmental stress in dogs. Animal Welfare 9: 49-62.

Feddersen- Petersen, D. (2004). Hundepsychologie – Sozialverhalten und Wesen; Emotionen und Individualität, 4. Edition. Franckh- Kosmos Verlag: Stuttgart (Germany).

Foreman, D.M. and Henshaw, C. (2002). Objectivity and subjectivity in postnatally depressed mothers' perception of their infants. Child Psychiatry and Human Development 32 (4): 263-275.

Fujiwara, K., Tsukishima, E., Kasai, S., Masuchi, A., Tsutsumi, A., Kawakami, N., Miyake, H. and Kishi, R. (2004). Urinary catecholamines and salivary cortisol on workdays and days off in relation to job strain among female health care providers. Scandinavian Journal of Work, Environment and Health 30 (2): 129-138.

Gosling, S.D., Kwan, V.S. and John, O.P. (2003). A dog's personality: A cross-species comparative approach to personality judgements in dogs and humans. Journal of Personality and Social Psychology 85 (6): 1161-1169.

Griffin, J.E. and Ojeda, S.R. (1996). Textbook of Endocrine Physiology, 3. Edition. Oxford University Press: New York (USA).

Haubenhofer, D.K. (2003). Höhe der Stressbelastung von Mensch und Hund während der Ausbildung für die Arbeit im Bereich der tiergestützten Therapie. Master's Thesis at the Institute for Anthropology, University of Vienna (Austria).

Haubenhofer, D.K., Möstl, E. and Kirchengast S. (2005). Cortisol concentrations in saliva of humans and their dogs during intensive training courses in animal-assisted therapy. Wiener Tierärztliche Monatsschrift, 92 (3): 66-73.

Herbert, T.B. and Cohen, S. (1993). Stress and immunity in humans: A meta- analytic review. Psychosomatic Medicine 55 (4): 364-379.

Hennessy, M.B., Voith, V.L., Mazzei, S.J., Buttram, J., Miller, D.D. and Linden, F. (2001). Behavior and cortisol levels of dogs in a public animal shelter, and an exploration of the ability of these measures to predict problem behavior after adoption. Applied Animal Behaviour Science 73: 217-233.

Homepage 'Tiere als Therapie' (Animals as Therapy) www.tierealstherapie.org (May 7th, 2005).

Kirschbaum, C. and Hellhammer, D.H. (1989). Salivary cortisol in psychobiological research: an overview. Neuropsychobiology 22: 150-169.

Kobelt, A.J., Hemsworth, P.H., Barnett, J.L. and Butler, K.L. (2003). Sources of sampling variation in saliva cortisol in dogs. Research in Veterinary Science 75: 157-161.

Kunz-Ebrecht, S.R., Kirschbaum, C., Marmot, M. and Steptoe, A. (2003). Differences in cortisol awakening response on work days and weekends in women and men from the Whitehall II cohort. Psychoneuroendocrinology 29 (4): 516-528.

Kunz-Ebrecht, S.R., Kirschbaum, C. and Steptoe, A. (2004). Work stress, socioeconomic status and neuroendocrine activation over the working day. Social Science and Medicine 58: 1523-1530.

Meissner, W.W. (2001). Psychic reality in the psychoanalytic process. Journal of the American Psychoanalytic Association 49 (3): 855-890.

Morris, P.H., Gale, A. and Duffy, K. (2002). Can judges agree on the personality of horses?. Personality and Individual Differences 33: 67-81.

Nagel, M and Von Reinhardt, C. (2003). Stress bei Hunden, 2. Edition. Animal Learn Verlag: Grassau (Germany).

Palme, R. and Möstl, E. (1997). Measurement of cortisol metabolites in faeces of sheep as a parameter of cortisol concentration in blood. International Journal of Mammal Biology 62 (2): 192-197.

Patzl, M. (1990). Entwicklung eines Biotin-Streptavidin-Enzymimmunoassays zur Bestimmung von Cortisol in Blut und Speichel von Hunden. Doctoral Thesis at the Institute for Biochemistry at the University for Veterinary Medicine Vienna (Austria).

Pruessner, J.C., Hellhammer, D.H. and Kirschbaum, C. (1999). Burnout, perceived stress, and cortisol responses to awakening. Psychosomatic Medicine 61: 197-204.

Schlotz, W., Hellhammer, J., Schulz, P. and Stone, A. (2004). Perceived work overload and chronic worrying predict weekend-weekday differences in the cortisol awakening response. Psychosomatic Medicine: 66 (2): 207-214.

Smith, H.F. (1999). Subjectivity and objectivity an analytic listening. Journal of the American Psychoanalytic Association 47 (2): 465-484.

Vincent, I.C. and Michell, A.R. (1992). Comparison of cortisol concentrations in saliva and plasma of dogs. Research in Veterinary Science 53: 342–345.

Wang, Y.L. (2005). A concept analysis of health. Hu Li Za Zhi 52 (1): 40-43.

Yang, Y., Koh, D., Ng, V., Lee, F.C., Chan, G., Dong, F. and Chia, S.E. (2001). Salivary cortisol levels and work- related stress among emergency department nurses. Journal for Occupational and Environmental Medicine 43 (12): 1011-1018.

Manuscript 4: Searching for Stress-Factors in Animal-Supported Therapy

Abstract

In this survey we collected saliva samples from a heterogeneous group of 13 humans and 18 companion dogs that worked together as teams in animal-supported therapy and searched for both internal and external parameters that may influence the levels of cortisol. Cortisol is a 'stress-hormone' secreted increased during longer periods of stress and easily detectable in saliva.

Levels of salivary cortisol were higher at therapy-days than at control-days without therapeutic work. Different groups of clients led to different concentrations of cortisol, as well as the place of a therapeutic setting. Age had an effect on cortisol levels, and so did the place of domicile and – only for dogs – the year of starting with the therapeutic work. Among humans, type of occupation and presence of children in the family led to different levels of secernated cortisol. Among dogs, sterilization and breed were parameters which influenced the cortisol concentrations.

We conclude that a range of different parameters led to increased levels of cortisol in both humans and their dogs. Therefore we have to consider a subjective description by the dog owners of their own condition, respectively the one of their dogs to be able to evaluate whether the individuals perceived a situation as straining. Although they showed increased levels of cortisol concentration caused by therapy, they apparently did not sense it negatively but as joyful, due to the fact that they fancied their work and were not obliged to do things they did not like.

Introduction

The question how to define and measure animal welfare is difficult and always part of great discussion. One possibility is the absence of stress. 'Stress' is one of the most used, but also misused words in today's language. It turns up everywhere and many people are 'stressed'. In science there exist many different definitions of what stress really is, depending on the scientific field (Hill Rice, 2000). In this paper we want to be content with a physiological perception of chronic stress: It happens when the body starts to protect himself against longer lasting strains by releasing a greater number of glucocorticosteroids (mainly cortisol) from the adrenal glands cortex than normal (Von Faber and Haid, 1995).

Cortisol – or Δ_4-Pregnen-3,20-dion-11 β, 17 α, 21-triol – is an essential hormone and considered to be a major indicator of altered physiological states in response to stressful stimulation in most mammals (Von Faber and Haid, 1995). In humans, about 8-25 mg of cortisol are secernated every day. One can notice an increase of secernation 3-5 hours before waking up with a great peak in the morning about one hour after waking up. During the rest of the day the cortisol concentration decreases again to reach its minimum a few hours after falling asleep (Hadley, 1996). Most often represented in specialised literature is the opinion that dogs (*Canis familiaris*) loose their daily variations in cortisol secretion at a juvenile age and from then on show a constant secretion of cortisol during the whole day (Haubenhofer et al., 2005).

Whether a situation is sensed as stressful depends always on many factors, both in humans and in dogs: Perception, information processing of outside influences, and interior factors like genetic disposition and individual experiences in the past may be some examples (Feddersen-Petersen, 2004). Additionally, Handy (1988, 1991) has shown in his work how strategies to cope with stress differ across social contexts. Lawler et al., (1975) as well as Koepke and Obrist (1983) corroborate the existence of great individual differences in stress-perception in

dogs, relating to breed, gender, age, or earlier life experiences. However, Hennessy et al. (1997) point out that a dog's gender has no effect on the cortisol levels measured.

In this paper we will search for parameters that may have an influence of the levels of cortisol measured in the saliva from humans and their dogs that worked together as teams in animal-supported therapy (Haubenhofer and Kirchengast, in prep. a). This kind of therapeutic service can be defined as the sum of all procedures that shall lead to positive effects in both experience and behavior of humans, using animals in a very directed manner.

The question whether therapeutic work might be straining and exhausting for those individuals that offer it is a rather young one. It seems amazing that although the whole topic of animal-supported therapy deals with the well-being of living creatures not more attention is paid to the needs and wishes from those who do it. Only a handful of surveys have been done yet, some of them not even published and with rather varying results (Ferrara et al., 2004 not published; Heimlich, 2001; Iannuzzo and Rowan, 1991; Suthers-McCabe and Albano, 2004 not published). Some voices claim that therapeutic work is not stressful for the relevant humans and especially their animals, others try to disprove these statements.

We have designed the first overarching survey to evaluate the levels of subjectively perceived and objectively measured strains on humans and dogs offering therapeutic service. This paper is part of this large-scaled project and presents a range of external and internal parameters that may have an influence on the levels of salivary cortisol measured in these individuals.

Thus we can provide the possibility to optimize the work of these human-dog teams. We can provide information about which parameters could lead to situations of increased stress and therefore help to minimize their strains and stresses.

Following questions and hypothesis will be investigated:

(A) Do different types of institutions respectively clients have various effect on the teams' stress levels? We hypothesize yes (1st hypothesis).

(B) Do we get different results from settings where the teams visited their clients in institutions and from settings where they were being visited (e.g. therapists, teachers)? Again, we hypothesize yes (2nd hypothesis).

(C) Are there differences in the results gathered from teams that already have more work experience than those, who have just started? Here, we also hypothesize yes (3rd hypothesis).

(D) Do the parameters sex, age and place of domicile have any effects? We hypothesize no for all parameters (4th, 5th and 6th hypothesis). Do sterilization and breed of the dogs play any role? We again hypothesize no (7th and 8th hypothesis).

(E) Do we get different results depending on varying life circumstances like type of occupation and the presence of children in the family among humans, and daily routine among the dogs? We hypothesize yes (9th hypothesis).

Material and Methods

1. Subjects

Thirteen teams participated in this study consisting of 13 humans and 18 dogs. Among the dog owners were 12 female and one male person and their year of birth ranged between 1937 and 1977. Six of them lived in urban, seven of them in rural areas. One of them was housewife and dog-breeder, one executive employee, two therapists (ergotherapy, and physiotherapy), two advisors (learning advisor and social advisor), one veterinarian, two teachers (kindergarten and primary school), one student (school for health care and nursing), and three retirees (one former cook, one dental surgeon assistant, one bank employee). Seven of them had children, mostly already grown up (only one woman had four children younger than 18 years of age).

Among the dogs was one Bernese Mountain Dog, three Border Collie, one Bouvier des Flandres, one (unidentifiable) crossbreed, one Dachshund-crossbreed, three Golden Retriever, one Great Pyrenees, three Labrador Retriever, one Pointer-crossbreed, one Polski Owczarek Podhalanski, and two Puli. Three dogs were born in 1996, two in 1997, two in 1998, four in 1999, three in 2000, three in 2002, and one in 2003. Fifteen dogs were female (four sterilized), three male (one sterilized).

All teams were members of the Austrian organization '*Tiere als Therapie*' (TAT, which means 'Animals as Therapy'). All teams had done their training between the years 2000 and 2005. TAT is the biggest non-profit organization in Austria. It trains humans and their animals (especially, but not only dogs) for later work in the field of animal-supported therapy and animal-supported pedagogy. More information about this organization can be found at their Homepage.

2. Methods and Statistical Evaluation

We devised a type of longitudinal study especially suited for the requirements of our survey.

In a self-administered questionnaire we asked for information about following topics:

(A) Information about the dog owners: Sex, date of birth, place of domicile, today's vocation, number of children.

(B) Information about the dogs: Breed, date of birth, sex, (if done) sterilization.

(C) Information about their work at TAT: Date of joining, type(s) of therapy offered.

Additionally we collected saliva samples from both humans and dogs for the analysis of their cortisol levels: First, control data were gathered on six non-consecutive days without therapeutic work three times a day (morning, midday, evening). Then a period of three consecutive months started, during which saliva samples were taken from the dog owners and

their dogs each time immediately before and after a therapeutic setting. The period of sample collection continued from March 2004 until February 2005.

For the collection of the saliva samples so called 'Salivette tubes' (number 51.1534, Sarstedt, Wiener Neudorf, Austria) were used, little plastic tubes containing a cotton swab similar to those applied by dentists. The cotton swabs had to be put into the cheek pouches of the participating humans and dogs and left there until they were saturated with saliva (usually 30 seconds). Then the plastic tubes were placed on ice in a deep-freezer until the beginning of the analysis. Kobelt et al. (2003) point out that within the first four minutes after the beginning of handling a dog no changes in saliva cortisol concentration can be measured. That means that up to four minutes saliva samples can be collected without a bias. Thus we can assume that changes of salivary cortisol by the extraction of the saliva samples itself do not exist.

After all teams had finished the collection of their data the 'Salivette tubes' were brought to the Institute for Biochemistry at the University of Veterinary Medicine in Vienna. There they were defrosted sequentially and centrifuged for about 10 minutes at 1 500g.

For the analysis of the saliva samples we used a special kind of non-radio-active immunoassay called 'double-antibody biotin-linked enzyme-immunoassay'. This special method is more precisely than a 'direct enzyme-immunoassay' and can therefore be used for very low concentrations of sample hormones. It was developed and applied in many cases at the Institute for Biochemistry at the University for Veterinary Medicine in Vienna (Palme and Möstl, 1997). The applicability of this special method for the evaluation of samples from dogs was shown in the Doctoral Thesis by Patzl (1990). Later, Haubenhofer modulated the analysis procedure within her Master's Program to make it suitable for the additional evaluation of human saliva (Haubenhofer, 2003).

Samples that contained not enough saliva for at least one double-analysis (100 µl) were separated and not used for any evaluation.

For statistical analysis the Computer Software SPSS was used. For the analysis of the questionnaires we chose descriptive statistical methods. Saliva samples were both descriptively and correlatively analyzed using Linear Regressions, Kolmogorov-Smirnov Tests in combination with Lilliefors-Significance-Corrections and Shapirol-Wilk Tests for parametric distribution, Mann-Whitney-U-Tests for unrelated samples, and Wilcoxon-Sign-Rank Tests for related samples. A value of $p \leq 0.05$ was considered statistically significant. Two decimal places were given for most cortisol data, except those lower than the third decimal place. For graphical illustration Box-Plot Graphs were used.

Results

Among the humans a total of 655 valid samples were collected with a range of 0.028 nmol/ L^{-1} to 159.81 nmol/ L^{-1} of cortisol. The total median was $median_{humans}$ = 13.78 nmol/ L^{-1}. A list of all frequencies is shown in the *Appendices* of the Doctoral Thesis (App 5).

Among the dogs 554 samples were valid, with a total median at the level of $median_{dogs}$ = 1.96 nmol/ L^{-1} salivary cortisol, and with a range from 0.003 nmol/ L^{-1} up to 91.62 nmol/ L^{-1}. A list of all frequencies is shown in the *Appendices* of the Doctoral Thesis (App 6).

We calculated a non-parametric distribution for all data ($p \leq 0.001$).

Among the dog owners the total median of all control-days was at $median_{control}$ = 12.43 nmol/ L^{-1} ranging from 1.27-74.45 nmol/ L^{-1} of salivary cortisol. During days of therapeutic settings they showed a $median_{therapy}$ = 14.12 nmol/ L^{-1} and a range from 0.23-159.83 nmol/ L^{-1}. Among the dogs the total median of all control-days was at the level of $median_{control}$ = 1.72 nmol/ L^{-1}, ranging from 0.003-36.89 nmol/ L^{-1} cortisol in saliva. Their cortisol concentrations during days of therapeutic settings were $median_{therapy}$ = 2.15 nmol/ L^{-1}, with a range from 0.003-91.62 nmol/ L^{-1}.

For both humans and dogs these differences were statistically significant ($p_{humans} \leq 0.005$;

$p_{dogs} \leq 0.001$).

1. Comparison of Salivary Cortisol Levels and Type of Therapy

First we investigated whether the type of therapeutic work could have had an effect on the levels of salivary cortisol. Eleven teams worked with old and/ or bedridden people, 3 with disabled grown-ups, and 5 with children (Table 4.1).

Table 4.1: Levels of salivary cortisol (median, quartiles) in nmol/L^{-1} for the different types of therapy. Data for dog owners and dogs presented separately

	Dog owners			Dogs		
Type of Patient	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
Old/ Bedridden	14.59 *	9.09	23.37	2.62 *	1.49	5.43
Disabled	7.57 *	2.51	12.26	0.29 *	0.04	1.59
Children	17.04 *	11.51	25.89	1.96 *	1.28	2.76

Percentile 25 = quartile 1; Percentile 75 = quartile 3. Medians indicating statistically significant differences are marked with a *.

The results indicate that for humans work with disabled grown-ups was least stressful, followed by work with old/ bedridden people and children (both kindergarten and primary school). We found statistically significant differences between the groups 'old/ bedridden people' and 'disabled grown-ups', respectively between 'disabled grown-ups' and 'children' (each $p \leq 0.001$).

For dogs work with disabled grown-ups was least stressful as well, though followed by work with children and then work with old/ bedridden people. All three types of therapy differed statistically significant ($p_{\text{geriatrics-disabled}} \leq 0.001$; $p_{\text{geriatrics-children}} \leq 0.004$; $p_{\text{disabled-children}} \leq 0.001$).

Then we analyzed whether the type of meeting the clients could have had an effect on the levels of salivary cortisol. We separated the data into three groups: The first one included

those teams that went into an institution and did their therapeutic work there (10 teams). The second one was made up of teams that involved animal-supported therapy into their own work at their own place of occupation (therapists and teacher) and therefore let the clients come to them (two teams). Only one team did both, and was therefore excluded from statistical analysis. The dog owners that went to an institution reached a *median* = 13.2 nmol/ L^{-1} (interquartile-range 9.558 nmol/ L^{-1}) compared to those teams those who let their clients come to them, who had a *median* = 28.84 nmol/ L^{-1} (interquartile-range 38.79 nmol/ L^{-1}). The dogs that went into institutions had a *median* = 2.44 nmol/ L^{-1} (interquartile-range 3.9 nmol/ L^{-1}), those who were visited by their clients only a *median* = 1.78 nmol/ L^{-1} (interquartile-range 3.56 nmol/ L^{-1}).

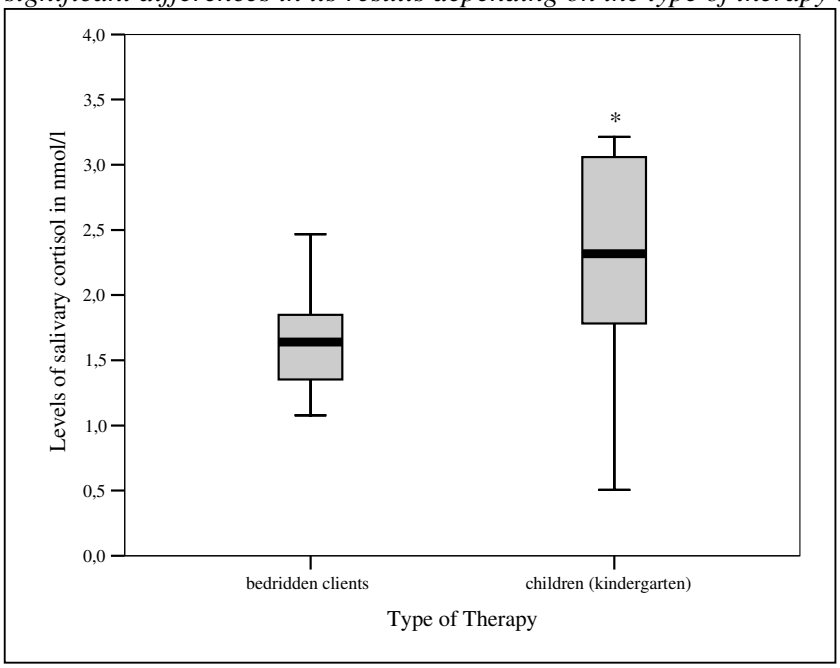
The results show that those humans that went with their dog into an institution had the lowest levels of salivary cortisol. Contrary had their dogs the highest levels. For both humans and dogs we could find significant differences between the two groups ‘go to institution’ and ‘let clients come’ (each $p \leq 0.001$).

Finally we determined whether there were statistically significant differences within those teams that worked in more than one type of therapy (e.g. geriatrics and children).

We compared the data collected during the therapeutic settings from those humans and dogs that worked at different places. Four teams worked both with old/ bedridden people and with children, and one team worked with old/ bedridden people, disabled grown-ups, and with children. For the dog owners none of the results were statistically significant in their difference. Among the animals only one dog showed statistically significant differences in its salivary cortisol levels during therapeutic settings depending on whether the dog worked with old/ bedridden people or with children ($p_{\text{geriatrics-children}} \leq 0.028$). We examined the salivary cortisol levels of this dog and found out that working with children in a primary school was

more straining for the animal than working with old/ bedridden people in a hospital (*median* $_{hospital}$ = 1.63 nmol/ L^{-1}; *median* $_{school}$ = 2.58 nmol/ L^{-1}) (Figure 4.1).

Figure 4.1: Levels of salivary cortisol in mol/L^{-1} from one dog that showed statistically significant differences in its results depending on the type of therapy it did



Outliners and extreme values excluded. Significant higher levels from therapeutic setting with children are marked with a *.

2. Comparison of Salivary Cortisol Levels and Age

We grouped the dog owners into 3 groups of year of birth, 'till 1949', '1950-1969', and 'from 1970', but let the dogs ungrouped, thus a time span of 1 year plays a major role in the life of a dog than of a human.

Among the dog owners highest levels of salivary cortisol were provided in the group of persons that were born in the year 1970 or later. This was true for both control-days and days of therapeutic settings.

Among the dogs we excluded one animal (born in 2003) due to a lack of valid data. During control-days the youngest animals showed the lowest levels of salivary cortisol, but this trend vanished at days of therapeutic settings. Strikingly high were the cortisol concentrations of the

two dogs born in 1997. These animals belonged both to the same team thus we can assume that there existed other parameters than their age that led to these results (Table 4.2).

Table 4.2: Levels of salivary cortisol (median, quartiles) in nmol/ L^{-1} sorted into the year of birth, respectively control-days and therapy-days for both dog owners and dogs

		Year of Birth	Median	Percentile 25	Percentile 75
Dog Owners	Control-Days	Till 1949 (3)	16.22	8.38	24.57
		1950-1969 (6)	11.24	6.29	18.62
		From 1970 (4)	16.55	6.54	27.29
	Therapy-Days	Till 1949 (3)	13.62	7.79	18.29
		1950-1969 (6)	13.22	8.59	18.39
		From 1970 (4) *	22.07	10.42	44.33
Dogs	Control-Days	1996 (3)	1.76	1.36	2.51
		1997 (2)	6.65	2.38	14.31
		1998 (2)	1.57	0.83	2.39
		1999 (4)	1.74	1.13	2.34
		2000 (3)	2.00	0.96	3.26
		2002 (3)	1.44	1.11	1.95
	Therapy-Days	1996 (3)	2.39	1.65	3.19
		1997 (2)	8.9	2.78	22.72
		1998 (2)	1.52	0.62	2.33
		1999 (4)	1.93	1.27	3.07
		2000 (3)	1.04	0.03	2.62
		2002 (3)	2.13	0.81	3.63

Number of teams in parenthesis. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Statistically higher levels of salivary cortisol are marked with a *.

We found statistically significant differences between the different years of birth for both humans ($p \leq 0.001$) and dogs ($p \leq 0.001$). For humans no statistically significant differences could be found at the control-days, but within the days of therapeutic settings between the groups ‘till 1949’ and ‘from 1970’ ($p \leq 0.001$) and the groups ‘1950-1969’ and ‘from 1970’ ($p \leq 0.001$).

Among the dogs we excluded the data of the dogs born in 1997 from our lists before we started our statistical analysis. Then we did not find statistically significant differences at the control-days, but several at the days of therapeutic settings ($p_{1996\text{-}1998} \leq 0.001$; $p_{1996\text{-}2000} \leq 0.001$; $p_{1998\text{-}1999} \leq 0.03$; $p_{1998\text{-}2002} \leq 0.047$; $p_{1999\text{-}2000} \leq 0.004$; $p_{2000\text{-}2002} \leq 0.003$). Still they were not connected to any logical trend, thus we can assume that the age of a dog is not related to the levels of salivary cortisol.

3. Comparison of Salivary Cortisol Levels and Place of Domicile

We divided the teams into two groups. The first one included those teams living in urban (six teams), the second one those teams living in rural areas (seven teams).

Table 4.3: Levels of salivary cortisol (median, quartiles) in nmol/ L^{-1} sorted into the place of domicile, respectively control-days and therapy-days for both dog owners and dogs separately

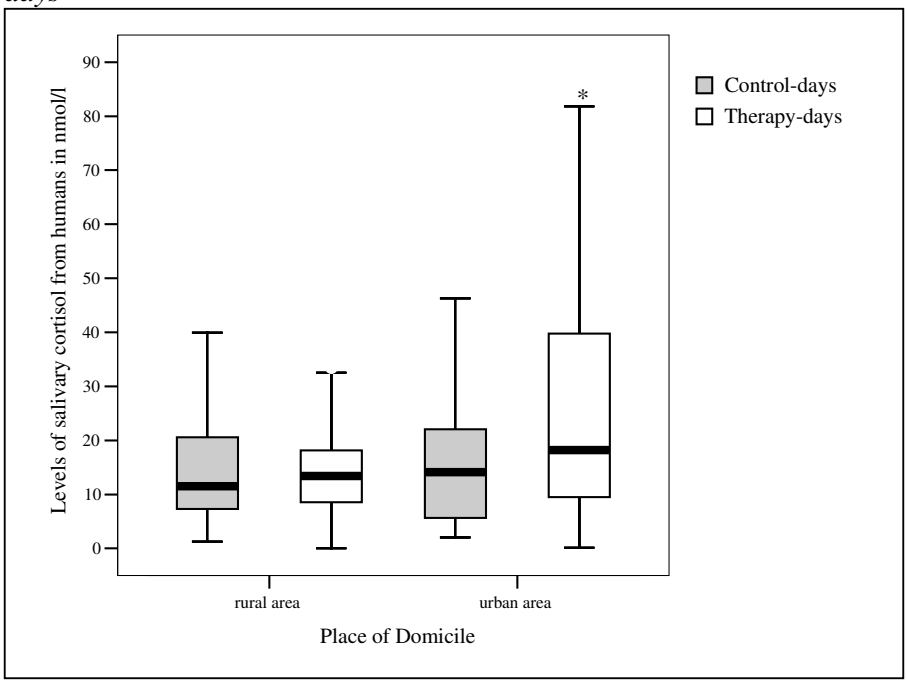
		Statistics	Urban Area	Rural Area
Dog Owners	Control-Days	Median	14.13	11.48
		Percentile 25	5.52	7.27
		Percentile 75	22.04	20.66
	Therapeutic Setting	Median	18.2 *	13.39
		Percentile 25	9.48	8.5
		Percentile 75	39.75	18.15
Dogs	Control-Days	Median	1.67	1.51
		Percentile 25	1.26	1.00
		Percentile 75	2.33	2.47
	Therapeutic Setting	Median	1.73	2.17 *
		Percentile 25	0.55	1.3
		Percentile 75	2.57	3.43

Two dogs excluded. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Statistically significant higher medians of salivary cortisol from humans living in urban areas, respectively dogs living in rural areas, both at therapy days, are marked with a *.

Again, we excluded those two dogs from our lists, which had shown those extremely high levels of salivary cortisol.

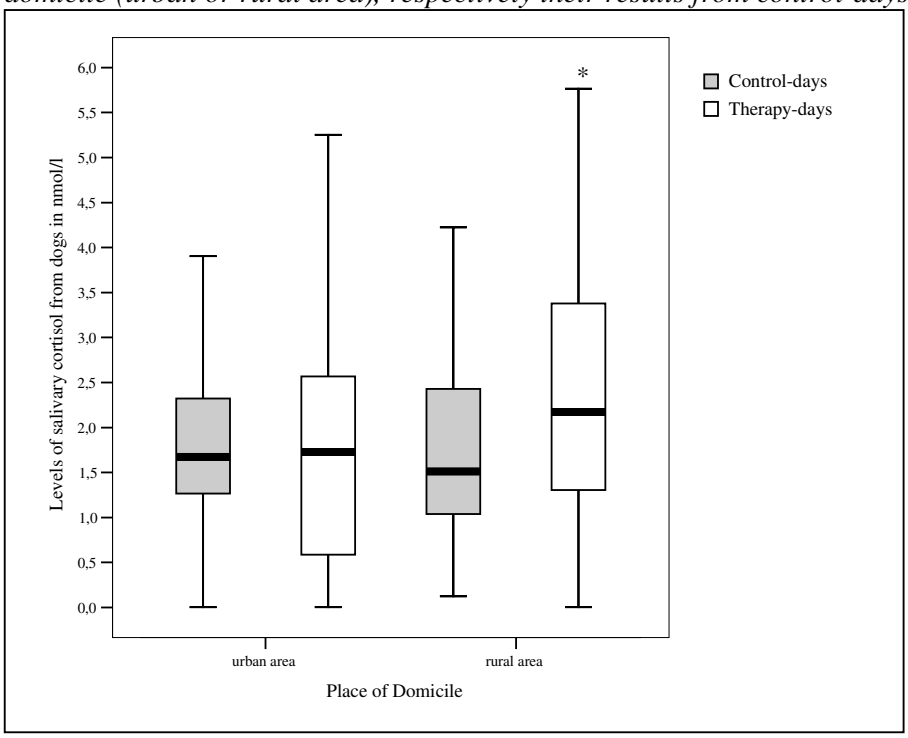
Among humans, levels of salivary cortisol were lower from persons living in rural areas. This was true for both control-days and days of therapeutic settings. Additionally, the difference between the median from the control-days and the one from the therapy-days was smaller for persons in rural areas than persons living in an urban area. Among the dogs levels of salivary cortisol were higher for dogs living in urban areas at control-days, but lower at days of therapeutic settings. Additionally, the difference between the medians of control-days and therapy-days for dogs from rural areas was greater than for dogs from urban areas (Table 4.3).

Figure 4.2: Levels of salivary cortisol in mol/L^{-1} from dog owners separated into their place of domicile (urban or rural area), respectively their results from control-days and therapy-days



Outliners and extreme values excluded. Significant higher levels from people living in urban areas at therapy-days marked with a *.

Figure 4.3: Levels of salivary cortisol in mol/L^{-1} from dogs separated into their place of domicile (urban or rural area), respectively their results from control-days and therapy-days



Outliners and extreme values excluded. Significant higher levels from dogs living in rural areas at therapy-days marked with a *.

Among humans living in urban areas, levels of salivary cortisol were statistically significant higher at days of therapeutic settings than among humans living in rural areas ($p \leq 0.001$) (Figure 4.2). Contrary, among the dogs were the levels of animals living in rural areas statistically significant higher at days of therapeutic settings than levels of dogs living in urban areas ($p \leq 0.001$). Like among their owners there were no statistically significant differences during control-days (Figure 4.3).

4. Comparison of Salivary Cortisol Levels and the Year of Training

We separated the teams into the year of their training at the organization TAT (year of joining the organization) and compared their concentrations of saliva cortisol at days of therapeutic settings (Table 4.4).

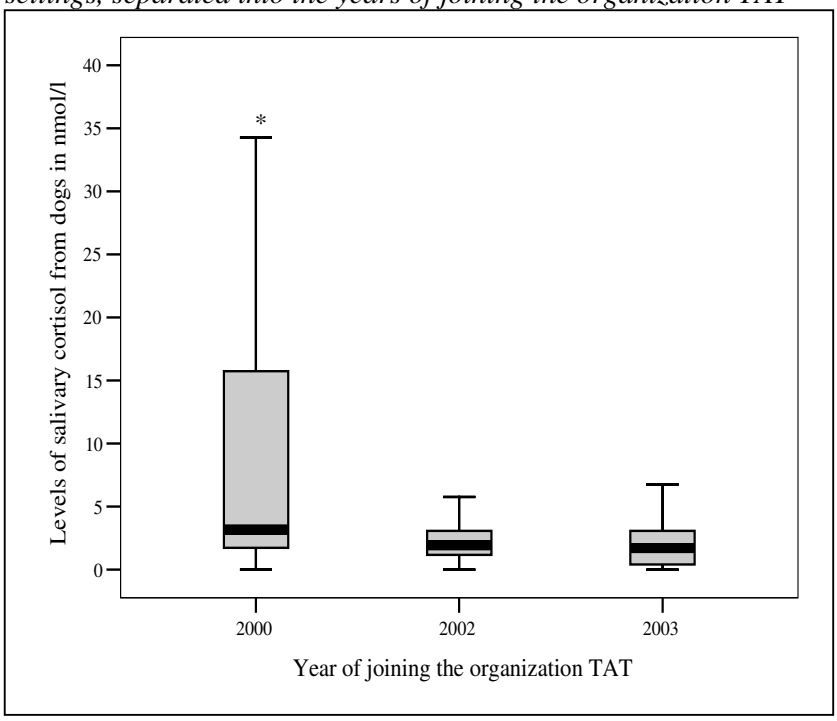
Table 4.4: Levels of salivary cortisol (median, quartiles) in nmol/L^{-1} from the data collected at therapy-days for the years of joining the organization TAT. Data for dog owners and dogs presented separately

	Year of Joining	Median	Percentile 25	Percentile 75
Dog owners	1993 (1)	16.05	9.75	22.74
	2000 (2)	12.62	6.16	15.93
	2002 (9)	16.62	11.12	27.38
	2003 (1)	7.54	3.2	12.35
Dogs	2000 (5) *	3.17	1.71	15.83
	2002 (7)	1.94	1.16	3.09
	2003 (5)	1.69	0.38	3.08
	2005 (1)	1.28	0.003	2.45

Number of teams in parenthesis. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Year 2000 representing statistically higher levels of salivary cortisol in dogs are marked with a *.

Among the humans there was no trend towards higher levels of salivary cortisol of those who had joined the organization earlier, but there was such a trend among the dogs. After we had excluded the year 2005 which was represented by only one dog, we found statistically significant higher levels of the year 2000 than 2002 ($p \leq 0.001$), respectively the year 2000 than 2003 ($p \leq 0.001$) (Figure 4.4).

Figure 4.4: Levels of salivary cortisol in mol/L^{-1} from dogs collected at days of therapeutic settings, separated into the years of joining the organization TAT



Outliners and extreme values excluded. Significant higher levels from dogs that joined the organization TAT in the year 2000 marked with a *.

5. Comparison of Salivary Cortisol Levels and other Possible Parameters among Humans

First we investigated whether the type of occupation may have had an effect on the levels of salivary cortisol during days of therapeutic settings. We combined teachers working in a primary school and in a kindergarten to the occupation 'teacher' (Table 4.5).

Thus the occupations housewife, veterinarian, student, and executive employee were represented by just one person we excluded them from our evaluations.

We found statistically significant differences between the occupations 'therapist', respectively 'teacher' and the other groups ($p_{therapist\text{-}advisor} \leq 0.001$; $p_{therapist\text{-}retirement} \leq 0.001$; $p_{teacher\text{-}advisor} \leq 0.001$; $p_{teacher\text{-}retirement} \leq 0.001$), which means that these two types of occupation led to significantly higher levels of salivary cortisol than the other types of occupation.

Table 4.5: Levels of salivary cortisol (median, quartiles) in nmol/L^{-1} from the data collected at therapy-days and separated into the different types of occupation from the dog owners

Type of Occupation	Median	Percentile 25	Percentile 75
Advisor (2)	12.4	5.83	15.8
Executive Employee (1)	16.05	9.75	22.74
Housewife (1)	13.23	8.56	23.7
Retiree (3)	13.62	7.79	18.29
Student (1)	10.36	8.27	13.63
Teacher (2) *	20.61	13.41	42.31
Therapist (2) *	28.84	8.07	46.85
Veterinarian (1)	17.13	13.16	20.36

Types of occupation sorted into alphabetical order. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Occupations 'teacher' and 'therapist', representing statistically higher levels of salivary cortisol in humans are marked with a *.

Then we investigated whether the presence of children, could have an effect on the levels of salivary cortisol, both at control-days and at therapy-days. For this purpose we separated the data into three groups named 'no children', 'grown-up children', and 'children younger than 18 years of age' (Table 4.6).

Table 4.6: Levels of salivary cortisol (median, quartiles) in nmol/L^{-1} separated into the three groups of the status of having children for the dog owners. Results additionally separated into data from control-days and therapy-days

	Control-Days			Therapy-Days		
Children	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
no children (6)	12.93	6.92	24.98	18.18 *	11.38	39.55
grown-up (6)	11.66	5.85	20.66	12.96	7.31	17.91
younger than 18 (1)	13.93	4.35	20.74	14.55	11.13	17.43

Number of humans in parenthesis. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Median of group 'no children' at therapy days, representing statistically higher levels of salivary cortisol, is marked with a *.

Thus the last group was represented by only one participant we excluded it from our statistical analysis.

We found no statistically significant differences at the control days, but we did between the groups 'no children' and 'grown up children' ($p \leq 0.001$) at days of therapeutic settings.

6. Comparison of Salivary Cortisol Levels and other Possible Parameters among Dogs

We forbore from analyzing the differences between the sexes among the humans, because there was only one male participant in our study. Still we did it for the dogs and investigated whether the sex and sterilization could have had an effect on the measured levels of salivary cortisol both at control-days and days of therapeutic settings.

The analysis showed that female dogs had higher levels of salivary cortisol during control-days than male dogs (independent of whether they were sterilized or not). However, at days of therapeutic settings, not sterilized dogs reached higher levels than sterilized animals (Table 4.7, Figure 4.5).

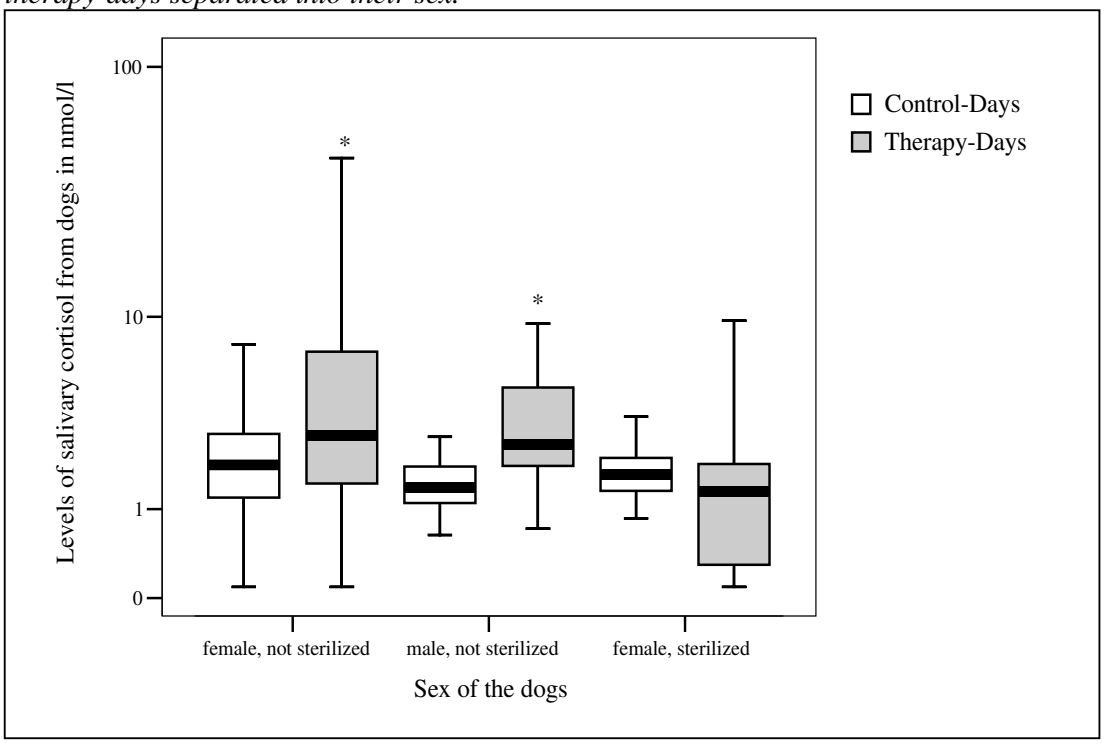
Table 4.7: Levels of salivary cortisol (median, quartiles) in nmol/L^{-1} separated into sex and status of sterilization of the dogs. Results represented separately for control-days and therapy-days

	Control-Days			Therapy-Days		
Sex	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
Female, not Sterilized (11)	1.96	1.21	2.89	2.84 *	1.5	7.16
Male, not Sterilized (2)	1.42	1.05	2.01	2.54 *	1.89	4.98
Female, Sterilized (4)	1.72	1.33	2.24	1.33	0.2	1.99
Male Sterilized (1)	1.15	0.45	1.61	0.28	0.09	0.99

Number of dogs in parenthesis. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Medians of the groups ‘female, not sterilized’ and ‘male, not sterilized’ at therapy days, representing statistically higher levels of salivary cortisol, are marked with a *.

Among the control-days there were no statistically significant results at all. But there were some among the days of therapeutic settings between the groups ‘female-not sterilized’ and ‘female-sterilized’ ($p \leq 0.001$), as well as ‘male-not sterilized’ and ‘female-sterilized’ ($p \leq 0.001$).

Figure 4.5: Levels of salivary cortisol in nmol/L^{-1} from the dogs during control-days and therapy-days separated into their sex.



Y-axis logarithmized, group 'male-sterilized' excluded due to a lack of data, outliners and extreme values excluded. Significant higher levels from female and male not sterilized dogs marked with a *.

Then we investigated whether the breed of the dogs could have had an effect on the levels of salivary cortisol both at control-days and therapy-days. As we found out, results were rather heterogeneous. The Bernese Mountain Dog, the Bouvier des Flandres, the Pointer-crossbreed, the Polski Owczarek Podhalanski, and the unidentifiable crossbreed had lower medians for their control-days than for the therapy days. The Labrador Retrievers had almost the same levels at both types of days, and the other breeds had higher medians for their therapy-days than for their control-days (Table 4.8).

Certainly, these results are tricky, for there were several breeds only represented by one individual. Thus we excluded those breeds for statistical analysis (Bernese Mountain Dog, Bouvier des Flandres, Dachshund-crossbreed, Great Pyrenees, Pointer-crossbreed, Polski Owczarek Podhalanski, and the unidentifiable crossbreed). The results showed that at control-

days Border Collies had statistically significant lower levels of salivary cortisol than Golden Retriever ($p \leq 0.037$). Yet there were no statistically significant differences between the other breeds. At days of therapeutic settings Golden Retriever had statistically significant higher results than the Border Collies ($p \leq 0.001$), the Labrador Retrievers ($p \leq 0.001$), and the Puli ($p \leq 0.001$).

Table 4.8: Levels of salivary cortisol (median, quartiles) in nmol/ L^{-1} separated into the groups of breeds of dogs for both control-days and therapy-days

	Breed	Median	Percentile 25	Percentile 75
Control-Days	Bernese Mountain Dog (1)	1.15	0.45	1.61
	Border Collie (3)*	1.37	0.89	2.09
	Bouvier des Flandres (1)	10.77	5.75	23.02
	Dachshund-Crossbreed (1)	2.74	1.76	10.21
	Golden Retriever (3)	1.77	1.37	2.92
	Great Pyrenees (1)	1.22	0.93	1.51
	Labrador Retriever (3)	1.87	1.5	2.57
	Pointer-Crossbreed (1)	2.28	1.61	3.67
	Polski Owczarek Podhalanski (1)	1.94	0.5	2.84
	Puli (2)	1.6	0.88	2.46
	Unidentifiable Crossbreed (1)	1.47	1.25	1.79
Therapy-Days	Bernese Mountain Dog (1)	0.28	0.09	0.99
	Border Collie (3)	1.71	0.71	2.75
	Bouvier des Flandres (1)	5.53	1.24	17.49
	Dachshund-Crossbreed	17.93	4.39	53.92
	Golden Retriever (3) °	2.57	1.87	4.62
	Great Pyrenees (1)	3.31	1.97	7.53
	Labrador Retriever (3)	1.8	1.39	2.41
	Pointer-Crossbreed (1)	2.19	0.95	3.47
	Polski Owczarek Podhalanski (1)	0.08	0.003	1.26
	Puli (2)	1.62	0.94	2.49
	Unidentifiable Crossbreed (1)	0.28	0.09	0.94

Number of dogs in parenthesis. Percentile 25 = quartile 1; Percentile 75 = quartile 3. Statistically lower levels of the Border Collies at control-days marked with a *; statistically significant higher levels of the Golden Retrievers at therapy-days marked with a °.

We also investigated the possible impact of other parameters on the levels of cortisol in the saliva of dogs. We could not find any logical statistical significant differences to the factors

(A) where the dogs stayed during the day and slept at night,

(B) number of hours being alone, being active and resting per day, and

(C) number and duration of walks per day.

We did not investigate whether the presence of children may have an effect on the levels of salivary cortisol in dogs, because there was only one team with little children and a comparison between dogs from families with grown-up children and no children is obsolete because the dogs joined the family when the children were already grown-up and had moved out.

Discussion

In a survey published by Kunz-Ebrecht *et al* (2004) mean levels of cortisol in humans directly after awakening in the morning reached 18.9 +/- 10.5 nmol/ L^{-1}, and increased to 28.0 +/- 13.6 nmol/ L^{-1} 30 minutes later. During the rest of the day levels of about 7.59 +/- 2.6 nmol/ L^{-1} were typical. These data represented employed women of higher socio-economic status, comparable to those in our study. In their study about the evaluation of fear in dogs King et al. (2003) sampled salivary cortisol levels of 108 dogs of various breed, sex, and experience before and after four different tests that were thought to cause fear in dogs. The average concentration of saliva cortisol before the tests was 2.8 +/- 3.8 nmol/ L^{-1}, while the mean concentration after the tests was 4.7 +/- 5.6 nmol/ L^{-1}, which means that there was a tendency, but no significance for concentrations to be higher after the tests ($p \leq 0.07$). In another paper (Beerda et al., 1998), dogs of different breed, sex and age (selected randomly) were evaluated for behavioral, saliva cortisol, and heart rate responses towards different types of stimuli. The scientists measured a mean basal cortisol level of 6.0 nmol/ L^{-1}, then they exposed the dogs to several stressful situations, like pulling them on a leash, releasing a paper-filled bag from the ceiling, sudden noise, and electro-shock. The stimulus ‘pull the leash’ caused mean levels of saliva cortisol of 16.7 +/- 12.1 nmol/ L^{-1} (due to one dog that showed extreme levels of 100.7 and 69.4 nmol/ L^{-1}), loud noise caused an increase of cortisol up to 20.4 +/- 4.5 nmol/ L^{-1}, the

falling bag caused 18.7 +/- 6.1 nmol/ L^{-1}, and the electric shock caused 15.5 +/- 4.6 nmol/ L^{-1}. Other stimuli tested – forcing the dog down on the floor and opening an umbrella in front of the dog – caused no significantly increased cortisol secretion in the dogs. The scientists explain this to the predictability of stimuli used. They claim that electro shocks, sound blasts, and a falling bag are sudden, non-social stimuli and therefore caused an increase of cortisol secretion.

Our first aim was to evaluate whether different types of institutions respectively clients had various effects on the teams' stress levels. We hypothesized that they would and can now confirm this assumption. For both humans and dogs working with disabled grown-ups was least stressful, followed by old/ bedridden people and children for humans, and other way round for dogs. We may explain these results by controlling the typical procedures of such therapeutic settings. Work with disabled and old people happens mostly in groups (if the clients are mobile enough to meet in a public room) or as single therapy for bed-ridden clients. Mostly the dog is brushed, petted, and fed. Exercises are done to improve the clients' motor functions, fine motor activity, communication, concentration, and memory. A very important part of working with old people is talking and listening to them. The dog may lie on a table, while the clients sit around it, or it moves from client to client. The dog needs to stay calm and is hardly allowed to move quickly.

The dog owners reported that working with old people was emotionally depressing, bodily straining, and sometimes boring. Positive about working with old people was that work was more relaxed and that much gratefulness was returned from the clients.

Several participants said that they did not like working with disabled people, especially disabled children because they feared depressing and distressing surroundings. However, those who did work with disabled clients mentioned that the therapeutic settings were anything but scaring or staggering, because of the friendly surroundings and mostly happy

mood of the clients and the nursing stuff. Contrary to institutions for old people are such places always very bright and merry and emanate much vitality. Thus work with disabled clients can partly be compared to work with children, which was also defined as very interesting, exciting, and joyful from most participants, although bodily encumbering. Usually the teams do many precise exercises to increase communication and motor functions (climb over dog, crawl under it, walk with it on the leash, brush it, feed it, do tricks and stunts with the dog, play around with the children), and the dog is urged to move at lot.

What we can derive from these statements is that the work with old people is little physically, but often mentally straining for the dog owners. For the dogs it is difficult to stay calm and keep still all the time, especially when the dog is young. This may have led to the increased levels of salivary cortisol among both humans and dogs compared to their data derived from the control-days but still normal compared to the results described by Beerda et al (1998) and King et al (2003). The increased levels of salivary cortisol from working with children can be explained by the higher degrees of physical action. Although it may be fun for most of the teams, action and noise are still exhausting and stressful. Work with disabled clients seems to be a mixture from the positive effects of the other two types of therapy. It contains both action, fun and creativity, but not to the extent of working with children. None of the dog owners and only one animal that visited different kinds of clients showed different results. This was a female, sterilized Golden Retriever born in 1996 and thus the oldest dog of the whole group. This individual had higher levels during therapy in a school than in a hospital with bedridden clients. Since this was a single case in our survey we can only guess that the age of the dog was related to the results. The dog owner had stated that she thought the dog was more stressed by therapy in the school than in the hospital and explained this by several symptoms of old age like articular-problems in the dog. Decreases in vitality of mammals during their senescence are well known (Hofecker et al., 1981). Thus we may assume that

young dogs are better adapted for working with lively children thus they are still lively themselves. Older dogs that do not like to jump and run may be better suited for calm types of therapy like they do with old people. But this is only a supposition and surely something which should be investigated more exactly. Working with disabled clients seems appropriate for both younger and older dogs, depending on the design of the therapeutic units.

We also evaluated whether the levels of salivary cortisol were related to the way of meeting the clients. Again, we can support our assumption because we found higher cortisol concentrations in humans that let their clients come to them and lower concentrations among their dogs. We can explain these results by comparing them to results of another paper written within our large-scaled survey (Haubenhofer and Kirchengast, in prep. b). There we compared the time flows of short- and longer-lasting therapeutic settings. Independent from the duration of the setting is the dog owner always in action. The same is true for shorter settings which are typical for therapies in which institutions are visited. Visits in old-peoples' homes, hospitals, and schools normally do not last longer than a few hours, because afterwards the daily routine as to be restarted. Very long settings (6-8 hours) are only possible when animal-supported therapy is involved into the work of the dog owner at their place of occupation (e.g. therapists or teachers). Yet the dog owner is the only one who needs to work through this whole time span, the dog always has periods of leisure time during which it can rest.

Hypothesis three was that teams which had joined the organization TAT earlier showed different levels of salivary cortisol than short-term teams. Although there were statistically significant differences, there was no obvious trend among the humans, but there was a clear trend to higher levels of salivary cortisol in dogs working longer in animal-supported therapy. Such variations could not be found when we analyzed the concentrations of cortisol of each age-class of the dogs, so we can assume that the dogs' age was not connected to its levels of salivary cortisol. This leads us again to our hypothesis that this kind of therapy is stressful for

dogs and led to a steady increase of cortisol levels depending on the number of years and settings they had already been working in animal-supported therapy.

Yet we have to keep in mind that the general levels of salivary cortisol are rather low in therapy dogs (total median $_{dogs}$ = 1.96 nmol/ L^{-1}, median $_{control\text{-}days}$ = 1.72 nmol/ L^{-1}), while King et al. (2003) claimed a mean basal cortisol level of 2.8 +/- 3.8 nmol/ L^{-1}, and Beerda et al. (1998) of 6.0 nmol/ L^{-1}. Hence we have to refine our statement insofar, as the dogs have higher cortisol concentrations compared to their own results from the control-days, but range besides that in about the same area than the dogs used in the study by Beerda et al. (1998).

The lack of similar relations between years of therapeutic work and level of cortisol secretion among humans may be caused by various factors. First of all, one year does not count equally long for a human than a dog. Second, these humans do their work voluntarily, and find for sure some kind of pleasure and emotional satisfaction in it. And third, maybe humans are more able to regenerate or are less stressed than their dogs by therapeutic work. This vagueness should certainly be topic of further investigation.

The next hypotheses dealt with the influence of sex (4th hypothesis), age (5th hypothesis), place of domicile (6th hypothesis), and – among dogs- sterilization (7th hypothesis) and breed (8th hypothesis). We assumed that none of these factors would have an effect on the levels of salivary cortisol.

Svartberg (2002) tested the relationship between personality and performance of dogs in working dog trails. He showed that breed and sex differences disappear in dogs that have reached certain levels of training. That means that only dogs with a special kind of personality and education reach the highest levels of performance in working dog trails. We hypothesize that the same is true for dogs working in animal-supported therapy. Only dogs that fulfil the extremely high demands on personality and training are allowed to become therapy-dogs.

These dogs should hardly show any range in their personality and behavior, regardless of which sex, age or breed they are. Something similar could apply to the dog owners.

Hypothesis four was only tested among dogs, because there was just one male dog owner among the participants. For the dogs our hypothesis was correct insofar, as there were no statistically significant differences in the levels of salivary cortisol between female and male dogs at days of therapeutic settings. However, female animals provided higher levels of cortisol secretion during control days than male dogs. Still these differences did not show any statistically significant difference.

Some authors mention changes in diurnal variations of cortisol secretion depending on the different phases of menstrual cycle among humans (Bao et al., 2003). For dogs, no such investigations are known. Anyhow, these changes are of no interest in this study because data were collected using a longitudinal design over a period of at least four months (for collecting both control-data and therapy-data), thus any variations would have been recognized.

We were also correct due to hypothesis five, both for humans and for dogs. Although there were statistically significant differences between the single groups of age there was no obvious trend within these results. Humans, who had been born in 1970 or later, had higher levels rather because of the fact that this was the group of the two therapists and the teacher. These persons had higher levels of salivary cortisol because of their kind of work and not because of their age. Although Palazzolo and Quadri (1987) claimed the existence of daily variations in cortisol secretion in adult (3.3 +/- 0.6 (SD) years) dogs and the absence of such daily variations in old (12.1 +/- 0.3 years) dogs, we cannot countenance this notion.

Nevertheless we were wrong due to hypothesis six. Humans living in a rural area had lower concentrations of cortisol than those living in an urban area, which counted for both control-days and therapy-days. Dogs from rural areas provided lower levels of salivary cortisol at control-days, but higher levels at therapy-days. The results could indicate that living off the

chaos of urban areas reduces physiological stress in both humans and dogs. The very same rural peace could have led to the increased stress levels in dogs that lived in rural areas and were therefore less used to urban chaos. Every single dog owner living with their dog in rural areas mentioned that their dogs were afraid of the traffic and hectic of cities. The effect of rural peace also showed up among the humans, but did not lead to similar differences between control-days and therapy-days, which could indicate that humans are less stressed by urban surroundings than dogs.

Neither was the 7th hypothesis correct. Sterilization played a significant role in the levels of salivary cortisol among dogs. During therapy-days sterilized dogs had significantly lower levels of salivary cortisol than not sterilized animals. Certainly we cannot exactly explain these results, because our sampling size was certainly too small to develop any empirically stable hypotheses. But we know that female, non sterilized dogs must not be used shortly before, during, and after their heat, and that male-non sterilized dogs must pass a special exam during their training in which they are brought into contact with dogs of the same sex. Sterilization maybe leads to a more balanced and relaxed personality and therefore to lower levels of cortisol during stressful situations, because the animals are not bothered by their sexual drive.

Our 8th hypothesis was also incorrect. We found different levels of salivary cortisol depending on the dogs' breed, as Golden Retriever had significantly higher levels than all the other breeds. As we searched the scientific literature for possible explanations we found an article by Neer et al. (1987) in which they claim that the Labrador Retriever is perceived to be calmer than the Golden Retriever. Thus Retrievers had slightly higher concentrations than Border Collies and Pulis during the control-days, and Labrador Retriever had the second highest levels during days of therapeutic settings we could suppose that Retrievers have higher levels of salivary cortisol by nature. But this is again only a supposition.

Our last hypothesis was that different life circumstances would lead to varied cortisol concentrations. This was only true in parts: The kind of occupation played a role among humans as the two therapists and the teacher had higher levels than the other dog owners. The reason (long duration of the settings) we have already discussed. Participants having grown-up children had significantly lower levels of salivary cortisol at therapy-days. We might assume that persons being used to rising children are more relaxed in working with old, disabled, or young clients than persons without this experience.

As well absorbing was the fact that the daily routine of the dogs did not have effects on their levels of salivary cortisol. They rather seemed to depend on the combination of these and other facts, and not single ones. Kobelt et al. (2003) point out that although there exist great differences in basic saliva cortisol concentrations in dogs, there is little overall variation in average cortisol concentrations between different days. This indicates that cortisol does not vary with changes in environmental effects that change on a day to day basis.

Finally we must not forget that all levels of salivary cortisol measured in this survey did not range higher than the concentrations measured in other studies. That means that these levels, although increased, were still within the normal spectrum of humans respectively dogs.

This thought also shapes the conclusion of this paper. Although both humans and dogs showed increased levels of salivary cortisol at days of therapeutic settings caused by a series of reasons, all dog owners emphasized that they themselves and their dogs liked this kind of work. They claimed that their dogs entered the therapeutic settings in a happy mood and that they would instantly stop their work if the dog started to show any signs of harm. Values surely play an important role in work-related processes and outcomes. The basic assumption is that a person will be happier, more motivated, satisfied, and committed when the individual's values are congruent with those emphasized at the place of employment, and that people prefer vocations where they are able to work in line with their values (Berings et al.,

2004). If animal-supported therapy is what these people want to do, they do not feel stressed but 'happily busy'. The same is true for dogs. They may be stressed physiologically by therapy, but as long as they like their job, live in harmony with their owner and are not obliged to do things they do not like, they will not sense their situations as bad, but will enjoy it. Furthermore, one should not forget that – following the theories of Lazarus (1966) – positive stimuli in life may as well cause changes in a individual's physiology comparable to those caused by unpleasant experiences, but with the great difference that they are not linked to negative emotions. Increases of cortisol levels are caused stimuli that can be sensed both positively and negatively. Thus it is so important to compare measured hormone levels to subjective perceptions or at least the behavior of the same individual to circumvent false conclusions.

References

Bao, A.M., Liu, R.Y., Van Someren, E.J., Hofman, M.A. and Zhou, J.N. (2003). Changes in diurnal rhythms of free cortisol secretion during different phases of menstrual cycle. Sheng Li Xue Bao 55 (5): 547-553.

Beerda, B., Schilder, M.B., Van Hooff, J.A., De Vries, H.W. and Mol, J.A. (1998). Behavioural, saliva cortisol and heart rate responses to different types of stimuli in dogs. Applied Animal Behaviour Science 58: 365-381.

Berings, D., De Fruyt, F. and Bouwen, R. (2004). Work values and personality traits as predictors of enterprising and social vocational interests. Personality and Individual Differences 36: 349-364.

Feddersen-Petersen, D. (2004). Hundepsychologie – Sozialverhalten und Wesen; Emotionen und Individualität, 4. Edition. Franckh- Kosmos: Stuttgart (Germany).

Ferrara, M., Natoli, E. and Fantini, C. (2004). Dog Welfare during Animal Assisted Activities and Animal Assisted Therapy. Poster at the 10th International Conference of the IAHAIO October 6th - October 9th in Glasgow (Scotland). Not published.

Hadley, M.E. (1996) Endocrinology, 4. Edition. Prentice Hall International Editions: Prentice-Hall (USA).

Handy, J.A. (1988). Theoretical and methodological problems within occupational stress and burnout research. Human Relations 41: 351-369.

Handy, J.A. (1991). Stress and contradiction in psychiatric nursing. Human Relations 44: 39-53.

Haubenhofer, D.K. (2003). Höhe der Stressbelastung von Mensch und Hund während der Ausbildung für die Arbeit im Bereich der tiergestützten Therapie. Master's Thesis at the Institute for Anthropology, University of Vienna (Austria).

Haubenhofer, D.K. and Kirchengast, S. (in prep. a) Austrian way of therapeutic service with animals. For Anthrozoös.

Haubenhofer, D.K. and Kirchengast, S. (in prep. b) Subjectivity vs. objectivity in animal-supported therapy. For Work and Stress.

Haubenhofer, D.K., Möstl, E. and Kirchengast, S. (2005). Cortisol concentrations in saliva of humans and their dogs during intensive training courses in animal-assisted therapy. Wiener Tierärztliche Monatsschrift 92 (3): 66-73.

Heimlich, K. (2001). Animal-assisted therapy and the severely disabled child: a quantitative study. Journal of Rehabilitation 67 (4): 48-54.

Hennessy, M.B., Davis, H.N., Williams, M.T., Mellott, C. and Douglas, C.W. (1997). Plasma cortisol levels of dogs at a county animal shelter. Physiology and Behavior 62: 485-490.

Hill Rice, V. (2000). Handbook of Stress, Coping and Health – Implications for Nursing Research, Theory, and Practice. Sage Publications: Thousand Oaks (USA).

Hofecker, G., Niedermüller, H. and Skalicky, M. (1981) Der altersbedingte Leitungsabfall und seine Beeinflussung im Tierexperiment. Aktuelle Gerontologie 11 (6): 188-194.

Iannuzzi, D. and Rowan, A.N. (1991). Ethical issues in animal-assisted therapy programs. Anthrozoös 4: 154-163.

King, T., Hemsworth, P.H. and Coleman, G.J. (2003). Fear of novel and startling stimuli in domestic dogs. Applied Animal Behaviour Science 82 (1): 45-64.

Kobelt, A.J., Hemsworth, P.H., Barnett, J.L. and Butler, K.L. (2003). Sources of sampling variation in saliva cortisol in dogs. Research in Veterinary Science 75: 157-161.

Koepke, J.P. and Obrist, P.A. (1983). Angiotensin II in the renal excretory response to behavioral stress in conscious dogs. American Journal of Physiology 245: R259-R264.

Kunz-Ebrecht, S.R., Kirschbaum, C. and Steptoe, A. (2004). Work stress, socioeconomic status and neuroendocrine activation over the working day. Social Science and Medicine 58: 1523-1530.

Lawler, J.E., Obrist, P.A. and Lawler, K.A. (1975). Cardiovascular function during pre-avoidance avoidance, and post avoidance in dogs. Psychophysiology 12 (1): 4-11.

Lazarus, R.S. (1966). Psychological stress and the coping process. McGraw-Hill: New York (USA).

Neer, C.A., Dorn, C. and Grayson, I. (1987). Dog interaction with persons receiving institutional geriatric care. Journal of the American Veterinary Medical Association 191: 300-304.

Palazzolo, D.L. and Quadri, S.K. (1987). The effects of aging on the circadian rhythm of serum cortisol in the dog. Experimental Gerontology 22 (6): 379-387.

Palme, R. and Möstl, E. (1997). Measurement of cortisol metabolites in faeces of sheep as a parameter of cortisol concentration in blood. International Journal of Mammal Biology 62 (2): 192-197.

Patzl, M. (1990). Entwicklung eines Biotin-Streptavidin-Enzym-Immunoassays zur Bestimmung von Cortisol in Blut und Speichel von Hunden. Doctoral Thesis at the Institute for Biochemistry at the University for Veterinary Medicine Vienna (Austria).

Suthers-McCabe, H.M. and Albano, L. (2004). Evaluation of Stress Response of Horses in Eqine Asssited Therapy Programs. Poster at the 10th International Conference of the IAHAIO October 6th - October 9th in Glasgow (Scotland). Not published.

Svartberg, K. (2002). Shyness-boldness predicts performance in working dogs. Applied Animal Behaviour Science 79: 157-174.

Von Faber, H. and Haid, H. (1995). Endokrinologie, 4. Edition. UTM – Für Wissenschaft Verlag Eugen Ulmer: Stuttgart (Germany).

Manuscript 5: Daily Variations of Cortisol Secretion in Humans and Dogs

Abstract

In this survey we investigated the daily variations of cortisol secretion in humans and their companion dogs and the influences of their work in animal-supported therapy on this secretion. We collected saliva samples from 13 dog owners and 18 dogs at control-days without therapeutic work and days with therapeutic settings and analyzed the concentrations of salivary cortisol using a special kind of enzyme-immunoassay.

Humans showed a typical daily variation in their secretion of cortisol, dogs did not. Salivary cortisol ranged higher on therapy-days than on control-days. Therapeutic work led to an increase of cortisol concentrations if therapy was done between midday and evening among humans. In dogs, levels increased independently from the time of the day. In humans cortisol concentrations were higher before than after therapeutic settings, in dogs it was vice versa. Settings that started in the morning and lasted until the afternoon led to increased levels of salivary cortisol only in the dog owners, not in the dogs.

We conclude that while the dog owners were rather stressed by the arrangements for the settings, the dogs were stressed by the therapeutic work itself. The results also show that dogs are not influenced in their hormonal physiology of cortisol by sharing their life and activities with humans.

Introduction

Scientific knowledge about daily variations in hormonal release provides important information about states of health and disease. Cortisol is an essential and one of the most important glucocorticosteroids in most mammals and considered to be a major indicator of altered physiological states in response to stressful stimulation (Von Faber and Haid, 1995). Among children and adult humans the existence of a daily variation in cortisol secretion is widely accepted (De Weerth et al., 2003). About 8-25 mg of cortisol are excreted every day (Griffin and Ojeda, 1996). One can notice an increase of cortisol production 3-5 hours after falling asleep with a great peak in the morning about one hour after waking up. During the rest of the day the cortisol concentration decreases again to reach its minimum a few hours after falling asleep (De Weerth et al., 2003; Kunz-Ebrecht et al., 2004). Already in the early 1990s, Kirschbaum (1991) described that the daily cortisol secretion can be separated into about 15 strictly devisable pulses of secretion. He continued that, after some strong pulses of secretion in the morning (3-7 am), the cortisol concentration reached its daily maximum between 8 and 9 am, and afterwards declined again to reach its minimum at about midnight. Still, he underlined that exogenic stimuli (e.g. corporal or mental pressure) could interrupt these daily variations and may lead to maxima of cortisol concentrations during other times of the day.

For dogs (*Canis familiaris*) literature is less uniform. Some authors claim that the daily secretion of cortisol underlies similar variations as humans (Kolevská et al., 2003). Others have tried to show that adult dogs do not vary in the daily secretion of cortisol (Koyama et al., 2003). A third opinion is that daily variations of serum cortisol are present in adult dogs (3.3 +/- 0.6 years), but not in puppies (8.4 +/- 0.2 weeks) nor in old dogs (12.1 +/- 0.3 years) (Palazzolo and Quadri, 1987).

Thereby it is hypothesized that the activity of cortisol secretion underlies a certain day-to-day variability dependent on time of awakening, light exposure, psychological dimensions of affect, immune function, and systemic health (Hucklebridge et al., 2005). Additionally may range individual differences heavily, both in humans (Kunz-Ebrecht et al., 2003, 2004) and in dogs (Beerda et al., 1997, 1998; King et al., 2003). Possible reasons for non pathological individuals are gender, age, earlier life experiences, menstrual cycle, and – among dogs – their breed.

The aim of this paper is to clarify some of these ambiguities. The data were collected within the scope of a larger-scaled survey about personality and work-related stress of human-dog teams working in animal-supported therapy.

We will investigate following questions:

(A) How does the daily secretion of salivary cortisol look like in humans and dogs? We hypothesize a typical daily variation within humans and none in dogs (1st hypothesis).

(B) Is there a difference in cortisol secretion due to work-related stress in both humans and dogs? Again we hypothesize yes (2nd hypothesis).

Material and Methods

1. Subjects

Thirteen teams participated in this study consisting of 13 humans and 18 dogs. Among the dog owners were 12 female and one male person and their year of birth ranged between 1937 and 1977.

All dogs were born between 1996 and 2003 and of different breed. Fifteen dogs were female (four sterilized), three male (one sterilized). None of the dogs had pathological allergies, skin-diseases, vomitus, diarrhea or any other chronic disease.

All teams were members of the Austrian organization 'Tiere als Therapie' (which means 'Animals as Therapy'). This is the biggest non-profit organization in Austria, which trains humans and their animals for later work in the field of animal-supported therapy and animal-supported pedagogy. More information about this organization can be found at their Homepage.

2. Methods

We devised a type of longitudinal study especially suited for the requirements of our survey.

In connection to a larger-scaled survey we collected saliva samples from both humans and dogs for the analysis of their cortisol levels. First control data were gathered on six non-consecutive days without therapeutic work three times a day (8am, 2pm, 8pm). After this a period of three consecutive months started, during which saliva samples were taken from the dog owners and their dogs always immediately before and after one therapeutic unit. The period of sample collection continued from March 2004 until February 2005.

For pointing the saliva samples so called 'Salivette tubes' (number 51.1534, Sarstedt, Wiener Neudorf, Austria) were used, little plastic tubes containing a cotton swab similar to those applied by dentists. These cotton swabs had to be put into the cheek pouches of the participating humans and dogs and left there until they were saturated with saliva (usually 30 seconds). Then the plastic tubes were placed on ice in a deep-freezer until the beginning of the analysis. Kobelt et al. (2003) point out that within the first four minutes after the beginning of handling a dog no changes in saliva cortisol concentration can be measured. That means that up to 4 minutes saliva samples can be collected without a change. Thus we can assume that changes of salivary cortisol by the extraction of the saliva samples itself do not exist.

After all teams had finished collecting their data the 'Salivette tubes' were brought to the Institute for Biochemistry at the University of Veterinary Medicine in Vienna. There they were defrosted sequentially and centrifuged for about 10 minutes at 1.500g.

For the analysis of the saliva samples we used a special kind of non-radio-active immunoassay called 'double-antibody biotin-linked enzyme-immunoassay'.

This method works more precisely than the 'direct enzyme-immunoassay' and can therefore still be used for very low concentrations of sample steroids. It was developed and applied in many cases at the Institute for Biochemistry at the University for Veterinary Medicine (Palme and Möstl, 1997). The applicability of this special method for the evaluation of samples from dogs was shown in the Doctoral Thesis by Patzl (1990). Later Haubenhofer modulated the analysis procedure within her Master's Program to make it suitable for the evaluation of saliva from both humans and dogs (Haubenhofer, 2003).

Samples that contained not enough saliva for at least one double-analysis (100 µl) were separated and not used for any evaluation.

3. Statistical Analysis

For statistical analysis the Computer Software SPSS was used. Saliva samples were analyzed using One-Sample Kolmogorov-Smirnov Tests in combination with Lilliefors-Significance-Corrections and Shapirol-Wilk Tests, Mann-Whitney-U-Tests for unrelated samples, and Wilcoxon-Sign-Rank Tests for related samples. Illustrations were designed as Box-Plot graphs. A value of $p \leq 0.05$ was considered statistically significant. Two decimal places were given for most cortisol data, except those lower than the third decimal place.

Results

From humans a total of 742 samples were collected, whereas 87 samples had to be separated out due to absence of saliva or vitiations of the samples. That resulted in a sample size of n = 655 with a range of 0.028 nmol/L^{-1} to 159.81 nmol/ L^{-1} of cortisol. The total median was at *median* $_{humans}$ = 13.78 nmol/ L^{-1}. A frequency list of all salivary samples is shown in the *Appendices* of the Doctoral Thesis (App 5).

In sum only 554 samples collected from the dogs were valid, while 586 samples had to be sorted out and could not come to evaluation (reason was less than 100 µ of saliva). The total median of all dogs was at a level of *median* $_{dogs}$ = 1.96 nmol/ L^{-1} salivary cortisol, with a range from 0.003 nmol/ L^{-1} up to 91.62 nmol/ L^{-1}. A list of all frequencies is shown in the *Appendices* of the Doctoral Thesis (App 6).

Among the dog owners was the total median of all control-days *median* $_{control}$ = 12.43 nmol/ L^{-1} ranging from 1.27-74.45 nmol/ L^{-1} of salivary cortisol. During days of therapeutic settings they showed a *median* $_{therapy}$ = 14.12 nmol/ L^{-1} and a range from 0.23-159.83 nmol/ L^{-1}. Among the dogs the total median off all control-days was at the level of *median* $_{control}$ = 1.72 nmol/ L^{-1}, ranging from 0.003-36.89 nmol/ L^{-1} cortisol in saliva. Their cortisol concentrations during days of therapeutic settings were *median* $_{therapy}$ = 2.15 nmol/ L^{-1} with a range from 0.003-91.62 nmol/ L^{-1}.

For both humans and dogs these differences were statistically significant ($p_{humans} \leq 0.005$; $p_{dogs} \leq 0.001$).

We calculated a non-parametric distribution for all data ($p \leq 0.001$).

1. Comparison of Daily Variations from Dog Owners and Dogs at Control-Days

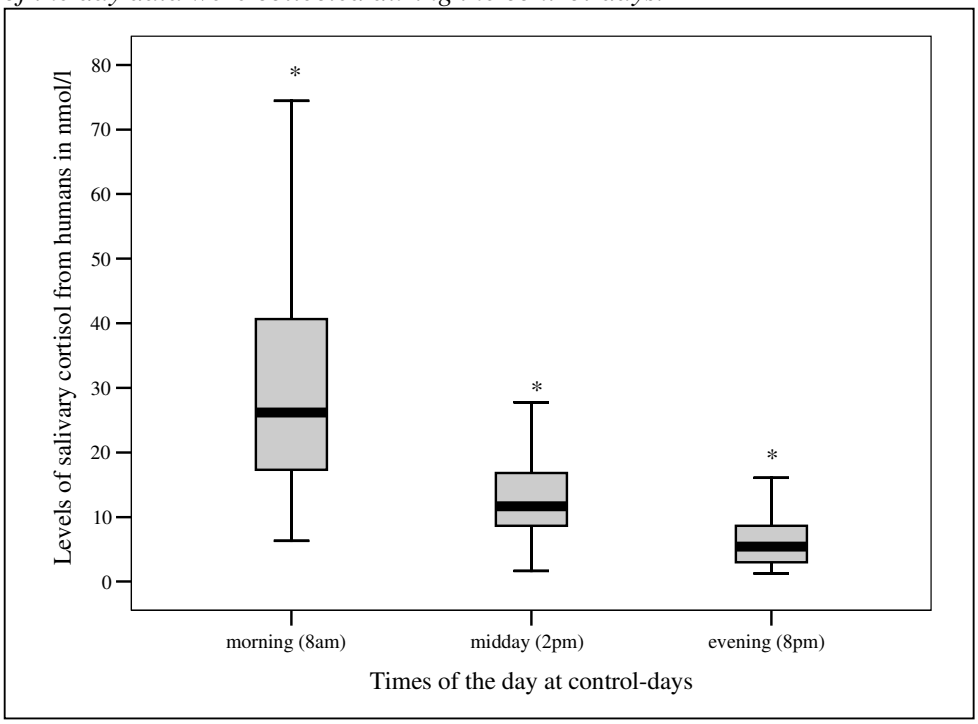
Our first step was to investigate, whether humans and dogs showed daily variations in their daily secretion of cortisol during days without therapeutic work (control-days).

Table 5.1: Levels of salivary cortisol (median, quartiles) in nmol/L^{-1} measured at 8am, 2pm, and 8pm at 6 non-consecutive control days from both humans and dogs.

	Dog Owners			Dogs		
Time of the Day	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
Morning (8 am)	26.16 *	17.23	40.72	2.06	1.31	2.59
Midday (2 pm)	11.66 *	8.58	17.35	1.76	1.31	2.53
Evening (8 pm)	5.41 *	2.85	8.76	1.44	0.89	2.27

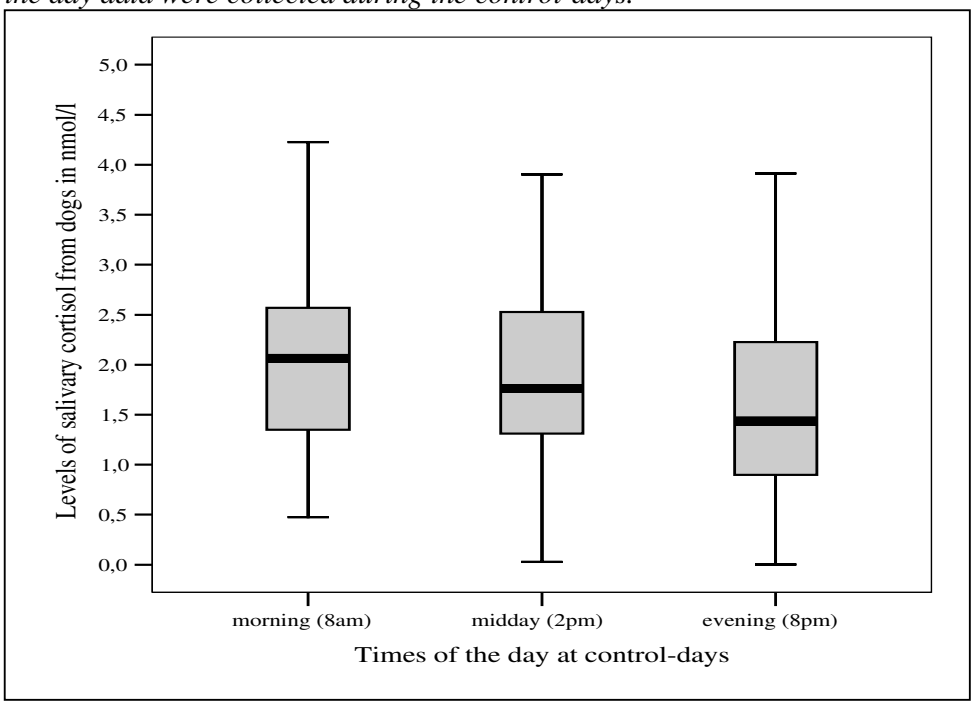
Percentile 25 = quartile 1; Percentile 75 = quartile 3. Medians of significant differences for the humans in the levels of salivary cortisol between all three times of the day marked with a *.

Figure 5.1: Levels of salivary cortisol in nmol/L^{-1} from humans separated into the three times of the day data were collected during the control-days.



Outliners and extreme values are excluded. Significant differences in the levels of salivary cortisol between all three times of the day marked with a *.

Figure 5.2: Levels of salivary cortisol in nmol/L^{-1} from dogs separated into the three times of the day data were collected during the control-days.



Outliners and extreme values are excluded.

As obvious in Table 5.1 showed the dog owners a typical decline of the cortisol concentrations during the day (see also Figure 5.1). We found that the data of all three times of the day differed significantly from one another (each $p \leq 0.001$). The dogs also showed a decrease in their levels of salivary cortisol throughout the day (Table 5.1, Figure 5.2). We investigated whether these differences were statistically significant, but none of them was ($p_{morning\ midday} \leq 0.291$; $p_{morning\text{-}evening} \leq 0.083$; $p_{midday\text{-}evening} \leq 0.606$).

2. Comparison of Daily Variations from Dog Owners and Dogs at Therapy-Days

We separated the data collected at days of therapeutic settings into the times of the day when the therapeutic settings had taken place. We defined four groups; 'time 1' included therapeutic settings in the morning (before 12pm); 'time 2' contained therapeutic settings

during midday (12-2pm); 'time 3' combined all those therapeutic settings that had taken place in the afternoon (from 2pm); and 'time 4' included the remaining data from teams that had worked from morning till afternoon. This concerned two therapists and one teacher, who did not do the therapeutic work with their dog during their leisure time but involved it into their work. Their settings corresponded therefore with their normal work-days.

Table 5.2: Lists of salivary cortisol (median, quartiles) in nmol/L^{-1} from humans and dogs separated into the times of the day at therapy-days

	Dog Owners			Dogs		
Times	Median	Percentile 25	Percentile 75	Median	Percentile 25	Percentile 75
Time 1	13.67	8.66	19.49	2.11	0.88	7.19
Time 2	13.27	10.8	22.04	1.84	1.01	3.19
Time 3	12.24	7.25	17.67	2.28	1.22	4.93
Time 4	42.13 *	27.24	69.37	2.49	1.61	3.94

Percentile 25 = quartile 1; Percentile 75 = quartile 3. Median of significant difference in the levels of salivary cortisol marked with a *.

Among the humans there was a trend to decreased levels from 'time 1' to 'time 3'. The data appeared higher than the data collected at the according times of the day during the control-days thus they did not decrease that strongly from morning to afternoon. Extremely high appeared the data of the group 'time 4' (Table 5.2).

We found statistically significant differences between 'time 4' and all other times (each $p \leq .001$) for the humans. Among the dogs all groups contained higher levels of salivary cortisol than those collected during the control-days, but were within themselves more consistent than the groups of the humans. 'Time 4' was not that extremely increased and the highest levels were reached during settings that had taken place in the afternoon ('time 3') (Table 5.2). However, we found no statistically significant differences at all for the dogs.

Then we investigated whether there were any differences between the data collected before and after therapeutic settings.

Both dog owners and dogs showed differences in their data depending on whether they were collected before or after a therapeutic setting (Table 5.3). Among humans levels of salivary cortisol were higher before than after a setting, unattached to the time of the day. Again, the data did not decrease like they did at the control-days which emphasises the existence of stress. Extremely high were the levels of the group 'time 4', originating from increased levels both before and after therapeutic settings. The medians of this group collected in the morning were more than four times higher than the medians of 'time 1' which indicates a great amount of preload for the dog owners. Instead, the levels of salivary cortisol collected after therapeutic settings among 'time 4' was only 2.5 times higher than the data collected after therapeutic settings within 'time3'.

Table 5.3: Lists of salivary cortisol (median, quartiles) in nmol/L^{-1} from humans and dogs separated into times of the day at therapy-days and data collected before and after the settings

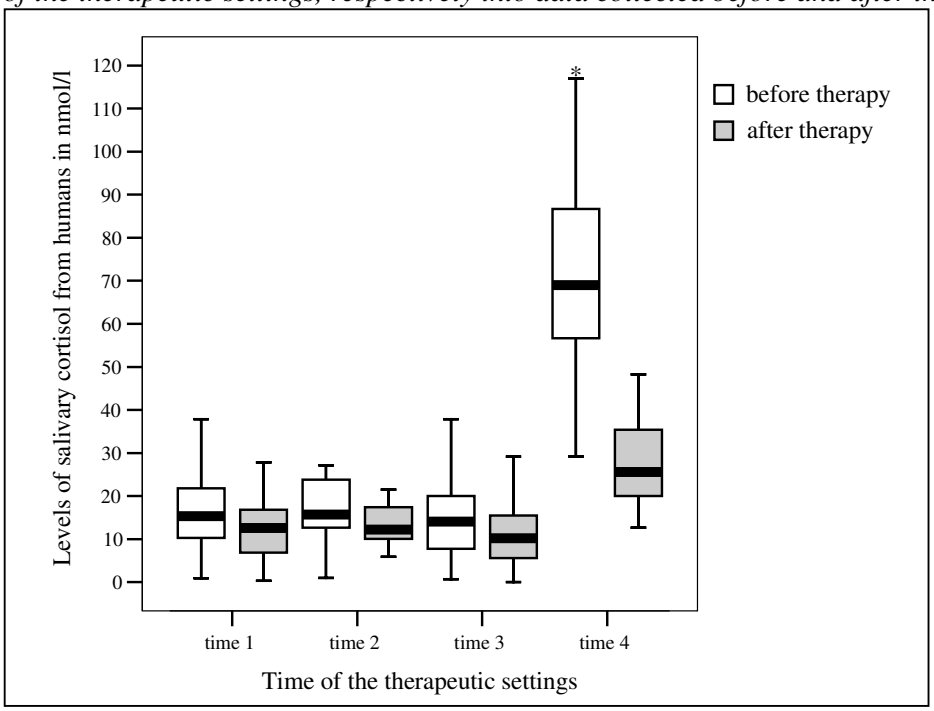
		Statistics	Time 1	Time 2	Time 3	Time 4
Dog Owners	Before Settings	Median	15.33	15.69	14.19	68.98 *
		Percentile 25	10.16	12.21	7.78	56.13
		Percentile 75	21.88	23.95	20.03	91.57
	After Settings	Median	12.61	12.21	10.26	25.61 *
		Percentile 25	6.73	8.56	5.51	19.79
		Percentile 75	16.81	21.46	15.55	35.68
Dogs	Before Settings	Median	2.03	1.64	2.47	2.07
		Percentile 25	0.89	0.87	1.56	1.59
		Percentile 75	7.85	3.57	5.41	3.37
	After Settings	Median	2.19	2.09	2.19	2.53
		Percentile 25	0.88	1.25	1.13	1.61
		Percentile 75	5.71	3.19	4.79	5.25

Percentile 25 = quartile 1; Percentile 75 = quartile 3. Medians of significant differences in the levels of salivary cortisol marked with a *.

Among the humans we found statistically significant differences between the data of 'time 4' and all other times, both before and after the therapeutic settings (each $p \leq 0.001$). The other levels did not differ significantly which underlines the stressful situation for the dog owners (Figure 5.3).

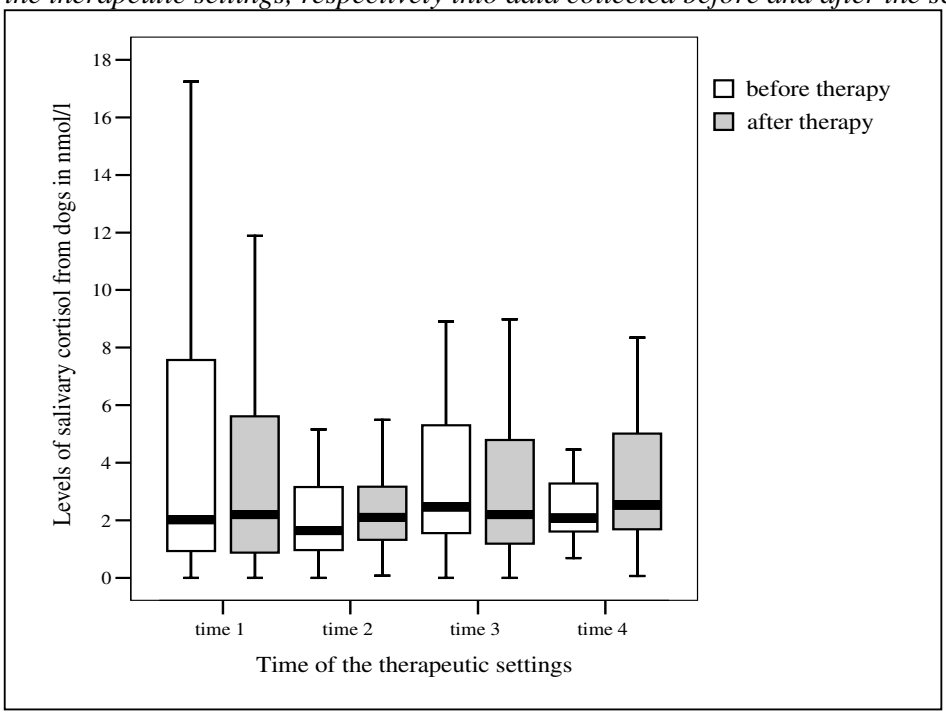
Among the dogs levels of salivary cortisol were higher after than before therapeutic settings, with the exception of 'time 3'. All levels were increased compared to the results of the control-days but within themselves again more homogeneous than among their owners. The highest levels before therapeutic settings were reached in 'time 3' and the highest levels after therapeutic settings were reached in 'time 4'. The slight, but not statistically significant decline of the data throughout the day did not show up within the data of the therapeutic settings, which again indicates stress. We analyzed the results to compare dogs which had had settings at different times of the day, which was possible due to the lack of natural cortisol decrease within dogs throughout the day, but did not find any statistically significant differences which means that the time of the day during which the therapeutic settings had taken place did not play a role for the levels of salivary cortisol in the dogs (Figure 5.4).

Figure 5.3: Levels of salivary cortisol in nmol/L^{-1} from humans separated into the four times of the therapeutic settings, respectively into data collected before and after the settings



Outliners and extreme values are excluded. 'Time 1' = before 12pm; 'time 2' = from 12 to 2pm; 'time 3' = after 2pm; 'time 4' = morning till afternoon. Statistically significant high level of 'time 4 – before settings' is marked with a *.

Figure 5.4: Levels of salivary cortisol in nmol/L^{-1} from dogs separated into the four times of the therapeutic settings, respectively into data collected before and after the settings



Outliners and extreme values are excluded. 'Time 1' = before 12pm; 'time 2' = from 12 to 2pm; 'time 3' = after 2pm; 'time 4' = morning till afternoon.

Discussion

As expected we were right that adult healthy humans show daily variations in their cortisol secretion and dogs do not. The decrease within the data of the animals was not statistically significant and can therefore be disregarded. Therefore we subscribe to the views of De Weerth et al. (2003), Koyama et al. (2003), and Kunz-Ebrecht et al. (2004), that adult humans vary in their levels of daily cortisol secretion and adult dogs do not.

International scientific literature provides many papers that indicate the relation between the human sleep-wake rhythm and the secretion of cortisol. Most articles deal with aging-related changes of the sleep-wake rhythm and involved changes in the daily secernation of cortisol (Nair et al., 1998; Sharma et al., 1989; Whittier et al., 1997). Another great part of papers

within this field investigate such changes as mentioned above that are the results of blindness (Folkard et al., 1990; Nakagawa et al., 1992; Orth et al., 1979; Sack and Lewy, 2001).

Literature about sleep-wake rhythms in dogs, respectively its related secernation of cortisol is rather spare, or better said nearly not existent at all (Takeuchi and Harada, 2002).

What seems no very interesting in the context of this paper is that the levels of daily secretion of cortisol in dogs do not seem to be biased by the fact that they spend their life with humans. Scientists hypothesize that human infants do not show daily variations in secretion of cortisol up to a certain age of several months because these variations are linked to the sleep-wake rhythms of the human body which are still missing in such young individuals (De Weerth et al., 2003). That would indicate that the daily secretion of cortisol that is typical for children and adult humans with its peak in the morning and decreasing levels during the day and night exists because man is evolutionary trimmed on being active during the day and sleep in the night. This appears logical when we remember the fact that one of the general functions of cortisol is to leverage the body in the morning. Thus cortisol secretion starts to decline a few hours before waking up and peaks a few hours after it.

Among dogs the situation would be different. Most scientists represent the hypothesis that dogs descend from a common ancestor with the wolf (*Canis lupus*) (Feddersen-Petersen, 2004). Therefore they are not evolutionary trimmed on sleeping the whole night through and being active only at day. Although wild living *Canidae* may rest a lot both during day and night, they do not really sleep during this time but only save their energies. Out of this resting they do not need a starting-time to be absolutely awake. This hypothesis fits the suggestion that young dogs do have daily variations in their secretion of cortisol but loose it at the age of several months (Haubenhofer et al., 2005). Infant dogs are nidicolous animals which means that they are totally dependent from the care of their mother during the first months of their life. Their eyes are closed, they can only crawl on the ground, and cannot eat solid food.

During this time they sleep a lot and do not have to secret the same levels of cortisol the whole day long to be always disposed to moving and acting.

Although companion dogs spend their whole life at the side of their human owner they do not seem to be influenced in their lack of variability in cortisol secretion. Although they adapt to their owner's sleep-and wake rhythm in their behavior, their physiology - regarding to the secretion of cortisol - does not, or at least not statistically significant. Maybe these adaptations led to the trend of increased levels of salivary cortisol in the morning among the dogs in this survey and to the results of other papers in which the authors claimed to have found daily variations of cortisol secretion in dogs (Kolevská et al., 2003; Palazzolo and Quadri, 1987).

Our second hypothesis was that we would get different results of cortisol concentrations due to work-related stress. Thus we compared the levels of salivary cortisol collected at control-days with those collected at days of therapeutic settings.

In their article Schlotz et al. (2004) provide evidence that the cortisol increase after awakening is associated with work-related stress. They gathered saliva samples from participants immediately after awakening and 30, 45, and 60 minutes later on six consecutive days starting on Saturday. Results showed that independent of sex and weekend-weekday differences in time of awakening and sleep duration, participants who reported higher levels of chronic work overload and worrying showed a stronger increase and higher mean levels of cortisol after awakening on weekdays, but not on weekend-days.

In an international study from Universities in London (UK) and Duesseldorf (Germany) it was determined whether the cortisol awakening response was greater on a work day than on a weekend day (Kunz-Ebrecht et al., 2003). Salivary cortisol samples were collected immediately after waking up and 30 minutes later on two days. The results showed that salivary cortisol levels after waking up did not differ by gender or between work and weekend days. However, the cortisol awakening response (defined as the difference between waking up

and 30 minutes later) was greater on work than weekend days (mean increases 10.5 and 3.7 nmol/ L^{-1}, $p \leq .001$). The authors concluded that the cortisol awakening response occurs on both work and non-work days, but that the anticipation of a work day is associated with an enhanced response. In their second paper the authors investigated the salivary cortisol levels of humans during the first hour after waking up compared to the levels during the rest of the day. The mean levels of cortisol in saliva directly after waking up in the morning averaged 18.9 +/- 10.5 nmol/L^{-1} and increased to 28.0 +/- 13.6 nmol/ L^{-1} 30 minutes later. The average cortisol levels in saliva during the rest of the day ranged in men from 7.52 +/- 2.8 nmol/ L^{-1} to 9.65 +/- 4.1 nmol/ L^{-1} and in women from 6.53 +/- 2.0 nmol/ L^{-1} to 7.59 +/- 2.6 nmol/ L^{-1} (Kunz-Ebrecht et al. 2004).

Beerda et al. (1997) described a mean level of 3.6 +/- 0.4 nmol/L^{-1} as a basal cortisol concentration in saliva of Beagles during non stressed conditions and 37.4 +/- 8.2 nmol / L^{-1} during stressful situations. In their following paper they measured a mean basal cortisol level in saliva of 6.0 nmol/ L^{-1} for a group of dogs from different breed (Beerda et al., 1998).

In their study about the evaluation of fear in dogs King et al. (2003) sampled the saliva cortisol concentrations of 108 dogs of various breed, sex, and experience before and after four different tests that were thought to cause fear in dogs. The average concentration of saliva cortisol before the tests was 2.8 +/- 3.8 nmol/ L^{-1}, while the mean concentration after the tests was 4.7 +/- 5.6 nmol/ L^{-1}.

As we have shown led the therapeutic work to increased levels of salivary cortisol compared to control-days in both dog owners and dogs. Splitting the times of the therapeutic settings into the different times of the day we wanted to find out when these statistically significant differences arose exactly. We found out that among humans levels of salivary cortisol from therapeutic settings in the morning were not higher than normal levels of salivary cortisol during this time of the day, but failed to decrease for settings during midday and the

afternoon. These results indicate that therapeutic work in the morning did not lead to greater cortisol secretion than normal, but very well during the rest of the day, when the levels of measured salivary cortisol decreased less than at control-days. This counted for both data collected before and after therapeutic settings. Especially high appeared the levels of those teams that involved animal-supported therapy into the dog owner's occupation and whose settings lasted from the morning until the afternoon. The levels of salivary cortisol were extremely increased compared both to the data collected during therapy-days of the other teams and to those of the control-days. In this case we can refer to the papers of Kunz-Ebrecht et al. (2003, 2004) and Schlotz et al. (2004) in which they describe that the anticipation of a working day is associated in an enhanced cortisol awakening response. The increased levels in the afternoon were thus the result of the stressful work itself. The hypothesis of stressful anticipation may also work as a reason for the fact that the dog owners showed higher levels of salivary cortisol before their therapeutic work than afterwards. These results indicate that the dog owners were stressed by the situation of therapeutic work, but thereby not only by the therapeutic work itself, but mainly by strains arising before therapy began (e.g. arrival, excitement and worries about how the work and the patients will be).

Results among the dogs were different. Although all dogs showed increased levels of salivary cortisol due to their therapeutic work they had mostly higher levels after the settings than before them (except for 'time 3', therapeutic settings in the afternoon). The levels of salivary cortisol before therapeutic settings ranged at about 2.0 nmol/L^{-1}, after them 2.2 nmol/L^{-1}. The lack of statistically significant differences between the cortisol concentrations of the 4 times of the day emphasize that therapeutic work was stressful for dogs, independent from the time during which it happened.

Compared to the results of Beerda et al. (1997, 1998) and King et al. (2003) these levels did not appear stressfully increased at all. Data from 'time 4' (settings from morning till

afternoon) were not higher than data from the other times when collected before the settings, but tended to be higher afterwards. Yet we have to keep the extreme range of all of these data in mind which in single cases went up to more than 90.0 nmol/L^{-1} of salivary cortisol. And we have to remember that these data were statistically significant increased, compared to the levels of salivary cortisol from the same animals at the control-days. These results indicate that although the levels of measured cortisol may not appeared increased compared to other surveys, they were increased compared to an intra-individual relation.

This underlines not only the conclusion that while the dog owners were rather stressed by the arrangements for the settings, the dogs were stressed by the therapeutic work itself. Additionally it shows, like the results of our first hypothesis, that dogs are not influenced in their hormonal physiology of cortisol by sharing their life and activities with humans. But it also emphasizes the importance of longitudinally designed methods to detect stressful situations using hormones like cortisol. As already mentioned in the introduction of this paper does the concentration of cortisol vary due to both daily adjustments and individual differences in the hormonal budget of every living being. This complicates the comparison of results from different studies seriously and recommends the use of intra-individual methods.

References

Beerda, B., Schilder, M.B., Van Hooff, J.A. and De Vries, H.W. (1997). Manifestations of chronic and acute stress in dogs. Applied Animal Behaviour Science 52: 307-319.

Beerda, B., Schilder, M.B., Van Hooff, J.A., De Vries, H.W. and Mol, J.A. (1998). Behavioural, saliva cortisol and heart rate responses to different types of stimuli in dogs. Applied Animal Behaviour Science 58: 365-381.

De Weerth, C., Zijl, R.H. and Buitelaar, J.K. (2003). Development of cortisol circadian rhythm in infancy. Early Human Development 73: 39-52.

Feddersen-Petersen, D. (2004). Hundepsychologie – Sozialverhalten und Wesen; Emotionen und Individualität, 4. Edition. Franckh- Kosmos: Stuttgart (Germany).

Folkard, S., Arendt, J., Aldhous, M. and Kennett, H. (1990). Melatonin stabilises sleep onset time in a blind man without entrainment of cortisol or temperature rhythms. Neuroscience Letters 113: 193-198.

Griffin, J.E. and Ojeda, S.R. (1996). Textbook of Endocrine Physiology. Oxford University Press, 3. Edition: New York (USA).

Haubenhofer, D.K. (2003). Höhe der Stressbelastung von Mensch und Hund während der Ausbildung für die Arbeit im Bereich der tiergestützten Therapie. Master's Thesis at the Institute for Anthropology, University of Vienna (Austria).

Haubenhofer, D.K. and Kirchengast, S. in prep. Austrian way of therapeutic service with animals. For Anthrozoös.

Homepage 'Tiere als Therapie' (Animals as Therapy) www.tierelastherapie.org (May 7th, 2005).

Hucklebridge, F., Hussain, T., Evans, P. and Clow, A. (2005). The diurnal patterns of the adrenal steroid cortisol and dehydroepiandrosterone (DHEA) in relation to awakening. Psychoneuroendocrinology 30 (1): 51-57.

King, T., Hemsworth, P.H. and Coleman, G.J. (2003). Fear of novel and startling stimuli in domestic dogs. Applied Animal Behaviour Science 82 (1): 45-64.

Kirschbaum, C. (1991). Cortisolmessung im Speichel – Eine Methode der Biologischen Psychologie. Verlag Hans Huber: Bern (Switzerland).

Kolevská, J., Brunclík, V. and Sviboda, M. (2003). Circadian Rhythm of Cortisol Secretion in Dogs of Different Daily Activities. Acta Veterinaria Brno 72: 599-605.

Koyama, T., Omata, Y. and Saito, A. (2003), Changes in salivary cortisol concentrations during a 24-hour period in dogs. Hormone and Metabolic Research 35 (6): 355-357.

Kunz-Ebrecht, S.R., Kirschbaum, C., Marmot, M. and Steptoe, A. (2003). Differences in cortisol awakening response on work days and weekends in women and men from the Whitehall II cohort. Psychoneuroendocrinology 29 (4): 516-528.

Kunz-Ebrecht, S.R., Kirschbaum, C. and Steptoe, A. (2004). Work stress, socioeconomic status and neuroendocrine activation over the working day. Social Science and Medicine 58: 1523-1530.

Nair, N.P.N., Schwartz, G., Ng Ying Kin, N.M.K., Thakur, M. and Thavundayil, J.X. (1998). Melatonin and cortisol circadian rhythms in Alzheimer's disease patients and normal elderly subjects. In Y. Touitou (Ed.) *Biological Clocks. Mechanisms and Applications*, pp. 357-360. Elsevier: Amsterdam (NL).

Nakagawa, H., Sack, R.L. and Lewy, A.J. (1992). Sleep propensity free-runs with the temperature, melatonin and cortisol rhythms in a totally blind person. Sleep 15: 330-336.

Orth, D.N., Besser, G.M., King, P.H. and Nicholson, W.E. (1979). Free-running circadian plasma cortisol rhythm in a blind human subject. Clinical Endocrinology 10: 603-617.

Palme, R. and Möstl, E. (1997). Measurement of cortisol metabolites in faeces of sheep as a parameter of cortisol concentration in blood. International Journal of Mammal Biology 62 (2): 192-197.

Palazzolo, D.L. and Quadri, S.K. (1987). The effects of aging on the circadian rhythm of serum cortisol in the dog. Experimental Gerontology 22 (6): 379-387.

Patzl, M. (1990). Entwicklung eines Biotin-Streptavidin-Enzymimmunoassays zur Bestimmung von Cortisol in Blut und Speichel von Hunden. Doctoral Thesis at the Institute for Biochemistry at the University for Veterinary Medicine Vienna (Austria).

Sack, R.L. and Lewy, A.J. (2001). Circadian rhythm sleep disorder: lessons from the blind. Sleep Medicine Reviews 5 (3): 189-206.

Schlotz, W., Hellhammer, J., Schulz, P. and Stone, A.A. (2004). Perceived work overload and chronic worrying predict weekend- weekday differences in the cortisol awakening response. Psychosomatic Medicine 66 (2): 207-214.

Sharma, M., Palacios-Bios, J., Schwartz, G., Iskandar, H., Thakkur, M., Quirion, R. and Nair, N.P. (1989). Circadian rhythms of melatonin and cortisol in aging. Biological Psychiatry 149: 1028-1032.

Takeuchi, T. and Harada, E. (2002). Age-related changes in sleep-wake rhythm in dog. Behavioural Brain Research 136: 193-199.

Von Faber, H. and Haid, H. (1995). Endokrinologie, 4. Edition. UTM – Für Wissenschaft Verlag Eugen Ulmer: Stuttgart (Germany).

Whittier, F.M., Toy, E.C. and Baker III, B. (1997). Sleep disorders in the elderly patient. Primary Care Update for Ob/Gyns 4 (6): 212-216.

Summary of the Results and Outlook

This Doctoral Thesis presents the results of the first large-scaled survey about the personality of humans and their dogs working together as teams in animal-supported therapy and about the levels of salivary cortisol gathered from these individuals as parameter for the amount of stress encumbering the teams in every respect of this work. We investigated 13 teams consisting of 13 humans and 18 dogs using several types of questionnaires and a 'double-antibody biotin-linked enzyme-immunoassay' for analyzing the concentration of cortisol within the saliva samples.

Manuscript 1 (chapter 1) is a theoretical review submitted for publication in *Anthrozoös*. It describes several differences of therapeutic work with animals between the USA, which can be characterized as the country of origin for many terms and definitions in the field of this kind of therapy, and Austria, one typical example for the establishment of further trends in this respect. We discuss these variations on the basis of the guidelines for training and work from the 'Delta Society' and 'Tiere als Therapie' ('Animals as Therapy'). These two organizations are the biggest non-profit organizations within their country dealing with therapeutic service using animals.

The review starts with the description of the terms 'animal-assisted activities' (AAA) 'and animal-assisted therapy' (AAT), common in the USA, and explain why these definitions do not perfectly fit the demands for therapeutic use of animals in Austria, and thus prefer the terms 'animal-assisted therapy' (AAT) and 'animal-supported therapy' (AST).

Later we explain the discrepancies that exist concerning the training, examination, and criteria for volunteering persons and their animals that want to offer therapeutic service.

Finally we present three American declarations constitution the rights of all animals living in human custody and allocate, respectively complete these guidelines for Austria, designing a schedule of eight basic articles, which covers all needs of animals working in animal-supported therapy.

In the second manuscript (chapter 2) we work through the results regarding to the personality of humans and their dogs that work in the field of therapeutic service with animals. This manuscript was submitted to *Personality and Individual Differences*. We used a personality test especially designed for humans working in a socio-communicative domain, and let the owners describe the personality of their dogs. Our results show that the humans had significantly good results for single traits of their socio-communicative behavior and health-and-recreation behavior. These traits were comparable to the dimensions *Agreeableness* and *Extraversion* of the 'Big Five'. This is today's most widely accepted model of human personality. It is a hierarchically structured model which defines five global factors of human personality, named *Neuroticism*, *Extraversion*, *Openness* (*to Experience)*, *Agreeableness*, and *Conscientiousness*. Similarly, the dogs reached high levels within the dimensions *Affection* and *Energy*, which can be compared to the traits *Agreeableness* and *Extraversion* for humans. These results led us to the conclusion that humans and dogs that work in animal-supported therapy do not only own a personality slightly varying from the majority of the population, but also have similar personality pattern.

In the following chapters we finalize the results of the measurement of salivary cortisol. They were submitted to *Work and Stress*, *Animal Welfare*, and *Biological Rhythms*.

Manuscript 3 (chapter 3) sums up the discrepancies between subjective perception of stress and levels of salivary cortisol measured in the participating humans and dogs. The results

showed that while the dog owners described their own life as being more stressful than the life of their dog, they defined therapeutic work more stressful for the animal than for themselves. They characterized themselves as being happy and relaxed before therapy, and satisfied and happy afterwards, and valued their dogs as being excited and full of anticipation before therapy, but as well satisfied and happy afterwards. Hormone analyzation showed that both humans and dogs had higher levels of cortisol at therapy-days than at control-days; however did the humans have higher levels before therapy than afterwards, dogs lower levels before therapy than afterwards. Cortisol concentration increased with the duration of therapeutic settings in humans, but decreased in dogs. Levels did not correlate with the number of settings in humans, but did very well in dogs. Dogs that had done more therapeutic settings in the time of measurement showed higher levels of cortisol than the other dogs. Evaluation of daily stresses, levels of exhaustion and resistance against stress did only partly correlate with cortisol concentration. Humans who described their lives as rather straining and themselves as often exhausted showed lowest levels of secernated cortisol both at control-days and days of therapeutic settings. Dogs, from which their owners suggested that they had to suffer from great amounts of daily stresses showed the highest levels of salivary cortisol at control-days, but lowest at therapy-days. Dogs that were defined as very resistant against stress showed the greatest levels of salivary cortisol at both control- and therapy-days.

We can conclude that subjective estimation of situations and objective measurements do not always go conform and should therefore both be considered in scientific surveys.

In the 4th manuscript (chapter 4) we search for both internal and external parameters that may influence the levels of measured cortisol. We found out that different groups of clients (e.g. old people, children) led to different concentrations of cortisol, as well as the place of a therapeutic setting (in the institution of the client/ at the working place of the dog owner). Age had an effect on cortisol levels for both humans and dogs, and so did the place of domicile.

The year of starting with the therapeutic work only showed an effect on the cortisol levels of the dogs. Among humans, type of occupation and presence of children in the family led to different levels of secernated cortisol. Among dogs, sterilization and breed were additional parameters which influenced the cortisol concentrations.

We conclude that a range of different parameters can lead to increased levels of cortisol in both humans and their dogs. Therefore we have to consider the subjectively description by the dog owners of their own condition, respectively the behavior of the dogs to be able to evaluate if the individuals perceive a situation as straining. They may have increased levels of cortisol concentration caused by therapy, but as long as they like their work and are not obliged to do things they do not like, they will not sense their situations as bad, but as joyful.

In the last manuscript (chapter 5) we investigate the daily variations of cortisol secretion in humans and dogs and the influences of their work in animal-supported therapy on this secretion. Humans showed a typical daily variability in their secretion of cortisol, dogs did not. Therapeutic work led to an increase of cortisol concentration when therapy was done between midday and evening among humans. In dogs, levels were increased independently from the time of the day. In humans cortisol concentrations were higher before than after therapeutic settings, in dogs it was vice versa. Settings that started in the morning and lasted until the afternoon led to increased levels of salivary cortisol only in the dog owners, not in the dogs.

We conclude that while the dog owners were rather stressed by the arrangements for the settings, the dogs were stressed by the therapeutic work itself. The results also show that dogs are not influenced in their physiology of cortisol by sharing their life and activities with humans.

As mentioned at the beginning of this Doctoral Thesis, it was the main purpose of this survey to provide detailed information about personality and work-related stress of human-dog teams working in animal-supported therapy. By using this consolidated knowledge we hope that the training and therapeutic work of the teams can now be optimized and the efficiency of this therapy increased.

Certainly we do not only provide answers, but also create new questions that can become topic of further investigation. One problem that may be criticized is for example surely the rather small sampling size. The survey was originally planned with the aid of 20 dog owners and 32 dogs. But due to the fact that all teams participated voluntarily in this study we could not bar single teams from quitting. By the end of the data collection only these 13 teams were left and there was neither enough time nor funds left for further investigation. Still it would be very interesting to repeat such a study with a different group of individuals, maybe even from another country, to get the possibility to compare these results to other empirical data.

A further critique could be that not all possible internal and external parameters that may have influenced our results were considered. We are aware of this problem and excuse it with two considerations. First, we were not able to investigate all possible influences because of our temporary and financial limited possibilities. Second, and more important, it was our aim to analyze the teams' conditions within their usual surrounding and without disrupting their daily life. The evaluation of several additional effects would have been possible only under specified experimental conditions. Examples for such effects are hormones that may influence the secretion of cortisol, respectively other internal disturbing factors and genetic dispositions, as well as further external parameter, like e.g. the time of the year, or the weather. These still missing links should be topic of other, especially designed studies.

These results provide a first taste of the special circumstances of humans and dogs working in therapeutic service. What should now follow are particular surveys investigating single parts more precisely and accurately.

We want to finish this chapter with a brief list of continuative addresses and links for further information about animal-supported therapy and pedagogy in Austria. We want to outline that we do not lay claim to completeness of this information, nor do we take responsibility for the availability or the content of these external website, nor do we endorse, warrant or guarantee the products, services or information described or offered at these external sites.

Continuative Addresses and Links in Austria:

1. Animal-Supported Therapy

Verein Tiere als Therapie - TAT

Office: University for Veterinary Medicine, A-1210 Vienna, Veterinärplatz 1, Gebäude AE, Monday - Friday, 9 - 12 am

Contact: Helga Widder, Gabi Glaser

Phone: +43/1/250 77/3340 DW, Fax: +43/1/250 77/3391 DW

Email: tat@vu-wien.ac.at

Homepage: http://www.tierealstherapie.org

Tiergestütze Therapie von Rettet das Kind-Burgenland

Neusiedlerstraße 60, A-7000 Eisenstadt

Office: Monday – Thursday 8:00 am- 4:00 pm, friday 8:00 am- 1:00 pm

Contact: Frau DSA Mag. Karin Schmidtbauer

Phone: +43/2682/ 72090, Fax: +43/2682/ 72090-19

Email: landesleitung@rettet-das-kind-bgld.at

Homepage: http://www.rettet-das-kind-bgld.at

Kindertierkreis Artemis

Hart 2, A-3033 Altlengbach

Contact: Felicitas Grübl

Phone: +43/2772/ 51 564 or +43/664/ 481 73 74 (mobile)

Email: artemis@kindertierkreis.at

Homepage: http://www.kindertierkreis.at

Vet-Magazin.com

http://www.vet-magazin.com/wissenschaft/mensch-tier.html

Offer additional links and book hints.

2. Animal-Supported Pedagogy

Sonderpädagogisches Zentrum Unterweißenbach:

Unterweißenbach 91, A-4273 Unterweißenbach

Contact: s406321@lsr.eduhi.at

Phone and Fax: +43/7956/7956

Homepage: http://schulen.ehudi.at/spzfreistadt/default.htm

Institut Vanek: Zentrum für Tiergestützte Heilpädagogik - TGHP ®

Baumagrtenstraße 23/3, A-1140 Vienna

Contact: Andrea Vanek

Phone: +43/664 / 392 46 49

Email: andreavanek@tghp.at

Homepage: http://www.tghp.at

Schulprojekte Tiergestützte Therapie - Canistherapie des Bundesministeriums für Bildung, Wissenschaft und Kultur:

For the subjects Biology and Physical Education, 1st-5th grade

Contact: Dipl. Päd. Eva Brandner-Höfer

Email: dr.franz.brandner@utanet.at

Homepage: http://www.schule.at

Esperanza – Zentrum für tiergestützte Pädagogik

Zimmerau 5, A-3281, Oberndorf /Melk

Contact: Fr. Mag. Martina Kotzina

Phone and Fax: +43/7483 / 7720 or (mobile: +43/664 / 461 02 12)

Email: info@esperanza.at

Homepage: http://esperanza.at

3. Mount-Supported Therapy and Pedagogy

Zentrum für tiergestützte Pädagogik, Integratives Voltigieren und Reiten Schottenhof

Amundsenstrasse 5, A-1170 Vienna

Office: Monday - Friday 8:30 am - 7:00 pm

Phone: +43 1 4896672

Contact: Michaela Jeitler,

Email: office@schottenhof.at

Homepage: http://www.schottenhof.at

Hippotherapie an der Veterinärmedizinischen Universität Wien

Contact 1: Frau Elke Truschnig at the University Hospital for child and juvenile medicine, AKH Vienna – Department for Physiology

Email: elke.truschnig@akh-wien.ac.at

Contact 2: Frau Gerda Zörrer at the University for Veterinary Medicine, Vienna, Department for orthopedics.

Email: gerda.zoerrer@vu-wien.ac.at

Lamatherapie in Tirol:

Contact 1: Lu Volgger, Wildermieming 1; A-6414 Mieming

Contact 2: Joe Thöni, Herzog Friedrich Str.51; A-6500 Landeck

Email: tirolerlama@networld.at

Homepage: http://www.tirolerlama.at/joe

Der Wooly-Lama Hof Ludwig für tiergestützte Pädagogik

Pischelsdorf 17, A-8212 Pischelsdorf

Contact: Kristina and Rainer Ludwig

Phone: +43/3113/3224 or +43/664/3457902 (mobile)

Email: rainer.ludwig@utanet.at

Homepage: http://www.wooly-lamahof.at

4. Dolphin-Supported Therapy and Pedagogy

Delphinunterstützte Therapie Österreich

http://www.dolphin-support.at

offer additional links and book hints.

Zusammenfassung auf Deutsch

Diese Dissertation präsentiert die Ergebnisse der ersten allumfassenden Studie über die Persönlichkeit von Menschen und ihren Hunden, die gemeinsam im Bereich der tiergestützten Therapie arbeiten. Ebenso gemessen wurden die Konzentrationen von Speichelkortisol als Indikator für die Mengen an Stress, die auf diese Individuen bei ihrer Arbeit einwirken.

Wir untersuchten 13 Teams (13 Menschen und 18 Hunde) mittels unterschiedlicher Fragebögen, sowie eines speziellen Enzym-Immonuassays um die Kortisolkonzentrationen im Speichel zu bestimmen.

Manuskript 1 ist ein theoretisches Review, das sich mit den Unterschieden der tiergestützten Arbeit in den USA (dem Ursprungsland vieler sich heute im Gebrauch befindlicher Definitionen und Richtlinien) und Österreich (einem typischen Beispiel von länder-spezifischen Weiterentwicklungen auf diesem Gebiet) beschäftigt. Zudem führen wir einen neuen englischen Begriff ein („animal-supported therapy“) und erstellen ein Acht-Punkte Basis-Dekret, das alle Bedürfnisse von Tieren abdecken soll, die im Bereich der tiergestützten Therapie arbeiten. In Manuskript 2 erörtern wir die Persönlichkeitsmerkmale der teilnehmenden Menschen und Hunde. Die Ergebnisse zeigten signifikant gute Werte in den Bereichen „Agreeableness“ und „Extraversion“ für sowohl die Menschen, als auch die Hunde. Daraus schließen wir, dass diese Individuen nicht nur eine leicht abweichende Persönlichkeit von der Grundgesamtheit haben, sondern dass sie auch eine ähnliche Persönlichkeit untereinander aufweisen. Manuskript 3 befasst sich mit den Unterschieden zwischen subjektiver Wahrnehmung von Stress und Kortisolmessungen. Bei den Menschen stieg die Kortisolkonzentration mit der Dauer der therapeutischen Sitzungen an; bei den Hunden gab es Korrelationen zwischen der Dauer von therapeutischen Einheiten und der Anzahl der im

Zeitraum der Datenerhebung durchgeführten Sitzungen. Diese Ergebnisse wichen zum Teil dramatisch von den subjektiven Einschätzungen der Menschen ab. Das deutet darauf hin, dass subjektives Empfinden und objektive Hormonmessungen nicht immer Konform gehen und deshalb beide in wissenschaftlichen Studien Beachtung finden sollten. In Manuskript 4 suchen wir nach internen und externen Parametern, die die Levels von Speichelkortisol beeinflusst haben könnten. Für sowohl Menschen als auch Hunde filtern wir die Eigenschaften „Patientengruppe“, „Ort der therapeutischen Sitzung“, „Alter“, und „Wohnort“ heraus. Zusätzlichen finden wir für die Hunde „Ausbildungsjahr“, „Sterilisation“, und „Rasse“, für die Menschen „Art der Arbeit“ und „Vorhandensein von Kindern“. Im letzten Manuskript erforschen wir die Wirkung der Arbeit im Bereich der tiergestützten Therapie auf die normale tägliche Ausschüttung von Kortisol. An den Kontrolltagen zeigten nur die Menschen tägliche Schwankungen in der Kortisolausschüttung. Zudem führte die therapeutische Arbeit bei den Menschen nur dann zu erhöhten Werten, wenn sie zwischen Mittag und Abend durchgeführt wurde. Bei den Hunden kam es immer zu erhöhten Werten, unabhängig von der Tageszeit. Die Menschen hatten höhere Werte vor als nach den Einsätzen, bei den Hunden war es umgekehrt. Einsätze, die von morgens bis abends reichten, führten nur bei den Menschen zu signifikant erhöhten Ergebnissen. Wir schließen daraus, dass die Menschen eher von den Vorbereitungen zu therapeutischen Arbeit gestresst waren, während die Hunde durch die Arbeit selbst belastet wurden. Die Ergebnisse zeigen außerdem, dass die Kortisolphysiologie der Hunde nicht durch ihr Zusammenleben mit dem Menschen beeinflusst wurde.

Acknowledgements

I owe the realization of this project to the cooperativeness and support of several persons. Within a few lines I want to express my deep gratitude to them.

First I want to thank my supervisor A.O.Univ.Prof. Dr. Mag. Mag. Sylvia Kirchengast for her continuous help and advice during all phases of the Thesis.

Special thanks go also to the organization 'Tiere als Therapie' ('Animals as Therapy'), especially to Mrs. Helga Widder and Mrs. Gabi Glaser for their unhesitant allocation of documents and information. In this context I want to thank all members of the organization who participated together with their beloved four-legged friends in this study and never grew tired of filling out questionnaires or collecting saliva samples. Special thanks go to Mrs. Neyder for her generous donation.

Additionally I want to express my thanks to A.O. Univ. Prof. Dr. Mag. Eva Millesi, and A.O.Univ.Prof. Tzt. Dr. Hermann Bubna-Littitz, for their worthwhile advice.

Furthermore I am thankful to Mrs. Martina Nagl and Mrs. Clarissa von Reinhardt for giving me the permission to use their questionnaire.

Equally important than this support on the scientific side was all the help and aid I was permitted to receive from my family and friends. First of all, I want to thank my parents and brothers for giving me the essential mental and financial support without which I would not have been able to work myself through the last two years. Additionally, I like to give special regards to my boyfriend Koos and my dear friend Martina. I am truly toughed by what you all have done for me and will always remember the gratefulness I am feeling right now.

References

Allen, K.M., Blascovich, J., Tomaka, J. and Kelsey, R.M. (1991). Presence of human friends and pet dogs as moderators of autonomic responses to stress in women. Journal of Personality and Social Psychology 61: 582-589.

Allport, G. (1961). Pattern and Growth in Personality. Holt, Rinehart and Winston: New York (USA).

Anderson, W., Reid, P. and Jennings, G.L. (1992). Pet ownership and risk factors for cardiocascular disease. Medical Journal of Australia 157: 298-301.

Baun, M.M. and McCabe, B.W. (2000). The Role Animals Play in Enhancing Quality of life fort he Elderly. In A. Fine (Ed.) *Handbook on Animal- Assisted Therapy – Theoretical Foundations and Guidelines for Practice*, pp. 237-251. Academic Press, Elsevier Science: San Diego (USA).

Beck, A.M. (2000). The Use of Animals to Benefit Humans: Animal- Assisted Therapy. In A. Fine (Ed.) *Handbook on Animal- Assisted Therapy – Theoretical Foundations and Guidelines for Practice*, pp. 21-40. Academic Press, Elsevier Science: San Diego (USA).

Berings, D., De Fruyt, F. and Bouwen, R. (2004). Work values and personality traits as predictors of enterprising ans social vocational interests. Personality and Individual Differences 36: 349-364.

Binder, R., Palme, R., Sommerfeld-Stur, I., Baumgartner, J., Niebuhr, K., Zaludik, K., Bartussek, H., Waiblinger, S., Reifinger, M., Kuebber-Heiss, A., Rabitsch, A., Gneist, M., and Troxler, J. (2004). Tierschutz in Österreich: Grundkonzepte der Tierethik, rechtliche Rahmenbedingungen und ausgewählte Schwerpunkte der Tierschutzforschung. Wiener Tierärztliches Monatsblatt 91 (1): 44-58.

Bossard, J.H.S. (1944). The mental hygiene of owning a dog. Mental Hygiene 28: 408-413.

Bossard, J.H.S. (1950). I wrote about dogs. Mental Hygiene 34: 345-349.

Brickel, C.M. (1980). A review of the roles of pet animals in psychotherapy and with the elderly. International Journal of Aging and Human Development 12: 119-128.

Brackert, H. and Van Kleffens, C. (1989). Von Hunden und Menschen – Geschichte und Lebensgemeinschaft. C. H. Beck- Verlag: München (Germany).

Campbell, J. (1984). The way of the animal powers: Historical Atlas of World Mythology. Times Books: London (UK).

Cannon, W.B. (1915). Bodily changes in pain, hunger, fear, and rage. Bradford: Boston (USA).

Coppinger, R., Coppinger, L. and Skillings, E. (1998). Observations on assistance dog training and use. Journal of Applied Animal Welfare Science 1: 133-144.

Corson, S.A. and Corson, E.O. (1980). Pet animals as nonverbal communication mediators in psychotherapy in institutional settings. In S. A. Corson and E. O. Corson (Eds.) *Ethology and nonverbal communication in mental health*, pp. 83-110. Pergamon Press: Oxford (UK).

Costa, P.T. Jr. and McCrae, R.R. (1985). The NEO Personality Inventory manual. Psychological Assessment Recources: Odessa (USA).

Costa, P.T. Jr. and McCrae, R.R. (1992). Revised NEO Personality Inventory (NEO PI-R) and NEO Five-Factor Inventory (NEO FFI) professional manual. Psychological Assessment Recources: Odessa (USA).

Dale- Green, P. (1966). Dog. Rupert Hart-Davis: London (UK).

Duncan, S.L. (1995). Loneliness: A Health Hazard of Modern Times. Interactions 13 (1): 5-9.

Ferrara, M., Natoli, E. and Fantini, C. (2004). Dog Welfare during Animal Assisted Activities and Animal Assisted Therapy. Poster at the 10th International Conference of the IAHAIO October 6th - October 9th in Glasgow (Scotland). Not published.

Fick, K.M. (1993). The influence of an animal on social interactions of nursing home residents in a group setting. American Journal of Occupational Therapy 47 (6): 529-534.

Fine, A. (2000). Handbook on Animal- Assisted Therapy – Theoretical Foundations and Guidelines for Practice. Academic Press, Elsevier Science: San Diego (USA).

Friedmann, E., Katcher, A.H., Lynch, J.J. and Thomas, S.A. (1980). Animal companions and one- year survival of patients after discharge from a coronary care unit. Public Health Reports 95: 307-312.

Friedmann, E., Katcher, A.H., Thomas, S.A., Lynch J. and Messent, J. (1983) Social interaction and blood pressure – Influence of animal companions. Journal of Nervous and Mental Deseas 171: 461-465.

Fritz, C.L., Farver, T.B., Kass, P.H. and Hart, L.A. (1995). Association with companion animals and the expression of noncognitive symptoms in Alzheimer's patients. Journal of Nervous and Mental Disease, 183 (8), 359-363.

Gosling, S.D. and John, O.J. (1999). Personality dimension in nonhuman animals: a cross-species review. Current Directions in Psychological Science 8: 69-75.

ms in Alzheimer´s patients. Journal of Nervous and Mental Disease 183 (8): 359-363.

Griffin, J.E. and Ojeda, S.R. (1996). Textbook of Endocrine Physiology, 3. Edition. Oxford University Press: New York (USA).

Granger, B.P. and Kogan, L. (2000). Animal- Assisted Therapy in Specialized Settings. In A. Fine (Ed.) *Handbook on Animal- Assisted Therapy – Theoretical Foundations and Guidelines for Practice*, pp. 213-236. Academic Press, Elsevier Science: San Diego (USA).

Grier, K.C. (1999). Childhood socialization and pet keeping in nineteenth- century America. Society and Animals 7: 95-120.

Hadley, M.E. (1996). Endocrinology, 4. Edition. Prentice Hall International Editions: Prentice-Hall (USA).

Haubenhofer, D.K. (2003). Höhe der Stressbelastung von Mensch und Hund während der Ausbildung für die Arbeit im Bereich der tiergestützten Therapie. Master's Thesis at the Insitute for Anthropology, University of Vienna (Austria).

Haughie, E., Milne, D. and Elliott, V. (1992). An evaluation of companion pets with elderly psychiatric patients. Behavioural Psychotherapy 20 (4): 367-372.

Heimlich, K. (2001). Animal-assisted therapy and the severely disabled child: a quantitative study. Journal of Rehabilitation 67 (4): 48-54.

Hergovich, A., Monshi, B., Semmler, G. and Zieglmayer, V. (2002). The effects of the presence of a dog in the classroom. Anthrozoös 15 (1): 37-50.

Hill Rice, V. (Ed.) (2000). Handbook of Stress, Coping and Health – Implications for Nursing Research, Theory, and Practice. Sage Publications: London (UK).

Holmes, T. and Rahe R. (1967). The social readjustment rating scale. Journal of Psychosomatic Research 12: 213-233.

Homepage 'IAHAIO' (International Association of Human-Animal Interaction Organizations) www.iahaio.org (March 11th – 15th, 2005).

Homepage 'Tiere als Therapie' ('Animals as Therapie') www.tierealstherapie.org (March 10th – 20th, 2005).

Iannuzzi, D. and Rowan, A.N. (1991). Ethical issues in animal-assisted therapy programs. Anthrozoös 4: 154-163.

Karasek, R.A. (1979). Job decision latitude, and mental strain: implications for job redesign. Administrative Science Quarterly 24: 285-307.

Katcher, A.H. and Wilkins, G.G. (2000). The Centaur´s Lesson: Therapeutic Education through Care of Animals and Nature Study. In A. Fine (Ed.) *Handbook on Animal-Assisted Therapy – Theoretical Foundations and Guidelines for Practice*, pp. 153-177. Academic Press, Elsevier Science: San Diego (USA).

Kidd, A.H. and Kidd, R.M. (1989). Factors in adults´ attitudes towards pets. Psychological Reports 65: 903-910.

Kirschbaum, C. and Hellhammer, D.H. (1989). Salivary cortisol in psychobiological research: an overview. Neuropsychobiology 22: 150-169.

Knoop, R. (1994). Relieving stress through value-rich work. Journal of Social Psychology 134: 829-836.

Kongable, L.G., Bulckwalter, K.C. and Stolley, J. (1989). The effects of pet therapy on the social behavior of institutionalized Alzheimer´s clients. Archives of Psychiatric Nursing 3 (4): 191-198.

Kunz-Ebrecht, S.R., Kirschbaum, C. and Steptoe, A. (2004). Work stress, socioeconomic status and neuroendocrine activation over the working day. Social Science and Medicine 58: 1523-1530.

Kusztrich, I. (1988). Haustiere helfen heilen – Tierliebe als Medizin. Ariston Verlag: Genf (Switzerland).

Lazarus, R.S. (1966). Psychological stress and the coping process. McGraw-Hill: New York (USA).

Levinson. B.M. (1962). The dog as co-therapist. Mental Hygiene 46: 59-65.

Levinson, B.M. (1970). Pets, child development and mental illness. Journal of the American Veterinary Medical Association 157: 1759-1766.

Levinson, B.M. (1972). Pets and human development. Charles C. Thomas: Springfield (USA).

Limond, J.A., Bradshaw, J.W.S. and Magnus Cormack, K.F. (1997). Behavior of children with learning disabilities interacting with a therapy dog. Anthrozoös 10: 84-89.

Masuda, M. and Holmes, T.H. (1967). Magnitude estimations of social readjustments. Journal of Psychsomatic Research 11: 219-225.

Melson, G.F. (2000). Companion animals and the development of children: Implications of the Biophilia Hypothesis. In A. Fine (Ed.) *Handbook on Animal- Assisted Therapy – Theoretical Foundations and Guidelines for Practice*, pp. 376-383. Academic Press, Elsevier Science: San Diego (USA).

Meyerson, D.E. (1994). Interpretations of stress in institutions: The cultural production of ambiguity and burnout. Administrative Science Quarterly 39: 628-653.

Moestl, E. and Palme R., 2002. Enzyme Immunoassay. CD from the Institute of Biochemistry, University of Veterinary Medicine, Vienna (Austria).

Nagel, M and van Reinhardt, C. (2003). Stress bei Hunden, 2. Edition. Animal Learn Verlag: Grassau (Germany).

Odendaal, J.S.J. (2000). Animal- assisted therapy – magic or medicine? Journal of Psychosomatic Research 49: 275-280.

Schaarschmidt, U. and Fischer, A.W. (1999). IPS - Inventar zur Persönlichkeitsdiagnostik in Situationen. Swets und Zeitlinger B.V.: Sewts Test Services: Frankfurt/ Main (Germany). Computerversion im Rahmen der Wiener Testsystems. Schuhfried Ges.m.b.H.: Wien/ Mödling (Austria).

Schrack, C. (2004). Der Einsatz des Hundes im Rahmen der Physiotherapie. Tiere als Therapie 1 (1): 119-122.

Selye, H. (1957). Stress beherrscht unser Leben, 1. Edition. Econ Verlag: Düsseldorf (Germany).

Serpell, J.A. (1991). Beneficial effects of pet ownership on some aspects of human health and behavior. Journal of the Royal Society of Medicine 84: 717-720.

Serpell, J.A. (2000). Animal Companions and Human Well- Being: An Historical Exploration of the Value of Human- Animal Relationships. In A. Fine (Ed.) *Handbook on Animal-Assisted Therapy – Theoretical Foundations and Guidelines for Practice,* pp. 3-19. Academic Press, Elsevier Science: San Diego (USA).

Siegel, J.M. (1990). Stressfull life events and use of physician services among the elderly: The moderating role of pet ownership. Journal of Personality and Social Psychology 58 (6): 1081-1086.

Suthers-McCabe, H.M. and Albano, L. (2004). Evaluation of Stress Response of Horses in Eqine Asssited Therapy Programs. Poster at the 10th International Conference of the IAHAIO October 6th - October 9th in Glasgow (Scotland). Not published.

Svartberg, K. (2002). Shyness-boldness predicts performance in working dogs. Applied Animal Behaviour Science 79: 157-174.

Svartberg, K. and Forkman, B. (2002). Personality traits in the domestic dog (*Canis familiaris*). Applied Animal Behaviour Science 79: 133-155.

Svartberg, K., Tapper, I., Temrin, H., Radesäter, T. and Thorman, S. (2005). Concistency of personality traits in dogs. Animal Behaviour 69: 283-291.

Tilley, L.P. and Smith, F. (1997). The 5 minute Veterinary Consult – Canine and Feline. Lippincott, Williams and Wilkins: Philadelphia (USA).

Von Faber, H. and Haid, H. (1995). Endokrinologie, 4. Edition. UTM – Für Wissenschaft Verlag Eugen Ulmer: Stuttgart (Germany).

Appendices

App 1. Control-Protocol, Control-Days 1-3

Protokoll vor dem Einsatz:

*Bitte entnehmen Sie die Proben sich selbst **und** Ihrem Hund dreimal täglich an drei selbst gewählten Tagen einer Woche (davon 1 Ruhetag und 2 Arbeitstage) wenn möglich zu folgenden Zeiten:*

1. *morgens um etwa 8 Uhr*
2. *mittags um etwa 14 Uhr*
3. *abends um etwa 20 Uhr*

Notieren Sie bitte auf diesem Protokollblatt, wann genau Sie die Probe entnommen haben.
Geben Sie die Watteröllchen zurück in die Behälter und lagern Sie sie in Ihrem Tiefkühlfach

Zur Erklärung der Salivettenbeschriftung:	*T1-T3*	*Untersuchungstage*
	F/M/A	*morgens/ mittags/ abends*
	M/H	*Mensch/ Hund*

Protokollführer:
Hund:
Datum der Tage:

ZEITPUNKT DER ENTNAHME	VORHERIGE TÄTIGKEIT (direkt vorher)

App 2. Therapy-Protocol

Einsatzprotokoll:

Bitte entnehmen Sie die Proben sich selbst ***und*** *Ihrem Hund jeweils vor und nach einem therapeutischen Einsatz:*

1. Wenn möglich direkt vor dem Einsatz (vor Betreten der Einrichtung/ des Zimmers/ bevor der Patient kommt,…);
2. Wenn möglich direkt nach dem Einsatz (gleich nach Verlassen der Einrichtung/ nach Verabschiedung des Patienten,…).

Geben Sie die Watteröllchen zurück in die Behälter und lagern Sie sie in einer Kühltasche (o.Ä.) bis Sie wieder zuhause sind (dann im Tiefkühlfach).

Zur Erklärung der Salivettenbeschriftung:	*E1-E…*	*Nummerierung der Einsätze*
	V/N	*vor/ nach dem Einsatz*
	M/H	*Mensch/ Hund*

Protokollführer:
Hund:

Proben-Nr	DATUM und UHRZEIT	EINSATZORT	TÄTIGKEIT (kurz vor dem Einsatz bzw. während des Einsatzes)	etwaige BESONDERHEITEN

App 3. Control-Protocol, Control-Days 4-6

Protokoll nach dem Einsatz:

*Bitte entnehmen Sie die Proben sich selbst **und** Ihrem Hund dreimal täglich an drei selbst gewählten Tagen einer Woche (davon 1 Ruhetag und 2 Arbeitstage) wenn möglich zu folgenden Zeiten:*

4. *morgens um etwa 8 Uhr*
5. *mittags um etwa 14 Uhr*
6. *abends um etwa 20 Uhr*

Notieren Sie bitte auf diesem Protokollblatt, wann genau Sie die Probe entnommen haben.
Geben Sie die Watteröllchen zurück in die Behälter und lagern Sie sie in Ihrem Tiefkühlfach

Zur Erklärung der Salivettenbeschriftung:	*T4-T6*	*Untersuchungstage*
	F/M/A	*morgens/ mittags/ abends*
	M/H	*Mensch/ Hund*

Protokollführer:
Hund:
Datum der Tage:

ZEITPUNKT DER ENTNAHME	VORHERIGE TÄTIGKEIT (direkt vorher)

App 4. Self-Administered Questionnaire

Fragebogen:

a. allgemeine Angaben zum Besitzer:

1. Name:_____

2. Geschlecht:
   - o Weiblich
   - o Männlich

3. Geburtsdatum:_____

4.Wohnort (Straße, Platz, Ort):_____

5. Ausbildungsweg seit der Volksschule:
_____
_____

6. heutiger Beruf:_____

7 Arbeitsplatz:_____

8. Familienstand:
   - o Single
   - o in einer Partnerschaft
   - o verheiratet
   - o verwitwet

9. Kinder:
   - o nein
   - o ja

10. Wenn ja, wie viele und wie alt sind sie?
_____
_____

b. allgemeine Angaben zum Hund:

1. Name:_____

2. Rasse:_____

3. Geburtsdatum:_____

4. Geschlecht:
   - o Weiblich
   - o Männlich
   - o sterilisiert
   - o kastriert

c. Angaben zum Alltag des Besitzers:

1. Kreuzen Sie all jene Worte an, die einen typischen Wochentag von Ihnen am ehesten beschreiben:
   - o anstrengend
   - o belastend
   - o spannend

- o erschöpfend
- o auslaugend
- o hektisch
- o zu lang
- o langweilig
- o zu kurz
- o lustig
- o positiv
- o negativ
- o ereignisreich
- o ereignisarm
- o schön
- o interessant
- o wenig belastend
- o wenig anstrengend
- o nicht hektisch
- o ausgefüllt mit Aktivitäten
- o Sonstiges:_____

2. Kreuzen Sie all jene Worte an, die ein typisches Wochenende von Ihnen am ehesten beschreiben:

- o anstrengend
- o belastend
- o spannend
- o erschöpfend
- o auslaugend
- o hektisch
- o zu lang
- o langweilig
- o zu kurz
- o lustig
- o positiv
- o negativ
- o ereignisreich
- o ereignisarm
- o schön
- o interessant
- o wenig belastend
- o wenig anstrengend
- o nicht hektisch
- o ausgefüllt mit Aktivitäten
- o Sonstiges:_____

3. Würden Sie Ihren Beruf als hektisch und anstrengend bezeichnen?

- o ja sehr
- o eher ja
- o eher nein
- o überhaupt nicht

4. Würden Sie ihr gesamtes Lebensumfeld (Zeit mit Familie und Freunden/ Zeit mit Hobbys/…) als hektisch und anstrengend bezeichnen?

- o ja sehr
- o eher ja
- o eher nein
- o überhaupt nicht

5. Womit beschäftigen Sie sich, wenn Sie nicht arbeiten?

- o mit meiner Familie/ meinem Partner

- o mit meinem Hund
- o mit meinen Hobbys_____
- o Sonstiges_____

6. Fühlen Sie sich oft ausgelaugt, erschöpft und urlaubsreif?
   - o ja, immer
   - o ja, oft
   - o manchmal
   - o nie

7. Wie viel Urlaub haben Sie pro Jahr?_____

8. Wie viel davon nehmen Sie in Anspruch?_____

d. Angaben zum Alltag des Hundes:

1. Kreuzen Sie all jene Worte an, die einen typischen Wochentag Ihres Hundes am ehesten beschreiben:
   - o ruhig
   - o hektisch
   - o aufregend
   - o spannend
   - o interessant
   - o ereignisreich
   - o ereignisarm
   - o anstrengend
   - o belastend
   - o erschöpfend
   - o auslaugend
   - o zu lang
   - o langweilig
   - o zu kurz
   - o lustig
   - o positiv
   - o negativ
   - o schön
   - o wenig belastend
   - o wenig anstrengend
   - o nicht hektisch
   - o ausgefüllt mit Aktivitäten
   - o Sonstiges:_____

2. Kreuzen Sie all jene Worte an, die ein typisches Wochenende Ihres Hundes am ehesten beschreiben:
   - o ruhig
   - o hektisch
   - o aufregend
   - o spannend
   - o interessant
   - o ereignisreich
   - o ereignisarm
   - o anstrengend
   - o belastend
   - o erschöpfend
   - o auslaugend
   - o zu lang
   - o langweilig
   - o zu kurz
   - o lustig
   - o positiv

- o negativ
- o schön
- o wenig belastend
- o wenig anstrengend
- o nicht hektisch
- o ausgefüllt mit Aktivitäten
- o Sonstiges:_____

3. Wie schätzen Sie die täglichen Belastungen Ihres Hundes ein?
- o hoch
- o mittel
- o gering

4. Für wie belastbar halten Sie Ihren Hund in stressvollen Situationen?
- o sehr
- o mittelmäßig
- o gering
- o weiß ich nicht

5. Welche Charaktereigenschaften würden Sie Ihrem Hund geben?
- o ruhig, gelassen
- o verspielt
- o schüchtern
- o zutraulich
- o neugierig
- o ängstlich
- o extrovertiert
- o mutig
- o aktiv
- o klug
- o gehorsam
- o gelehrig
- o kinderlieb
- o vertrauensvoll
- o introvertiert
- o gern in Gesellschaft
- o ausgeglichen
- o Sonstiges_____

6. Mein Hund hat Angst vor/ mag keine
- o plötzlichen, lauten Geräusche
- o vielen Menschen um sich herum
- o allein gelassen werden
- o großen befahrenen Straßen/ lautem Stadtleben
- o im Auto mitfahren
- o überall angefasst werden (auch in Mund, Ohren, Pfoten,…)
- o von Fremden berührt werden
- o Tierarzt
- o Reisen/ Ausflüge
- o Sonstiges_____

7. Was machen Sie abgesehen von der tiergestützten Therapie sonst noch mit Ihrem Hund?
_____
_____

e. Angaben zur Ausbildung bei TAT:

1. Wann haben Sie und ihr Hund die Ausbildung bei TAT gemacht?
_____

2. Wo haben Sie die Ausbildung gemacht?
- o Beim Verein Tiere als Therapie in Wien
- o Beim Verein Tiere als Therapie in einem anderen Bundesland:_____
- o Sonstiges:_____

3. Was für eine Art von Kurs war das?
- o 5-Tage Intensivkurs
- o mehrwöchiger Kurs einmal pro Woche
- o Sonstiges:_____

4. Wenn Sie alles noch einmal machen müssten, würden Sie wieder diese Kursart wählen?
- o ja, sicher
- o das müsste ich mir gut überlegen
- o sicher nicht

5. Begründen Sie bitte Ihre Antwort:
_____
_____

6. Haben Sie das Gefühl, dass der Ausbildungskurs Sie gut auf ihre therapeutische Arbeit vorbereitet hat?
- o ja, voll und ganz
- o eher ja
- o na ja, teilweise
- o eher nicht
- o nein, überhaupt nicht

7. Begründen Sie bitte Ihre Antwort:
_____
_____

8. Ist ihre therapeutische Arbeit heute so, wie Sie sie sich vor der Ausbildung vorgestellt haben?
- o ja, voll und ganz
- o eher ja
- o na ja, teilweise
- o eher nicht
- o nein, überhaupt nicht

9. Begründen Sie bitte Ihre Antwort:
_____
_____

10. Warum haben Sie sich dazu entschlossen, in der tiergestützten Therapie zu arbeiten?
- o Um bedürftigen Menschen zu helfen
- o Für meinen Beruf
- o Um meinem Hund eine sinnvolle Aufgabe zu geben
- o Um mir selbst eine sinnvolle Aufgabe zu geben
- o Sonstiges: _____

f. Angaben zum Zeitraum zwischen Ihrer Ausbildung und heute:

1. In welchen Bereichen haben Sie früher schon gearbeitet (und heute nicht mehr)?
_____
_____

2. Warum haben Sie dort aufgehört?
_____
_____

3. Erinnern Sie sich bitte zurück: Wie empfanden Sie Ihre ersten Einsätze im Bereich der tiergestützten Therapie?

- o aufregend
- o spannend
- o neu
- o ungewohnt
- o interessant
- o abstoßend
- o erschreckend
- o ekelhaft
- o schön
- o lustig
- o langweilig
- o Sonstiges_____

4. Was ist Ihnen diesbezüglich über das Verhalten Ihres Hundes in Erinnerung?
_____
_____

5. Welche Veränderungen haben Sie bei sich festgestellt seit dem Beginn Ihrer Arbeit und heute?
_____
_____

6. Welche Veränderungen haben Sie bei Ihrem Hund festgestellt seit dem Beginn Ihrer Arbeit und heute?
_____
_____

7. Die Arbeit in welchen Bereichen liegt Ihnen aufgrund Ihrer heutigen Erfahrungen am meisten?

- o Geriatrie
- o behinderte Erwachsene
- o behinderte Kinder
- o verhaltensauffällige Kinder
- o Kindergarten, Volksschule
- o Sonstiges:_____

8. Und wie ist das bei Ihrem Hund?

- o Geriatrie
- o behinderte Erwachsene
- o behinderte Kinder
- o verhaltensauffällige Kinder
- o Kindergarten, Volksschule
- o Sonstiges:_____

9. Begründen Sie bitte Ihre Antworten der Fragen 7 und 8:
_____
_____

10. Die Arbeit in welchen Bereichen liegt Ihnen aufgrund ihrer heutigen Erfahrung überhaupt nicht?

- o Geriatrie
- o behinderte Erwachsene
- o behinderte Kinder
- o verhaltensauffällige Kinder
- o Kindergarten, Volksschule
- o Sonstiges:_____

11. Und wie ist das bei Ihrem Hund?

- o Geriatrie
- o behinderte Erwachsene
- o behinderte Kinder
- o verhaltensauffällige Kinder

- o Kindergarten, Volksschule
- o Sonstiges:_____

12. Begründen Sie bitte ihre Antworten der Fragen 10 und 11:
_____
_____

g. Angaben zu den aktuellen Einsatzgebieten:

1. Auf welchem Gebiet/ welchen Gebieten arbeiten Sie und Ihr Hund heute?
- o Geriatrie
- o behinderte Erwachsene
- o behinderte Kinder
- o verhaltensauffällige Kinder
- o Kindergarten, Volksschule
- o Sonstiges:_____

2. Warum haben Sie sich dazu entschlossen, auf diesem Gebiet/ diesen Gebieten zu arbeiten?
_____
_____

3. In welchen Intervallen findet dies statt?
_____
_____

4. Wie lange sind Sie schon dort?
_____
_____

5. Wie lange ist Ihre Arbeit dort noch geplant?
_____
_____

6. Gab es anfangs Bedenken seitens der Einrichtungen, tiergestützte Therapie an diesem Ort anzuwenden?
- o ja, große
- o einige, aber sie wurden schnell geklärt
- o nein, gar keine

7. Um was für Bedenken und Probleme handelte es sich und wie konnten sie bereinigt werden?
_____
_____

8. Wie werden Sie und Ihr Hund heute von den Angestellten/ Mitarbeitern/ Leitern,… der Einrichtung aufgenommen?
- o es gibt noch immer regelmäßig Probleme
- o es gibt noch ab und zu Probleme
- o die meisten sind sehr nett
- o alle sind sehr nett und freundlich zu uns

9. Beschreiben Sie bitte den typischen Ablauf einer dortigen Therapie-Einheit:
_____
_____

10. Wie beurteilen Sie die Wirkung Ihrer Einsätze auf sich selbst?
- o anstrengend
- o körperlich belastend
- o seelisch belastend
- o auslaugend

- o interessant
- o spannend
- o lustig
- o kraftspendend
- o nervenaufreibend
- o lang
- o kurz
- o Sonstiges

11. Begründen Sie bitte Ihre Antwort:

_____

12. Und wie ist das bei Ihrem Hund?

- o anstrengend
- o körperlich belastend
- o seelisch belastend
- o auslaugend
- o stressig
- o kraftspendend
- o lang
- o kurz
- o Sonstiges

13. Begründen Sie bitte Ihre Antwort:

_____

14. Machen Ihnen ihre Einsätze Spaß?

- o ja, immer
- o meistens
- o eher nicht
- o nein

15. Haben Sie das Gefühl, dass Ihrem Hund seine Arbeit Spaß macht?

- o ja, immer
- o meistens
- o eher nicht
- o nein

16. Wie fühlen Sie sich vor einem Therapieeinsatz?

- o aufgeregt
- o nervös
- o entspannt
- o locker
- o voller Vorfreude
- o voll Spannung, was nun wieder passiert
- o genervt
- o gestresst
- o gut aufgelegt
- o Sonstiges_____

17. Begründen Sie bitte Ihre Antwort:

_____

18. Was glauben Sie, wie fühlt sich Ihr Hund vor einem Therapieeinsatz?

- o aufgeregt
- o nervös
- o entspannt
- o locker

- o voller Vorfreude
- o voll Spannung, was nun wieder passiert
- o genervt
- o gestresst
- o gut aufgelegt
- o Sonstiges_____

19. Begründen Sie bitte Ihre Antwort:
_____

20. Wie geht es Ihnen nach einem Therapieeinsatz?

- o gelöst
- o locker
- o zufrieden
- o genervt
- o gestresst
- o überanstrengt
- o seelisch ausgelaugt
- o körperlich erschöpft
- o gut aufgelegt
- o lustig
- o Sonstiges:_____

21. Begründen Sie bitte Ihre Antwort:
_____

22. Wie geht es Ihrem Hund nach einem Therapieeinsatz?

- o gelöst
- o locker
- o zufrieden
- o genervt
- o gestresst
- o überanstrengt
- o seelisch ausgelaugt
- o körperlich erschöpft
- o gut aufgelegt
- o lustig
- o Sonstiges:_____

23. Begründen Sie bitte Ihre Antwort:
_____

24. Was machen Sie typsicher weise vor einem Therapie-Einsatz um sich und Ihren Hund darauf vorzubereiten?

- o essen/ füttern
- o spazieren gehen
- o spielen
- o bürsten, kuscheln
- o gar nichts Besonderes
- o Sonstiges:_____

25. Was machen Sie typsicher weise nach einem Therapie-Einsatz um sich und ihren Hund davon zu regenerieren?

- o essen/ füttern
- o spazieren gehen
- o spielen
- o bürsten, kuscheln
- o gar nichts Besonderes

o Sonstiges:_____

26. Wie lange wollen Sie noch im Bereich der tiergestützten Therapie arbeiten?

_____

27. Begründen Sie bitte Ihre Antwort:

_____

App 5. Frequencies of all Saliva Samples from Humans

Salivary Cortisol in nmol/L^{-1}	Frequency	Salivary Cortisol in nmol/L^{-1}	Frequency	Salivary Cortisol in nmol/L^{-1}	Frequency	Salivary Cortisol in nmol/L^{-1}	Frequency
,028	1	8,370	1	14,669	1	24,448	1
,110	1	8,398	1	14,751	1	24,613	1
,331	1	8,481	3	14,834	1	24,779	2
,580	1	8,564	1	14,917	1	24,862	1
,718	1	8,591	1	14,945	1	25,276	1
,912	1	8,646	1	15,000	1	25,304	1
,939	1	8,674	1	15,110	2	25,331	1
,967	3	8,702	2	15,249	2	25,359	1
1,022	1	8,729	2	15,276	1	25,746	1
1,271	2	8,757	2	15,331	4	25,773	1
1,298	1	8,785	1	15,359	1	26,022	1
1,381	2	8,812	1	15,387	1	26,105	1
1,519	1	8,840	2	15,414	1	26,630	1
1,630	1	8,867	1	15,442	1	26,906	1
1,657	1	8,895	1	15,470	1	26,934	1
1,740	1	8,950	2	15,497	1	27,044	1
1,796	1	9,061	1	15,552	1	27,155	1
1,823	1	9,116	2	15,635	1	27,210	1
1,851	1	9,171	1	15,691	2	27,238	1
1,878	2	9,199	2	15,801	1	27,320	1
1,934	2	9,254	1	15,829	1	27,541	1
2,044	1	9,282	2	15,994	1	27,597	1
2,072	1	9,365	1	16,077	2	27,762	1
2,099	1	9,392	1	16,105	1	27,790	1
2,182	1	9,420	1	16,160	1	28,039	2
2,210	1	9,475	1	16,188	1	28,508	1
2,265	1	9,503	2	16,215	3	28,674	1
2,348	1	9,530	2	16,243	1	28,840	1
2,376	1	9,558	2	16,326	1	28,978	1
2,403	1	9,586	2	16,436	1	29,171	1
2,431	2	9,641	1	16,492	1	29,199	1
2,459	2	9,724	1	16,602	2	29,282	1
2,486	1	9,834	1	16,630	1	29,475	1
2,514	1	9,890	2	16,768	1	29,890	2
2,541	1	9,917	1	16,796	2	30,110	2
2,569	1	9,945	1	16,823	1	30,166	1
2,597	1	10,000	1	16,851	1	30,221	1
2,652	2	10,110	1	16,906	2	30,470	1
2,680	2	10,166	1	17,017	1	30,635	1
2,762	2	10,193	2	17,044	2	30,663	1
2,845	1	10,221	1	17,182	1	30,967	1
2,901	1	10,276	1	17,293	1	31,050	1
3,149	1	10,304	1	17,320	1	31,160	1
3,177	1	10,331	5	17,403	1	31,464	1

3,204	1	10,387	2	17,459	1	31,961	1
3,453	1	10,414	1	17,486	1	32,017	1
3,536	1	10,497	1	17,541	1	32,514	1
3,564	1	10,525	2	17,624	1	32,597	1
3,646	1	10,635	1	17,652	1	32,983	1
3,812	1	10,856	1	17,680	2	33,481	1
3,840	1	10,912	1	17,762	1	33,757	1
3,895	2	10,939	2	17,845	1	33,840	1
4,006	1	11,077	1	17,873	1	34,558	1
4,061	1	11,133	1	17,901	1	34,807	2
4,088	2	11,243	1	17,928	1	34,834	1
4,116	2	11,271	2	18,149	2	35,967	1
4,144	1	11,298	2	18,204	1	36,630	2
4,309	1	11,326	1	18,287	3	37,348	1
4,337	2	11,409	2	18,315	1	37,845	2
4,392	1	11,464	2	18,370	1	38,840	1
4,420	1	11,519	1	18,425	2	38,867	1
4,448	1	11,547	1	18,453	1	39,254	1
4,530	3	11,575	2	18,508	1	39,309	1
4,558	2	11,602	1	18,619	1	39,365	1
4,613	2	11,657	1	18,674	1	39,475	1
4,641	1	11,685	1	18,895	3	39,751	2
4,669	1	11,713	2	18,950	2	39,834	2
4,724	1	11,796	1	19,006	1	39,917	1
4,751	1	11,823	1	19,033	1	39,945	1
4,779	1	11,906	1	19,116	1	40,663	1
4,862	1	11,989	1	19,365	1	40,746	1
4,917	2	12,044	1	19,448	1	40,884	1
4,972	1	12,127	3	19,503	1	41,823	1
5,028	2	12,182	1	19,530	1	42,127	1
5,138	1	12,210	2	19,613	2	42,403	1
5,166	1	12,293	1	19,724	1	42,486	1
5,193	1	12,348	2	19,890	1	42,983	1
5,221	1	12,376	1	19,917	1	43,122	2
5,387	1	12,403	2	19,945	1	43,149	1
5,414	2	12,431	1	20,000	1	44,033	1
5,470	1	12,459	1	20,028	2	44,144	1
5,497	1	12,514	1	20,193	2	44,227	1
5,525	1	12,569	1	20,221	1	44,365	1
5,608	2	12,597	2	20,414	3	45,193	1
5,663	1	12,624	1	20,442	1	45,912	1
5,691	1	12,652	2	20,552	2	46,050	1
5,718	1	12,707	1	20,608	1	46,298	1
5,746	2	12,790	1	20,773	1	46,326	1
5,801	2	12,845	1	20,967	1	47,652	1
5,829	2	12,901	2	21,105	1	48,260	1
5,856	1	12,928	1	21,381	1	48,536	1
5,912	1	12,956	2	21,464	1	48,564	1
5,939	1	13,011	1	21,492	1	53,785	1

5,994	1	13,066	1	21,602	1	54,475	1
6,160	1	13,094	2	21,630	1	54,669	1
6,188	1	13,149	1	21,685	2	56,133	1
6,243	1	13,177	2	21,713	1	56,989	1
6,271	1	13,204	2	21,740	1	57,072	1
6,298	2	13,232	2	21,796	1	57,182	1
6,492	1	13,287	1	21,823	1	60,110	1
6,575	1	13,315	1	21,878	2	60,691	1
6,630	1	13,343	1	22,044	2	61,492	1
6,657	1	13,370	2	22,072	2	61,685	1
6,740	1	13,425	1	22,127	1	62,238	1
6,768	1	13,453	2	22,182	1	62,790	1
6,878	1	13,481	1	22,293	1	63,094	1
6,961	3	13,564	1	22,514	1	64,669	1
7,044	1	13,591	1	22,652	1	65,442	1
7,072	1	13,619	2	22,790	1	65,470	1
7,182	1	13,674	2	22,845	1	66,630	1
7,238	1	13,702	1	22,983	1	68,646	1
7,293	3	13,757	1	23,039	1	68,978	1
7,320	2	13,785	2	23,066	1	69,365	1
7,431	1	13,840	1	23,232	2	71,436	1
7,459	1	13,867	1	23,343	1	71,768	1
7,486	1	13,895	1	23,398	1	74,448	1
7,541	1	13,923	3	23,591	1	74,696	1
7,652	2	13,950	3	23,646	1	77,265	1
7,735	1	14,006	1	23,702	1	80,000	1
7,790	4	14,088	2	23,867	1	81,823	1
7,845	1	14,116	3	23,950	1	87,127	1
7,901	1	14,199	3	23,978	1	91,575	1
7,928	1	14,309	1	24,061	1	92,597	1
8,011	1	14,337	2	24,088	1	104,917	1
8,122	1	14,392	1	24,199	1	106,989	1
8,177	1	14,420	1	24,254	1	117,017	1
8,204	2	14,503	1	24,282	1	135,580	1
8,260	3	14,558	1	24,337	1	137,569	1
8,287	1	14,586	2	24,365	1	159,834	1
						Total	655
						Total Missing	87
						Total	742

App 6. Frequencies of all Saliva Samples from Dogs

Salivary Cortisol in nmol/L^{-1}	Frequency	Salivary Cortisol in nmol/L^{-1}	Frequency	Salivary Cortisol in nmol/L^{-1}	Frequency	Salivary Cortisol in nmol/L^{-1}	Frequency
,003	18	1,285	1	2,146	2	3,917	1
,006	2	1,287	1	2,155	1	3,942	1
,011	1	1,290	1	2,157	1	4,030	1
,014	1	1,293	1	2,160	1	4,047	1
,019	1	1,301	1	2,163	1	4,160	1
,025	1	1,304	1	2,174	1	4,169	1
,028	2	1,307	2	2,196	1	4,227	1
,033	1	1,315	1	2,199	1	4,238	1
,039	1	1,331	1	2,202	1	4,249	1
,041	1	1,334	1	2,227	1	4,329	1
,044	2	1,345	1	2,238	1	4,412	1
,047	2	1,348	1	2,246	1	4,428	1
,050	1	1,351	1	2,254	1	4,461	2
,064	1	1,354	3	2,268	1	4,577	1
,077	1	1,356	1	2,279	1	4,619	1
,083	1	1,359	1	2,287	1	4,630	1
,088	1	1,365	1	2,309	2	4,682	1
,091	1	1,378	1	2,312	1	4,715	1
,105	1	1,381	1	2,320	1	4,718	1
,108	1	1,384	1	2,326	1	4,762	1
,116	1	1,387	1	2,334	1	4,779	1
,124	2	1,395	1	2,345	1	4,787	1
,135	1	1,401	1	2,354	1	4,809	1
,174	1	1,403	1	2,356	1	4,975	1
,177	1	1,412	1	2,359	1	5,028	1
,185	1	1,417	1	2,362	1	5,075	1
,218	1	1,450	1	2,365	1	5,157	1
,240	1	1,459	1	2,370	2	5,193	1
,243	3	1,464	1	2,387	1	5,251	1
,249	1	1,470	1	2,390	1	5,414	1
,262	1	1,472	1	2,398	1	5,494	1
,276	1	1,483	2	2,406	1	5,528	1
,285	2	1,492	2	2,417	1	5,710	1
,307	1	1,497	2	2,428	1	5,765	1
,309	1	1,500	2	2,434	1	5,912	1
,323	1	1,511	1	2,445	2	5,983	1
,329	1	1,514	1	2,453	1	6,075	1
,401	1	1,525	1	2,456	1	6,182	1
,439	2	1,528	1	2,459	1	6,470	1
,450	1	1,533	1	2,467	1	6,569	1
,467	1	1,541	1	2,478	1	6,754	1
,475	1	1,547	1	2,492	1	6,975	1
,497	1	1,555	1	2,506	1	7,160	1
,500	1	1,558	2	2,511	1	7,290	1

,503	1	1,561	2	2,519	1	7,293	1
,506	1	1,583	1	2,522	1	7,307	1
,514	1	1,588	1	2,525	1	7,453	1
,517	1	1,602	2	2,530	1	7,550	1
,544	1	1,608	1	2,539	1	7,591	1
,550	1	1,610	1	2,544	1	7,616	1
,580	1	1,622	1	2,555	1	7,768	1
,588	1	1,627	1	2,566	1	7,831	1
,613	1	1,633	1	2,569	2	7,845	1
,622	2	1,638	1	2,577	2	7,867	1
,638	1	1,641	2	2,594	1	8,174	1
,641	1	1,649	1	2,608	1	8,193	1
,646	1	1,652	1	2,610	1	8,260	1
,682	2	1,657	1	2,616	1	8,351	1
,688	1	1,663	1	2,619	1	8,901	1
,713	1	1,671	1	2,624	1	8,978	1
,715	1	1,685	1	2,630	1	9,144	1
,729	1	1,693	1	2,724	1	9,354	1
,746	1	1,702	1	2,738	1	9,638	1
,762	1	1,704	1	2,743	1	10,210	1
,768	1	1,710	1	2,746	2	10,768	1
,793	1	1,718	2	2,749	1	11,887	1
,798	2	1,729	1	2,762	1	12,127	1
,818	1	1,740	1	2,782	1	12,182	1
,829	1	1,749	1	2,785	1	12,873	1
,843	1	1,751	1	2,793	1	13,356	1
,851	1	1,762	1	2,804	1	13,605	1
,862	1	1,765	1	2,826	1	13,715	1
,865	1	1,773	1	2,837	1	14,083	1
,870	1	1,776	1	2,843	1	15,470	1
,876	1	1,787	1	2,851	1	15,483	1
,878	3	1,793	1	2,865	1	15,594	1
,881	1	1,796	1	2,867	1	15,787	1
,890	1	1,804	2	2,873	1	15,912	1
,892	1	1,818	1	2,898	1	16,312	1
,903	2	1,826	1	2,901	1	16,367	1
,912	1	1,834	1	2,906	1	17,246	1
,923	1	1,848	1	2,917	1	17,445	1
,928	1	1,862	2	2,923	1	17,539	1
,936	2	1,865	1	2,950	1	17,586	1
,942	1	1,867	2	2,956	1	18,199	1
,956	1	1,876	1	2,989	1	18,276	1
,967	2	1,884	1	3,003	2	18,467	1
,975	1	1,887	1	3,064	1	19,420	1
1,006	1	1,895	1	3,072	1	19,503	1
1,008	1	1,906	2	3,075	1	20,014	1
1,036	1	1,912	1	3,091	1	20,204	1
1,039	2	1,917	2	3,105	1	20,732	1
1,055	1	1,931	1	3,108	2	20,829	1

1,064	1	1,934	1	3,119	1	20,867	1
1,069	1	1,936	1	3,149	2	22,721	1
1,077	1	1,939	1	3,152	1	23,088	1
1,080	1	1,942	2	3,163	1	23,356	1
1,108	1	1,945	1	3,188	1	23,550	1
1,122	1	1,956	1	3,193	1	25,925	1
1,124	1	1,959	2	3,196	1	26,091	1
1,141	1	1,961	1	3,213	1	30,555	1
1,146	1	1,970	1	3,307	1	32,337	1
1,149	1	1,972	1	3,309	1	33,727	1
1,155	1	1,978	1	3,329	1	34,276	1
1,160	1	1,981	2	3,384	1	36,890	1
1,166	2	1,989	1	3,428	1	36,906	1
1,171	1	2,006	1	3,431	1	37,030	1
1,177	2	2,017	1	3,439	1	43,163	1
1,182	1	2,025	1	3,461	1	44,033	1
1,191	1	2,028	1	3,475	1	47,536	1
1,202	1	2,030	1	3,489	1	48,412	1
1,213	1	2,047	1	3,525	1	52,785	1
1,224	1	2,058	1	3,547	1	57,329	1
1,227	1	2,064	1	3,566	1	59,851	1
1,249	2	2,077	1	3,575	1	65,193	1
1,251	1	2,097	1	3,776	1	72,044	1
1,260	1	2,099	2	3,807	1	72,066	1
1,271	1	2,119	1	3,903	1	79,834	1
1,273	2	2,130	1	3,909	1	91,622	2
1,279	1	2,133	1	3,912	1		
1,282	1	2,141	1	3,914	1		
						Total	554
						Total Missing	586
						Total	1143

App 7. Results of Salivary Cortisol Sorted by each Human

	All Days	Control Days	Therapeutic Settings
Team 1	Median = 13.066	Median = 9.917	Median = 13.232
	Minimum = 1.271	Minimum = 1.271	Minimum = 4.53
	Maximum = 42.983	Maximum = 42.983	Maximum = 33.757
Team 2	Median = 40.248	Median = 18.508	Median = 44.143
	Minimum = 2.597	Minimum = 2.597	Minimum = 17.044
	Maximum = 159.834	Maximum = 56.989	Maximum = 159.834
Team 3	Median = 11.325	Median = 10.524	Median = 11.519
	Minimum = 0.331	Minimum = 1.657	Minimum = 0.331
	Maximum = 37.348	Maximum = 29.475	Maximum = 37.348
Team 4	Median = 14.972	Median = 11.851	Median = 17.127
	Minimum = 5.663	Minimum = 5.663	Minimum = 9.89
	Maximum = 60.11	Maximum = 60.11	Maximum = 25.359
Team 5	Median = 9.488	Median = 15.994	Median = 7.583
	Minimum = 2.431	Minimum = 2.431	Minimum = 2.431
	Maximum = 57.072	Maximum = 57.072	Maximum = 21.796
Team 6	Median = 9.530	Median = 8.674	Median = 10.359
	Minimum = 1.298	Minimum = 1.298	Minimum = 2.901
	Maximum = 48.536	Maximum = 48.536	Maximum = 18.37
Team 7	Median = 17.361	Median = 20.759	Median = 17.044
	Minimum = 0.028	Minimum = 3.646	Minimum = 0.028
	Maximum = 68.646	Maximum = 68.646	Maximum = 39.945
Team 8	Median = 12.32	Median = 10.801	Median = 12.762
	Minimum = 3.812	Minimum = 3.812	Minimum = 6.961
	Maximum = 28.039	Maximum = 28.039	Maximum = 22.79
Team 9	Median = 27.209	Median = 24.627	Median = 29.198
	Minimum = 4.144	Minimum = 4.144	Minimum = 12.376
	Maximum = 81.823	Maximum = 74.448	Maximum = 81.823
Team 10	Median = 8.066	Median = 12.901	Median = 5.621
	Minimum = 0.11	Minimum = 3.177	Minimum = 0.11
	Maximum = 34.807	Maximum = 34.807	Maximum = 19.945
Team 11	Median = 7.79	Median = 8.950	Median = 7.541
	Minimum = 0.912	Minimum = 2.652	Minimum = 0.912
	Maximum = 30.663	Maximum = 30.663	Maximum = 22.652
Team 12	Median = 13.922	Median = 13.922	Median = 14.544
	Minimum = 2.514	Minimum = 2.514	Minimum = 8.702
	Maximum = 46.298	Maximum = 46.298	Maximum = 34.558

Team 13	Median = 13.162	Median = 10.041	Median = 16.049
	Minimum = 2.044	Minimum = 2.044	Minimum = 5.166
	Maximum = 71.768	Maximum = 71.768	Maximum = 32.597

App 8. Results of Salivary Cortisol Sorted by each Dog

	All Days	Control Days	Therapeutic Settings
Dog 1	Median = 2.624	Median = 2.232	Median = 2.837
	Minimum = 0.798	Minimum = 1.202	Minimum = 0.798
	Maximum = 5.494	Maximum = 2.917	Maximum = 5.494
Dog 2	Median = 0.769	Median = 1.228	Median = 0.662
	Minimum = 0.003	Minimum = 0.439	Minimum = 0.003
	Maximum = 2.746	Maximum = 2.428	Maximum = 2.746
Dog 3	Median = 1.304	Median = 1.058	Median = 1.566
	Minimum = 0.047	Minimum = 0.497	Minimum = 0.047
	Maximum = 3.566	Maximum = 1.956	Maximum = 3.566
Dog 4	Median = 2.737	Median = 1.939	Median = 3.149
	Minimum = 0.047	Minimum = 0.047	Minimum = 1.122
	Maximum = 48.412	Maximum = 6.182	Maximum = 48.412
Dog 5	Median = 6.089	Median = 10.768	Median = 5.527
	Minimum = 0.276	Minimum = 2.362	Minimum = 0.276
	Maximum = 47.536	Maximum = 30.555	Maximum = 47.536
Dog 6	Median = 15.594	Median = 2.743	Median = 17.931
	Minimum = 0.514	Minimum = 0.903	Minimum = 0.514
	Maximum = 91.622	Maximum = 36.89	Maximum = 91.622
Dog 7	Median = 2.277	Median = 2.277	Median = 2.196
	Minimum = 0.003	Minimum = 0.124	Minimum = 0.003
	Maximum = 8.26	Maximum = 8.26	Maximum = 7.591
Dog 8	Median = 1.812	Median = 0.987	Median = 2.181
	Minimum = 0.715	Minimum = 0.715	Minimum = 1.064
	Maximum = 8.174	Maximum = 1.26	Maximum = 8.174
Dog 9	Median = 2.619	Median = 2.063	Median = 2.678
	Minimum = 0.818	Minimum = 0.818	Minimum = 0.878
	Maximum = 5.912	Maximum = 5.912	Maximum = 5.193
Dog 10	Median = 2.163	Median = 1.219	Median = 3.309
	Minimum = 0.588	Minimum = 0.588	Minimum = 1.224
	Maximum = 25.925	Maximum = 2.793	Maximum = 25.925
Dog 11	Median = 1,5	Median = 2.863	Median = 1.472
	Minimum = 1.039	Minimum = 1.039	Minimum = 1.039
	Maximum = 7.616	Maximum = 7.616	Maximum = 4.619
Dog 12	Median = 1.864	Median = 2.146	Median = 1.788
	Minimum = 0.064	Minimum = 1.633	Minimum = 0.064
	Maximum = 4.577	Maximum = 3.075	Maximum = 4.577

Dog 13	Median = 0.5	Median = 1.942	Median = 0.0745
	Minimum = 0.003	Minimum = 0.014	Minimum = 0.003
	Maximum = 17.246	Maximum = 14.083	Maximum = 17.246
Dog 14	Median = 0.779	Median = 1.469	Median = 0.284
	Minimum = 0.003	Minimum = 0.439	Minimum = 0.003
	Maximum = 11.887	Maximum = 2.047	Maximum = 11.887
Dog 15	Median = 1.723	Median = 1.632	Median = 1.859
	Minimum = 0.506	Minimum = 0.881	Minimum = 0.506
	Maximum = 12.127	Maximum = 3.489	Maximum = 12.127
Dog 16	Median = 0.828	Median = 1.146	Median = 0.282
	Minimum = 0.003	Minimum = 0.003	Minimum = 0.003
	Maximum = 1,685	Maximum = 1.685	Maximum = 1.141
Dog 17	Median = 2.204	Median = 1.956	Median = 2.204
	Minimum = 0.003	Minimum = 0.262	Minimum = 0.003
	Maximum = 4.047	Maximum = 2.785	Maximum = 4.047
Dog 18	Median = 1.295	Median = 1.306	Median = 1.284
	Minimum = 0.003	Minimum = 0.003	Minimum = 0.003
	Maximum = 3.912	Maximum = 2.539	Maximum = 3.912

Curriculum Vitae

(A) Personal Information:

Full Name:	Haubenhofer, Dorit Karla
Born:	18 – 09 - 1979 in Graz, Austria
Nationality:	Austria
Academic title:	Magistra rer.nat.

(B) Education and Studies:

09/ 1990 - 06/ 1997:	High school in Graz, Austria, graduation paper about the ethology of cats. Date of graduation June 18th, 1997.
10/ 1997 – 07/ 2000:	Study at the Karl-Franzens- University in Graz: Biology, English and Spanish (1 year).
10/ 2000:	Immatriculation at the University of Vienna: Biology (Zoology: main topic Animal Ethology/ Anthropology: main topic Social Anthropology).
04/ 2002 - 10/ 2003:	Writing of the Master's Thesis '*Intensity of stress levels of humans and dogs during their training for the work in Animal-Assisted Therapy'* at the Institute for Anthropology in Vienna;
25/ 11/ 2003:	Master's Degree of Biology (Zoology and Anthropology).
11/ 2003 – 07/2005:	Writing of the Doctoral Thesis '*Situation Study of Humans and Companion Dogs Working as Teams in Animal-Supported Therapy. Description of their Personality and Search for Work-Related Strains on the Basis of Cortisol Measurement in Saliva'* at the Institute for Anthropology in Vienna.