



**THE DETERMINATION OF PLASMA
ADRENOCORTICOTROPIC HORMONE DURING
THE TREATMENT OF WOMEN EXPERIENCING
DOG PHOBIA**

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Submitted in partial fulfilment for the
requirements for the degree Magister Scientiae
in the Department Veterinary Production and Ethology,
Faculty of Veterinary Science,
University of Pretoria

1999

DECLARATION

I herewith declare that the thesis submitted for the degree Magister Scientiae at the University of Pretoria has not previously been submitted for a degree at another University and that it is my own work.

WA Hoffmann



Breton de la Rivière. Sympathy. Oil on canvas, 1871, in the collection at the Royal Holloway and Bedford New College, University of London, Egham, Surrey (Rowan, 1988:124)

To my family, for your support

ACKNOWLEDGEMENTS

1. Prof JSJ Odendaal, Dept Veterinary Ethology, Faculty of Veterinary Science, University of Pretoria
My greatest appreciation to Prof Odendaal who provided the initial inspiration for this study. His enthusiasm and support throughout the highs and lows of this study speak volumes for his professional and personal character.
2. Prof D du Toit, Dept of Biological Sciences, Faculty of Natural Sciences, Technikon Pretoria
His contribution as a mentor for my personal and professional development is greatly appreciated. He gave me the opportunity to pursue my interest in psychology within the context of natural sciences.
3. Mr L Human, Dept of Psychology, University of Pretoria
His inputs and supervision as psychologist contributed greatly to the multidisciplinary character of this study.
4. Frikkie and Sonia van Kraayenburg, Grehenheim German Shepherds, Pretoria
A special word of thanks to Frikkie and Sonia who was willing to participate in this study despite a very full program. Their offer to use Quando, a South African champion German Shepherd, as the dog stimulus, deserves special mentioning.
5. Me S Kloppers, Technikon Clinic, Technikon Pretoria
To Sarina, thanks for her support during the collection of blood samples during the study. She was always friendly and professional in her handling of the students.

6. Dr A Lourens, Statistical Support and Strategic Research Service, Technikon Pretoria
Her inputs in the design of the study, as well as her very effective statistical analyses of the data, proved to be very valuable to the study.
7. Dept of Chemical Pathology, Drs Niehaus and Botha Pathologists, Pretoria
Hannes Marais and the technologists in his laboratory is sincerely thanked for the biochemical analysis of the plasma samples. His offer to perform the analyses at cost price, is especially appreciated.
8. Faculty Research Committee, Faculty of Natural Sciences, Technikon Pretoria
Their substantial financial support made the execution of this project possible.
9. The Triune God, for giving me talents, opportunities and loyal friends.

OPSOMMING

Die sosiale en sielkundige belangrikheid van mens-dier interaksies kan moeilik oorskat word. Tot op hede het mens-geselskapsdier studies hoofsaaklik gefokus op positiewe aspekte en interaksies, terwyl diere fobie studies byna eksklusief gefokus het op spinnekop- en slangfobie. Die probleem met negatiewe mens-dier interaksies in die algemeen, en dierefobie spesifiek, is in essensie 'n oppervlakkige verstaan van die bepaling van fisiologiese veranderinge en parameters wat geassosieer word met die beskrywing en behandeling daarvan. Die hoofokus van hierdie studie was om teoretiese en fisiologiese inligting te verskaf aangaande die bepaling van 'n biochemiese parameter wat aangewend kan word vir die effektiewe diagnose en behandeling van individue wat aan hondfobie ly.

'n Trimodale benadering is gevolg om die ang en vrees response wat met hondfobie geassosieer word, te beskryf. Proefpersone is in twee groepe ingedeel: 'n eksperimentele groep van dames wat ly aan hondfobie, en 'n kontrole groep. Die studie het uit drie eksperimentele fases bestaan: die eerste fase (rustende fase) het basislynwaardes gemeet, die tweede fase (preïntervensie fase) het waardes gemeet in die teenwoordigheid van 'n hondstimulus voor aanvang van die intervensieprogram, en die derde fase (postïntervensie fase) het waardes gemeet in die teenwoordigheid van 'n hondstimulus na voltooiing van die intervensieprogram. Kognitief-affektiewe aspekte is inisiël gemeet deur middel van die Vrees Opname Vraelys. Gedurende die eksperimentele fases is dit gemeet deur middel van 'n angsskaal en stressorvraelys. Motor-gedrag aspekte is bepaal deur meting van die termineringsafstand tydens die hondnaderingstoets gedurende die pre- en postïntervensie fases. 'n Sielkundige het nie-verbale gedrag gedurende die naderingstoets geëvalueer deur middel van direkte waarneming. Die meting van fisiologiese aspekte het gefokus op die bepaling van die plasmavlakke van adrenokortikotropiese hormoon (ACTH) gedurende die eksperimentele fases.

Die belangrikste resultate was die volgende:

- die eksperimentele groep het betekenisvol hoër gemiddelde tellings as die kontrole groep gehad vir die dier, hond, bloed/inspuiting en totale vrees kategorieë van die Vrees Opname Vraelys;
- die intervensieprogram was effektief vir die behandeling van motor-gedrag en kognitief-affektiewe aspekte van die hondedefobierespons;
- die effek van die intervensieprogram op die plasma ACTH-vlakke was onduidelik. Geen betekenisvolle verskille is gevind tussen die eksperimentele groep se gemiddelde plasma ACTH-vlakke gedurende enige van die eksperimentele fases, of tussen die eksperimentele en kontrole groep gedurende die rustende en preïntervensie fases. Die gemiddelde plasma ACTH-vlakke van die kontrole groep was betekenisvol laer as dié van die eksperimentele groep gedurende die postintervensie fase;
- die totale waardes van die stressorvraelys suggereer dat proefpersone in die eksperimentele groep 'n predisposisie vertoon om in die algemeen meer angstig en vreesagtig te wees as proefpersone in die kontrole groep;
- die aanvangouderdom van hondedefobie varieer vanaf kleutertyd tot 20-jarige ouderdom;
- twee-derdes van die hondedefobie proefpersone het klassieke kondisionering gerapporteer as die etiologiese meganisme;
- verskeie ouditoriese en visuele kenmerke het na vore gekom as die persepsiefokuspunt by persone wat ly aan hondedefobie; en
- 'n poststudie het die effektiwiteit van die intervensieprogram bevestig. Die

eksperimentele groep het hul huidige kwalitatiewe vreesvlak vir honde as beduidend laer geëvalueer as aan die begin van die projek.

Die gevolgtrekking van die studie is dat die bepaling van plasma ACTH-vlakke as 'n enkele parameter nie genoegsame ondersteuning verskaf vir die komplekse interaksie tussen overte motor-gedrag, kognitief-affektiewe en fisiologiese patrone gedurende die behandeling van dames wat ly aan hondefobie nie.



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ABBREVIATIONS

ACTH	adrenocorticotrophic hormone
ANS	autonomic nervous system
AR	applied relaxation
BAT	behavioural approach test
BFS	behavioural facilitation system
BIS	behavioural inhibition system
BPM	beats per minute
CNS	central nervous system
CS	conditioned stimulus
DA	dopamine
df	degrees of freedom
DSM-IV	Diagnostic and Statistical Manual (fourth edition)
DZ	dizygotic
EDTA	ethylenediamine tetraacetic acid
EMG	electromyographic
FSS	Fear Survey Schedule
GABA	gamma-aminobutyric acid
GH	growth hormone
HYPAC	hypothalamic-pituitary-adrenal cortex
ICD-10	International Classification of Diseases and Related Health Problems (10 th edition)
MZ	monozygotic
NA	noradrenaline
OST	one-session treatment
PVN	paraventricular nuclei
RAS	reticular activating system
RF	reticular formation



SON supraoptic nuclei
UCS unconditioned stimulus

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND AND MOTIVATION

The field of study known as veterinary ethology includes a branch which focusses on human-companion animal interaction. The interaction between human and companion animal ranges from positive interaction, no interaction to negative interaction (Vermeulen & Odendaal, 1993:249). Most studies on human-companion animal interaction have focussed on the positive aspects, while studies on animal phobia have almost exclusively focussed on spider and snake phobia.

A specific phobia is a strong, persistent and unwarranted anxiety of some specific object or situation. Panic attacks often occur when the person encounters the phobic stimulus. Attempts to avoid the object or situation notably interfere with the individual's life. The person realises that the anxiety and fear response is excessive. An animal phobia is a subtype of specific phobias which is characterised by an extreme anxiety of a specific kind or group of animals (Sue, Sue & Sue, 1994:171, 174-179).

Physiological studies indicate that neuropeptides have an important physiological role in the regulation of behaviour and emotional tone. The term "neuropeptide" refers to a group of peptides originally described in other physiological contexts as hormones or growth factors. The neuropeptides share a communication principle, with receptors serving as targets for circulating levels of neuropeptides produced at other loci in the brain and body. This intercellular communication network extend from the brain to the endocrine and immune systems. Therefore, integrating the

internal milieu of the whole organism. The patterns of neuropeptide receptor distribution in mood regulating areas of the brain and their communication role throughout the whole organism makes neuropeptides strong candidates for the biochemical mediation of emotion (Pert, Ruff, Weber & Herkenham, 1985:820, 823-824).

Few studies have till now described and dealt with the role of neuropeptides in animal phobia. However, various researchers suggest that serotonin, adrenaline, noradrenaline, adrenocorticotrophic hormone, vasopressin, oxytocin and β -endorphin play an important role in the general stress response (Carter & Altemus, 1997:166; Depue & Spoont, 1986:54; Egan, Carr, Hunt & Adamson, 1988:287; Marks, 1987:198-200, 203; Meyer, Meij & Meyer, 1997:18.36; Uvnäs-Moberg, 1997:149-153).

1.2 PROBLEM STATEMENT

The overt behavioural patterns of animal phobia are relatively well-known in the field of psychology. The problem with negative human-animal relationships is in essence a superficial understanding of the determination of physiological changes and parameters associated with its description and treatment. Trimble (1996:168) states the following with regards to biological psychiatry:

“To date there are few hormonal investigations of patients with ... neuroses”.

If an indication of neuropeptide patterns and changes can be found, some of the behavioural aspects will be accounted for and could provide physiological markers for successful treatment. Also, an evaluation and description of the process involved in the determination of neuropeptide patterns will provide a multidisciplinary protocol

for physiological studies of phobic behavioural patterns in humans.

1.3 HYPOTHESIS

If biochemical parameters, such as ACTH, can support overt motor-behavioural and cognitive-affective patterns and changes during pre- and posttreatment of persons suffering from animal phobia, this will provide an objective measure for effective diagnosis and treatment.

1.4 AIM AND OBJECTIVES

The general aim is followed with some specific objectives for the study.

1.4.1 General aim

The main aim of the study is to provide theoretical and physiological information on the determination of plasma ACTH-levels as a biochemical marker regarding psychopathological human-animal interactions which could enhance effective diagnosis and treatment of individuals suffering from animal phobia.

1.4.2 Specific objectives

In order to investigate the relationship between the diagnosis and treatment of animal phobia, and the determination of biochemical indicators, the following objectives are stated:

- to provide an overview of existing knowledge on human-companion animal interaction and human-dog interaction as introductory themes for interaction studies;

- to provide an overview of existing knowledge on the descriptive characteristics, etiology and treatment of specific phobias (animal type);
- to provide an overview of existing knowledge on the role of the central nervous system and endocrine system in specific phobia responses;
- to describe a methodology for assessing changes in plasma ACTH-levels associated with negative human-animal interactions during pre- and postintervention, in order to support the theoretical framework presented in chapters two to four;
- to describe a methodology for the treatment of specific phobia (animal type) in general, and dog phobia in particular;
- to discuss the results of the experimental investigation and intervention program;
- to indicate the implications of this study, and how these can be applied to the phenomenon of specific phobia (animal type) in general, and dog phobia in particular;
- to make recommendations based on this study.

The following chapter deals with human-animal interaction.

CHAPTER 2

HUMAN-ANIMAL INTERACTION

2.1 INTRODUCTION

It is difficult to overestimate the significance of human-animal interactions in the social and psychological life of humans. Ever since the earliest times there were interactions between the hominid family, animals and the natural environment. Art created during the dawn of humankind were primitive drawings and paintings depicting people with animals. Many cave paintings of animals are records of respect, nurturance and admiration. Also, primitive people found that human-animal partnerships were important to their well-being and general health. Today, images of animals are found just about anywhere - language, religion, dreams, television and folklore (Bustad, 1991:233-234; Robinson & Tiger, 1991:xxiii).

The human-animal relationship contributes fundamentally to humankind's history and development. Humans have transformed other species to meet their own needs for food, power, mobility and companionship. This is evident in the ways that dogs have enhanced humans' hunting abilities, how oxen have provided work power, and how horses have provided mobility for the exploration and conquest of new frontiers (Robinson & Tiger, 1991:xxii).

The "human-animal relationship" concept refers to a transpecies relationship involving primarily a non-linguistic engagement between them. A positive relationship involves an enduring emotional and ethical commitment, as well as a mutual, but not necessarily equal, responsibility for one another. The needs of each member of the relationship are fulfilled to the extent of their inherent and learned

abilities. In order for bonding to occur, it seems that the animal must be able to perform some kind of satisfying act of a self-reinforcing nature with the bonded person. The pay-off may meet needs for love, attachment, nurturance and attention (Bustad, 1991:233, 253; Odendaal, 1999:iv).

2.2 HISTORICAL PERSPECTIVE AND DOMESTICATION

The interactions between humans and animals for the past thousands of years have many remarkable and interesting aspects. There were difficult times for animals, sometimes marked by intense cruelty and ostracism. Yet, in every age there also seem to be evidence of strong relationships between humans and a variety of animals. Throughout history, art, literature, music, magic and religion have reflected the central role of the human-animal relationship, both positive and negative, in human life. Ancient Egyptian hieroglyphics featuring a wide range of mammals, birds and insects, are just one example of this central role (Bustad, 1991:252-253; Robinson, 1991:291-292).

The original relationship between humans and animals is thought to have been a predator-to-prey or hunter-to-hunted interaction which could have fluctuated from humans being the hunter to being the hunted. Thus, animals engendered fear and respect as well as a sense of hunger in humans (Robinson, 1991:291).

The ancient Greeks had four different schools of thought on the nature of animals. The animists held that animals and humans share souls of the same kind. In contrast, the mechanists held that both humans and animals lack souls and are nothing more than machines. The vitalists, held that animals have souls, but that it is not as advanced as that of humans. However, the largest group believed that animals have been placed on earth for human use and benefit (Rowan, 1988:9; Rowan, 1991:284).

The views of the early Christian Church was influenced by classical Greek and Roman ideas which were actively rejected as being “pagan”. The earliest church fathers formulated the Christian view by establishing a principle of qualitative differences between humans and animals. They concluded that animals lack reason and would therefore not participate in the promise of an afterlife. Despite this view, a prodigious number of animal representations is found in early Christian manuscripts, stained-glass windows, tapestries and other art objects (Hume, 1957:26; Salisbury, 1994:4-5).

This view was not shared by all, as St.Chrysostom (A.D. 347-407), an early church father, wrote:

”The Saints are exceedingly loving and gentle to mankind, and even to brute beasts... surely we ought to show them great kindness and gentleness for many reasons, but, above all, because they are of the same origin as ourselves...” (Hume, 1957:26).

During the Middle Ages (circa 400 A.D. to 1 400 A.D.) thinkers in western Europe moved away from the view that animals are qualitatively different from humans to a view that humans have more in common with animals than most would like to admit. However, they pointed out that animals were free to go and do what they liked, not like humans which were expected to abide to social norms. Since animals were believed to lack the ability to make rational decisions, all animal behaviour was attributed to instinct. This lead to the formulation of a belief in the “natural” dominion of humans over animals. It also found support in the biblical creation myth - i.e. that Adam had been given dominion over all animals. It was also believed that humans cannot show charity or friendship towards animals, as animals were not regarded as rational creatures, while friendship and fellowship was thought to be

primarily based on reason (Salisbury, 1994:2, 5-7, 11).

During the Renaissance (onset in the 15th century), the tendency to increased urbanisation led to an economy in which people lived away from animals and regarded them as expendable objects. Throughout this period, extremely brutal sports with animals (e.g. cock-throwing in which sticks were thrown at a fowl tied to a post) also coincided with public brutality to human beings (e.g. torture, burning of heretics and witch-hunting). The rise of humanism tended to dethrone God and put humans in God's place - i.e. humans became the centre of the universe and the object of its own worship. Also, animals were not valued except in so far as they provided humans with food, labour and entertainment. During this period of anthropocentric humanism, animals had no rights against the supreme human dominance (Hume, 1957:30-31).

In the early 17th century, Descartes (1596-1650) argued that animals have no souls, intellect or language, and are therefore no more than machines. This meant that animals were regarded as having no moral status. Thus, humans could do with animals what they wished. The notion that animals had no feelings was an important rationalisation in the development of a mechanistic and technocratic worldview. Ironically, during this period it was not uncommon for animals to be put on trial for committing criminal acts (e.g. murder). Human intellect was glorified and the virtue of human reason was believed to be the primary characteristic setting humans apart from animals. Also, it was concluded that animals could not experience any human sensations, feelings and emotions (Hume, 1957:32; Rowan, 1991: 284; Salisbury, 1994:3).

The following quote vividly illustrates this attitude:

”... (anatomists who followed Descartes) ... administered beatings to dogs with perfect indifference, and made fun of those who pitied the creatures as if they had felt pain. They said animals were clocks; that the cries emitted when struck, were only the noise of a little spring which had been touched, but the whole body was without feeling” (Salisbury, 1994:3).

In the 18th century England, people gradually became more sympathetic to the needs and value of animals. Animals were not considered to be equal with humans, but they were considered to be worthy of moral concern as a result of being able to suffer pain. The 18th century Christian revival in Great Britain demanded the prevention of cruelty to animals (Hume, 1957:33; Rowan, 1991: 285).

Only towards the end of the 18th century and early 19th century did the realisation dawned that humans and animals share sensations (e.g. pain) and emotions. Darwinism proved to be one of the most influential modern viewpoints to undermine the idea that human life has a special, unique worth not shared with animals. Charles Darwin provided a scientific basis for what St. Chrysostom had asserted on religious grounds, namely that animals “...are of the same origin as ourselves” (Hume, 1957:34; Salisbury, 1994:2-3).

In the modern era, animals have, in a certain sense, been made more “human” to the extent that animals are being portrayed in a human way (i.e. with compassion and emotions traditionally associated with humans) in cartoons, television and films (e.g. Mickey Mouse and Lassie). Also, companion animals are being treated with very much the same care as humans. However, at the same time there have been a serious fracture in most human-animal interactions. Industrialisation, urbanisation and

mechanisation have had a severe impact on these interactions. Many people have no daily association with animals, more people are living alone and fewer people are having children. This reduction in objects for nurture and the ensuing widespread loneliness have resulted in certain animals becoming increasingly more important to people as companion animals (Bustad, 1991:234, 244; Salisbury, 1994:2-3).

“Domestication” refers to a process where the care, feeding, movement and breeding of animals is primarily under human control. Domesticated animals are subjected to strict breeding selection and denied free choice of mates. Domestic animals were initially bred to serve specific advantageous functions for humans (e.g. as property and source of food) (Bustad, 1991:236; Odendaal, 1988:21; Salisbury, 1994:17, 34; Woloy, 1990:7).

“Animals belong to people” was one of the earliest principles governing the relationship between humans and animals. People’s dominion over animals were expressed physically in this ownership relationship. The first human ownership of animals was established when dogs were domesticated and bred to participate in hunting activities. This was followed by food animals (e.g. sheep, goats, pigs and cattle) being enclosed and bred instead of humans relying on hunting (Katcher & Beck, 1991:265; Salisbury, 1994:13, 16).

2.3 BASIC ATTITUDES TOWARDS ANIMALS

The interaction between humans and animals is characterised by a wide variety of attitudes which contribute to its intensity, complexity and often paradoxical nature. Factors such as age, education, urbanisation and social class are but some of the more salient parameters influencing the formation and development of these attitudes. It is also important to acknowledge individual differences in attitudes towards animals (Herzog & Burghardt, 1988:75-76, 83).

Kellert (1988:139-144) describes a number of basic attitudes towards animals which seem to occur across diverse cultures, geographical regions and historical periods. These attitudes describe basic and relatively stable perceptions rather than specific behaviours. The following eight basic attitudes are regarded as relevant to this thesis:

- the humanistic attitude emphasises feelings of strong affection and attachment to individual animals, usually companion animals; emotional projections and companionship are conveyed towards the animal, but the animal is regarded as subhuman due to intrinsic biological differences; empathy for animal emotion and thought typically characterises this perspective;
- the moralistic attitude focuses on the ethically appropriate, human treatment of animals; it is often associated with feelings of strong affection for animals, but its fundamental concern is a philosophical preoccupation with the nature of appropriate human contact with animals (e.g. opposition to perceived exploitation of animals);
- the scientific attitude focuses on the biological and physical characteristics of animals; it regards animals as objects of study and often fosters feelings of emotional detachment;
- the aesthetic attitude emphasises the attractiveness, symbolic value and significance of animals;
- the utilitarian attitude is concerned with the practical and material value of animals - i.e. animals should serve some human purpose and be sources of personal gain;
- the dominionistic attitude focuses on the satisfaction derived from the mastery

and control of animals, e.g. in a sporting context; primarily animals are only valued as challenging opponents which serve to demonstrate human prowess, skill and strength; conquest of the animal signifies superiority and dominance;

- the negativistic attitude is an active dislike of animals; and
- the neutralistic attitude, in contrast to the negativistic attitude, is orientated towards passive avoidance of animals because of indifference.

2.4 DOGS AS COMPANION ANIMALS

The term “pet” implies ownership of property, while the term “companion animal” implies a mutual relationship or “friendship” (Lagoni, Butler & Hetts, 1994:4).

There are large variations in the nature of the relationship with companion animals. At one end, companion animal owners treat them like family members, spend large sums of money on veterinary care and mourn their deaths. At the other end, some people neglect, abandon and even subject them to acts of cruelty (Katcher & Beck, 1991:267).

Often companion animal owners will describe their animals as family members, children, parents, best friends, partners and confidantes. These animals enhance and stabilise the lives of their owners with their constant presence and unconditional love regardless of appearance, feelings and behaviours. This partially explains the reason for the human-animal relationship being among the strongest and most important relationships in the lives of companion animal owners (Katcher & Beck, 1991:267; Lagoni *et al*, 1994:3).

The current interest in the behavioural, physiological and health consequences of the

human-companion animal interaction marks a reassessment of the value assigned to animals and the natural world. It includes a rediscovery of the value of social relationships with animals. Animals and the environment are being given a new utility and value, namely a psychological and social rather than material significance (Katcher & Beck, 1991:275; Odendaal, 1999:iv).

“Attachment” is defined as an affectional relationship that endures over time. Human-animal attachment is influenced by people’s time, activities, affect, knowledge and behavioural responsiveness toward companion animals (Lagoni *et al*, 1994:7).

Strong human-companion animal attachments represent a seemingly paradox. Many companion animal owners are not well-informed about species-typical behaviour patterns of their companion animals and they then tend to anthropomorphise these behaviour patterns. People often attribute human emotions, thoughts and behaviours to animals despite little supportive scientific evidence. The result of anthropomorphism is perceived mutual communication between persons and companion animals (Lagoni *et al*, 1994:10-11; Odendaal, 1988:49).

Dogs were probably the first animals to be domesticated in the Mesolithic Period of human cultural development (10 000 years B.C.). This is supported by archaeological evidence from excavations in Mallaha (Israel) which exposed a human skeleton in close association with the skeleton of a puppy (3-5 months old). The Mesolithic Period was characterised by a shift from the hunting economies of the Ice Age to the hunting-gathering economies in the semi-settled communities following the retreat of the ice caps. These changes allowed for a closer human-animal association. It has been postulated that the domestic dog’s wild canine ancestors were encouraged to accompany early humans on hunting and scavenging expeditions, although it is unlikely that they were domesticated solely for this purpose. Rather, some

researchers postulate that it was probably humans' need to relate to the non-human environment and the ability to include others in their social interactions, that was the key to the bond. Some others claim that the dog is a self-domesticated animal, i.e. the dog took the initiative in its interactions with humans (Bustad, 1991:235-237; Davis & Valla, 1978:608-609; Lagoni *et al*, 1994:8-9; Odendaal, 1988:21-22; Woloy, 1990:7, 9).

Today, attitudes towards dogs differ substantially between different cultures and socio-economic contexts. In some parts of the world dogs are regarded as vermin. The Peking municipal authorities have banned dogs (except police dogs and those bred for meat) as they are considered a danger to health and society. In Russia, there have been calls to destroy all dogs except service animals. The reason for this being that ownership of dogs is perceived as anti-proletarian as tons of food are consumed by animals instead (Rowan, 1988:9-10).

Despite the phenomenon that some societies lack tender care of dogs, in general dogs are closely bonded with people and are usually affectionately cared for and kept until very old. Euthanasia is usually not performed until the dog is moribund. In contrast, a detached relationship exists between people and working dogs and animals used in research. In this case, no strong bonding occurs and it is killed with little hesitation when it is no longer useful (Bustad, 1991:246).

In the modern society, dogs satisfy numerous psychological needs, for example companionship, love, attention, reverence, fashion, art (literature and music), leisure (dog shows, dog races and hunting), child substitutions, family members, stress dischargers and superstitions (witchcraft). In terms of their economic value, dogs play a very important role in the trade of dogs, pet food industry, hunting, protection, labour and scientific experiments (Odendaal, 1988:30, 36; Odendaal, 1999:iv).

2.5 DISCUSSION

The human-animal relationship is a complex transpecies interaction which is influenced by many factors. This interaction is a dynamic one which has changed, and is continuously changing over time, as well as between different socio-cultural groups. The nature of the relationship stretches across an attitude continuum from being highly positive and mutually beneficial, to highly negative (e.g. animal phobias and active hate). The fundamental positive affectional response of humans to animals is clearly visible in the enormous volume of the pet trade, the popularity of natural history programs on television, the bird watching hobby, the attendance at zoos and the growth of the animal liberation movement (Robinson, 1991:314).

In the modern era, the positive human-animal relationship developed many beneficial applications. The general value of the human-animal attachment for individuals (children, adults and aged persons) has only recently been recognised by the scientific and medical fraternity. In addition, human-animal interactions have a great potential for enriching lives and conditions of both people and animals (Bustad, 1991:258).

The human-dog relationship is the oldest known human-companion animal interaction. This explains why this interaction has diversified into many attitude and functional types. The widespread religious and symbolic value of dogs is also an indication of the profound influence of dogs on the lives of many communities and cultures.

The cited literature in this chapter suggests strongly that the human-dog relationship forms an integral part in the lives of many individuals and societies. It also contributes positively to the psychological and physical well-being of many people. Therefore, when people suffer from dog phobia, one can appreciate the “double” negative influence of this psychological disorder on their lives. One being to suffer

from a specific phobic disorder (animal type), the other being deprived of the positive pay-offs of a positive human-dog interaction.

The following chapter deals with specific phobias (animal type).

CHAPTER 3

SPECIFIC PHOBIAS - ANIMAL TYPE

3.1 INTRODUCTION

In order to understand human behaviour and/or behavioural phenomena, two separate but related procedures need to take place, namely description and explanation. From a logical perspective, description comes first - one must be able to describe the phenomenon before one can attempt to explain it. This means that scientists must attempt to make sense of phenomena by offering a detailed description of it - so that others may know *what it is* - and then offering causal explanations for what has been described - so that others may know *why it is* (McAdams, 1995:368).

This approach is followed in this chapter as it initially describes fear behaviour by referring to the definitions of appropriate concepts, followed by a general description of fear-evoking stimuli and the different behavioural strategies employed under different threatening circumstances. As animal phobia is a specific anxiety disorder recognised by psychologists, the most important diagnostic criteria are described in the next section. This is followed by a description of some of the more salient characteristics of animal phobia in terms of gender ratio, age of onset, prevalence, developmental span, animal types, physiological parameters, imagery, anxiety persistence, attentional bias and personality factors. Following the descriptive part of the chapter, the approach changes to one offering causal explanations of specific phobia disorder. The last section deals with a wide variety of treatment perspectives.

3.2 DEFINITIONS

The following definitions are applicable to this study.

3.2.1 Fear

Fear is an emotion experienced as an immediate alarm reaction in response to present realistic dangers or life-threatening situations. It can appear without any previous experience of threat and its strength and structure can be altered by learning to result in new patterns of defensive behaviour. A sharp increase in the reactions of the autonomic nervous system (ANS) is associated with fear which motivates individuals to either escape or attack - the “fight-flight” response. From a biological perspective, the primary aim of this response is to defend the body against harmful or noxious situations, whether actual or anticipated. Fear should not be regarded as a unitary phenomenon, but as a set of behavioural systems - namely the cognitive-affective, physiological and motor-behavioural systems. Thus, fear can be measured on three levels by means of self-reports, physiological responses and overt motor behaviour (Barlow & Durand, 1995:152-153; Costello, 1982:280; Marks & Tobena, 1990:365; Öhman, 1986:124-125).

From a phenomenological perspective, fear must be dealt with as a *lived* emotion. In fear, individuals are confronted with themselves as finite and mortal. The person is caught up in the moment and is only concerned with escape. Thus, the world is revealed as a threatening place. Arcaya (in Kruger 1988:118-119) describes it as follows:

”(during) fear ... time contracts as the future and past are ignored in favor of the immediately perceived situation. As the threatening object nears... space ... is no longer perceived as an

area with multiple possibilities... it is delimited and constricted. The fearsome object encroaches upon his lived space, leaving ... few if no personal boundaries. Moreover, fear severs the subject's interpersonal bonds... he often experiences himself to be alone... he is stuck in the present with no creative possibilities”.

3.2.2 Anxiety

Anxiety is a mood state in which the person experiences negative affect and somatic symptoms. In contrast to fear which is a present-orientated emotional reaction to current danger, anxiety is a future-orientated mood state that seems to help individuals plan for the future. Anxiety manifests in cognitions (e.g. preoccupation with perceived danger), behaviours (e.g. worried facial expression) and physiological responses (e.g. elevated heart rate) (Barlow & Durand, 1995:151-152; Sue *et al.*, 1994:163).

3.2.3 Panic

Panic is a sudden and overwhelming experience of intense fear for a real or perceived threat. The fourth edition of the American Psychiatric Association's Diagnostic and Statistical Manual (DSM-IV) (Barlow & Durand, 1995:155) defines a panic attack as follows:

“... a discrete period of intense fear or discomfort, in which at least four of the following symptoms developed abruptly and reached a peak within 10 minutes: palpitations, pounding heart or accelerated heart rate; sweating; trembling or shaking;

sensations of shortness of breath or smothering; feeling of choking; chest pain or discomfort; nausea or abdominal distress; feeling dizzy, unsteady, lightheaded, or faint; derealisation or depersonalization; fear of losing control or going crazy; fear of dying; paresthesias; and chills or hot flushes”.

Panic is often associated with frantic attempts to escape from the situation. Three basic types of panic attacks are recognised: situationally bound panic attacks which occur only in situations that the individual fully expect it, e.g. just before or during exposure to a feared stimulus; unexpected panic attacks which occur in situations without any recognisable cue, i.e. it occurs spontaneously and without warning; and situationally predisposed panic attacks which are more likely to occur in certain situations but are not certain to occur, i.e. it occurs usually but not always in the presence of the feared stimulus (Barlow & Durand, 1995:153-155; Sue *et al.*, 1994:163).

3.2.4 Phobia

A phobia is an excessive, persistent and unwarranted anxiety or a feeling/perception of fear for a specific object or situation. This anxiety and fear cannot be reasoned away, is largely beyond voluntary control and leads to avoidance of the specific situation. The phobic person may be quite aware that the specific situation is actually innocuous, as well as to recognise the avoidance behaviour as rationally unfounded. However, phobics remain unable to consciously control their fear, appear to be helpless victims of their automatically elicited anxiety, and revert to escape and avoidance strategies. Phobic avoidance can be maintained long after the aversive stimulus has ceased to be applied. In some cases, the aversive stimulus is applied only once but phobic avoidance develops and persists for many years, even a lifetime

(Gorman, Liebowitz, Fyer & Stein, 1989:155-156; Marks, 1987:5; Öhman & Soares, 1993:121&129; Sue et al, 1994:171).

3.3 THE FEAR RESPONSE

“Stress” refers to the responses elicited by physical or psychological events that an individual perceives to be harmful or emotionally upsetting. In response to either physical or psychological danger, the individual feels threatened and tries to cope with the situation. Coping behaviour is regarded as successful if it reduces or eliminates the threat (Baron & Byrne, 1994:550).

Fear responses develop as adaptations to protect the organism against perceived or realistic threats from the environment. Defensive systems consist of a number of functional and structural components, namely sensory components, motor components, hormonal processes, central and peripheral neural processes. The human cerebral cortex has developed the capacity to consciously evaluate and resolve fear, as well as to learn new fear responses very quickly and keep it intact for a lifetime (Marks, 1987:14-15, 17; Porges, 1997:65).

Fear is characterised by a combination of reactions that occur simultaneously or sequentially. These reactions include motor-behavioural expressions, physiological changes, cognitive thoughts and emotions. Several behaviour patterns are associated with fear, namely tendencies to freeze, flee, escape, fight, negotiate, hide away, capitulate, camouflage and defuse the situation. The physiological changes have a sympathetic basis which include a pale sweaty skin, hair erection, dilation of pupils, rapid breathing, increased heart rate, elevated blood pressure and increased perfusion of skeletal muscles. The endocrinological and neurological patterns of fear are discussed in Chapter 4. A number of negative emotions are also associated with strong fear (e.g. feelings of terror and an urge to escape or hide, and anger) (Di Nardo,

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Guzy & Bak, 1988:250; Marks, 1987:4).

Fear is evoked by stimuli which are sudden, intense, irregular, rapidly increasing or novel. Proximity, approach or movement may also serve as sources of potential fear in humans. Input to any of the sensory receptors can be perceived as a potential stimulus to evoke fear behaviour. Hearing and vision are the dominant sensory cues influencing human behaviour. On the other hand individuals are influenced to a lesser extent by smell, taste and touch stimuli - just think about the reactions elicited by the angry buzzing of various insects, compared to the rather passive reactions elicited in response to aversive smells (Marks, 1987:45-52).

Withdrawal and immobility are the primary defensive strategies in potential dangerous situations, while aggressive defence may be utilised when these are not effective. Only when a predator's attack can not be prevented will appeasement be used. The degree and type of danger will determine the strategy or combination of strategies to be used, as well as the intensity of those responses (Marks, 1987:51, 93).

Withdrawal manifests in flight, escape or avoidance and is usually quite rapid. Active escape from threat relies on the presence of telereceptors (eyes and ears) to perceive danger well in advance and avoid it rather than waiting for direct contact before attempting to escape. A sophisticated nervous system allows individuals to interpret and compare stimuli, as well as to initiate appropriate somatic and physiological actions. Active withdrawal includes running, jumping, swimming or sudden movements which continue until the pursuing predator gives up the chase or the individual reaches perceived safety. Passive avoidance refers to situations where the individual ceases to approach a feared stimulus (Marks, 1987:55-56, 92; Porges, 1997:64).

Immobility is used when active withdrawal from danger is not possible or feasible.

Two types are recognised, namely attentive and tonic immobility. Attentive immobility (freezing) means that an alerted individual remains motionless and monitors the source of danger by being very vigilant to sounds and visual images from the environment. The individual remains ready for instantaneous fight or flight. Freezing may last from a few seconds to several minutes, and may cease gradually or end abruptly in flight. Tonic immobility refers to an extreme fear reaction in which the individual is “paralysed with fear” and unresponsive to intense stimulation. It is also known as akinesis, terror paralysis, paroxysmal inhibition, mesmerism, feigned death and catalepsy. In animal studies the following autonomic changes have been noted: pupillary dilation, lowered body temperature, an initial increase in respiration and heart rate subsequently followed by apnea and bradycardia. Onset of tonic immobility may be very sudden with an apparent motor collapse. Recovery from this condition often occurs rapidly and is followed by escape or attack. It seems from electroencephalogram studies that behavioural inhibition is a motoric mechanism, and not a sensoric mechanism, as perception of stimuli stays intact. The adaptive value of tonic immobility is based on the principle that movement usually triggers attack by predators. The following features were reported by humans after experiencing tonic immobility due to attacks by wild animals, war or rape: profound motor inhibition; tremors; inability to call out or scream; no loss of consciousness; apparent analgesia and numbness; reduced core body temperature; sudden onset and remission of paralysis; aggressive reactions at termination; and frequent inhibition of the predator’s attack (Marks, 1987:58-69; Porges, 1997:62, 66, 74-75).

Aggressive defence is usually displayed when an individual is close to being attacked by a predator. When approached by a predator many organisms will adopt a characteristic body posture to intimidate, startle, warn or mislead the predator. These displays may cause the predator to hesitate, which increases the chance to escape or flee from the situation. During defensive behaviour a prey individual may also attempt to focus the attack away from itself or to some less vulnerable part of its own

body (deflection) (Marks, 1987:69-72).

Appeasement is mainly used to inhibit attack from a threatening conspecific and/or when escape is disadvantageous. This strategy often fails when focussed towards a predator of another species. Appeasement is a regular feature of human behaviour, e.g. giving gifts to prevent anger, religious sacrifice, superstitious taboos and submissive behaviour in dominant marriage relationships (Marks, 1987:76-81).

Fear should be regarded as an emotional response syndrome which consists of a combination of factors, e.g. typical evoking stimuli, response patterns and courses. Three broad groups of response patterns are recognised: cognitive-affective (appraisal and sensation of danger), motor-behavioural (actions) and physiological (internal changes that mobilise the body for action). The quality and content of fear response patterns are determined by inherent (evolutionary), social, and personal factors and experiences. The cognitive-affective, motor-behavioural and physiological features of fear may all be present in a specific fear response to danger, i.e. congruent. However, there are several possible combinations of different components being present or absent in a fear response, i.e. incongruence between the components. An example would be a person claiming to feel frightened, yet without any physiological changes and appearing to be calm. The different patterns of congruence or incongruence may reveal information of the fear response itself, or about an individual's style of interacting with his/her environment (e.g. repression of feelings, simulation of fear, conforming to cultural values, malingering). Different components of the fear response may be triggered by different conditions and stimuli. Therefore, each fear response consists of a unique combination and intensity of these components. Thus, no single component is an undoubted sign of fear. Rather, the fear response is evaluated in terms of its structure and appropriateness in a given situation. Also, individuals may vary in their fear responses during different emotional states, contexts and developmental range (Marks, 1987:7-10).

3.4 DIAGNOSIS OF ANXIETY DISORDERS

Anxiety disorders are amongst the oldest recognised and most common of the emotional disorders. The diagnosis of an anxiety disorder is only applicable on conditions where excessive anxiety negatively influences the individual's social or occupational functioning, or produce significant personal distress (Barlow & Durand, 1995:152; Reich, 1986:129; Sue *et al*, 1994:162).

According to the DSM-IV, one of the following criteria must be met for a diagnosis of anxiety disorder:

- the anxiety itself is the major disturbance, but unfocused or free-floating - e.g. panic disorder and generalised anxiety disorder; or
- the anxiety only manifests when the person encounters a particular situation - e.g. specific phobias; or
- the anxiety results from attempts to overcome obsessions and/or compulsions - e.g. obsessive-compulsive disorder; or
- the anxiety results from exposure to an extraordinary psychological or physical trauma - e.g. posttraumatic stress disorder (Barlow & Durand, 1995:165; Sue *et al*, 1994:164-165, 182, 189).

Individuals suffering from an anxiety disorder can usually go about most of the day-to-day business of living. Usually they are aware of the illogical and self-defeating nature of their anxious behaviours, but seem unable to control it. A preoccupation with this anxiety may result in emotional distress, maladaptive behaviours and disrupted interpersonal relationships (Sue *et al*, 1994:163).

3.4.1 Phobic disorders

Phobias have in the past been known as “muscular exhaustion of the heart”, irritable heart, cardiac neurosis, nervous exhaustion and anxiety neurosis (Reich, 1986:129).

Phobic disorders can be classified into endogenous and exogenous phobic anxiety. Endogenous phobic anxiety refers to a condition where individuals experience spontaneous panic attacks in addition to phobic symptoms (e.g. agoraphobia), while exogenous phobic anxiety refers to a condition where no spontaneous panic attacks are experienced (Sheehan, Sheehan & Minichiello, 1981:547).

The DSM-IV distinguishes three categories of phobias: agoraphobia - an intense, irrational fear of being trapped in public places where escape or help may not be readily available; social phobia - an intense, excessive fear of being scrutinised in social situations; and specific phobias - an extreme fear of a specific object or situation (Sue *et al*, 1994:171, 173-174).

The 10th edition of the International Classification of Diseases and Related Health Problems (ICD-10) classifies “Phobic anxiety disorders” under the category “Neurotic, stress-related and somatoform disorders”. This subcategory is characterised by anxiety which is evoked by certain well-defined situations or objects which are not currently dangerous. The anxiety is not relieved by the knowledge that other people do not regard the situation in question as dangerous or threatening. Mere contemplation of exposure to the phobic situation usually generates anticipatory anxiety. These situations or objects are characteristically avoided or endured with dread (World Health Organization, 1992:132, 134).

3.4.1.1 Specific phobic disorders

According to the DSM-IV (Barlow & Durand, 1995:177-178; Sue *et al*, 1994:174), the diagnostic criteria for specific phobia disorder are as follow:

- marked and persistent anxiety that is excessive or unreasonable, cued by the presence or anticipation of a specific object or situation;
- exposure to the phobic stimulus almost invariably provokes an immediate fear response, which may take the form of a situationally bound or situationally predisposed panic attack;
- the person recognises that the anxiety and fear is excessive or unreasonable;
- the phobic situation(s) is avoided or else is endured with intense anxiety or distress;
- the avoidance, anxious anticipation, or distress in the specific situations interferes significantly with the person's normal routine, occupational (or academic) functioning, or social activities or relationships;
- in individuals under age 18, the duration is at least 6 months;
- the anxiety, panic attacks, or phobic avoidance associated with the specific object or situation are not better accounted for by another mental disorder, such as obsessive-compulsive disorder, posttraumatic stress disorder, separation anxiety disorder, social phobia, panic disorder with agoraphobia, or agoraphobia without a history of panic disorder; and

- specific types are recognised: animal type - fears of animals and insects; natural environment type - fears of situations or events occurring in nature (e.g. heights, storms and deep water); blood-injection-injury type; situational type - fears of public transportation or enclosed places; and other type (includes all the phobias that do not fit the description for any of the four major types).

According to the ICD-10 (World Health Organization, 1992:137-138), “Specific (isolated) phobias” is one of the categories under the “Phobic anxiety disorders”.

Four diagnostic guidelines are given:

- psychological or autonomic symptoms must be primary manifestations of anxiety, and not secondary to other symptoms (e.g. delusions or obsessional thought);
- anxiety and fear must be restricted to the presence of the particular phobic object or situation;
- the phobic situation is avoided whenever possible; and
- there is usually no other psychiatric symptoms present.

3.5 DESCRIPTIVE CHARACTERISTICS OF ANIMAL PHOBIA

Specific phobias have been found to differ significantly with regards to age of onset, gender ratio, family history, co-morbidity with other anxiety disorders, fear acquisition, physiological factors, cognitive response profiles, psychopathology and treatment (Craske & Sipsas, 1992:569).

3.5.1 Biographical characteristics

Animal phobia is characterised by a number of demographic and biographical characteristics which seems to be specific to this disorder.

3.5.1.1 Gender ratio

Several studies found a significant difference in the gender ratio of animal phobics. A Swedish study found that 12% of the females and 3.3% of the males in a random sample suffer from animal phobia, while another Swedish study, found that a clinical sample of adults suffering from animal phobia consisted of 95% females. Also, a German study found that a sample of parents suffering from animal phobia (primarily spider phobia), consisted of 93.7% females and 6.3% males (Fredrikson, Annas, Fischer & Wik, 1996:37; Öhman, 1986:131; Unnewehr, Schneider, Margraf, Jenkins & Florin, 1996:493).

3.5.1.2 Age of onset

Several studies have found that animal phobias tend to begin at an earlier age (early childhood), than claustrophobia (early to mid-twenties) or height phobia (late childhood to early adolescence). Öhman (1986:131) reports an average onset age of 7.3 years (range 3 to 17 years) for a sample of Swedish adults suffering from animal phobia. Two other Swedish studies (Öst, 1987a:225-226; Öst, 1992:72) found the mean age of onset in clinical samples of animal phobics to be 6.9 ± 2.8 years (median value = 7.5 years) and 6.9 years respectively. In a British study, the average age of onset was found to be 4.4 ± 2.8 years. This suggests a facilitatory period in early childhood for the acquisition of animal phobias (Craske & Sipsas, 1992:569; Marks & Gelder, 1966:219-220).

3.5.1.3 Prevalence

Animal phobia is one the most common categories of specific phobias in both normal and clinical populations. A Swedish study found a prevalence of 8% for animal phobia (snakes and spiders) in a sample aged 18 to 70 years. A Canadian study on adult females (18-65 years), reported a prevalence of 42.9% for animal fears and a prevalence of 12.5% for animal phobia. Animal phobia was defined as an intense fear with avoidance behaviour, while animal fears were defined as intense fears with no avoidance behaviour. In this study, dogs, snakes, cats and spiders were included in the animal type category. Animal fears were the most prevalent, followed by nature (e.g. heights, tunnels and enclosed spaces), social, mutilation (e.g. injections, blood and doctors) and separation fears (Costello, 1982:282, 285; Fredrikson *et al.*, 1996:37; Matchett & Davey, 1991:91; Öhman, 1986:131).

3.5.1.4 Developmental range

The most frequent anxieties and fears amongst children are as follows: animals at age 2 to 4 years, and darkness and imaginary creatures at age 4 to 6 years. Preschool children (2 to 6 years) also frequently present with anxieties and fears for doctors, dogs, snakes and storms. At age 6 to 12, children frequently report anxieties and fears for mysterious events and animals - often animals never directly encountered before. Anxiety and fear for animals seem to be more common in rural children (age 4 to 11 years) than in urban children - many of these for animals never seen in the particular region. One study found that the incidence of anxiety and fear for animals decrease sharply at ages 13 to 14 years. This seems to be especially marked amongst boys, leaving more girls than boys with anxiety and fear for animals after this age. Before the onset of puberty, animal phobias often occur equally common in both sexes. However, the few animal phobics that remain after the onset of puberty, are usually women. As anxiety and fear for animals primarily originate during childhood, older

people appear to be resistant to acquire these during adulthood. Animal phobias that originate in adolescence or adult life are usually associated with trauma (e.g. dog bite), whereas such anxieties and fears in young children seemingly appear unexpectedly and for no obvious reason. An American study on the developmental pattern of dog phobia among females (aged 15 to 89 years), found that the phobia decreases across age categories, followed by an increase in the older (45+ years) groups (Kirkpatrick, 1984:144-145; Marks, 1987:148-151, 297, 374; Marks & Gelder, 1966:220).

3.5.1.5 Animal types

In 1913, Freud (in Marks, 1987:374) remarked the following regarding the type of animals involved in animal phobia:

“The child suddenly begins to fear a certain animal species and to protect itself against seeing or touching any individual of this species... the phobia is as a rule expressed towards animals for which the child has until then shown the liveliest interest, and has nothing to do with the individual animal ... they are horses, dogs, cats, more seldom birds, and strikingly often very small animals like bugs and butterflies ... sometimes animals which are known to the child only from picture books and fairy stories become objects of the senseless and inordinate anxiety which is manifest in these phobias”.

Research provides some evidence that anxiety and fear of spiders co-vary with that of other animals which are normally considered to be fear-evoking (e.g. snakes, lizards, rats and mice). Interestingly, it also co-vary with anxiety and fear of animals normally considered to be disgust-evoking (e.g. cockroaches, caterpillars and snails).

This suggests that animal phobia can be identified as an integrated set of responses which reflects anxieties and fears of either predatory animals (e.g. snakes) or non-predatory (i.e. “harmless” to humans) animals (e.g. snails and cockroaches) (Hare & Blevings, 1975:8; Matchett & Davey, 1991:91, 93).

In a British study, clinical subjects were disproportionately more anxious and fearful of rats than of 28 other animals (including Spaniels) and insects listed. The same study also found that ratings of ugliness, sliminess and quality of movement of animals were significantly correlated with phobic measures. This suggests that the perceptual characteristics of animals are of some importance in determining their positive or negative appraisal by humans - ugly, slimy, sudden-moving animals are experienced as more anxiety and fear-provoking than animals without these characteristics. “Ugliness” referred to sliminess, hairiness, colour of animal, perceived dirtiness, number of limbs and antennae, compactness of the body, and relation of eyes to the head. The more these characteristics were seen as discrepant from the human, mammalian form, the more “ugly” the particular animal was judged. Tactile (e.g. hairiness of spiders), auditory (e.g. hissing of snakes) and visual cues were found to be an integral part of the perception process. This strongly suggests that anxiety and fear of animals are focused on a limited set of animal characteristics, rather than the holistic view of the animal (Bennett-Levy & Marteau, 1984:39-42; Merckelbach, Van den Hout & Van der Molen, 1987:1205-1208).

3.5.2 Physiological parameters

Several studies found that animal phobics and non-phobic individuals differ with regards to a number of physiological parameters.

3.5.2.1 Electrodermal response

Adult females suffering from animal phobia react with larger electrodermal responses to phobic stimuli than either treated women or non-phobic subjects (De Jong, Merckelbach & Arntz, 1995:58-59, 61; Hamm, Cuthbert, Globisch & Vaitl, 1997:102, 105; Hare & Blevings, 1975:6).

3.5.2.2 Heart rate

Di Nardo *et al* (1988:248) found that females (age 18-21 years) suffering from dog phobia have a higher heart rate than control subjects before the onset of a behavioural approach test involving a dog, as well as during exposure to the dog stimulus. In other studies, snake/spider phobics also had significantly higher heart rates during exposure to snakes or spiders. A Swedish sample of adults suffering from animal phobia, presented with a resting heart rate 90.9 BPM (beats per minute), while the peak heart rate during exposure to a phobic stimulus averaged 108.9 BPM. Females suffering from animal phobia showed a heart rate waveform with characteristic acceleratory responses on exposure to phobic stimuli, while their heart rate response to neutral stimuli was decelerative (Craske & Sipsas, 1992:578; Hamm *et al*, 1997:102-103; Hare & Blevings, 1975:4; Öhman, 1986:131).

3.5.2.3 Vasoconstriction

Female students suffering from snake phobia reacted with cephalic vasomotor constriction and increased electromyographic (EMG) activity on exposure to a phobic stimulus, while the responses of non-phobics remained more or less constant or even decreased (Hare & Blevings, 1975:5-7).

Changes in the electrodermal and cardiovascular system are part of the visceral

mobilisation for effective escape and avoidance. An increase in heart rate and cephalic vasoconstriction to feared stimuli may be indicative of the rapid redistribution of blood to the striated muscles. A temporary reduction in cerebral blood flow can occur in extreme cases of fear, resulting in “emotional” fainting (Cook, Hodes & Lang, 1986:205; Hamm *et al*, 1997:98; Hare & Blevings, 1975:11).

3.5.2.4 Respiratory rate

The respiration of female students suffering from snake phobia became significantly more irregular, together with an increase in respiration rate during exposure to a phobic stimulus (Hare & Blevings, 1975:5-7).

3.5.2.5 Electromyographic activity

Females suffering from animal phobia showed significantly higher eye blink and corrugator supercilli muscle activity to phobic stimuli than a control group or to neutral stimuli (Hamm *et al*, 1997:101, 103, 105).

3.5.3 Psychological characteristics

There are no psychological characteristics which are exclusively associated with animal phobia. However, persons suffering from animal phobia share a number of salient cognitive, emotional and personality characteristics with persons suffering from anxiety disorders.

3.5.3.1 Imagery

“Imagery” refers to the cognitive process through which perceptual-motor memories are activated. Research suggests that the generative anxiety and fear memory in

phobics is a stable, context-specific avoidance disposition which mobilise the phobic person for escape or avoidance. On imaging phobic objects, phobics show distinct, large amplitude visceral responses which are greater than those of non-phobic persons. Imaging also prompts greater sympathetic responses and reports of greater affective intensity and vividness in phobic persons (Cook, Melamed, Cuthbert, McNeil & Lang, 1988:734, 737, 739).

3.5.3.2 Anxiety persistence

A striking feature of animal phobia is the persistence of anxiety for certain stimuli in the absence of contingent aversive and feared events. One reason for this may be that phobic subjects tend to overestimate the covariation between the phobic stimuli and aversive events - the so-called “illusory correlation”. One study found that adult females with spider phobia confidently overestimated the correlation between phobia-relevant stimuli and aversive events, while treated subjects did not show the same bias. This suggests that untreated subjects predominantly rely on a priori expectations, whereas treated subjects rely more on the available situational information (De Jong, Merckelbach, Arntz & Nijman, 1992:724, 726-727).

Two other studies also found that adult women with spider phobia a posteriori overestimated a stimulus-aversive event association. These studies also found that untreated women more often a priori expected (initial expectancy) an aversive event after the first “dangerous” stimulus than were the case with treated women. This expectancy for the phobic stimuli was found to be quite resistant to disconfirmation. This differential resistance to disconfirmation may explain the maintenance of phobic fear. It also suggests that the a posteriori reported illusory correlation between the phobic stimulus-aversive event arises from initial expectancies that survive extinction (De Jong et al, 1995:57-58, 60-62; McNally & Heatherton, 1993:657-658; Tomarken, Mineka & Cook, 1989:385).

The above-mentioned concepts of illusory correlation, initial expectancy and a posteriori overestimation suggest that phobias have cognitive mechanisms and biases that underlie the apparent irrationality of such anxieties and fears (McNally & Heatherton, 1993:653).

3.5.3.3 Attentional bias

“Attentional bias” refers to the selective allocation of attentional resources to cues related to threat and danger. This bias is specific for disorder-related cues, e.g. dog phobics to dog cues. The presence of attentional bias in phobic persons may be conceptualised in terms of the “information structure” construct. According to this concept, emotions are represented as a network in memory structures. These structures include actual information about stimuli and responses, as well as interpretations about their meaning for the individual. In the case of fear these structures serve as a program for escape and avoidance behaviour. Hyperattention to anxiety and fear-associated stimuli may then serve to facilitate the triggering of the anxiety and fear network. Thus, hyperattention to feared stimuli can facilitate early escape. Attentional bias may enhance anxiety, because hyperattention to threatening information result in the individual experiencing his/her environment as too dangerous. However, attentional bias may also be seen as a consequence, and not result, of anxiety (Lavy, Van den Hout & Arntz, 1993:17-18, 23-24; Tomarken et al., 1989:381).

3.5.3.4 Personality factors

A study of the relationship between personality trait scores and phobic factor scores, found low, but statistically significant, correlations between a number of personality traits and phobic responses. The following personality traits were significantly correlated to animal phobia (correlation coefficient appears in brackets): dependence

(0.31), lack of self-esteem (0.35), suggestibility (0.19), self-doubt (0.31), pessimism (0.24), introversion (0.18), passivity (0.20), emotionality (0.20) and egocentricity (0.17). This research also found that the animal phobic in a monozygotic twin pair, when compared to the other twin, tend to have more neurotic symptoms, display a lower self-esteem, being more yielding, more passive, less orally aggressive and obstinate - thus, on the whole, presenting with a more “neurotic” personality structure. The physiological and anatomical bases of two personality dimensions (introversion-extraversion and neuroticism) are discussed in a later section of the thesis (see 4.4) (Torgersen, 1979:347-350).

3.6 ETIOLOGY OF SPECIFIC PHOBIA

During the last few decades various researchers have postulated different theories and models with regards to the etiology of phobias. The earliest psychological models focussed on classical conditioning as the prime etiological factor, but since then a number of other models also came to the front. Recent models have added concepts such as “preparedness” to the traditional conditioning model, while others have turned to cognitive models and vicarious learning models. To further complicate the etiological picture, one also need to keep genetic, maturational and environmental factors in mind when attempting to understand the origin of animal phobias (King, Clowes-Hollins & Ollendick, 1997:77; McNally & Steketee, 1985:431).

3.6.1 Psychoanalytic perspective

This viewpoint holds that phobias are expressions of the individual’s unconscious and unacceptable wishes, anxieties, fears and fantasies. A phobia begins with a basic unconscious conflict in the person’s feeling towards a significant other person. The pain of the conflict (anxiety) is then too much to bear and initiates the person’s internal, psychological defense mechanisms. The unconscious conflicts are then

displaced from their intrapsychic source to an external object or situation which now carries the full charge of the painful emotions. Final protection is achieved by an additional defense mechanism, namely the avoidance of specific external objects (Nemiah, 1981:116-119; Sue *et al*, 1994:175; Torgersen, 1979:343).

3.6.2 Learning perspective

The learning perspective identifies three main etiological pathways for phobias, namely direct conditioning, vicarious acquisition and instruction. In practical terms this means that animal phobics may account for their anxiety and fear in terms of having been bitten or directly exposed to an animal (direct conditioning), having observed another person being bitten/harmed (vicarious learning) or having been informed by a credible source that specific animals bite or are dangerous in some respect (verbal instructions) (Antony, Brown & Barlow, 1997:1090; Rimm, Janda, Lancaster, Nahl & Dittmar, 1977:231).

Some animal phobics report an inability to recall the origin of their phobias. This has led to various hypotheses. The “infantile amnesia” hypothesis holds that only a few memories of anxious experiences during early childhood are available to the adult. The brain systems required for memory elaboration are not fully matured until some years after birth. The maturation of certain areas of the neocortex, cerebellum and hippocampus proceed postnatally - mature hippocampal functions only emerge at 18 to 36 months postpartum. Considerable learning is possible prior to maturation of the hippocampus, but such learning does not include information on the temporal or spatial context of experiences (Jacobs & Nadel, 1985:514-518).

McNally and Steketee (1985:432-433) found that in a group of adult animal phobics, most (68%) could not recall the onset of their phobia as they had had the fear as long as they could remember; 23% attributed it to direct conditioning; 4% involved an

instructional onset; and 4% involved vicarious learning. Antony *et al* (1997:1093) found a much lower frequency for persons who could not recall the onset of their animal phobia (33%). Öst (1987a:226) found that animal phobics had ascribed the onset of their phobias to the following sources: conditioning experiences (48%), vicarious experiences (26%), instruction or transmission of information (14%), and no recall (12%). In a study on children animal phobics, Ollendick and King (1991:121-122) found that boys were more likely than girls to report direct or vicarious conditioning, while girls were more likely than boys to report instructional/informational sources, suggesting possible gender role socialisation factors.

3.6.2.1 Classical conditioning

For a long time it was thought that most specific phobias begin with some kind of unusual traumatic event. Today it is known that conditioning experiences are only one of several mechanisms of phobia acquisition. Some phobias are acquired through a direct experience when a person experiences real danger or pain resulting in a true alarm response. A person can also develop a phobia through experiencing a panic attack in a specific situation which is then associated with the alarm response - i.e. a false alarm. Clinically, there is often an incubating period between events causing anxiety and subsequent phobias. It is unclear what happens during this incubating period, but some persons might rehearse the event in their mind and build up emotion to the point of kindling avoidance of the situation (Barlow & Durand, 1995:181; Marks & Tobena, 1990:368, 372; Sue *et al*, 1994:176).

3.6.2.2 Operant conditioning

Some researchers suggest that phobias may be learned and enhanced through reinforcement. Phobics very often show active or passive avoidance of anxiety and

fear-provoking situations if it results in the reduction of anxiety and fear. Avoidance results in the termination of danger signals, prevents aversive stimuli from occurring, or brings on safety signals indicating a reduction of aversive stimuli. These conditions may serve as reinforcers of avoidance behaviour (Marks & Tobena, 1990:368; Sue *et al*, 1994:178).

3.6.2.3 Vicarious learning (modelling)

Vicarious learning involves seeing someone else experiencing a traumatic event or enduring intense anxiety and fear. Social transmission and role modelling of phobias seem to be more frequent among women than men. It also seems that women may be more sensitive to modelling than men. The gender differences might also reflect differences in the extinction process (Barlow & Durand, 1995:181; Fredrikson *et al*, 1996:38 Marks & Tobena, 1990:370-371; Öst, 1987a; Sue *et al*, 1994:178).

3.6.2.4 Preparedness theory

For a long time it was accepted that the laws of learning are universal across species, that all stimuli and responses are equipotential, and that phobias are specific conditioned anxiety and fear responses. However, the preparedness perspective holds that anxiety and fear do not develop randomly, but rather that it is easier for individuals to acquire phobias to objects or situations to which they are physiologically and cognitively predisposed. In other words, phobias result from a phylogenetically programmed tendency for anxiety and fear responses to be selectively associated with specific fear stimuli (Cook *et al*, 1986:195, 206; Marks & Tobena, 1990:366; Matchett & Davey, 1991:91; Seligman, 1971:308-312; Sue *et al*, 1994:179).

3.6.3 Cognitive and information perspective

Information transmission and instruction are considered to be one of the etiological mechanisms resulting in phobic responses. Sometimes, just being warned repeatedly about a potential danger may be sufficient for a phobia to develop. This explains why someone may suffer from animal phobia while he/she has never directly encountered the specific animal, but had been repeatedly told about its dangers (Barlow & Durand, 1995:181; Sue *et al.*, 1994:178).

3.6.4 Genetic perspective

Evidence for a direct genetic transmission of specific anxiety disorders is not strong. It seems that genetic influences are usually quite modest and vary among the subtypes of phobias. More support exists for the view that heritable physiological factors (e.g. autonomic nervous system reactivity) may predispose individuals to develop phobic reactions. These factors create the physiological condition for the person to experience anxiety and fear reactions, but do not act as causal factors *per se*. Thus, a number of weak contributions from many genes collectively make a person vulnerable to anxiety and panic attacks (Barlow & Durand, 1995:156; Sue *et al.*, 1994:179).

Research studies found that monozygotic (MZ) twin partners are more similar than dizygotic (DZ) twin partners with regards to the strength of animal phobic responses. Also, it was found that MZ twin partners more often fear the same kind of situation than DZ twin partners. This is not an absolute proof that genetic factors are involved as MZ twins spend more time together, have more of the same friends, and are more influenced by the same environmental factors. One twin study found a heritable estimate of 32% for animal phobia. The implication is that environmental factors account for twice the variance than the genetic factors (Fredrikson, Annas & Wik,

1997:23; Kendler, Neale, Kessler, Heath & Eaves, 1992:278; Torgersen, 1979:349).

3.6.5 Cultural perspective

Studies of animal fears in children up to the age of 8 years show no consistent tendency with regards to gender differences. However, studies on adult animal phobics have found that considerably more women than men report animal phobias. These studies have mostly been conducted in societies with gender role expectations that allows females to be fearful, but males not. It is likely that males hide or deny their animal phobia and that social pressures force them to face feared situations rather than avoid them, leading to a reduction in phobic responses through habituation due to self-induced “exposure therapy”. With regards to age role expectations, children are usually allowed to be more fearful than adults. This may partially account for younger age groups to have higher frequencies and intensities of phobic responses than older age groups (Kirkpatrick, 1984:145-146).

3.6.6 Evolutionary perspective

Most of the significant events a person is likely to experience in his/her lifetime have already been experienced by his/her ancestors, who were selected for their ability to detect and respond to those events. The evolutionary perspective holds that an individual which can modify his/her behaviour to benefit from experience is more likely to survive and pass on its genes to the next generation. Thus, natural selection has shaped human behaviour so that certain defensive responses are learned far more easily than others (Marks & Tobena, 1990:366).

3.7 TREATMENT OF SPECIFIC PHOBIAS

Many phobic people are unaware of the possibility to receive effective treatment for their condition. Some may feel ashamed to admit the extent and nature of their problem, while others may feel that psychotherapy is appropriate only for those who are “crazy” or “insane”. Others do not consider their phobia that much of a problem to warrant them seeking professional help (Rimm *et al*, 1977:236).

3.7.1 Drug therapy

Drug treatments in animal studies have proved largely inadequate. Also, pharmacological agents are ineffective to improve the efficiency of treatment. In conditioning laboratory studies and human clinical studies, drugs do not increase exposure effectiveness. The best use of calming agents (e.g. barbiturates and benzodiazepines) is probably as a short-term crutch in order to cope with threatening situations or to facilitate exposure to phobic stimuli during behaviour therapy (Baum, 1988:421; Baum, 1989:307; Gray, 1982:450-452).

3.7.2 Behavioural therapies

Phobic disorders have attracted great interest in the field of behaviour therapy over the last 35 years. There are approximately 50 variants of behavioural treatment methods described in the literature. These yield clinically significant improvement in 75-85% of specific phobic cases. These dramatic successes provide a significant impetus for the learning interpretation as an etiological mechanism of phobias. Behaviour therapy focuses on the extinction of avoidance behaviour through decreased sensitisation or increased habituation (Lavy *et al*, 1993:17; Öst, 1989:1; Seligman, 1971:308).

Many researchers and clinicians agree that the treatment of specific phobias require structured and consistent exposure-based interventions. Exposure therapy involves repeated contact with the phobic stimulus until habituation results in a decline of the phobic response. The patient is gradually introduced to increasingly difficult encounters with the feared situation. Repeated encounters with the phobic stimulus reduces the different elements of the evoked response - i.e. avoidance, subjective anxiety and autonomic symptoms. The initial encounters may only involve imagination or visualisation of the feared context (Barlow & Durand, 1995:183; Ghosh & Marks, 1987:3, 12, 14; Marks & Tobena, 1990:365, 374; Sue *et al*, 1994:180).

Flooding therapy is a specific form of exposure therapy that consists of thwarting the avoidance response and having the person confront the anxiety and fear-evoking situation. The therapist attempts to maximise emotional arousal and opposes any attempt on the part of the individual to avoid it. The dissociation of the avoidance response from the conditioned and unconditioned stimulus is important for the phobic response to decline. The reduction of phobias involves the habituation of innate defensive responses, the extinction of conditioned anxiety and fear responses, and the extinction of conditioned avoidance behaviour. Conditioned avoidance is extinguished through exposure to the phobic stimulus while blocking avoidance behaviour. Avoidance behaviour attempts quickly declines as blocking result in the withholding of the reinforcers of avoidance (i.e. preventing avoidance from becoming a safety signal) (Baum, 1988:421; Gray, 1982:446; Marks & Tobena, 1990:376-378; Marshall, 1988:76-77).

Systematic desensitisation is regarded as one of the most effective behavioural treatments for phobic disorders. First, the phobic stimuli are graded into a hierarchy according to their capacity to elicit anxiety and fear. These stimuli are then presented to the individual in a sequence of gradual increasing phobic intensity. Each stimulus

is terminated as soon as the patient experience anxiety. Directly following stimulus termination, the patient is instructed to relax according to a relaxation technique that the therapist has taught the patient beforehand. The relaxation response is incompatible with the phobic response. The graded hierarchy of phobic stimuli and the short stimulus presentation time are intended to keep the level of anxiety and fear low so that counterconditioning is facilitated. Thus, extinction of the phobic response occurs through counterconditioning with an interfering response, namely relaxation (Gray, 1982:446; Sue *et al*, 1994:181).

One-session treatment (OST) consists of a combination of exposure therapy and vicarious learning (modelling). It differs from traditional exposure therapy in that the person is presented with all the phobic stimuli in the hierarchy during a single session which lasts for approximately 2.4 hours in the case of animal phobias. This therapy technique has been successfully applied to patients suffering from phobias for spiders, dogs, cats, rats and birds. Suitable patients should present with a circumscribed phobia, they must be motivated to get rid of the phobia, be prepared to tolerate a potentially high degree of anxiety for a relatively long time, and there must not be any predictable negative consequences of successful treatment. The aim of OST is to expose patients to phobic situations in a controlled way, and to enable them to stay in the phobic situation until they realise that the anticipated consequences does not occur. OST should be seen as the initial step which must be followed by self-exposure to phobic situations in everyday life in order to maintain the positive effects of therapy (Öst, 1989:1-4).

The rationale behind affect modification through language conditioning is that changes in the emotional value of words will alter the emotional value of their physical equivalents. The principles of classical conditioning suggest that the emotional properties of words may be altered through conditioning to the emotional properties of other words. This means that when a conditioned stimulus (CS) word

(e.g. dog) is paired with unconditioned stimulus (UCS) words (e.g. aggressive and dangerous), then the CS word will evoke fear and anxiety. On the other hand, if the CS word is paired with pleasant words (e.g. friendly and love), then the CS word and the real object will evoke more positive, pleasant feelings (Weiss & Evans, 1978:115-119).

Coping techniques were developed within behaviour therapy during the 1970's in reaction to some dissatisfaction with systematic desensitisation and flooding as treatments for phobias. The rationale behind applied relaxation (AR) holds that phobic persons encountering a phobic stimulus will initially experience a physiological reaction, followed by negative thoughts, which further enhances an increase of physiological reactions, and so on in a vicious circle. One way to break this circle is to focus on the physiological reactions and to learn not to react so strongly. The aim of AR is to teach patients a relaxation skill (i.e. coping technique), which can be applied rapidly and in any situation. The coping technique counteracts, and eventually eliminates, the initiation of physiological reactions in phobic situations. Patients are taught to recognise early signals of anxiety (e.g. increased heart rate) in order to cope with the anxiety and fear instead of being overwhelmed by it (Öst, 1987b:397-402, 408).

3.7.3 Cognitive-behavioural therapy

Cognitive therapy focuses on the identification of irrational thoughts. These are replaced with positive self-statements or modified by challenging their truthfulness and correctness. Cognitive modification is often combined with behavioural therapies (Chambless & Gillis, 1993:248).

3.7.4 Paradoxical intention

Paradoxical intention is a therapeutic technique associated with Viktor Frankl's logotherapy. It is based on the phenomenon that anticipatory anxiety is an integral part of phobic disorders. Such anticipatory anxiety often results in the initiation of phobic symptoms. Frankl noted that the more a phobic person anxiously anticipates the occurrence of phobic symptoms and the more he/she tries to avoid it, the more likely it is to occur. Instead of trying not to anticipate the initiation of phobic symptoms, the patient is actually requested to consciously attempt to initiate the symptoms. Since individuals cannot voluntarily control autonomic actions, they will be unable to achieve it. This technique often results in individuals changing their attitudes towards their anxiety. Often they will find it humorous to attempt initiating phobic symptoms, which put some psychological distance between themselves and the phobic symptoms. Subsequently, they will experience a paradox in that the more they attempt to initiate phobic symptoms, the more they will find themselves completely unable to do so (Frankl, 1967:186-189).

3.7.5 Multimodal treatment strategy

The multimodal treatment strategy recognises that anxiety and fear is characterised by cognitive, behavioural and biological components. Therefore, it suggests that treatment effectivity can be enhanced by treating the different components simultaneously. Thus, therapists use cognitive restructuring (i.e. identifying anxiety and fear-inducing thoughts and replacing them with positive coping statements), as well as behavioural rehearsal (i.e. exposure and practice) (Sue *et al.*, 1994:181-182).

3.8 DISCUSSION

Animal phobia is a far more complex behavioural phenomenon than may appear at the first glance. The complexity of this phenomenon is evident from the numerous factors, descriptive characteristics and experiences that it shares with other phobias and anxiety disorders, but also from the unique characteristics that distinguish it from other related behavioural phenomenon and mental disorders.

The ontology and etiology of animal phobias can be attributed to psychoanalytic factors, classical conditioning, social learning experiences (modelling), prepared learning, cognitive irrationalities and genetic factors. Thus, overt phobic behaviour is only the surface manifestation of a complex combination of underlying processes. To view phobias narrowly in only biological, psychoanalytical, or learning theory terms will result in an oversimplification. This will limit one's understanding of specific phobias, as well as the ability to select the most effective combination of treatment regimes, whether these are pharmacologic, psychotherapeutic or behavioural. The treatment techniques for specific phobias resemble and have close ties with the etiological theory one holds. Therefore, the various conceptual and therapeutic approaches to phobias are complementary, not mutually exclusive.

The following chapter deals with the physiology associated with the phobia response.

CHAPTER 4

THE PHYSIOLOGY ASSOCIATED WITH THE PHOBIA RESPONSE

4.1 INTRODUCTION

According to Manning (1979:1) behaviour can be studied through two main approaches, namely the physiological and psychological. The physiological approach is primarily interested in mechanisms which explain behaviour in terms of the nervous and endocrine systems. The psychological approach, on the other hand, is more concerned with the internal and external factors which affect the development and performance of overt behaviour.

In order to survive, organisms require mechanisms to avert threat without negatively affecting other functions and mechanisms equally essential to survival and reproduction. In response to stress and fright, higher organisms have evolved neural and hormonal mechanisms and adaptations to maintain homeostasis in an ever-changing and threatening environment. These mechanisms are primarily associated with the hypothalamic-pituitary-adrenal cortex (HYPAC) axis and sympathetic nervous system where neurotransmitters and hormones play a vital role in the coordination of the physiological and behavioural functions. Understanding the influence of these neurotransmitters and hormones on fear behaviour facilitates the explanation of some of the factors involved in clinical phobias (De Wet, Oosthuizen, Barnard & Potgieter, 1994:302-303; Marks, 1987:ix; Marks & Tobena, 1990:365).

This chapter describes the physiology of anxiety and fear by referring to the role of the central nervous system and endocrine system respectively. The first part is devoted to the various brain structures, neural pathways and neurotransmitters that play an integral role in fear responses. The second part focuses on the role of the

hormonal system in fear responses, with specific emphasis on the neuropeptides of the hypothalamus, adenohipophysis, adrenal medulla, adrenal cortex and pancreas. The last part provides an integrated model of the physiology of anxiety and fear.

4.2 CENTRAL NERVOUS SYSTEM

The anatomical structures, neural pathways and neurotransmitters of the central nervous system (CNS) involved in anxiety and fear are discussed in the following paragraphs.

4.2.1 Brain structures and neural pathways

The complexities of the mammalian brain regarding the way in which it mediates anxiety and fear and related behaviours, is still very much an unknown domain despite intensive research efforts. However, it seems that emotions are more closely associated with certain deep brain structures than with the cerebral cortex. The cerebral cortex is not completely uninvolved in fear behaviour as the prefrontal cortex is associated with complex emotions and learning. There are also extensive anatomical connections between the prefrontal cortex and deep brain structures. These deep brain structures include the limbic system, hypothalamus, thalamus, locus coeruleus, raphe nucleus and cerebellar nuclei. They are linked together in subsystems which are largely responsible for the acquisition, expression and extinction of passive and active avoidance, classical conditioning, freezing, tonic immobility, autonomic physiological expressions of anxiety and fear, and the subjective experience of anxiety and fear (Gorman *et al.*, 1989:156; Marks, 1987:190-191, 222).

Research findings suggest that the left and right cerebral hemispheres are involved in different emotional experiences. The right side seems to be more involved in fear

emotions, while the left side seems to be involved in pleasant affects (Marks, 1987:197).

The limbic system is located on the medial and inferior surfaces of each cerebral hemisphere. This system consists of deep subcortical structures, namely the septum, hippocampus, amygdala and limbic cortex (cingulum). The limbic system represents the phylogenetically older part of the cerebral cortex. It is responsible for positive and negative affective evaluation of sensations and experiences. Memory information regarding such an experience is stored in the hippocampus, which can in future be used in the evaluation of a similar situation. The amygdala is involved in attack behaviour, fear reactions and activation of increased attention, while the septum has an inhibitory effect on the amygdala and hippocampus. The limbic system has extensive fibre connections with the thalamus, hypothalamus and ANS, but has relatively few connections with the neocortex. This limits the neocortex's influence on limbic activity (Jordaan & Jordaan, 1989:179-183; Meyer et al, 1997:7.25-7.26).

Stimulation of the dorsomedial part of the amygdala elicits fear and flight, while stimulation of the basolateral part results in the inhibition of fear and attack behaviour. Different parts of the amygdala play inhibitory and facilitatory roles in irritative aggression, as well as a modulation role in hypothalamic elicitation of aggression. Thus, the amygdala is the central structure which integrates the affective value of sensory input and regulates efferent output - i.e. a defensive response pattern. It serves as the hub of a network which modulates the pattern of anxiety and fear responses. The amygdala is also in contact with the rest of the limbic system (especially the septum and hippocampus), hypothalamus and parts of the cerebral cortex (e.g. frontal cortex)(Depue & Spoont, 1986:54; Hamm et al, 1997:106; Marks, 1987:195-196; Spoont, 1992:337; Van der Kolk, 1994).

The septum and hippocampus inhibit the amygdala's activation of fear and aggressive behaviour. The septum inhibits aggression through modulation of the fight-flight pathways. The hippocampus is involved in the evaluation of spatially and temporally unrelated events, comparing it with previously stored information and determining their association with reward and non-reward. The hippocampus is also involved in the inhibition of exploratory behaviour. Serotonin plays an important role in the hippocampus' capacity to activate inhibitory pathways which prevent unnecessary initiation of fight-flight responses (Depue & Spoont, 1986:55; Marks, 1987:195-196; Spoont, 1992:337; Van der Kolk, 1994).

The limbic cortex plays an important role in the acquisition of avoidance and defensive behaviour, but not in their performance. It is also involved in the inhibition of physiological fear reactions following avoidance behaviour (Marks, 1987:197).

The behavioural inhibition system (BIS) is a brain circuit which is involved in anxiety. It is located in the septal-hippocampal area of the limbic system, with connections to the anterior thalamus, limbic cortex and prefrontal cortex. Ascending serotonergic, cholinergic and noradrenergic circuits innervate this area. These circuits originate in brain stem nuclei, especially the raphe nuclei and locus coeruleus. The BIS is activated by sensory impulses from the brain stem in reaction to danger signals of potentially threatening events. Stimuli from association areas in the cerebral cortex also transmit danger signals to the septal-hippocampal system in reaction to threatening visual images. The BIS compares actual environmental circumstances with the expected outcomes. When significant mismatches between actual and expected outcomes are detected, the BIS arrests ongoing behaviour through inhibition of the behavioural facilitation system (BFS) until appropriate response strategies are activated. Increased BIS activity manifests in frustration due to non-reward, fear due to punishment, and anxiety due to uncertainty (Barlow & Durand, 1995:157; Depue & Spoont, 1986:51, 54).

The BFS mobilises active engagement behaviour. It is a generalised facilitation system that functions through activation of locomotor and incentive-reward motivation components. One group of behavioural patterns facilitated by the BFS is related to environmental threat and include escape-avoidance. The BFS facilitates unconditioned behaviour (e.g. spontaneous exploratory behaviour in response to novel stimuli) and conditioned behaviour (e.g. voluntary motivated behaviour). In both instances, the BFS is primarily activated by inherently rewarding stimuli or conditioned signals of reward. The BFS is also activated by aversive stimulus contexts in which escape or avoidance responses are possible - a safe area is experienced as a positive reward. Thus, although the BFS is activated by a wide variety of stimulus contexts, most share a reward component (Depue & Spoont, 1986:48-50).

A number of studies found that stimulation of the hypothalamus resulted in flight, defense and attack behavioural responses. It also induced fear, rage, piloerection, pupil dilation, sweating and raised blood pressure. Stimulation of the posterior hypothalamus elicited sympathetic reactions, behaviour arousal and fight-flight responses. The opposite effects were elicited when the anterior hypothalamus was stimulated (Marks, 1987:194).

The locus coeruleus is primarily associated with α_2 -adrenergic receptors. Stimulation of this brain area in monkeys leads to alert behaviour (e.g. wide open eyes, increased body movements, wringing of paws and attempts to escape), suggesting that it forms part of an “alarm system”. Nerve tracts originating from the locus coeruleus innervate the forebrain, septum and hippocampus. Locus coeruleus inhibition of hippocampal activity provokes generalised forms of anxiety. Experimental evidence suggests that the α_2 -adrenergic receptors controlling locus coeruleus excitability may be dysfunctional in panic attacks (Gorman *et al.*, 1989:154; Marks, 1987:193-194; Nutt & Lawson, 1992:174).

4.2.2 Neurotransmitters

More than 50 neuropeptides have thus far been isolated and sequenced. They range in size from small dipeptides to large molecules consisting of more than 40 amino acids. Neuropeptides are important chemical messengers which function as neurotransmitters or neuromodulators in the CNS. They are heterogeneously distributed in the CNS. Neuropeptides are synthesised in the neuron's perikaryon and transported down the axon to the nerve terminal from which it is released. Depolarisation of neurons results in its secretion (Nemeroff, 1991:3, 6-8).

Noradrenaline (NA) is found in relatively high concentrations in a number of brain areas, particularly the locus coeruleus, reticular activating system (RAS), hypothalamus and cerebellum. Activation of the locus coeruleus results in the onset of fear behaviours. Thus, it may serve as a mediating centre for "alarm reactions". In the hypothalamus, NA is responsible for inducing the secretion of vasopressin and oxytocin. Most chronically anxious patients, persons in frightening situations and depressed people present with an increased plasma NA (Marks, 1987:198-199; Meyer *et al*, 1997:6.21, 7.21, 7.30).

Dopamine (DA) is found in several areas of the CNS. There are indications that DA is involved in the limbic system (e.g. goal-directed affective behaviours) and the cerebral cortex (e.g. reactions to changing environmental contingencies). The mesolimbic DA pathway has strong facilitatory effects on irritative aggression and inhibits the habituation of irritative attacks - indicating an association with the BFS. In the adenohypophysis, DA is involved in the inhibition of prolactin secretion (Barlow & Durand, 1995:56; Depue, Luciana, Arbisi, Collins & Leon, 1994:485-486; Depue & Spont, 1986:53, 55, 57; Meyer *et al*, 1997:6.21, 7.15, 7.30; Spont, 1992:332).

Serotonin (5-hydroxytryptamine) inhibits the conduction of impulses in the postsynaptic neurons of the raphe nuclei. This suppression can be linked to tonic immobility. Serotonin is also involved in the inhibition of pain impulses in the spinal cord where it modulates the perception of aversive stimuli during arousal. Furthermore, serotonin initiates the tendency to explore as opposed to withdrawal from new situations. Serotonin exerts an inhibitory effect on the startle response, while a decrease produce potentiated startle. It also seems to be involved in a generalised behavioural constraint system which regulates aggressive behaviours and inhibits behavioural engagement patterns in response to the environmental stimuli of non-reward, punishment and uncertainty. The serotonergic midbrain raphe nuclei innervate the locus coeruleus in the pons - both areas are involved in the initiation of panic attacks. Reduced serotonin activity leads to impairment of the BIS in the septal-hippocampal area and increased BFS responsivity. This results in the initiation of locomotor activity (e.g. aggressive display) and exaggerated emotional arousal (e.g. hyperirritability). Researchers describe the primary function of serotonin as being the facilitation and stabilisation of the information inflow process in the brain. Therefore, serotonin has been conceptualised as a moderator, inhibitor or regulator of behaviour, mood and thought processes (Barlow & Durand, 1995:53-54; Depue & Spoont, 1986:54-55, 57, 59; Gorman et al, 1989:152; Marks, 1987:199-200; Meyer et al, 1997:7.30-31; Spoont, 1992:331, 334-337; Van der Kolk, 1994).

Adrenaline occurs in a number of the “older” brain structures (e.g. medulla oblongata, pons, midbrain and hypothalamus). There are indications that adrenaline is involved in the central regulation of blood pressure and respiration, that it plays a role in the cortical arousal system, and that it elicits sympathetic activity in the body (Meyer et al, 1997:7.21, 7.30).

Enkephalins and endorphins are endogenous opioid peptides. These peptides have the capacity to biologically mimic morphine. They react with opiate receptors which

induce analgesia, euphoria, sleep and suppression of respiration. Endorphins act as natural analgesics with regard to physical and emotional aspects of pain perception (Barlow & Durand, 1995:53-54; Meyer *et al*, 1997:7.30-31; Shier, Butler & Lewis, 1996:374; Van der Kolk, 1994).

In a study of snake phobia, exposure to snakes led to an initial rise in plasma β -endorphin levels which decreased after a while as anxiety decreased. Some researchers suggest that endogenous opioids may play a role in the improvement of phobias during desensitisation treatment which includes habituation to phobia-evoking stimuli. It also plays an important role in the development of avoidance behaviour and blunting of an emotional response to a traumatic stimulus. With regards to fear behaviour in humans, it was found that excessive endogenous opioid secretion during attentive immobility and panic interfered with the storage of the experience in explicit memory. Freeze responses may thus allow the organism not to remember situations of overwhelming stress. On the negative side, this will also keep the organism from learning from the experience (Egan *et al*, 1988:287; Keverne, Nevison & Martel, 1997:3336-3337; Marks, 1987:203-205; Van der Kolk, 1994).

Gamma-aminobutyric acid (GABA) is probably the most common inhibitory neurotransmitter in the CNS. The GABA-system is involved in the reduction of overall arousal and tempering of emotional responses (Marks, 1987:200-203; Meyer *et al*, 1997: 7.29; Shier *et al*, 1996:54-55).

4.3 ENDOCRINE SYSTEM

Endocrine communication is primarily based on hormones. Hormones are products of glandular cells which are secreted into the internal milieu, most frequently blood. They act as signal molecules to target cells in different parts of the body. Target cells respond according to their degree of differentiation, age, functional and nutritional

status, and integrate hormonal and nervous regulatory stimuli. Neurohormones are released into synaptic clefts and blood vessels. They thus act as neurotransmitters and hormones. NA, liberins and endorphins are examples of neurohormones. Paracrine communication refers to hormones which are secreted into the intercellular space where it affects local cell activity. The hypothalamus integrates the functions of the nervous and endocrine systems as it is involved in both neural and endocrine activities (Balieu, 1990:3).

Stressful physical and psychological stimuli can elicit a variety of endocrine responses. Endocrine responses to stress are specific responses mediated by multiple CNS level afferent pathways, some of which mediate the release of adenohipophysis and hypothalamic hormones (Liotta & Krieger, 1990:245).

4.3.1 Hypothalamic hormones involved in anxiety and fear

A number of hypothalamic hormones are involved in anxiety and fear - namely corticoliberin, somatostatin, vasopressin and oxytocin.

Corticoliberin is transported to the adenohipophysis along the hypothalamo-hipophysial portal capillaries. In the adenohipophysis it stimulates the secretion of ACTH. In turn, ACTH stimulates the adrenal cortex to secrete corticosteroids. In one study on animal phobics, corticoliberin lead to reduced exploratory behaviour and increased defensive withdrawal (Marks, 1987:216, 218; Nesse, Curtis, Thyer, McCann, Huber-Smith & Knopf, 1985:329; Uvnäs-Moberg, 1997:149).

Somatostatin secretion is stimulated by sympathetic nervous activity, while somatostatin itself inhibits a wide variety of endocrine and exocrine cell secretions. DA enhances the release of somatostatin from cerebral cortical cells, while glutamate and aspartate are potent stimulants of somatostatin release in the cerebral cortex.

Somatostatin is a potent inhibitor of growth hormone (GH), thyroid stimulating hormone and prolactin release from the adenohypophysis. It also has an ability to inhibit ACTH secretion. In the gastrointestinal tract somatostatin may act as a hormone or neurotransmitter. It inhibits the release of glucagon and insulin in the pancreas. Glucagon is capable of stimulating insulin and somatostatin secretion. The effects of insulin upon somatostatin secretion are less clear, although it seems that inhibition occurs. Other functions of somatostatin include the following: it inhibits exocrine secretion of gastric acid, pancreatic amylase and lipase; and it inhibits gastric emptying and small intestinal motility. Somatostatin functions as a neurotransmitter and neuromodulator in the CNS with effects on locomotor activity and cognitive function (e.g. memory). (Bell, Yasuda, Kong, Law, Raynor & Reisine, 1995:65-66; Dixon & Andrews, 1985:19-20; Jonsson, Uvnäs-Moberg, Theorell & Gotthard, 1998:331; Pittenger, Vinik, Heldsinger & Seino, 1985:447; Robbins, 1985:203, 206; Rubinow, Post & Davis, 1991:37; Schonbrunn, Dorflinger & Koch, 1985:305-306; Slater, Katzen, Nutt, Saperstein & Steelman, 1985:361; Tannenbaum, 1985:232; Weir & Bonner-Weir, 1985:403, 405).

Circulating somatostatin has been implicated as a physiologic regulator of stress-induced GH suppression. Intrathecal administration of somatostatin produces analgesia in both animals and humans. One study found that somatostatin may enhance learning and reverse learning deficits, whereas somatostatin depletion resulted in impaired performance in the same learning paradigms. Central somatostatin administration appears to facilitate learning and memory (e.g. delayed extinction of a learned avoidance response). Another study found that patients subjected to a stress interview, showed a rapid increase in the plasma levels of somatostatin (Jonsson *et al.*, 1998:336; Rubinow *et al.*, 1991:36-37; Tannenbaum, 1985:237).

Vasopressin is a nonapeptide which is primarily synthesised in the supraoptic nuclei

(SON) and paraventricular nuclei (PVN) of the hypothalamus. Its primary function is to defend the organism against physiological stressors (e.g. maintenance of blood pressure after severe blood loss) or against psychological threats (e.g. aggression from another organism). Another major effect of vasopressin is to mobilise energy reserves through increased glucagon secretion and to promote glycogenolysis and gluconeogenesis in the liver. In the HYPAC axis it is capable of synergising with corticoliberin to release ACTH. Vasopressin acts as a weak ACTH secretagogue at the pituitary level (Edwards, 1979a:428, 436, 441, 446; Jard, 1990:283-285; Liotta & Krieger, 1990:237-238; McDonald & Krishnan, 1991:111, 113-115; Meyer *et al.*, 1997:18.10-11).

Vasopressin has an effect on a number of the deep limbic structures. In the hippocampus, vasopressin increases the firing rate of neurons. This may explain research evidence which suggests that vasopressin facilitates memory consolidation of passive-avoidance behaviour in rats. It also promotes aggressive behaviour and plays an important role in fear behaviour by enhancing the acquisition of avoidance, as well as to retard extinction of avoidance (Carter & Altemus, 1997:168-169; Carter, De Vries, Taymans, Roberts, Williams & Getz, 1997:267; Jard, 1990:297; Marks, 1987:223; McDonald & Krishnan, 1991:115-116, 118; Sanders, Freilicher & Lightman, 1990:48; Uvnäs-Moberg, 1997:149; Young, Wang & Insel, 1998:72).

Oxytocin is a nonapeptide which is synthesised in the PVN and SON of the hypothalamus. With regards to anxiety and fear behaviour, oxytocin seems to have an effect opposite to that of vasopressin. Oxytocin retards acquisition of avoidance, as well as to enhance extinction of learned avoidance behaviour. Some researchers even regard oxytocin as a naturally occurring amnesic neuropeptide. In animal studies, oxytocin was found to reduce anxiety, submissive behaviour and freezing, while increasing exploratory behaviour. In rodents it was found to block pain without the release of endogenous opioids, while it also reduces dopamine utilisation. In

another study on lactating rats it was found that endogenous opioids play a role in the prevention of an oxytocin response to stress. A study on lactating rats found a chronic high secretion of oxytocin which resulted in marked reduction of aggression (Carter & Altemus, 1997:165-166, 168-169; Edwards, 1979b:404-405, 413; Jard, 1990:284-285; Lightman, 1992:342; Marks, 1987:223; Meyer *et al*, 1997:18.12; Pedersen, 1991:131-134, 138-141; Sanders *et al*, 1990:48, 57; Trimble, 1996:108; Uvnäs-Moberg, 1997:150-153; Van der Kolk, 1994; Witt, 1997:292; Young *et al*, 1998:72).

Oxytocin is involved in the regulation of the release of a number of adenohipophysis hormones. It tends to inhibit corticoliberin-induced ACTH and cortisol release, while it stimulates prolactin and GH release. The wide spectrum of oxytocin's effects can be described in terms of a lowered sympathoadrenal tone, elevated parasympathetic tone, anabolic metabolism, relaxation and behavioural calm. These responses counter the general responses of the stress axis, i.e. an antithesis to the fight-flight response. However, during intense stress vasopressin might override the actions of oxytocin to promote the survival of the individual (Carter & Altemus, 1997:166-167, 169-170; Pedersen, 1991:133, 139; Uvnäs-Moberg, 1997:158).

4.3.2 Adenohipophysis hormones involved in anxiety and fear

A number of adenohipophysis hormones are involved in anxiety and fear - namely growth hormone, β -endorphin and ACTH. The role of ACTH in anxiety and fear is discussed in section 4.3.3.

Growth hormone (GH, somatotropin) secretion is controlled by somatoliberin and somatostatin. In one study on animal phobics, GH levels were found to increase 20 minutes after exposure to a phobic stimulus, with the peak being reached after an hour. This delayed response is characteristic of GH secretion. Another study on

animal phobics also found an increase in GH levels after exposure to a phobic stimulus (Marks, 1987:216, 218; Nesse *et al*, 1985:325, 329).

Beta-endorphin is the primary opioid peptide in the pituitary gland and is rapidly released in response to acute stress. In many instances, β -endorphin and ACTH seem to have opposite actions. While β -endorphin induce analgesia, euphoria, sedation and respiratory depression, ACTH induce hyperalgesia and hyperactivity. In lactating rats, endogenous opioid peptides seem to be involved in preventing an oxytocin response to stress (Bolles & Fanselow, 1982:95; Emrich, 1984:98; Lightman, 1992:342; Liotta & Krieger, 1990:243; Marks, 1987:223; Meyer *et al*, 1997:18.18; Millan & Emrich, 1981:52; Shier *et al*, 1996:500-501, 503).

4.3.3 The role of adrenocorticotrophic hormone in anxiety and fear

Adrenocorticotrophic hormone (ACTH, corticotropin) is a peptide hormone which is found throughout the brain, especially the hypothalamus, thalamus, amygdala and reticular formation (RF). ACTH is primarily synthesised in the adenohypophysis. Its major role is the regulation of adrenal cortex secretions. The amount of ACTH in the CNS is less than 1% of that in the pituitary. Secretion of ACTH is primarily controlled by corticoliberin and plasma cortisol level. The net output secretion of ACTH depends upon the difference between the excitatory afferent stimulation and the inhibitory feedback effect arising from plasma corticosteroids. The primary physiological functions of ACTH are to stimulate the synthesis and secretion of glucocorticosteroids from the adrenal cortex, and to stimulate lipolysis in adipose tissue and isolated adipocytes. Central or peripheral nervous system recognition of “stressors” leads to release of corticoliberin from the hypothalamus. Corticoliberin acts on the adenohypophysis to elicit increased production and release of ACTH. The corticoliberin-ACTH-glucocorticosteroid sequence is one of the most important regulatory systems governing the reaction of the body to environmental stress and

metabolic changes. A “stress” situation is followed by a rapid increase in the ACTH and cortisol levels which remains high for a considerable time to allow the body to withstand the stress. Thus, corticoliberin represents an important interface connecting complex neurophysiological “stress” reactions via the adenohipophysis to the adrenal cortex. Noradrenaline and adrenaline secreted by the adrenal medulla can stimulate the adenohipophysis to release ACTH. Vasopressin acts as a weak ACTH secretagogue at the pituitary level. Peripheral catecholamines, which are secreted from the adrenal medulla in response to emotional stimuli, may serve as a major pituitary ACTH secretagogue. Research findings suggest that ACTH can modify hippocampal responses. This may explain other research findings which suggest that ACTH is involved in the acquisition of avoidance behaviour and increased passive avoidance learning in rats. ACTH tends to increase learning and inhibit the extinction of an active avoidance task. In lactating women it seems that oxytocin inhibits the release of ACTH. A similar effect was found in lactating rats where a marked blunting of the ACTH response to stress was found. Concomitantly with the release of ACTH from the adenohipophysis, endorphins are also released. It seems that β -endorphin and ACTH have opposite actions. High doses of β -endorphin induce analgesia, euphoria and sedation, while ACTH induce hyperalgesia and hyperactivity (Balieu, 1990:27; Bethune, 1975:30, 33; Blalock, Harbour-McMenamin & Smith, 1985:859; Carter & Altemus, 1997:167; De Wied, 1997:103; Kamaraju & Krishnan, 1991:209; Lightman, 1992:341; Liotta & Krieger, 1990:229, 237-238, 242-243, 246; Meyer *et al.*, 1997:18.16-17; Toates, 1995:48, 55, 60, 152; Trimble, 1996:74, 111-112; University of Plymouth, 1998:2-3).

Early research suggested a simple negative feedback mechanism by cortisol on corticoliberin and ACTH. Yet, recent studies found an increase in plasma ACTH-levels following surgical, emotional traumatic stress despite high concentrations of plasma cortisol. This suggests a complex system of regulation. One research team proposed a motivational role for the action of hormones of the HYPAC axis on

behaviour. They found that exposure to a stressor was followed by a rapid release of ACTH, suggesting that ACTH has general excitatory effects which potentiate fear-motivated responses. Somewhat after this effect occurred, they found an ACTH-stimulated increase in corticosterone secretion which counter the excitatory effect. Thus, ACTH participates in a positive feedback loop and corticosterone in a negative feedback loop. Therefore it seems that ACTH maintains fear-motivated responses due to preserving the motivational value of environmental stimuli. This means that the capacity of any stimulus to evoke fear is ACTH-dependent, or that ACTH is necessary to learn that the conditioned stimulus predicts an aversive event (Bethune, 1975:29-30; Toates, 1995:157-158).

The adenohypophysis plays an important part in the integration of the stress response. There are inputs that act synergistically at the pituitary level in promoting the secretion of ACTH (e.g. corticoliberin and vasopressin) and also inhibitory effects (e.g. corticosteroid feedback) are exerted at this level (Toates, 1995:60).

The circadian periodicity of ACTH is well documented. In humans, it exhibits a diurnal rhythm with peak plasma concentrations occurring in the early morning hours (4:00 - 8:00). The mean half-life for the disappearance of ACTH in the circulatory system is 40 minutes. It is rapidly released during stress conditions (Bethune, 1975:31; Liotta & Krieger, 1990:238-239; Rees & Lowry, 1979:147-154).

4.3.4 Hormones of the adrenal medulla involved in anxiety and fear

The synthesis and secretion of catecholamines from the adrenal medulla is largely controlled by preganglionic nerve fibres of the sympathetic nervous system. Stressful conditions such as anxiety, fear, anger, pain and physical exercise trigger impulses in the hypothalamus which play an important role in sympathetic activity (Meyer *et al*, 1997:18.35-36).

The functions of adrenaline and NA mimic the actions of the sympathetic nervous system. Adrenaline and NA decrease the depolarisation threshold of the RAS in the brain stem causing irritability, fear, anxiety, emotional outbursts, aggression and the fight-flight response. In the cardiovascular system adrenaline causes increased cardiac activity. Adrenaline causes relaxation of the muscle fibres of the digestive tract and bladder, but constriction of the sphincter fibres. In carbohydrate metabolism both adrenaline and NA stimulate glycogenolysis and gluconeogenesis in the liver and muscle fibres, and inhibit glucose-induced insulin secretion. Adrenaline and NA stimulate lipolysis during the stress response in order to mobilise fatty acids from fat reserves. The stimulation of carbohydrate and fat metabolism result in an increase of metabolic rate, oxygen requirements and heat production. These actions suggest an important role for adrenaline and NA in the stress response (Meyer *et al*, 1997:18.36-37).

Studies on animal phobics, found that NA levels increased promptly in response to exposure to a phobic stimulus. An increase of adrenaline levels during anxiety were also reported (Marks, 1987:216, 218; Nesse *et al*, 1985:329).

4.3.5 Hormones of the adrenal cortex involved in anxiety and fear

The adrenal cortex is involved in the production of a number of corticosteroids (steroid hormones), namely glucocorticoids, mineralocorticoids and sex hormones. The glucocorticoids (e.g. cortisol, cortisone and corticosterone) are primarily associated with carbohydrate metabolism. Stress leads to an increase in corticoliberin secretion from the hypothalamus and ACTH secretion from the adenohypophysis. This in turn stimulates secretion of glucocorticoids. Cortisol stimulates an increase of gluconeogenesis and can also act as an insulin antagonist which leads to an increase of blood glucose levels (Meyer *et al*, 1997:18.38-42).

Human infants as young as one month show cortisol responses to stress. In a study on animal phobics, cortisol secretion increased promptly in response to exposure to a phobic stimulus. In a study on rhesus monkeys, the plasma cortisol level rose in response to inescapable shock and aggression. The plasma levels of cortisol follow a circadian rhythm similar to that of the preceding ACTH secretion. Thus, cortisol plasma levels are highest in the morning. However, one study on animal phobics found the inverse situation with a minimal cortisol response in the morning. In lactating women it seem that oxytocin inhibits the release of cortisol (Bethune, 1975:34; Carter & Altemus, 1997:167; Marks, 1987:216, 218; Nesse et al, 1985:325, 330; University of Plymouth, 1998:2, 5).

4.3.6 Pancreatic hormones involved in anxiety and fear

The secretion of insulin is stimulated by several amino acids (e.g. arginine, lysine and phenylalanine), fatty acids, GH and glucagon. Catecholamines inhibit the secretion of insulin. Insulin has far-reaching influences on carbohydrate, fat, protein and K⁺-metabolism. In carbohydrate metabolism it promotes the movement of glucose from the blood plasma across the membrane of insulin-dependent cells. Insulin is also involved in the catabolism of glucose in insulin-dependent cells, as well as in glycogenesis in muscle fibres, hepatocytes and adipocytes. Regarding fat metabolism, it promotes lipogenesis and storage of fat. In protein metabolism, insulin promotes protein synthesis and transport of amino acids into cells across the cell membrane (Meyer et al, 1997:18.46-49).

Studies on animal phobics, found that insulin secretion increased promptly in response to exposure to a phobic stimulus (Marks, 1987:216, 218; Nesse et al, 1985:325).

4.4 INTEGRATED MODEL OF ANXIETY AND FEAR

The mammalian nervous and endocrine systems evolved over millennia to provide effective mechanisms in order to respond to threatening conditions. Threat may elicit a simple reflex (e.g. eye blinking) or a much more complex behavioural pattern (e.g. avoidance behaviour). Several factors play a role in these complex behavioural patterns (e.g. the presence of conscious emotions, cognitions and complex neural pathways) (Marks, 1987:177, 184).

Gray's model attempts to explain two personality dimensions, i.e. introversion-extraversion and neuroticism, in terms of the interactions between different brain systems. They are postulated to correspond to individual differences in the sensitivity (reactivity) between the BFS and BIS. Introversion-extraversion corresponds to the balance of sensitivities towards inputs of the BIS and BFS respectively (Figure 4.1). "Introversion" reflects a relatively greater sensitivity to stimuli associated with punishment (or non-reward) than to stimuli associated with reward (or non-punishment). "Extraversion" reflects the reverse relative balance. "Neuroticism" (emotionality) reflects the sum of sensitivities towards inputs of the BIS and BFS - a high sum correspond to being neurotic, while low sum correspond to emotional stability. Proneness to anxiety represents a steep increase in sensitivity towards stimuli associated with punishment or non-reward (i.e. inputs to the BIS). Thus, high anxiety correspond to being a neurotic introvert and low anxiety to being a stable extrovert. The dimension of "impulsivity" represents a steep increase in sensitivity to stimuli associated with reward or non-punishment (i.e. inputs to the BFS). Thus, high impulsivity corresponds to being a neurotic extrovert and low impulsivity to being a stable introvert (Carver & White, 1994:319; Gray, 1987:494, 497, 507).

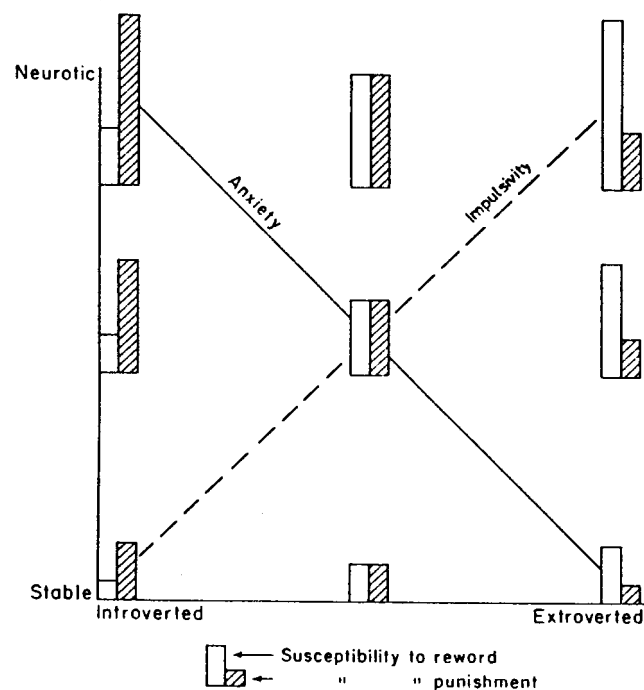


Figure 4.1: Gray's adaptation of Eysenck's dimensions of neuroticism and introversion-extraversion (from Gray, 1982:454)

The BIS and BFS operate interactively to modulate behaviour depending on environmental circumstances. As the environmental context changes, so the relative strength of these systems will vary over time. The balance between them will determine the specific behavioural expression, i.e. the occurrence and magnitude of environmental engagement behaviours and affective experiences. The relative balance between the two systems is determined by two factors: state factors (e.g. type and strength of sensory input) that have a directional influence on the activated system; and personality trait factors that influence the sensitivity towards activating stimuli. Anxiety symptoms are then hypothesised to be found in individuals whose personality is described as neurotic introverts - i.e. persons exhibiting shyness, social withdrawal, sensitivity to punishment and failure, a tendency to be easily discouraged, and a failure to develop active means of coping with situations. This suggests that the chief determinant of phobias and other symptoms of anxiety is the reactivity of the

BIS. Thus, anxious individuals are highly susceptible to threats of punishment and failure, but relatively insensitive to positive reinforcers. Studies of phobic individuals estimate that the contribution of heredity to the personality traits of neuroticism and extraversion explain about 50% of the variance. This means that 50% of the variance remains to be accounted for. It is likely that learning plays a determining role in this respect (Fowles, 1987:422; Gray, 1982:426-427; 438, 453-455).

4.5 SUMMARY

The CNS and the endocrine system function in a highly integrated way to facilitate anxiety and fear responses. On the level of brain systems, three interconnected systems exist for the control of emotional behaviour. These are the fight-flight system, BIS and BFS. The BIS deals specifically with aversive motivation, frustration, fear, anxiety and passive avoidance behaviour, while the BFS is responsible for activating behaviour in active avoidance situations. Several deep brain structures (the limbic system, hypothalamus and brain stem) are involved in anxiety and fear. The neocortex play a role in the cognitive aspects of anxiety and fear that are expressed through the deep brain structures. Escape is mediated by neural pathways in the hypothalamic nuclei and amygdala. Active avoidance is associated with activity in the limbic cortex and prefrontal cortex. Passive avoidance is controlled by the septal-hippocampal system, amygdala, locus coeruleus and raphe nuclei. The raphe nuclei seem to be specifically involved in tonic immobility. With regards to neurotransmitters involved in fear behaviour, it seems that their distribution in the CNS often correspond to particular pathways and brain structures. The serotonergic systems sensitise defensive responses in BIS and BFS. The noradrenergic systems associated with the locus coeruleus play an activating role in panic attacks, as well as to increase motor and autonomic activity during alarm responses. The GABA-ergic pathways are found throughout the brain and spinal cord where they modulate the ascending activating systems, namely the serotonergic and

noradrenergic systems.

An intricate network of hormones is implicated in anxiety and fear responses. The fear response is primarily associated with changes in the HYPAC axis. At present no definite biochemical markers specific to anxiety and fear have been found, but catecholamine (adrenaline and NA) and cortisol levels are regarded as fairly valid indicators. Endocrine responses are more prominent during acute stress compared to chronic stress. The primary response is an increase in the secretion of corticoliberin, sequentially followed by increases in ACTH and cortisol. Stressful stimuli may also lead to an increase in the secretion of oxytocin which will inhibit the release of ACTH and cortisol. Additionally, exposure to a phobic stimulus may result in an increased plasma concentration of vasopressin, NA, adrenaline, insulin, corticoliberin and GH. Somatostatin has an inhibiting effect on ACTH secretion. The major negative feedback control of the HYPAC axis is of peripheral origin, namely glucocorticosteroids operating at the level of the CNS and the pituitary gland. Figure 4.2 depicts a summary of the positive and negative interactions between the most important hormones secreted during exposure to stressful stimuli.

The following chapter deals with the methodology followed in the execution of this research project.

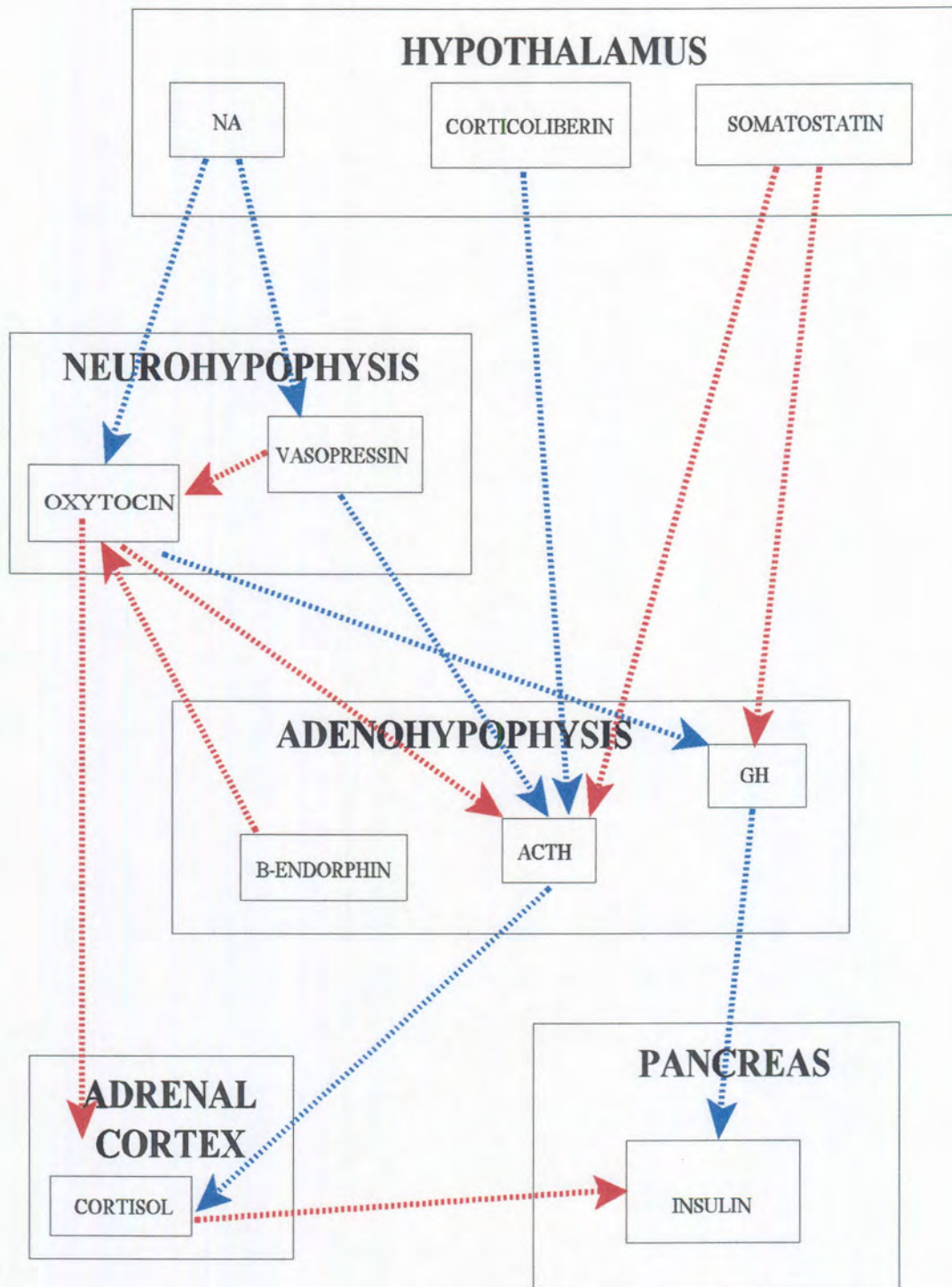


Figure 4.2: Summary of the positive (blue) and negative (red) interactions between the most important hormones secreted during exposure to stressful stimuli

CHAPTER 5

METHODOLOGY FOR ASSESSING CHANGES IN ADRENOCORTICOTROPIC HORMONE DURING DOG PHOBIA THERAPY

5.1 INTRODUCTION

Anxiety and fear can be evaluated on any one or more of the three levels of the anxiety and fear response: namely the cognitive-affective, motor-behavioural and physiological levels. In this study the cognitive-affective aspects were measured by means of the Fear Survey Schedule during the screening of potential subjects, and by means of the anxiety scale and stressor schedule during each of the three experimental stages. The motor-behavioural aspects were assessed by a psychologist through direct observation of non-verbal communication cues during the behavioural approach tests. Further, it was also measured as the termination distance of the dog approach during the pre- and postintervention stages. The measurement of a physiological aspect focussed on the determination of ACTH-levels in blood samples taken during all three experimental stages. Blood pressure, heart rate, respiratory rate and electrodermal conductivity were not included in the physiological measurements for two reasons. The one is that these parameters have already been measured in a number of animal phobia studies and are thus well-described. The second is that the presence and attachment of too many measuring devices to subjects during the experimental stages could have inhibited the elicitation of potential anxiety and fear responses due to increased self-awareness (Craske & Sipsas, 1992:578; De Jong *et al.*, 1995:58-59; Di Nardo *et al.*, 1988:248; Hare & Blevings, 1975:4-7; Marks, 1987:7-9; Öhman, 1986:131).

The experimental phase of the study followed a preexperimental approach with a case-control design. The intervention period between the pretest (preintervention) and posttest (postintervention) stages only involved the experimental group. Each subject in the experimental group was individually exposed to systematic desensitisation therapy (Ivey, Ivey & Simek-Morgan, 1997:291-294).

5.2 HYPOTHESIS

The process involved in the determination of plasma ACTH-levels during behavioural therapy will provide a multidisciplinary protocol for physiological studies of phobic behavioural patterns in humans.

5.3 BENEFITS ARISING FROM THE EXPERIMENT

The following benefits may arise from the project:

- the results can provide a biochemical parameter of anxiety and fear in animal phobia response patterns;
- plasma ACTH-levels may serve as an indicator for the successful completion of psychotherapy in persons suffering from animal phobia as plasma ACTH-levels could be correlated to the motor-behavioural aspect of the phobia response; and
- the development of an effective therapy protocol for the treatment of dog phobia.

5.4 MATERIALS AND METHOD

The type of research, a prestudy, the subjects, experimental design, experimental procedures and intervention are as follows:

5.4.1 Type of research

Experimental research begins with a hypothesis, modify a situational factor (independent variable) and compare the outcomes (dependent variables) with and without the intervention. The pretest measures the dependent variable prior to introduction of the intervention, while the posttest measures it after the introduction of the intervention into the experimental situation. Subjects are divided into two groups, namely an experimental group which receives the intervention, and a control group which does not receive the intervention. Preexperimental research lacks random assignment of subjects to the experimental and control groups (Neuman, 1997:177, 182, 185).

5.4.2 Prestudy

A prestudy was done to determine the prevalence of anxieties and fears towards animals in general, and dogs in particular, among adult females. This was necessary in order to determine the potential of recruiting enough subjects suffering from dog phobia on the Arcadia campus, Technikon Pretoria. A hundred and seventeen 1st-year female students were asked to anonymously indicate on a note whether they are afraid of any specific animals. They were told that these animals could include reptiles, amphibians, farm animals, companion animals, spiders, insects, birds and rodents. It should be noted that the word “afraid” was used rather than the word “phobia”. The meaning of “afraid” is broader and better known to most people than “phobia”. It also includes suggestions of being either anxious or fearful without explicitly

distinguishing between the two concepts. No other information was required from the students. This survey was expected to yield only a crude indication of the prevalence of adult females which experience some anxiety and fear in the presence of specific animals.

5.4.3 Sample selection

The sampling of subjects for the experimental and control groups is described in this section, as well as a description of the dog stimulus used during the behavioural approach tests.

5.4.3.1 Recruitment of subjects

In order to recruit subjects, an open oral invitation and information sheets were distributed to female students on the Arcadia campus of the Technikon Pretoria on various occasions, explaining the general nature of the study. Thus, a non-probability convenience sample was recruited. The information sheets provided the following:

- the aim of the study: to determine a biochemical parameter in a group of female students not suffering from dog phobia, as well as in a group of female students suffering from dog phobia;
- the experimental procedure: completion of documents (questionnaires and informed consent form), venipuncture during three separate occasions, a behavioural approach test (BAT) with a real dog on two occasions, and target dates;
- time implications for subjects in the control group: three separate occasions of one hour each;

- time implications for subjects in the experimental group: three separate occasions of one hour each, as well as the intervention period consisting of an hour session per week for six to ten weeks;
- location of study: Arcadia campus, Technikon Pretoria;
- supervision: the names of the study leader and co-study leader, as well as reference to a psychologist to be part of the intervention phase;
- assurances: confidentiality of all information, voluntary participation, possibility of withdrawal at any stage without negative consequences, and open access to researcher for information regarding the project;
- researcher information: name, office and telephone numbers; and
- compensation for participation: R100-00 for each research participant in the control group, R150-00 for each research participant in the experimental group (South African Medical Research Council, 1993:25-26, 28, 33-34, 43-44).

Initially, thirty-four subjects were recruited to take part in the experimental study. Thirteen subjects were allocated to the experimental group, while 21 subjects were allocated to the control group. During the course of the study, seven subjects were eliminated from the study.

The reasons for eliminating the seven subjects from the study were as follows:

- one subject in the experimental group chose to terminate her participation after the onset of the intervention phase;

- one subject in the control group became pregnant before the onset of the resting stage;
- three subjects in the control group did not attend the resting stage;
- one subject in the control group was absent from the postintervention stage due to the fact that her dad died a few days earlier; and
- one subject in the control group terminated her studies at the Technikon Pretoria during the intervention period. She could not attend the postintervention stage due to work-related responsibilities.

5.4.3.2 Screening of potential subjects

Potential subjects were invited for screening after they indicated their willingness to partake in the study. The screening event required each potential subject to complete a biographical information page (Addendum A) and an adapted Fear Survey Schedule (Addendum B).

The Fear Survey Schedule (FSS) was developed to assess clinical phobic behaviour and generalised anxiety in experimental studies of desensitisation psychotherapy. It provides a clinical tool to survey a wide range of reasonably common sources of anxiety and fear reactions. The stimulus situations forming the content of the FSS are situations to which it is unadaptive for a person to have anything more than moderate anxiety and fear. A persistent pattern of responding with considerable anxiety or fear in any such situation is regarded as phobic (Wolpe & Lang, 1964).

The original FSS consists of 72 items and have been adapted by the researcher to increase its suitability for the study, as well as to increase its applicability to the South African context. The adaptations involved on the one hand the replacement of

“American” English words with “British” English words which are better known in South Africa (e.g. item 11), and on the other hand the replacement of some items with “dog” and “predatory” items which is relevant to this particular study (e.g. item 10).

The following adaptations have been made:

- item 9: “People who seem insane” have been reformulated as “People who seem crazy”;
- item 10: “Falling” have been replaced by “Barking dogs”;
- item 11: “Automobiles” have been reformulated as “Motor vehicles”;
- item 14: “Thunder” have been reformulated as “Thunderstorms”;
- item 25: reformulated as “Journeys by taxi, bus or car”;
- item 26: “Feeling angry” have been replaced by “Lion in zoo”;
- item 37: “Birds” have been replaced by “Large dogs”;
- item 48: “Dogs” have been reformulated as “Security dogs”;
- item 51: “Being in an elevator” have been reformulated as “Being in a lift”;
- item 55: reformulated as “Blood of humans or animals”;
- item 56: “Parting from friends” have been replaced by “Loose dogs in street”;
- item 67: “Premature heart beats (missing a beat)” have been reformulated as

“Pounding heart”;

- item 68: reformulated as “Nude men / women”; and
- item 70: “Doctors” have been reformulated as “Medical doctors”.

The items in the FSS have been subclassified into different categories by its original authors. These categories are largely retained for this study. Two new categories have been added by the researcher, and the adapted items have been reclassified into the applicable categories. The two new categories are the dog and blood/injection categories which consist of selected items from the animal and tissue damage, illness and death categories respectively. The blood/injection category has been added in order to control for subjects responding with anxiety and fear responses towards the sight of blood or being subjected to venipuncture. The dog category has been added due to the primary focus of this study. The categories used in this study are as follow:

- animal: items 10, 20, 24, 26, 28, 34, 37, 43, 48, 54, 56 and 63 (12 items);
- dog: items 10, 37, 48 and 56 (4 items);
- social: items 7, 12, 17, 23, 27, 32, 36, 39, 45, 49, 53, 59, 62, 65, 68 and 72 (16 items);
- tissue damage, illness and death: items 2, 6, 9, 13, 19, 22, 29, 35, 40, 44, 47, 52, 55, 58, 61, 64, 67 and 70 (18 items);
- blood/injection: 2, 13, 22, 29, 52 and 55 (6 items);

- noises: items 1, 5, 15 and 30 (4 items);
- classical phobias: items 3, 8, 11, 14, 18, 25, 33, 38, 42, 46, 51, 57, 60, 66 and 69 (15 items);
- miscellaneous: items 4, 16, 21, 31, 41, 50 and 71 (7 items); and
- total fear score: sum of all items (Wolpe & Lang, 1964).

During completion of the FSS respondents are requested to tick one of five possible answers to indicate the way in which each item causes fear or other unpleasant feelings to the person. The possible answers are “not at all”, “a little bit”, “a fair amount”, “much” and “very much”. In order to interpret the completed FSS, a numerical value was allocated to each possible answer: “not at all” = 1, “a little bit” = 2, “a fair amount” = 3, “much” = 4 and “very much” = 5.

Potential subjects who scored an average of ≥ 4.00 for the dog items were initially allocated to the experimental group, while those scoring an average of ≤ 2.50 for the dog items were initially allocated to the control group. Subjects scoring an average between 2.50 and 4.00 were omitted from the study, unless an interview indicated that the person should be classified in either the experimental or control groups (South African Medical Research Council, 1993:4).

5.4.3.3 Dog stimulus

The same adult, male German Shepherd was used during all the behavioural approach tests:

- name: Quando vom Bohawald, SA Sieger (South African champion);

- registration number: SZ 1857074 LOSH 681118 [Verein für Deutsche Schäferhunde (Association for German Shepherds)];
- registration class: SchH3 [Schutzhund (Protection dog)];
- date of birth: 16/01/1992;
- weight: 36.0 kg;
- shoulder height: 64.5 cm;
- colouration: dark black-brown;
- general description: bigger than the standard German Shepherd, strong strides (front and back legs), big strides, self-assured body posture, and disciplined aggression; and
- owner and handler: Me S van Kraayenburg (Grehenheim German Shepherds).

5.4.4 Experimental design

A preexperimental design with a case-control study was used. Preexperimental designs lack random assignment of subjects to the experimental or control group (Neuman, 1997:185-187).

5.4.4.1 Experimental and control groups

The experimental group consisted of adult females suffering from dog phobia, while the control group consisted of adult female not suffering from dog phobia.

5.4.4.2 Pre- and postintervention approach

The pre- and postintervention approach meant that the effect of the intervention on the presence of the dog stimulus was measured against each subject's own baseline values.

All the subjects in the study were subjected to three measurement stages:

- resting stage: no dog stimulus present, prior to the intervention;
- preintervention stage: dog stimulus present; and
- postintervention stage: dog stimulus present.

The control group received no psychotherapeutic intervention with regards to animal phobia, while the experimental group was subjected to psychotherapeutic intervention in the form of systematic desensitisation.

5.4.4.3 Stressor schedule

During each measurement stage, a questionnaire was used to evaluate the subjects' state of anxiety. The stressor schedule (Addendum C) was developed by the researcher. The objectives of the questionnaire were twofold: firstly, to establish the subjects' present anxiety levels with regards to a number of general life situations, and secondly, to establish the subjects' pregnancy status.

The first part of the stressor schedule consisted of 15 items referring to objects and experiences which potentially may result in feelings of anxiety. Subjects were required to tick one of five possible answers to indicate the stress or anxiety each

situation caused them in the previous few days. The possible answers were “not at all”, “a little bit”, “a fair amount”, “much” and “very much”. In order to interpret the completed stressor schedule, a numerical value was allocated to each possible answer: “not at all” = 1, “a little bit” = 2, “a fair amount” = 3, “much” = 4 and “very much” = 5. The second part of the stressor schedule consisted of two questions with regards to the subjects’ pregnancy status.

Subjects had to complete a stressor schedule at the onset of every measurement stage. The purpose of the stressor schedule was twofold: firstly, to determine general anxious moods which could be linked to the physiological parameter, and secondly, to eliminate pregnant subjects from further participation in the study. A positive pregnancy status was envisaged to complicate the interpretation of physiological parameters. It was also deemed unethical to involve pregnant subjects in experimental situations involving potential anxiety and fear reactions (South African Medical Research Council, 1993:40).

5.4.5 Experimental model

Subjects were assigned to the experimental and control groups according to the results obtained on the FSS during the screening period. Subjects from the experimental and control groups were subjected to the testing procedure on a first-come-first-serve basis during each of the three experimental stages. The testing procedures were conducted between 9:00 and 12:00 during each of the experimental stages to control for physiological circadian rhythms. The first stage (resting stage) was one week later followed by the second stage (preintervention stage). The third stage (postintervention stage) followed after the psychotherapy intervention period (Table 5.1). The week that elapsed between the resting stage and the preintervention stage was decided on for practical reasons, namely to ensure that the blood vessels used for venipuncture recovered sufficiently for further blood collection.

Table 5.1: Roster for experimental design

Group	Resting stage	Preintervention stage	Intervention	Post-intervention stage
Experimental group (n=12)	Blood sample 1	BAT & Blood sample 2	Systematic desensitisation therapy	BAT & Blood sample 3
Control group (n=15)	Blood sample 1	BAT & Blood sample 2	No intervention	BAT & Blood sample 3

5.4.6 Experimental procedures

Subjects who were classified into the experimental and control group after the screening event, were requested to sign an informed consent form (Addendum D). The informed consent form was designed according to the guidelines provided by the Ethical Committee, Faculty of Medicine, University Pretoria (South Africa). No subject was allowed to participate in the experimental procedures without having first signed the informed consent form (South African Medical Research Council, 1993:35).

Vacutainer® blood sample tubes (4.5 ml) with ethylenediamine tetraacetic acid (EDTA) (K_3) from Becton Dickinson (VACUTAINER Systems, California, United States of America), were used. The evening preceding each measurement stage, 0.5 ml of a 10 mg aprotonin per 100 ml solution was added to each blood sample tube to be used during the specific measurement stage. Aprotonin (4.0 TIU/mg solid, Sigma Chemical Co, United States of America) is a protease inhibitor. The prepared blood sample tubes were stored overnight in a fridge at ± 4 °C.

The experimental procedures during all three experimental stages were conducted between 9:00 and 12:00. Subjects were dealt with on a first-come-first-serve basis.

On arrival at the experimental rooms, subjects were taken to a waiting room, which was furnished with a table and a number of chairs. Each subject was then requested to complete a stressor schedule. Subjects were allowed to interact with each other in terms of verbal communication while waiting for their individual behavioural approach test to commence.

The resting stage involved no interaction with a dog stimulus. Following completion of the stressor schedule and a period (10 to 15 minutes) of relaxed interaction with other subjects present in the waiting room, a subject was taken to the test room next to the waiting room for collection of blood samples. A registered nurse collected a 9 ml blood sample by means of venipuncture from the antecubital area of the subject. After ensuring that the subject was not feeling faint, she was allowed to leave the experimental area. A subject was not allowed to return to the waiting room following the collection of the blood sample (South African Medical Research Council, 1993:72).

The pre- and postintervention stages involved exposure to a dog stimulus during a BAT. Following completion of the stressor schedule and a period (10 to 15 minutes) of relaxed interaction with other subjects present in the waiting room, a subject was taken to the test room next to the waiting room.

The BAT was based on a procedure described by Di Nardo, Guzy and Bak (1988:246-247). The BAT was conducted in a room six meters long and three meters wide with a door at each end. Intervals of one meter divided the five meter long approach. Each interval was marked by a clearly visible numeral (1-5) attached at a height of 50 cm along one wall (Plate 5.1). The subject was seated at one end of the test room, facing towards the opposite end. The researcher and a psychologist were seated at the same end of the test room as the subject, but against the wall opposite the one with the numerals. The subject was informed that the dog and handler would start the

approach at numeral 5 on her indication. The dog and handler would pause at each numeral for 15 seconds and then proceed to the next numeral. The subject was also informed that she could discontinue the approach at any time by raising one hand, which would then result in a retreat of the dog and handler through the door from which it started the approach. Following a complete approach of the dog towards the subject, she was asked to touch the dog which automatically indicated the end of the dog approach (Plate 5.2). Directly following the termination of the dog approach, the subject was asked to verbally indicate her present subjective anxiety level on a ten-point scale (1 = no anxiety, 10 = maximum anxiety). The subject was then accompanied to a neighboring room where a blood sample was immediately collected. During the BAT the researcher noted the distance (0-5 m) at which the subject terminated the dog approach, as well as her subjectively reported anxiety level. The psychologist assessed the non-verbal behaviour of the subject during the BAT.

A registered nurse collected a 9 ml blood sample by means of venipuncture from the antecubital area of the subject. After ensuring that the subject was not feeling faint, she was allowed to leave the experimental area. A subject was not allowed to return to the waiting room following the collection of blood samples.

Blood samples were continuously transferred to a nearby laboratory where it was immediately centrifuged at ± 640 g for 6 minutes. The plasma was transferred to 2.0 ml cryogenic vials (Corning Costar Corporation, Canada). These vials were stored in a freezer at ± -70 °C until the analysis phase (Dacie & Lewis, 1975:605).



Plate 5.1: The dog approach area as seen from the subject's seat



Plate 5.2: A posed example of a model touching the dog at the end of the dog approach

The blood plasma samples were quantitatively analysed by the Department of Chemical Pathology, Drs Niehaus and Botha Pathologists (Pretoria), in an IMMULITE® Analyzer (Diagnostic Products Corporation, Los Angeles, United States of America). A sequential immunometric assay principle forms the basis of the analytical procedure. The specificity of the antibody is described as highly specific for ACTH. A study performed on 59 apparently healthy volunteers yielded a median value of 24 pg/ml and a 95% reference range of no detection to 46 pg/ml. The analytical sensitivity of this method is 9 pg/ml. The plasma samples of this study which yielded a LOW-value (i.e. a plasma concentration below the analytical sensitivity of the procedure), were assigned a value of 9.0 pg/ml (DPC, 1999:2-3).

The following measurements were taken during the experimental procedures:

- the average scores of the FSS's animal, dog and blood/injection categories for the experimental (n=12) and control (n=15) groups;
- the average score of the FSS's total fear value for the experimental (n=12) and control (n=15) groups;
- the average score of the stressor schedule's total value for the experimental (n=12) and control (n=15) groups at the onset of the resting, preintervention and postintervention stages;
- the average score of the dog approach termination distance during the BAT for the experimental (n=12) and control (n=15) groups during the preintervention and postintervention stages;
- the average score of the anxiety level during the BAT for the experimental (n=12) and control (n=15) groups during the preintervention and

postintervention stages; and

- the average score of the plasma levels of ACTH for the experimental (n=12) and control (n=15) groups during the resting, preintervention and postintervention stages.

5.4.7 Psychotherapy intervention

The intervention phase consisted of five to seven 60-minute sessions once a week. The subjects always attended the sessions on an individual basis in the researcher's office. The office was furnished with a desk and three chairs. Vertical blinds were kept drawn and neon lights provided artificial light. Set appointments were made with the participants. During each session, the subject sat in an upholstered chair, while the researcher was seated in a similar chair opposite and slightly to the right of the subject - therefore, not directly opposite the subject. The distance between the two chairs was approximately 1.5 m. Interruptions during the sessions were restricted to a minimum by keeping the office's door closed and requesting the secretary not to transfer any telephone calls to the office.

The intervention consisted of a combination of systematic desensitisation and instructional learning. Systematic desensitisation are divided into three primary steps: training in deep muscle relaxation, construction of an anxiety hierarchy, and matching specific objects of anxiety from the hierarchy with relaxation training. The instructional learning session consisted of two parts: firstly, showing pictures of fighter dog breeds, and secondly, explaining and modelling how to behave in different perceived threatening situations with dogs (Addendum E). The conveyed information was based on a consultation with a German Shepherd breeder (Ivey *et al.*, 1997:291; Palmer, Maggitti & Gebhardt, 1993:69; Van Kraayenburg, personal communication, 1998; Van Kraayenburg & Van Kraayenburg, 1995:1-19, 34-35).

The aims and procedures during the various intervention sessions were as follows:

- session 1 involved a discussion of the following aspects: reasons for participation in study; expectations with regard to the intervention; initial dog phobia factors (age of onset, context, emotions, thoughts, sensory focus); subsequent dog phobia experiences; social support; contact with other companion animals; BAT encounter; other anxieties and fears (based on the responses on the FSS); and personal goals with regard to successful intervention;
- session 2 involved training in deep muscle relaxation (Addendum F) which was concluded by imaging of a personally chosen calm scene; homework involved practising of deep muscle relaxation;
- session 3 involved the following two aspects: follow-up of deep muscle relaxation homework; and construction of an anxiety hierarchy containing 16 to 22 items of which at least 50% were dog situations - situations were graded (0 to 100) into a hierarchy according to their capacity to elicit anxiety and fear (Ivey *et al.*, 1997:292-293);
- sessions 4 to 6 involved the following aspects: working through the anxiety hierarchy starting from the least anxiety provoking items during session 4 and ending at the most anxiety provoking items during session 6. Working through an item on the anxiety hierarchy involved visualisation of the specific situation, identification of tense muscles, identification of negative emotions, and application of deep muscle relaxation while still visualising the specific situation until physical and emotional relaxation has been attained;
- session 7 involved the following aspects: feedback regarding the anxiety

hierarchy sessions; attainment of personal intervention goals; informal instructional learning regarding dog behaviour (pictures of physical signs of aggressiveness and subservience, verbal instruction and information page with practical tests to evaluate dog behaviour before entering a yard and optimal behaviour when encountering a dog in the street) (Addendum E); handling of relapse; and extending an open invitation for follow-up sessions.

5.4.8 Poststudy

Approximately 8 months following the postintervention stage, a poststudy was conducted in order to evaluate the continued effectiveness of the intervention program. A list of questions was sent to each subject in the experimental group which requested them to respond to the following aspects:

- general evaluation of being part of the study;
- evaluation and comparison of blood collection and BAT during the pre- and postintervention stages;
- levels of motivation to continue during the course of the study;
- evaluation of intervention phase (negative and positive comments);
- contact with dogs since postintervention stage and practical application of skills attained during intervention; and
- evaluation of present level of fear for dogs.

5.4.9 Project management

The total study was organised, managed and observed by the researcher. Co-workers were selected on the basis of their expertise, namely:

- a medical nurse;
- a psychologist, acting as observer during the BATs and supervising the intervention program;
- a dog breeder and handler;
- a medical technologist (chemical pathology) who determined the plasma levels of ACTH; and
- a statistician.

5.4.10 Variables

The variables of the study are defined as follows:

5.4.10.1 Independent variables

The independent variables consisted of an intervention program for the experimental group, i.e. 5 to 7 sessions distributed over a period of 2 months. The intervention involved a combination of systematic desensitisation and instructional learning. The intervention program followed a similar course and content for all subjects in the experimental group. The subjects in the control group received no intervention.

5.4.10.2 Dependent variables

The dependent variables consisted of the following:

- the distance at which the subjects terminated the dog approach during the BAT in the preintervention and postintervention stages. This variable was used as an indication of the effect of the psychotherapy intervention on the motor-behavioural aspect of the phobia response;
- the verbally self-reported anxiety score directly following the dog approach during the BAT in the preintervention and postintervention stages. This variable was used as an indication of the effect of the psychotherapy intervention on the cognitive-affective aspect of the phobia response; and
- the plasma ACTH-levels at the conclusion of the resting, preintervention and postintervention stage. This variable was used as an indication of the effect of the psychotherapy intervention on the physiological aspect of the phobia response.

5.5 VALIDITY AND RELIABILITY OF THE STUDY

Validity refers to the extent that an indicator is actually measuring the variable it is supposed to measure in the particular context. Reliability refers to an indicator's dependability to produce repeatable results (Neuman:1997:138, 141).

5.5.1 Validity

The internal validity of the study was kept as high as possible by controlling the following variables:

- all the subjects were young adult, non-pregnant females to control for age and gender;
- the initial assignment of subjects to the experimental and control groups were based on scores of a clinically tested questionnaire, namely the FSS;
- the final assignment of subjects to the experimental and control groups were based on interviews by a postgraduate psychology student;
- the assignment of subjects to the experimental and control groups were confirmed by a psychologist after evaluation of the subjects' non-verbal behaviour during the BAT of the preintervention stage;
- financial compensation of subjects in the experimental and control groups differed to such a limited extent (R100-00 vs R150-00) as not to serve as a motivation for non-phobic persons to fake being dog phobics;
- subjects in the experimental and control groups were tested on the same occasion during each of the three experimental stages on a first-come-first-serve basis;
- the time of blood collection was standardised to between 9:00 and 12:00 in the morning to compensate for circadian rhythms in the plasma ACTH-levels which exhibit a significant diurnal variation;

- baseline values for plasma ACTH-levels were used to control individual differences;
- the same rooms with the same environment were used as waiting room and test room for all three the experimental stages;
- collection of blood samples was done by the same medical nurse;
- the same dog stimulus and dog handler was used during the BATs of the preintervention and postintervention stages;
- the same people were present in the test room during the BATs of the preintervention and postintervention stages;
- the same instructions were given to subjects with regards to the BAT during the preintervention and postintervention stages;
- external causes of anxiety and fear for each subject were controlled for through the measurement of present stressors by means of a stressor schedule at the beginning of each experimental stage;
- indications of anxiety and fear were measured on three levels, namely the cognitive-affective (i.e. stressor schedule at the beginning of each stage, and the self-reported anxiety score at the end of the BAT), motor-behavioural (i.e. evaluation of non-verbal behaviour during the BAT, and the distance at which the subject terminated the dog approach during the BAT), and physiological (i.e. the plasma ACTH-levels at the conclusion of each experimental stage);
- the intervention program followed a similar course and content for all subjects

in the experimental group. Although the specific content of the program varied according to each subject's individual situation, the basic process and outcome of the program was similar in all cases;

- the same office with a relatively stable environment was used for all sessions of the intervention program;
- the same person was conducting all the sessions of the intervention program; and
- the researcher was not involved in the analysis of the plasma samples or the analysis of the results of the study. Bias towards, or manipulation of the results by the researcher was thus eliminated.

5.5.2 Reliability

The reliability of the study was based on the following aspects:

- repeatability of results was aimed at by using a statistically minimum sample size which could yield biologically significant results. The statistics consultant suggested a minimum sample size of 12 persons in each of the experimental and control groups. Initially, twenty subjects have been recruited for the control group, while 13 have been recruited for the experimental group. This was done in order to compensate for potential fall-out. Due to fall-out, the final control group consisted of 15 subjects and the experimental group of 12 subjects. The sample size could thus be accepted as adequate;
- although emotional states, unrecognised external stressors, specific outcomes (responses) to the intervention program and plasma levels of neurochemicals

can vary in persons, the fact that all the subjects were non-pregnant adult females and experienced the same experimental conditions in a controlled environment, could limit unacceptable variation in order to make the results reliable for similar groups;

- dependent and independent variables were properly identified and described;
- the experimental procedures and intervention program were described in detail;
- clinically accepted screening and intervention procedures were used; and
- statistical procedures were specified.

5.6 ETHICS

The research protocol was approved by the Ethics Committees of the Faculty of Veterinary Science, University of Pretoria (protocol 36.5.351), and the Faculty of Medicine, University of Pretoria (protocol 2/99). The Head of the Research Committee of the Department of Psychology, University of Pretoria, also indicated an ethical acceptance of the procedure to elicit anxiety and fear from subjects in the study. Subjects who participated in the experimental stages were required to sign an informed consent form (Addendum D) which was compiled according to the guidelines of the Ethics Committee, Faculty of Medicine, University Pretoria (South Africa). The only invasive procedure was collection of venous blood which was done by a medical nurse. During all stages of the BAT, the dog stimulus was under direct control of the dog handler. The dog was well-tempered and disciplined. Between different BATs in a specific experimental stage, the dog was allowed to drink water ad lib and to wander in an enclosed garden. A psychologist was present during all stages of the BAT to monitor the potential onset of panic in phobic subjects (South

African Medical Research Council, 1993:72, 81-87).

5.7 STATISTICS

The raw data (Addendum G) were statistically analysed by the Statistical Support and Strategic Research Service, Technikon Pretoria. The following measurements were statistically analysed:

- the scores of the FSS during the screening phase;
- the scores of the stressor schedule during the resting, preintervention and postintervention stages;
- the plasma ACTH-levels during the resting, preintervention and postintervention stages;
- the distance at which the subjects terminated the dog approach during the BAT in the preintervention and postintervention stages; and
- the self-reported anxiety scores directly following the dog approach during the BAT in the preintervention and postintervention stages.

5.7.1 Discrimination ability of Fear Survey Schedule

In order to test the FSS's ability to discriminate between dog phobic and non-phobic individuals, the scores for the animal, dog and blood/injection categories and total fear scores of the final experimental and control groups are compared. Student's *t*-test, also known as the independent samples *t*-test, was used to test the null hypothesis. It tests the equality of the means of two populations when independent

samples are available from each population (Everitt, 1998:324).

The null hypothesis that the average scores between dog phobic and non-phobic individuals is equal, is tested against the alternative that these scores are not equal at the 5% level of significance. The null hypothesis will be rejected when there is a significant difference in the average scores between dog phobic and non-phobic individuals. A rejection of the null hypothesis with regards to the dog category will indicate a statistically significant ability of the Fear Survey Schedule to distinguish between dog phobic and non-phobic individuals. Also, a rejection of the null hypothesis with regards to the animal, blood/injection and total fear categories will indicate a statistically significant difference between dog phobic and non-phobic individuals based on other FSS categories.

5.7.2 Effects of the intervention program

In order to test the effects of the intervention program on the experimental group with regards to the distance at which the subjects terminated the dog approach during the BAT, and the self-reported anxiety scores directly following the dog approach during the BAT, the preintervention values are compared to the corresponding postintervention values. Also, the plasma ACTH-levels during the resting, preintervention and postintervention stages are compared. The matched pairs *t*-test, was used to test the null hypotheses. It is a Student's *t*-test to test for the equality of the averages of two populations when the observations arise as paired samples. The test is based on the differences between the observations of the matched pairs (Everitt, 1998:207).

With regards to the termination distance of the dog approach and the self-reported anxiety scores, the null hypothesis that the average measurements before and after intervention are equal, is tested against the alternative that the averages are not equal

at the 5% level of significance. The null hypothesis will be rejected when the average values of the measurements after the intervention program are significantly lower. If the null hypothesis is rejected, it can be concluded that there is a statistically significant positive effect of the treatment program on the measurement values.

With regards to the plasma ACTH-levels, three statistical hypotheses are tested:

- the first is the null hypothesis that the average values of the resting and preintervention stages are equal. It is tested against the alternative that the average values of the measurements are not equal at the 5% level of significance. The null hypothesis will be rejected when there is a significant difference in the average values of the measurements. If the null hypothesis is rejected, it can be concluded that there is a statistically significant effect of the dog approach during the preintervention stage on the plasma ACTH-levels of phobic individuals. The direction of the influence can be observed in the data;
- the second is the null hypothesis that the average values of the preintervention and postintervention stages are equal. It is tested against the alternative that the average values of the measurements are not equal at the 5% level of significance. The null hypothesis will be rejected when there is a significant difference in the average values of the measurements. If the null hypothesis is rejected, it can be concluded that there is a statistically significant effect of the treatment program on the plasma ACTH-levels of the experimental group; and
- the third is the null hypothesis that the average values of the resting and postintervention stages are equal. It is tested against the alternative that the average values of the measurements are not equal at the 5% level of significance. The null hypothesis will be rejected when there is a significant difference in the average values of the measurements. If the null hypothesis is

rejected, it can be concluded that a maturation effect or external stressor effect has occurred during the experimental period.

5.7.3 Experimental versus control group

In order to control for changes across the study in the scores of the distance at which the subjects terminated the dog approach during the BAT, the self-reported anxiety scores directly following the dog approach during the BAT, or the plasma ACTH-levels due to maturation effects, the values of the experimental group are compared to the corresponding values of the control group. Student's *t*-test was used to test the null hypothesis (Everitt, 1998:324; Neuman, 1997:190).

The null hypothesis that the average values of the experimental and control groups are equal, is tested against the alternative that the average values are not equal at the 5% level of significance. The null hypothesis will be rejected when there is a significant difference between the mean values of the measurements for the experimental and control groups. If the null hypothesis is rejected, it can be concluded that there is a statistically significant difference between the experimental and control groups in the scores of the distance at which they terminated the dog approach during the BAT, the self-reported anxiety scores directly following the dog approach during the BAT or the plasma ACTH-levels.

5.7.4 External stressor effect

In order to control for the potential influence of external environmental stressors on the experimental parameters, the total values of the stressor schedule of each experimental stage for the experimental group are compared to the corresponding values of the control group. Student's *t*-test was used to test the null hypothesis. Also, the total values of the stressor schedule between the different experimental

stages for the experimental and control groups respectively, are compared. The matched pairs *t*-test was used to test the null hypothesis (Everitt, 1998:207, 324).

The null hypothesis that the average values of the experimental and control groups are equal, is tested against the alternative that the average values is not equal at the 5% level of significance. The null hypothesis will be rejected when there is a significant difference between the average values of the measurements for the experimental and control groups. If the null hypothesis is rejected, it can be concluded that there is a statistically significant difference between the experimental and control groups in the total values of the stressor schedule during the resting, preintervention and postintervention stages respectively.

The null hypothesis that the the difference between the average total values of the stressor schedule of the different experimental stages for the experimental and control groups respectively, is zero, is tested against the alternative that the difference is not zero at the 5% level of significance. The null hypothesis will be rejected when there is a significant difference in the average values of the different experimental stages for the experimental and control groups respectively. If the null hypothesis is rejected, it can be concluded that there is a statistically significant difference between the different experimental stages for the experimental and control groups respectively. The direction of the influence can be observed in the data.

The following chapter presents and discusses the results of the project.

CHAPTER 6

RESULTS OF BEHAVIOURAL AND PHYSIOLOGICAL ASSESSMENTS

6.1 PRESTUDY

The prestudy was conducted in order to determine a crude indication of the prevalence of adult females which experience some anxiety and fear with regards to specific animals.

6.1.1 Subjects of the prestudy

One hundred and seventeen female students participated on an anonymous and voluntary basis. The subjects were 1st-year students in the Departments of Somatology (n=57) and Biological Sciences (n=60), Arcadia campus, Technikon Pretoria.

6.1.2 Results of the prestudy

Results indicated that 41.0% of the subjects are not afraid of reptiles, amphibians, farm animals, companion animals, spiders, insects, birds or rodents. The largest group of fearful subjects (26.5%) was those who were afraid of snakes. Next were those afraid of dogs (especially large dogs and Bull Terriers) (15.4%), spiders (12.0%), rodents (e.g. mice, rats and hamsters) (12.0%), horses (10.3%), insects (e.g. ants, cockroaches, crickets and mantises) (7.7%), cattle (6.8%) and frogs (6.8%) (Table 6.1). Various smaller groups of subjects, each representing <5.0% of the

sample, were found to be afraid of poultry (e.g. hens, chickens, turkeys and geese), cats, bees, wasps, scorpions, reptiles, “worms”, sheep, donkeys, ostriches and “all animals” (Table 6.1). It should be noted that each subject could list as many animals as she wished. This means the response of a particular subject could be listed in more than one of the categories.

Table 6.1: Prevalence (%) of female students (n=117) which experience some anxiety and fear with regards to specific animals and animal groups

“Afraid of ... “	Somatology (n=57)	Biological Sciences (n=60)	Total
No animals	28.1	53.3	41.0
Snakes	49.1	5.0	26.5
Dogs	12.3	18.3	15.4
Spiders	21.1	3.3	12.0
Rodents	22.8	1.7	12.0
Horses	15.8	5.0	10.3
Insects	14.0	1.7	7.7
Cattle	8.8	5.0	6.8
Frogs	14.0	0	6.8
Poultry	8.8	0	4.3
Cats	0	6.7	3.4
Bees and Wasps	3.5	1.7	2.6
Scorpions	5.3	0	2.6
Pigs	3.5	0	1.7
Reptiles	1.8	1.7	1.7
“Worms”	3.5	0	1.7
Sheep	1.8	0	0.9
Donkeys	1.8	0	0.9
Ostrich	0	1.7	0.9
“All animals”	0	1.7	0.9

6.1.3 Conclusion of prestudy

The prestudy indicated that the prevalence of adult females which experience some anxiety and fear with regards to dogs was potentially high enough to successfully proceed with the formal recruitment of adult females suffering from dog phobia amongst students on the Arcadia campus, Technikon Pretoria.

6.2 THE RESEARCH SUBJECTS

The biographical data of the experimental group (n=12) and the control group (n=15) are reported in the following paragraphs.

Fifteen subjects were of European origin, ten of African origin and 2 of Indian origin. The experimental group consisted of 3 subjects of European origin, seven of African origin and 2 of Indian origin. The control group consisted of 12 subjects of European origin and three of African origin.

The ages of all the subjects (n=27) ranged from 18 to 28 years, while the average age was 20.1 years. The ages of the subjects in the experimental group (n=12) ranged from 18 to 28 years, while the average age was 20.4 years. The ages of the subjects in the control group (n=15) ranged from 18 to 25 years, while the average age was 19.9 years.

The home language of all the subjects (n=27) was as follows: four English, 13 Afrikaans, 6 Setswana, 1 Sepedi, 1 IsiZulu, 1 Sesotho and 1 SiSwati. The home language of the subjects in the experimental group (n=12) was as follows: two English, 3 Afrikaans, 4 Setswana, 1 Sepedi, 1 IsiZulu and 1 Sesotho. The home language of the subjects in the control group (n=15) was as follows: two English, 10 Afrikaans, 1 SiSwati and 2 Setswana.

Most subjects, except two, did never before receive psychotherapy for any psychological condition. One subject (#9) in the control group received psychotherapy for a darkness phobia during 1997, while one subject (#4) in the experimental group received psychotherapy for adaptation difficulties during November 1997.

Table 6.2 summarises the biographical characteristics of the research subjects.

Table 6.2: Biographical characteristics of the research subjects (n=27) in the experimental and control groups

Experimental group	Age (years)	Home language
(n=12)	18-28 20.4 average	2 English 3 Afrikaans 4 Setswana 1 Sepedi 1 IsiZulu 1 Sesotho
Control group	Age (years)	Home language
(n=15)	18-25 19.9 average	2 English 10 Afrikaans 2 Setswana 1 SiSwati

6.3 DISCRIMINATION ABILITY OF FEAR SURVEY SCHEDULE

The results of tests to determine the ability of the FSS to discriminate between phobic and non-phobic individuals in the study are given in this section.

Tables 6.3 - 6.6 provide the following information:

- arithmetic average of measurements for the total sample, as well as the experimental and control groups. These values are used as a measure of central

tendency; and

- standard deviations of measurements for the total sample, as well as the experimental and control groups. These values are an indication of the variability of the measurements.

6.3.1 Animal category

The results for all the research subjects, the experimental group and the control group on the 12 animal items during the screening phase are reflected in Table 6.3.

Table 6.3: Fear Survey Schedule scores for animal items on a 5-point scale during the screening phase

Group	Average	Standard deviation
All research subjects (n=27)	2.63	1.11
Experimental group (n=12)	3.62	0.72
Control group (n=15)	1.85	0.63

The difference in average scores during the screening phase of the final experimental and control groups were compared. The difference was statistically significant ($t=6.82$, $df=25$, two-sided $p<0.05$).

6.3.2 Dog category

The results for all the research subjects, the experimental group and the control group on the 4 dog items during the screening phase are reflected in Table 6.4.

Table 6.4: Fear Survey Schedule scores for dog items on a 5-point scale during the screening phase

Group	Average	Standard deviation
All research subjects (n=27)	2.93	1.55
Experimental group (n=12)	4.40	0.59
Control group (n=15)	1.75	0.93

The difference in average scores during the screening phase of the final experimental and control groups were compared. The difference was statistically significant ($t=8.59$, $df=25$, two-sided $p<0.05$).

6.3.3 Blood/injection category

The results for all the research subjects, the experimental group and the control group on the 6 blood/injection items during the screening phase are reflected in Table 6.5.

Table 6.5: Fear Survey Schedule scores for blood/injection items on a 5-point scale during the screening phase

Group	Average	Standard deviation
All research subjects (n=27)	2.32	1.12
Experimental group (n=12)	2.90	1.13
Control group (n=15)	1.86	0.89

The difference in average scores during the screening phase of the final experimental and control groups were compared. The difference was statistically significant ($t=2.69$, $df=25$, two-sided $p<0.05$).

6.3.4 Total fear

The average total fear score for all subjects, the experimental group and control group on the 72 item FSS during the screening phase are reflected in Table 6.6.

Table 6.6: Fear Survey Schedule scores for all the items on a 5-point scale during the screening phase

Group	Average	Standard deviation
All research subjects (n=27)	176.74	56.74
Experimental group (n=12)	219.17	37.61
Control group (n=15)	142.80	45.72

The difference in average scores during the recruitment phase of the final experimental and control groups were compared. The difference was statistically significant ($t=4.66$, $df=25$, two-sided $p<0.05$).

6.3.5 Interpretation of results

The final allocation of research subjects to the experimental and control groups was based on a number of subject evaluations: an initial screening by means of the FSS; the subjects' experience of anxiety and fear during the BAT of the preintervention stage; and the assessment of non-verbal behaviour by a psychologist during the BAT of the preintervention stage. Based on the holistic picture emerging from these evaluations, the allocation of research subjects to the final experimental and control groups were made. Thus, the initial composition of the experimental and control groups based on the results of the FSS differed from that of the final composition in the following respects:

- subject #4 scored an average of <4.00 in the dog category of the FSS, but was allocated to the final experimental group based on an interview during the

recruitment phase and her non-verbal behaviour during the BAT of the preintervention stage;

- subject #6 scored an average of >4.00 in the dog category of the FSS, but was allocated to the final control group based on interviews during the recruitment phase and after she reported only a low level of anxious and/or fearful emotions during the BAT of the preintervention stage;
- subject #11 scored an average of <4.00 in the dog category of the FSS, but was allocated to the final experimental group based on several factors: the relatively large distance at which she terminated the dog approach during the BAT of the preintervention stage; the highest possible self-reported anxiety score directly following the dog approach during the preintervention stage; and her non-verbal behaviour during the BAT of the preintervention stage; and
- subject #18 scored an average of <4.00 in the dog category of the FSS, but was allocated to the final experimental group based on various factors: an interview during the recruitment phase; her non-verbal behaviour during the BAT of the preintervention stage; the relatively high self-reported anxiety score directly following the dog approach during the preintervention stage.

The average scores of the final experimental and control groups on a number of FSS categories were compared to establish whether an initial screening by means of the adapted FSS could indeed distinguish between phobic and non-phobic subjects. The statistical analysis of results in this section avoids being based on circular reasoning as the final composition of the experimental and control groups are also based on measures other than that of the FSS which in some cases even contradict the indications of the FSS for those specific individuals.

The significant differences between the experimental and control groups with regards to the animal and dog categories of the FSS indicate that it does have the ability to distinguish between dog phobic and non-phobic individuals. The higher average score of the experimental group for the dog category (4.40) compared to the animal category (3.62) indicate that the newly added dog category has a higher discriminatory ability to indicate phobic anxiety and fear for dogs than when relying on the scores of the animal category.

The significant difference between the experimental and control groups with regards to the blood/inject category of the FSS may have had a confounding stressor effect on the plasma ACTH-levels as blood has been collected by means of venipuncture during the experimental stages. However, the average scores of the experimental group (2.90) and the control group (1.86) are both below the median of 3.00. This indicates that no extreme anxiety and fear for blood and/or injections (i.e. average score of ≥ 4.00) were present in any of the two groups.

The significant difference between the experimental and control groups with regards to the total fear score of the FSS indicate that the subjects in the experimental group show a predisposition to be more anxious and fearful than subjects in the control group towards a wide range of reasonably common situations and objects. This may give some support to Gray's model which holds that certain personality traits (introversion and neuroticism) are associated with an "anxious personality".

6.4 EFFECTS OF THE INTERVENTION PROGRAM

The results of various parameters to determine the effect of the intervention program on subjects in the experimental group are given in this section.

Tables 6.7 - 6.9 provide the following information:

- arithmetic average of measurements for the experimental group during the preintervention and postintervention stages, as well as the resting stage in the case of plasma ACTH-levels; and
- standard deviations of measurements for the experimental group during the preintervention and postintervention stages, as well as the resting stage in the case of plasma ACTH-levels.

6.4.1 Termination distance of dog approach

The results for the experimental group on the distance at which the subjects terminated the dog approach during the preintervention and postintervention BAT are reflected in Table 6.7.

Table 6.7: Termination distance (m) of dog approach during the preintervention and postintervention stages for the experimental group (n=12)

Stage	Average	Standard deviation
Preintervention stage	1.83	1.70
Postintervention stage	0.25	0.45

The average termination distances of the experimental group for the preintervention and postintervention stages were compared. The average of the postintervention stage was significantly lower than the average of the preintervention stage ($t=-3.51$, $df=1$, one-sided $p<0.05$).

6.4.2 Self-reported anxiety scores

The results for the experimental group on the self-reported anxiety scores directly following the dog approach during the BATs of the preintervention and postintervention stages are reflected in Table 6.8.

Table 6.8: Self-reported anxiety scores on a 10-point scale during the preintervention and postintervention stages for the experimental group (n=12)

Stage	Average	Standard deviation
Preintervention stage	5.83	2.59
Postintervention stage	2.92	2.95

The average self-reported anxiety scores of the experimental group for the preintervention and postintervention stages were compared. The average of the postintervention stage was significantly lower than the average of the preintervention stage ($t=-3.88$, $df=1$, one-sided $p<0.05$).

6.4.3 Plasma ACTH-levels

The results for the experimental group on the plasma ACTH-levels during the resting stage and directly following the BAT of the preintervention and postintervention stages are reflected in Table 6.9.

Table 6.9: Plasma ACTH-levels (pg/ml) during the resting, preintervention and postintervention stages for the experimental group (n=12)

Stage	Average	Standard deviation
Resting stage	18.43	8.07
Preintervention stage	16.68	7.61
Postintervention stage	18.72	6.17

The average plasma ACTH-levels of the experimental group for the resting, preintervention and postintervention stages were compared. The average of the preintervention stage was not significantly higher than the average of the resting stage ($t=-1.66$, $df=1$, one-sided $p=0.062$). The average of the preintervention stage was not significantly different from the average of the postintervention stage ($t=1.52$, $df=1$, two-sided $p>0.05$). The average of the resting stage was not significantly different from the average of the postintervention stage ($t=0.16$, $df=1$, two-sided $p>0.05$).

6.4.4 Interpretation of results

The significant difference between the pre- and postintervention stages with regards to the experimental group's termination distance of the dog approach, indicates that the psychotherapy treatment program had a positive effect on the motor-behavioural aspects of their response to a potential phobic stimulus. During the preintervention stage, five of the subjects in the experimental group allowed the dog to approach them until they could touch it. At first this may appear to indicate an absence of anxiety and fear for the dog stimulus. However, the psychologist which assessed the non-verbal behaviour of each subject during the BAT, noted the following behavioural cues for each of the five subjects which clearly indicate the presence of anxiety and fear:

- subject #2: entered the test room slowly and vigilantly. During the initial instruction period, she kept her eyes on the door where the dog was to enter. She showed some "courage" to actually touch the dog;
- subject #4: coped with anxiety and fear by asking a lot of questions before the onset of the dog approach - i.e. rationalisation;
- subject #16: entered the test room vigilantly. Facial expression appeared to be

very anxious. When the dog completely approached her, she touched the dog cautiously and with a visibly trembling hand - i.e. showing “courage”;

- subject #18: fiddled a lot with a pen she brought with her into the test room. During the dog approach she focussed on the dog handler rather than the dog; and
- subject #28: entered the test room vigilantly and giggling. Initially she fiddled a lot with her fingers, but it seemed as if the situation became more acceptable during the latter parts of the BAT.

During the postintervention stage, only three of the subjects in the experimental group did not allow the dog to approach them till they could touch it. However, in all three cases they terminated the dog approach only 1 meter from themselves. All the subjects in the experimental group terminated the dog approach during the postintervention stage at the same distance (0 meters) or closer to themselves than during the preintervention stage. This indicates that the psychotherapy treatment program was effective in treating the motor-behavioural aspects of the anxiety and fear response.

The significant difference between the pre- and postintervention stages with regards to the experimental group’s self-reported anxiety scores directly following the dog approach, indicates that the psychotherapy treatment program had a positive effect on the cognitive-affective aspects of their response to a phobic stimulus. When comparing the pre- and postintervention stages, 10 of the 12 subjects in the experimental group reported a lower anxiety score during the postintervention stage than during the preintervention stage. The other two subjects reported unchanged anxiety scores for the pre- and postintervention stages. Di Nardo *et al* (1988:247) performed a similar BAT on a group of young adult women suffering from dog

phobia. They reported an average self-reported anxiety score of 4.27 (minimum=0, maximum=8) for these subjects in a BAT which correspond to the current study's preintervention stage. Their study did not include an intervention program and postintervention BATs. However, the current study's result for the preintervention stage compare favourably to the cognitive-affective aspects of the Di Nardo-study.

The plasma ACTH-levels of the experimental group do not differ significantly between either of the resting, preintervention or postintervention stages. Therefore, all three the null hypotheses regarding the plasma ACTH-levels of the experimental group should be accepted, namely:

- the average plasma ACTH-values of the resting and preintervention stages are equal,
- the average plasma ACTH-values of the preintervention and postintervention stages are equal, and
- the average plasma ACTH-values of the resting and postintervention stages are equal.

The non-significant difference of the plasma ACTH-levels between the resting and preintervention stages is an unexpected result given the role of ACTH in the HYPAC axis. The plasma ACTH-levels in this study varies between an undetectable low level (< 10 pg/ml) to a maximum of 36.3 pg/ml. The average plasma ACTH-levels for all the experimental stages fall within normal ranges for the specific analytical method used, i.e. not detectable to 46 pg/ml (DPC, 1999:3). Rees and Lowry (1979:147) set the immunoreactive plasma ACTH-levels of normal adults at 9:00 to be between 10 and 80 pg/ml.

One possible reason for the unexpected results in this study can be postulated in terms of the interactions between different hormones associated with anxiety and fear in women. The interaction model given in Figure 4.2 suggests that ACTH-secretion from the adenohypophysis is directly and indirectly influenced in a positive and negative way by a number of other hormones. Corticoliberin and vasopressin are directly involved in stimulating ACTH-secretion from the adenohypophysis, while NA in the hypothalamus has an indirect influence through its stimulation of vasopressin secretion. On the other hand, somatostatin and oxytocin are directly involved in inhibiting ACTH-secretion from the adenohypophysis, while cortisol is involved in a negative feedback loop which acts directly on ACTH-secretion from the adenohypophysis, or indirectly on the secretion of corticoliberin from the hypothalamus. These interactions suggest that the measured plasma ACTH-level is the dynamic result of a number of positive and negative influences on its secretion from the adenohypophysis. As no measurements of any of these hormones have been determined in this study, it is impossible to substantiate its possible influence on the plasma ACTH-levels during the different experimental stages. Given the many factors influencing the plasma ACTH-levels, one can not conclude that the psychotherapy treatment program had no effect on this physiological parameter. However, the results in this study serve to highlight the need to further investigate the dynamic interaction between the secretion of ACTH, corticoliberin, NA, somatostatin, oxytocin, vasopressin and cortisol in anxiety and fear responses.

Another possible reason for the unexpected results can be postulated in terms of the unnaturalness and controlled nature of the experimental situation. The following factors contributed to this situation: the subjects were cognisant of the fact that a dog would be present during the preintervention BAT prior to the actual encounter; subjects were aware that the dog would be under the control of a dog handler; and the researcher gave an assurance to all subjects during the recruitment phase that the dog would not be able to “attack” anyone during the BATs. Given these factors, it is clear

that the BAT of the preintervention stage was not an unexpected encounter with a dog as would have been the case in everyday life. Thus, although the BAT did elicit phobia responses to some degree, the phobic subjects most probably displayed only toned-down and self-controlled behavioural and physiological reactions during the BAT.

In summary, the psychotherapy intervention program was significantly effective in decreasing the motor-behavioural and cognitive-affective aspects of the phobic response in the experimental group. The effect of the intervention program on the physiological aspects was inconclusive.

6.5 EXPERIMENTAL VERSUS CONTROL GROUP

The results of various parameters to control for changes across the study due to maturation effects in the experimental and control groups are given in this section.

Tables 6.10 - 6.16 provide the following information:

- arithmetic average of measurements for the experimental and control group during the preintervention and postintervention stages, as well as the resting stage in the case of plasma ACTH-levels; and
- standard deviations of measurements during the preintervention and postintervention stages, as well as the resting stage in the case of plasma ACTH-levels.

6.5.1 Termination distance of dog approach

The results for the experimental and control groups on the distance at which the subjects terminated the dog approach during the preintervention and postintervention BAT are respectively reflected in Table 6.10 and Table 6.11.

Table 6.10: Termination distance (m) of dog approach during the preintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	1.83	1.70
Control group (n=15)	0.07	0.26

The average termination distances of the experimental and control groups during the preintervention stage were compared. The average of the experimental group was significantly higher than the average of the control group ($t=3.99$, $df=25$, one-sided $p<0.05$).

Table 6.11: Termination distance (m) of dog approach during the postintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	0.25	0.45
Control group (n=15)	0.00	0.00

The average termination distances of the experimental and control groups during the postintervention stage were compared. The average of the experimental group was significantly higher than the average of the control group ($t=2.15$, $df=25$, one-sided $p<0.05$).

6.5.2 Self-reported anxiety scores

The results for the experimental and control groups on the self-reported anxiety scores directly following the dog approach during the preintervention and postintervention BAT are respectively reflected in Table 6.12 and Table 6.13.

Table 6.12: Self-reported anxiety scores on a 10-point scale during the preintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	5.83	2.59
Control group (n=15)	1.50	1.02

The average self-reported anxiety scores of the experimental and control groups during the preintervention stage were compared. The average of the experimental group was significantly higher than the average of the control group ($t=5.96$, $df=25$, one-sided $p<0.05$).

Table 6.13: Self-reported anxiety scores on a 10-point scale during the postintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	2.92	2.95
Control group (n=15)	1.07	0.26

The average self-reported anxiety scores of the experimental and control groups during the postintervention stage were compared. The average of the experimental group was significantly higher than the average of the control group ($t=2.43$, $df=25$, one-sided $p<0.05$).

6.5.3 Plasma ACTH-levels

The results for the experimental and control groups on the plasma ACTH-levels during the resting stage and directly following the BAT of the preintervention and postintervention stages are respectively reflected in Table 6.14, Table 6.15 and Table 6.16.

Table 6.14: Plasma ACTH-levels (pg/ml) during the resting stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	18.43	8.07
Control group (n=15)	15.73	5.48

The average plasma ACTH-levels of the experimental and control groups during the resting stage were compared. The average of the experimental group was not significantly different from the average of the control group ($t=1.03$, $df=25$, two-sided $p>0.05$).

Table 6.15: Plasma ACTH-levels (pg/ml) during the preintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	16.68	7.61
Control group (n=15)	14.19	5.40

The average plasma ACTH-levels of the experimental and control groups during the preintervention stage were compared. The average of the experimental group was not significantly different from the average of the control group ($t=0.97$, $df=24$, two-sided $p>0.05$).

Table 6.16: Plasma ACTH-levels (pg/ml) during the postintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	18.72	6.17
Control group (n=15)	13.11	4.97

The average plasma ACTH-levels of the experimental and control groups during the postintervention stage were compared. The average of the control group was significantly lower than the average of the experimental group ($t=2.39$, $df=21$, one-sided $p<0.05$). However, there was a tendency for the experimental group to have a higher average plasma ACTH-level than the control group during the resting, preintervention and postintervention stages.

6.5.4 Interpretation of results

In order to control for the influence of maturation effects on the results of the experimental group discussed in section 6.4, the results of the experimental group were compared to those of the control group with regards to the termination distance of the dog approach, the self-reported anxiety scores, and the plasma ACTH-levels.

The significant difference between the experimental and control group with regards to the termination distance of the dog approach during the preintervention stage confirms the validity of the motor-behavioural aspect in the anxiety and fear response. Also, it indicates that this parameter can be effectively used to discriminate between phobic and non-phobic individuals.

The significant difference between the experimental and control group with regards to the termination distance of the dog approach during the postintervention stage may at first appear to be an indication of an ineffective intervention program. However,

closer inspection of the data makes it clear that this may be just a statistical effect. The actual difference between the average termination distance of the experimental and control group is only 0.25 m, with the average termination distance of the control group being 0.00 m. Furthermore, the average termination distance between the pre- and postintervention stages with regards to the experimental group, decreased significantly from 1.83 m to 0.25 m, while in the control group it remained virtually unchanged and only decreased from 0.07 m to 0.00 m. The decrease in the control group is statistically non-significant ($t=-1.00$, $df=1$, two-sided $p>0.05$). This suggests that the influence of a maturation effect on the results of the termination distance of the dog approach can be excluded.

The significant difference between the experimental and control group with regards to the self-reported anxiety scores during the dog approach of the preintervention stage confirms the validity of the cognitive-affective aspect in the anxiety and fear response. Also, it indicates that this parameter can be effectively used to discriminate between phobic and non-phobic individuals. Closer inspection of the experimental and control group's data, suggests that a self-reported anxiety score of >4 can with caution be used as an indication of the presence of phobic anxiety and fear during a BAT. The study of Di Nardo *et al* (1988:247) on a group of young adult women suffering from dog phobia also found that fearful subjects reported higher anxiety ratings during the BAT than non-fearful subjects.

The significant difference between the experimental and control group with regards to the self-reported anxiety scores during the dog approach of the postintervention stage may initially also appear to be an indication of an ineffective intervention program. However, closer inspection of the data makes it clear that this may be a result of the scores for two subjects in the experimental group which remained unchanged between the preintervention and postintervention stages. All the other subjects in the experimental group reported scores of ≤ 4 during the postintervention

stage. While the average self-reported anxiety score of the experimental group decreased significantly between the preintervention and postintervention stages from 5.83 to 2.92, it only decreased slightly from 1.50 to 1.07 for the control group. The decrease for the control group is statistically non-significant ($t=-1.65$, $df=1$, two-sided $p>0.05$). This suggests that the influence of a maturation effect on the results of the self-reported anxiety scores can be excluded.

The average plasma ACTH-levels of the experimental and control group do not differ significantly during the resting and preintervention stages, while the control group has a significantly lower average plasma ACTH-level than the experimental group during the postintervention stage. The average plasma ACTH-levels of the experimental group did not change significantly across the three experimental stages. However, the average plasma ACTH-levels of the control group decreased significantly between the resting and postintervention stage ($t=-1.84$, $df=1$, one-sided $p<0.05$), while the difference between the resting and preintervention stage is statistically non-significant ($t=-1.38$, $df=1$, two-sided $p>0.05$). This results suggest that a maturation effect may have occurred in the control group as the average plasma ACTH-levels of this group decreased with each subsequent experimental stage. In contrast, the average plasma ACTH-levels of the experimental group remained similar during the different experimental stages. The decrease in the control group's plasma ACTH-levels may be due to their increased familiarity and associated lower general stress levels with the experimental conditions from the resting stage to the postintervention stage.

In summary, no indication of a significant maturation effect was found with regards to the termination distance of the dog approach and the self-reported anxiety scores. On the other hand, an indication of a maturation effect was found with regards to the plasma ACTH-levels for the control group.

6.6 EXTERNAL STRESSOR EFFECT

The results of the stressor schedule scores to determine the effect of external environmental stressors on the experimental parameters of the experimental and control group are given in this section.

Tables 6.17 - 6.19 provide the following information:

- arithmetic average of measurements for the experimental and control group during the resting, preintervention and postintervention stages; and
- standard deviations of measurements during the resting, preintervention and postintervention stages.

6.6.1 Experimental versus control group

The results for the experimental and control group on the stressor schedule total value during the resting, preintervention and postintervention stages are respectively reflected in Tables 6.17 to 6.19.

Table 6.17: Total stressor schedule values during the resting stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	48.33	16.20
Control group (n=15)	35.13	15.07

The averages of the total stressor schedule values for the experimental and control groups during the resting stage were compared. The average of the experimental group was significantly higher than the average of the control group ($t=2.19$, $df=25$,

one-sided $p < 0.05$).

Table 6.18: Total stressor schedule values during the preintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	47.50	19.61
Control group (n=15)	30.87	14.38

The averages of the total stressor schedule values for the experimental and control groups during the preintervention stage were compared. The average of the experimental group was significantly higher than the average of the control group ($t=2.54$, $df=25$, one-sided $p < 0.05$).

Table 6.19: Total stressor schedule values during the postintervention stage for the experimental and control groups

Group	Average	Standard deviation
Experimental group (n=12)	41.75	13.08
Control group (n=15)	32.20	13.65

The averages of the total stressor schedule values for the experimental and control groups during the postintervention stage were compared. The average of the experimental group was significantly higher than the average of the control group ($t=1.84$, $df=25$, one-sided $p < 0.05$).

6.6.2 Different experimental stages

The results for the differences between the averages of the total stressor schedule values of the different experimental stages for the experimental and control groups respectively, are as follows:

- the averages of the experimental group’s total stressor schedule values for the resting and preintervention stages do not differ significantly ($t=-0.31$, $df=1$, two-sided $p>0.05$);
- the averages of the experimental group’s total stressor schedule values for the resting and postintervention stages do not differ significantly ($t=-1.63$, $df=1$, two-sided $p>0.05$);
- the averages of the experimental group’s total stressor schedule values for the preintervention and postintervention stages do not differ significantly ($t=-1.78$, $df=1$, two-sided $p>0.05$);
- the average of the control group’s total stressor schedule values for the resting stage is significantly higher than the average for the preintervention stage ($t=-3.19$, $df=1$, one-sided $p<0.05$);
- the averages of the control group’s total stressor schedule values for the resting and postintervention stages do not differ significantly ($t=-1.46$, $df=1$, two-sided $p>0.05$); and
- the averages of the control group’s total stressor schedule values for the preintervention and postintervention stages do not differ significantly ($t=0.66$, $df=1$, two-sided $p>0.05$).

6.6.3 Interpretation of results

The potential effect of external environmental stressors on the experimental variables of this study was evaluated through self-reported measures on the stressor schedule.

The significantly higher average of the experimental group's total stressor schedule values when compared to the control group's values during all three experimental stages, support the earlier suggestion that the subjects in the experimental group show a predisposition to be more anxious and fearful than subjects in the control group. Since the plasma ACTH-levels of the experimental group were not significantly higher than the plasma ACTH-levels of the control group during the resting or preintervention stages, it seems that external stressors did not significantly affect these measurements. Cognitive studies on phobic individuals have found phobic individuals to show generalised attentional bias and hyperattention to potentially anxious and fearful stimuli, as well as with respect the interpretations about its meaning for the individual. This results in these individuals generally experiencing their environment as dangerous and stressful. Other studies also found that animal phobics generally present with a more "neurotic" personality structure than non-phobics (Lavy *et al*, 1993:17-18, 23-24; Tomarken *et al*, 1989:381; Torgersen, 1979:347-350).

The non-significant differences between the averages of the total stressor schedule values of the different experimental stages for the experimental and control groups respectively, indicate that the influence of external environmental stressors remained relatively constant across the experimental stages. This means that external environmental stressors can not account for changes in any of the experimental variables of this study. The resting stage's significantly higher average of the control group's total stressor schedule values than that of the preintervention stage, is not reflected in the measured plasma ACTH-levels during these stages.

In summary, external environmental stressors did not significantly influenced the experimental variables of this study.

6.7 PSYCHOTHERAPY PROGRAM

Specific qualitative aspects of the psychotherapy program, relevant to the determination of biochemical parameters of persons suffering from dog phobia, are reported and discussed in this section. Only the twelve subjects in the experimental group were involved in this part of the study.

6.7.1 Age of dog phobia onset

Two subjects reported suffering from dog phobia for as long as they can remember. The onset of dog phobia for three subjects was during their early childhood years - one as a toddler, and two at ages 6 to 7 years. One subject reported the onset of dog phobia as a primary school child - i.e. 9-10 years old. The remaining six subjects reported the onset of dog phobia during adolescence: two during early adolescence (12 and 14 years old respectively), one during middle adolescence (16 years old), and three during late adolescence (18, 19 and 20 years old respectively).

The relatively young age of onset for six of the subjects correspond with the findings of other studies which found the average onset age of animal phobia to be between 6 and 8 years old. These results also seem to support the suggestion that animal phobias which originate in adolescence are usually associated with direct trauma, whereas such anxieties and fears which originate in young children appear unexpectedly and for no obvious reason (Craske & Sipsas, 1992:569; Marks & Gelder, 1966:219-220).

6.7.2 Context of dog phobia onset

The most widely used perspective on the etiology of specific phobia, is probably the learning perspective. The learning perspective identifies different etiological

pathways for phobias, for example direct conditioning, vicarious acquisition and instruction.

Classical conditioning is usually associated with some kind of traumatic event (see 3.6.2.1 for an explanation of the psychological mechanism involved in classical conditioning). The following eight accounts of the context of dog phobia onset in this study, illustrate this specific etiological pathway:

Subject #4: Can only remember a flashback of a German Shepherd standing over her; she felt trapped and could not escape. Never been bitten by a dog;

Subject #7: Chased by a big dog similar to a German Shepherd, but “other eyes”; cried; ran away; afraid of attack; dog barked a lot;

Subject #12: The neighbour’s dog suddenly jumped up against the fence and lunged over it; she fell on her back and cried; the neighbour laughed at her;

Subject #13: The neighbour’s dog (medium-sized) just chased her; she ran into house; she screamed and cried a lot;

Subject #16: Bitten by three German Shepherds in a street of her suburb; disappointed in the owner (a medical nurse) who did not take responsibility; still have scars on both legs from this attack;

Subject #17: She was walking when a medium-sized dog suddenly bit her lower leg from behind; she did not notice the dog when it approached her; it left a slight scar; she screamed and cried a lot;

Subject #23: Slipped when busy feeding their family’s dogs (medium-seized); dogs

jumped on her; she ran away and screamed; and

Subject #28: Was enjoying a picnic with her sister when a Staffordshire Terrier approached them and attacked her “perhaps because we had a red blanket - as for a bull”; hysteric after attack .

Vicarious learning (modelling) is the etiological pathway which involves the acquisition of a phobia when the person observes someone else experiencing a traumatic event or enduring intense anxiety and fear. The following two accounts of the context of dog phobia onset in this study, illustrate this specific etiological pathway:

Subject #3: Neighbour’s Doberman attacked her sister who had to receive stitches; and

Subject #11: She and a friend walked past her neighbour’s house; gates were open; an aggressive dog (large German Shepherd) stormed out and wanted to bite her friend; the owner came out and prevented an attack; she froze out of fear to be bitten herself.

Some animal phobics report an inability to recall the origin and the context of onset of their phobias. The “infantile amnesia” hypothesis provides a stimulating explanation for this phenomenon (see 3.6.2). Various studies have found that a surprisingly high number of animal phobics, namely 12 to 68%, can not recall the onset context of their phobia (McNally & Steketee, 1985:432-433; Öst, 1987a:226). The following two accounts of the contexts of dog phobia onset in this study, illustrate this specific phenomenon:

Subject #2: Never been bitten or attacked by any dogs; and

Subject #18: Never been attacked by dogs, just afraid of the possibility of being bitten and attacked.

6.7.3 Sensory focus of dog phobia

Studies on animal phobics found that they do not generally respond to the holistic image of the animal. Rather, it was found that specific tactile, auditory and visual cues are usually the focal point. This is further supported by the cognitive phenomena of “attentional bias” and “hyperattention” which serve to facilitate the triggering of anxiety and fear in the cognitive network and memory structures (Bennett-Levy & Marteau, 1984:39-42; Lavy et al, 1993:17-18, 23-24; Merckelbach et al, 1987:1205-1208; Tomarken et al, 1989:381).

The following accounts from this study illustrate cases where auditory cues were the focal point of perception with regards to dog phobia:

Subject #2: Dogs/puppies can be cute, but she “hates” it when they bark;

Subject #4: Growling and aggressive dogs from which no escape is possible;

Subject #7: Barking dogs (large and small dogs);

Subject #13: Especially afraid of big, barking dogs; and

Subjects #18 and #28: Large, barking dogs; growling dogs.

The following accounts from this study illustrate cases where visual cues were the focal point of perception with regards to dog phobia:

Subjects #7, #12, #13, #18, #23: Large dogs;

Subject #3: Big teeth; direct eye contact with dog (“evil look”);

Subject #7: The way some dogs walk (“like a lion”);

Subject #11: Eyes;

Subject #12: The stare of some dogs (“They are thinking something nasty”);

Subject #13: All dogs (even smaller dogs); dogs with “angry eyes”;

Subject #17: Small and large dogs; all types of dogs (especially Bull-terriers); feel uneasy when dogs look at her (“I have this thing that dogs do not like me”);

Subject #18: Loose dogs in street; dogs staring at her; facial features and ears of Bull-terriers; and

Subject #28: Loose dogs.

The implication of these results is that persons suffering from dog phobia are usually not anxious and fearful of dogs sensu lato, but rather focus on specific sensory stimuli, especially different auditory and visual cues. This supports McNally and Steketee’s (1985:434) suggestion that animal phobics seem to focus on specific characteristics of the phobic stimulus. These cues should be deliberately included in the different behavioural therapies (e.g. exposure therapy, systematic desensitisation

and one-session treatment) in order to maximise its effectivity.

6.7.4 Contact with other companion animals

Six of the subjects (50% of the experimental group) reported not having any companion animals at home, while three of the subjects reported having dogs as companion animals at home. In the last-mentioned group, one subject had two Corgis, another subject had two Chows, and the last subject lived on a plot with a number of dogs (i.e. a Sheepdog and Bull-terriers). The remaining subjects reported owning cats or fishes.

The finding that 50% of the individuals suffering from dog phobia owned dogs as companion animals, give added support to the suggestion given in the previous section that persons suffering from dog phobia are usually not anxious and fearful of dogs sensu lato, but rather focus on specific sensory stimuli.

6.7.5 Other anxieties and fears

During the intervention program, an informal evaluation, based on information given on the FSS, yielded the following list of some other animals, objects and situations that each dog phobic in this study also subjectively perceived as being anxiety and fear-evoking:

Subject #3: Needles, snakes, rats and bats;

Subject #4: Darkness, to be alone, spiders, spider webs, scorpions, lifts, to be trapped by other persons;

Subject #7: Cats, lions, kangaroos (even on television), snakes, big rats, to loose

close relatives;

Subject #11: Cats, reptiles, spiders, big cockroaches, green locusts, cicadas, lightning, needles, blood;

Subject #12: Needles, surgical operations, to see others experience pain, reptiles, frogs, spiders, bees;

Subject #13: Injections, doctors, cats, snakes, spiders, wild animals;

Subject #16: Spiders, mice, lizards, bats, colourful locusts, to be alone;

Subject #17: Needles, cats, chickens, insects, snakes, spiders, blood, wounds, loud noises;

Subject #18: Snakes, lizards, heights;

Subject #23: Spiders (flat types), snakes, crocodiles, tigers, lions, ocean, heights, to see other experience pain; and

Subject #28: Snakes, spiders, flying cockroaches, bats, to cross a street, lifts (especially when the doors are opening and closing), small and dark place.

These results support other studies which found that anxiety and fear of a specific animal often co-vary with that of other animals which could be either fear-evoking (e.g. snakes, spiders and lizards) or disgust-evoking (e.g. cockroaches and locusts). The phenomenon that many of these animals can be considered as harmless to humans, also add to an earlier suggestion that phobic individuals have an “anxious personality” and that they show a predisposition to be more anxious and fearful than

non-phobic subjects. However, it should be noted that a similar informal evaluation of the subjects in the control group was not conducted. This ruled out a comparison of the experimental and control group (Hare & Blevings, 1975:8; Matchett & Davey, 1991:91-93).

6.7.6 Maximum (100%) situation on anxiety hierarchy

In order to get an indication of each phobic subject's perception of what constitutes a maximum anxiety and fear-provoking situation with regards to dogs, the verbal accounts of the maximum (100%) situation on the anxiety hierarchy are given in this section. They are as follow:

Subject #2: "A big dog, barking, jumping at me when I'm alone and it is impossible to escape";

Subject #3: "Two or three dogs attacking me; jumping, barking and biting me; evil look in eyes; eyes look hungry, as if going to eat me";

Subject #4: "Enter a yard and close the gate. Then suddenly an aggressive dog appears which growls. I have nothing with me";

Subject #7: "Very big dog; nobody to protect me; dog is barking; I run away but cannot hide";

Subject #11: "A dog near me; barking; touching me to bite; police dog; cry for help but nobody around to help";

Subject #12: "Dog running towards me; barking; big and fat; German Shepherd; I don't want it near";

Subject #13: “Being in your (i.e. the researcher’s) office with a big dog; barking and growling; would just like to escape; dog with angry eyes”;

Subject #16: “To be chased and bitten by three big dogs; their eyes are red-brown with no white; barking; teeth; tongue hanging out; hear him breathing; no hiding place and nobody to help”;

Subject #17: “To walk past a dog; barking; open situation; any kind of dog; dog approaches and snarls”; and

Subject #23: “Unexpected attack by dog; any fierce dog; being bitten”.

These verbal accounts indicate that each person suffering from dog phobia is unique in his/her perception of a maximum anxiety and fear-provoking situation. The implication is that for each person suffering from dog phobia which enters a therapeutic program (especially behavioural and cognitive therapies), the therapist should strive to describe and understand the phobic situation in detail in order to facilitate effective therapy.

6.7.7 Subject’s personal aim for successful therapy

The verbal accounts of each subject’s personal aim for the intervention program, are given in this section. They are as follow:

Subject #2: “To practically cope with dogs even when barking”;

Subject #3: “To come in contact with different types of dogs, especially Dobermans”;

Subject #4: “To learn to distinguish between safe and dangerous dogs; to cope in situations with dangerous dogs”;

Subject #7: “To touch, hug and kiss a dog (puppies and adults)”;

Subject #11: “To know how to handle fear situations. To just touch a dog, but not hug it”;

Subject #12: “To feed dogs and other animals. To touch a dog, but not aggressive dogs”;

Subject #13: “To be less anxious or maybe not anxious at all about dogs. To experience the joy and feeling of holding a dog. To maybe touch a smaller dog”;

Subject #16: “To walk in our street alone, without being excessively scared”;

Subject #17: “To overcome fear for dogs and how to handle the situations. Not to touch dogs, but to be comfortable in the vicinity of dogs. My uneasiness for dogs limits my life”;

Subject #18: “To be able to sum up any type of dog in any situation. To think positive about dogs”;

Subject #23: “To cope in situations with dogs. Not to touch a dog”; and

Subject #28: “To cuddle a large dog when alone”.

These verbal accounts of each subject’s personal aim for the intervention program seem to fall into two broad categories, namely practical and emotional aims. The

practical aims focus primarily on how to behave and cope in direct contact situations with dogs, to distinguish between “safe” and “dangerous” dogs, and to control own fear behaviour (e.g. Subjects #2, 3, 4, 7, 18 and 23). The emotional aims focus primarily on the social interaction with a companion animal, on experiencing positive affect in contact with dogs, and to be freed from the limiting influence of avoidance behaviour (e.g. Subjects #7, 12, 13, 16, 17, 18 and 28). A qualitative interpretation of the emotional aims, paradoxically emphasises the significance of human-animal interactions in general, and human-dog interactions in particular, in the social and psychological life of individuals suffering from dog phobia.

6.8 POSTSTUDY

The results of the qualitative evaluation of the experimental stages and psychotherapy program by the subjects which completed the program between seven and ten months earlier, are reported in this section. It was decided that selected parts of the actual written responses from the subjects would be given under each heading to allow the subjects to “speak for themselves”, rather than having the researcher provide an “interpreted” version of their responses.

6.8.1 Evaluation of pre- and postintervention stages

The responses of the subjects on their experience during the preintervention BAT (also referred to as “first session/time”) and postintervention BAT (also referred to as “second/last session/time”), are as follow:

Subject #2: “... in the first session I was afraid of the dog and in the second session it did not bother me that I was with a dog in the room”;

Subject #3: “... at first the dog approach session was the most scary one as it was

a big dog ... the last session ... I felt that even though I could touch the dog, but I was very scared ... at last I became a little bit proud of myself because my aim for this session was to be able to touch a dog someday”;

Subject #4: “I wasn’t afraid of the dog when I saw it the first time because it was under very controlled circumstances. During the last session I wasn’t at all afraid of the dog”;

Subject #7: “... first approach session, it was difficult to see such a big dog ... I was so very scared. My last session I was not very scared because I know how to relax my muscles”;

Subject #11: “... seeing the dog at first approach session, honestly I was scared, but after completion of therapy it was all different”;

Subject #12: “The first time I saw the dog, I thought the dog was going to bite me ... if the dog sees that you are scared it will take the advantage of that and bite you. The last session was better than the first as I used the relaxation methods to breath and relax though I wasn’t 100% relaxed”;

Subject #13: “... during the first session ... when I saw the dog, I thought it was going to break loose and come to where I sat. The last session was a bit better because I had learned a lot during the therapy sessions, therefore I took the knowledge that I had gained with me to the room - I used the relaxation technique. I did not let my fear overcome me”;

Subject #16: “... as for the dog approach sessions, I was scared, but not as scared as I’d be if I was alone in the room with the dog because I know that there was no way that dog was going to bite me ... when I saw the dog’s teeth I felt more scared but in

the last approach session I realised that the dog's teeth didn't bother me that much. I even patted it”;

Subject #17: “ ... as for the dog approach session, it was like hell for me because I'm really scared of dogs ... the second session was better than the first one because then I've already learned how to use relaxation techniques in order to overcome a stressful situation”;

Subject #18: “Before I saw the dog, I was afraid because I didn't know which kind of dog and how large it would be. When I saw the dog, and realised it was a German Shepherd, I felt relaxed as I know they use them in the Police. This type of dog doesn't appear aggressive to me. The first session was a risk, but the second time I was relaxed”;

Subject #23: “ ... during my first dog encounter I was a bit anxious, but as soon as I saw the dog I was not scared, because I expected a very fierce dog, that we usually come across in our everyday life. Before the therapy I did not have any skill of approaching a dog and after the therapy I had a way of facing it and controlling my feelings”; and

Subject #28: “I wasn't really that scared of the dog. I am more scared of dogs in uncontrolled situations, or when they bark at me. I wanted to touch the dog the second time, not as for the first time”.

6.8.2 Evaluation of psychotherapy program

The responses of the subjects on the evaluation of their experience during the therapy sessions of the psychotherapy program, are as follow:

Subject #2: “The experience, for me was totally positive ... Yes, the therapy did help me overcome my fear of dogs”;

Subject #3: “The therapy was quite positive. I enjoyed the relaxation method ... that teaches you to be able to relax whenever you are feeling stressful”;

Subject #4: “I found the behaviour therapy as very positive because it helped me to relax. Initially it was very difficult to relax because generally I’m an anxious person”;

Subject #7: “I experience the therapy during the project as positive, the most thing that I really enjoy is how you can handle dogs”;

Subject #11: “The therapy was a positive aspect. I learned how to relax during anxieties or difficult situations”;

Subject #12: “Positive as I learned different relaxing methods ... they help me to cope with everyday stress life”;

Subject #13: “At first negative, as I never thought it could help, but after being to the therapy several times I began to have the positive attitude ... I realised that talking could help, and I was free to talk about my fears”;

Subject #16: “Positive. The muscle relaxation session really worked for me because I could feel my muscles becoming less tense, that means it was helping me to deal with stress and tension, also teaching me to calm in certain situations”;

Subject #17: “The positive thing that come out of this whole thing is (1) ability to deal with stress, and (2) I got to learn more about dogs, i.e. how should we behave when we’re around them”;

Subject #18: “The therapy was positive and very relaxing, because one could also release some of your other stress factors during your fear for dogs”;

Subject #23: “The therapy was positive. The positiveness that I experienced was that I got to know myself better, and the way I can control my reactions when I feel threatened ... I even realised that what I learned from the relaxation program, I can also use when I feel stressed or tensed. I learned to control my actions and it helped me to control by dealing and talking to my feelings when I feel threatened and scared”;

Subject #28: “The positive aspect was the relaxation technique. It is currently helping me a lot. I learned a lot - dogs are not so bad and some of them are just as scared of me as I am for them”.

6.8.3 Contact with dogs after completion of psychotherapy program

The responses of the subjects on their experience, feelings and actions during contact with dogs in real life situations after completion of the psychotherapy program, are as follow:

Subject #3: “ ... I would come across big dogs ... in my neighbourhood ... as I was taught I would just pass through ... but there are this small dogs that like chasing after people ... I still do not know how to handle that kind of situation ... I am still handling that situation in a wrong way, by picking up a stone and throwing it. I found that to be the only solution for me”;

Subject #4: “Last time I visited a friend with dogs, I entered her yard without having to call her to come and fetch me at the gate. I was a bit scared, but I used the guidelines I learned in the project, and my fear is decreasing” and “There are two

Boxers at my daughter's school, and I was brave to walk past them to fetch her. The last few times I even tried to talk to the dogs”;

Subject #7: “It was on the street on the way home. It was a big dog, growl. I was not scared because I was relaxed and after dog passed away I was feeling proud”;

Subject #11: “ ... I went to visit my cousin, his friend came along with a dog, it was small and it came smelling my feet ... I was a bit scared but I tried to touch it ... I was proud because before I wouldn't do that”;

Subject #12: “I passed a certain house. A small Yorkshire terrier started barking and I thought to myself this little dog must be joking or is bored. It just wanted something to do to keep busy. I wasn't scared because I thought it was playing. It just stood there and barked till I passed. I just laughed”;

Subject #13: “It was in a yard. There was a gate. It was a big dog. It started growling, and came closer to where I stood. I used the relaxation technique, and identified if it was a dangerous dog or not. When I saw that it was not dangerous I was relieved. I was proud” and “It was in a street. The dog was in a yard. It was a medium-sized dog. When it realised where I was going, it came running to me. I tried not to run and to relax. I did manage not to run. I just stood there with my hands folded. It sniffed at my shoes and ran back to the yard. I was also proud”;

Subject #16: “I was walking in my street and saw this dog sort of running from lawn to lawn, and I was getting closer to this dog. Usually I turn back or try to get as far away as possible from a loose dog, but on this occasion I decided to just carry on walking. We were on opposite sides of the road. It didn't bark or anything, so we just passed each other and I went home. It was a very big dog. I felt proud because I usually hide away or wait for the dog to go pass me and then I walk on when the

road is clear. It may seem like such a minor achievement, to me it's a major achievement";

Subject #17: "The dog was on the street running towards me. I was really afraid, thought it was coming for me. I stopped for a moment not knowing what to do, but fortunately I remembered how the therapy taught us to use relaxation technique and silently I started doing/following it. The dog just passed me without barking or doing anything funny. Believe me I was really proud of myself, that I actually passed a dog without doing something silly like for instance run away";

Subject #18: "Our neighbour's dog barked at me. At first I stood still, although I felt a bit uneasy. When the neighbour came out the dog kept on barking. However, I remained calm and applied the therapy's principles. After I applied these principles I felt more at ease, but I was still cautious";

Subject #23: ""I was with a friend on our way to a friend's house. On our way she told me that where we are going there are dogs. At that moment I was not afraid. When we got there, the dogs started to bark and they were very fierce. My first reaction overwhelmed me, I was cold immediately and started to panic. I refused to get in the yard even though someone was holding the dog - a Bull-terrier"; and

Subject #28: "A young Doberman wandered outside our home for a few days. My friend decided to adopt it. The dog jumped up against us the whole time. I only held on to somebody, but didn't run away. I was proud of myself, because I can now play with the dog".

6.8.4 Evaluation of present level of fear for dogs

The responses of the subjects on their subjectively perceived current level of fear for dogs, are as follow:

Subject #2: “I am more relaxed around dogs and I am not afraid of barking dogs”;

Subject #3: “I cannot say that I am not afraid of the dogs because I haven’t come across ... a Doberman. I can only handle them, but I am still afraid of them”;

Subject #4: “The therapy taught me to risk more, and the more I risk, the less my fear becomes. I am busy losing my fear for dogs”;

Subject #7: “I am still afraid of dogs. It depends what type of dog, because with some dogs it is not simple to handle them. But some types I am not afraid of”;

Subject #11: “I am very proud because I overcame fear of dogs. I know it worked for me this project”;

Subject #12: “I can cope. I don’t think I can be 100% calm just yet because I think it’s going to take some time to overcome my fear of dogs. I am still afraid of some dogs because some dogs are not friendly. I can’t face unfriendly dogs”;

Subject #13: “I am still afraid of dogs, but not like before the experiment. This is because before the project whenever I heard a dog barking or seeing a dog and even being in the same room with it would have made me uneasy ... the therapy has helped not in dog situations only, but other situations that deal with fear”;

Subject #16: “It didn’t help me to overcome my total fear of dogs, but I’d say so 70%

of my fear of dogs. I still always have that 30/40% of fear of dogs because I was bitten by three dogs and that's something I'll never forget”;

Subject #17: “... I don't panic as much when I'm around a dog because now I know more about them and I can control myself in order to deal with the situation by using the technique. I can't say it helped me overcome the fear of dogs, I could simply say it taught me how to deal/handle stressful situations. I think I'm still afraid of dogs”;

Subject #18: “I haven't totally overcome my fear because I am still cautious”;

Subject #23: “The therapy partly helped me. Somehow, I still feel afraid”; and

Subject #28: “I am not as afraid of dogs any more, but that fear will always remain. Perhaps it is more a bit of respect rather than fear”.

6.9 CONCLUSION

There is no significant correlation between plasma ACTH-levels and cognitive-affective and motor-behavioural aspects of the phobia response during behavioural treatment of women suffering from dog phobia. Specifically, the experimental group's average plasma ACTH-levels were not significantly different between the preintervention and postintervention stages. Also, the average plasma ACTH-levels of the experimental and control group did not differ significantly during the resting and preintervention stages. Given the many factors influencing the plasma ACTH-levels, one can not conclude that the psychotherapy treatment program had no effect on the hormonal aspects of the dog phobia response. Therefore, the effect of the intervention program on the plasma ACTH-levels of this study was inconclusive.

The next chapter concludes the study.

CHAPTER 7

SUMMARY AND RECOMMENDATIONS

7.1 INTRODUCTION

This chapter will summarise the objectives stated for this study, the contribution it made, indicate further research following on this study and make some recommendations based on the findings of the study.

7.2 SUMMARY OF OBJECTIVES

In terms of the objectives set for this study in Chapter 1, this section will indicate how the objectives were met.

7.2.1 Human-animal interaction

The objective of Chapter 2 was to provide an overview of existing knowledge on the human-companion animal interaction and the human-dog interaction as introductory themes for interaction studies. The human-animal interaction was described in two parts. The first dealt with the general human-animal relationship by giving an overview of the history of the development and change in the general philosophical stance towards animals, the different types of basic attitudes towards animals, and the phenomenon of attachment between human and companion animals. The second part gave an overview of the history of the development and change in the human-dog interaction, and the modern applications of the human-dog interaction. It was concluded that it is difficult to overestimate the significance of human-animal interactions in the social and psychological life of humans. Also, the human-animal

relationship contributes fundamentally to humankind's history and development.

7.2.2 Specific phobias - animal type

The objective of Chapter 3 was to provide an overview of existing knowledge on the descriptive characteristics, etiology and treatment of specific phobias (animal type). It provided definitions which made the distinction between fear, anxiety and phobia clear, as the use of these often lead to confusion for the professional and lay-person alike. This was followed by a general description of fear-evoking stimuli and behavioural strategies employed under different threatening circumstances. The most important diagnostic criteria as stated in the two most widely used diagnostic manuals in psychology and psychiatry were described. The description of biographical, physiological and psychological characteristics of animal phobia, as well as the causal explanations of specific phobia from different theoretical perspectives were also discussed. The last section dealt with the wide variety of treatment techniques being used by therapists today.

7.2.3 The physiology associated with the phobia response

The objective of Chapter 4 was to provide an overview of existing knowledge on the role of the central nervous system and endocrine system in the phobia response. It was indicated that in the central nervous system various brain structures, neural pathways and neurotransmitters play an integral role in the phobia response. With regards to the endocrine system, it was indicated that the neuropeptides of the hypothalamus, adenohypophysis, adrenal medulla, adrenal cortex and pancreas also play an integral role in the phobia response. It emphasised the role of the hypothalamic-pituitary-adrenal cortex axis and sympathetic nervous system where neurotransmitters and hormones play a vital role in the coordination of physiological and behavioural functions.

7.2.4 Methodology for assessing changes in adrenocorticotrophic hormone during dog phobia therapy

The objectives of Chapter 5 were to describe a methodology for the determination of plasma ACTH-levels during a negative human-animal interactions in a pre- and postintervention study, and to describe a methodology for the treatment of dog phobia. The parameters chosen for the determination of plasma ACTH-levels were the distance at which the subjects terminated a dog approach, and the self-reported anxiety score during the dog approach. The choice of these parameters were based on the three components of the phobia response, namely motor-behavioural, cognitive-affective and physiological components. Two questionnaires were used to screen potential subjects and to quantify external environmental stressors. A control group of non-phobic subjects was used throughout the experimental stages. The treatment of the individuals suffering from dog phobia involved a combination of systematic desensitisation and instructional learning. A poststudy provided feedback from subjects on different aspects of the experimental stages and intervention program.

7.2.5 Results of behavioural and physiological assessments

The objective of Chapter 6 was to present and discuss the results of the experimental investigation and intervention program. The results were divided into eight sections. The first three concerned the prestudy, research subjects and evaluation of the FSS. This provided the foundation for the main part of the study. The next three concerned the proper experimental stages of the study which dealt with the effects of the intervention program, a comparison of the experimental and control group, and the effect of external environmental stressors. The seventh section dealt with some quantitative and qualitative aspects of the intervention program, while the last section dealt with the qualitative feedback from subjects on different aspects of the experimental stages and intervention program. It was concluded that the results of this

project support to an extent the theoretical framework provided in earlier chapters. It also provided results which should stimulate further investigations of biochemical parameters and treatment procedures.

7.3 CONTRIBUTIONS OF THE STUDY

The main contributions of this study are as follow:

7.3.1 Multidisciplinary approach to negative human-dog interaction

This study combined theoretical and methodological aspects from the fields of veterinary ethology, physiology and psychology in order to gain a better understanding of the pathological negative human-dog interaction known as dog phobia.

7.3.2 Method for determining biochemical parameters in phobic disorders

A comprehensive method was described in order facilitate the valid determination of plasma ACTH-levels in individuals suffering from specific phobia disorder (animal type). This included procedures regarding the screening of subjects, eliciting anxiety and fear responses under controlled circumstances, determining plasma ACTH-levels, conducting the phobia treatment program and obtaining evaluation feedback from subjects.

7.4 FURTHER RESEARCH

The following research may generate from this study:

7.4.1 Biochemistry of phobic behaviour

The role of neurotransmitters, peptide hormones and steroid hormones in phobic behaviour, is only in the initial stages of investigation and description. Especially the role and interaction of noradrenaline, corticoliberin, somatostatin, vasopressin, oxytocin, β -endorphin, ACTH and growth hormone should initially be focussed upon.

7.4.2 Psychotherapy

The psychological mechanisms involved in the successful treatment of specific phobia disorder in general, and animal phobia disorder in particular, are still not well understood. This situation is further complicated by grey areas in the understanding of the etiological pathways involved in the development of phobic behaviour. Multidisciplinary research involving neurophysiology, psychiatry and psychology need to focus on the etiology and treatment of phobia disorders.

7.4.3 Negative human-companion animal interaction

Relatively little research has been conducted regarding the development and influence of negative human-companion animal interactions when compared to the attention that has been given to positive human-companion animal interactions. Given the integral social and psychological importance of the human-companion animal interaction, the investigation of negative human-companion animal interactions should urgently be pursued.

7.5 RECOMMENDATIONS

The following recommendations can be made from this study:

7.5.1 Multidisciplinary approach

Research on the biochemical parameters of animal phobia disorder can not solely be conducted by natural scientists. It is recommended that research of this type be conducted by research teams consisting of individuals with expertise in veterinary ethology, physiology, psychology and psychiatry. This will ensure a holistic approach to a complex phenomenon which cannot be adequately understood from an unitary perspective.

7.5.2 Therapeutic application of results

The description of the intervention program, as well as the feedback from subjects regarding the intervention program, should be applied in clinical behavioural psychotherapy. This study provides invaluable information regarding the onset, sensory focus, co-variation with other anxieties and fears, fear-provoking situations and follow-up of effectiveness of the intervention program. It is recommended that this information should be used in therapeutic settings which focus on the treatment of dog phobia.

7.6 CONCLUSION

No direct correlation between plasma ACTH-levels and behavioural parameters (cognitive-affective and motor-behavioural patterns) during the treatment of women experiencing dog phobia was found. However, this study opened up this very important area in veterinary ethology which have received relatively little attention since its

inception as a valid branch of scientific study. Negative human-companion animal interactions place a double bind on those individuals suffering from dog phobia. On the one hand, suffering from a phobia disorder has a negative influence on the general life activities, mood settings and cognitions of these individuals. On the other hand, they are aware, explicitly or implicitly, of being deprived of important attentionis egens needs (Odendaal, 1999).

In terms of the hypothesis stated in Chapter 1, this study indicated that the determination of plasma ACTH-levels as a single parameter is not adequate to support the complex interaction between overt motor-behavioural, cognitive-affective and physiological patterns and changes during treatment of persons experiencing dog phobia.

“Scientists are like sailors who must rebuild their boat, plank by plank, not in drydock, but at sea. The process is never finished, but the ship is getting better all the time” (Based on an analogy by Otto Neurath) (Rosenthal, 1995:18).

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ADDENDUM A: BIOGRAPHICAL INFORMATION



BIOGRAPHICAL INFORMATION

Please answer the following questions by marking the block which applies to you with an ✓ or write a short answer in the given space

SURNAME: _____

FIRST NAME: _____

HOME LANGUAGE:

English	Afrikaans	IsiZulu	IsiXhosa
SiSwati	IsiNdebele	Sesotho	Sepedi
Tshivenda	Xitsonga	Setswana	Other (specify)

ADDRESS DURING SEMESTER: _____

CONTACT TEL. NO. DURING SEMESTER: _____

AGE: _____ YEARS

HAVE YOU EVER RECEIVED ANY PSYCHOTHERAPY?

YES	NO
-----	----

IF YES, PLEASE BRIEFLY INDICATE THE REASON FOR TREATMENT, WHEN AND WHERE:

ADDENDUM B: FEAR SURVEY SCHEDULE

FEAR SURVEY SCHEDULE (FSS-III)

The items in this questionnaire refer to things and experiences that may cause **fear or other unpleasant feelings**. Tick (✓) the column of each item that best describes how much you are disturbed by it nowadays.

	Not at all	A little bit	A fair amount	Much	Very much
1. Noise of vacuum cleaners					
2. Open wounds					
3. Being alone					
4. Being in a strange place					
5. Loud voices					
6. Dead people					
7. Speaking in public					
8. Crossing streets					
9. People who seem crazy					
10. Barking dogs					
11. Motor vehicles					
12. Being teased					
13. Dentists					
14. Thunderstorms					
15. Sirens					
16. Failure					
17. Entering a room where other people are already seated					
18. High places on land					
19. People with deformities					
20. Worms					
21. Imaginary creatures					
22. Receiving injections					
23. Strangers					
24. Bats					



	Not at all	A little	A fair amount	Much	Very much
25. Journeys by taxi, bus or car					
26. Lion in zoo					
27. People in authority					
28. Flying insects					
29. Seeing other people injected					
30. Sudden noises					
31. Dull weather					
32. Crowds					
33. Large open spaces					
34. Cats					
35. One person bullying another					
36. Tough looking people					
37. Large dogs					
38. Sight of deep water					
39. Being watched working					
40. Dead animals					
41. Weapons					
42. Dirt					
43. Crawling insects					
44. Sight of fighting					
45. Ugly people					
46. Fire					
47. Sick people					
48. Security dogs					
49. Being criticised					
50. Strange shapes					
51. Being in a lift					
52. Witnessing surgical operations					



	Not at all	A little	A fair amount	Much	Very much
53. Angry people					
54. Mice					
55. Blood of humans or animals					
56. Loose dogs in street					
57. Enclosed places					
58. Prospects of a surgical operation					
59. Feeling rejected by others					
60. Aeroplanes					
61. Medical odours					
62. Feeling disapproved of					
63. Harmless snakes					
64. Cemeteries					
65. Being ignored					
66. Darkness					
67. Pounding heart					
68. Nude men / women					
69. Lightning					
70. Medical doctors					
71. Making mistakes					
72. Looking foolish					

ADDENDUM C: STRESSOR SCHEDULE



STRESSOR SCHEDULE

Name: _____

The items in this questionnaire refer to things and experiences that may cause you some degree of **stress**. Tick (✓) the column of each item that best describes how much you were disturbed by it the last few days.

	Not at all	A little bit	A fair amount	Much	Very much
1. Writing tests and exams					
2. Waiting for test and exam results					
3. Financial crisis					
4. Broken motor vehicle					
5. Change of accommodation					
6. Family problems					
7. Poor health					
8. Relationship problems with husband/boyfriend					
9. Feelings of depressiveness					
10. Death of family member and/or close friend					
11. Physical injury					
12. Study problems					
13. Important decision					
14. Participation in this phobia project					
15. Course of study					

The following two questions require very sensitive and personal information. As with all other personal information collected and calculated during this study, these answers will be handled in a **strictly confidential** way. Certain hormones will be measured in your blood sample and this information is needed to validate the data obtained from the analysis.

1. ARE YOU CURRENTLY **PREGNANT**?

YES	NO
-----	----

2. IF YOUR ANSWER IS **NO**, INDICATE AS ACCURATELY AS POSSIBLE THE **NUMBER OF DAYS** SINCE YOUR LAST MENSTRUAL CYCLE: _____ **DAYS**

ADDENDUM D: INFORMED CONSENT

INFORMED CONSENT

1. TITLE

The determination of biochemical parameters in adult women experiencing dog phobia

2. RESEARCH STUDY

I, _____ willingly agree to participate in this study which has been explained to me by Mr WA Hoffmann. This research study is being conducted by the Department of Veterinary Ethology, University Pretoria.

3. PURPOSE OF THE STUDY

In this study we aim to see whether the plasma concentrations of certain fear hormones and neurotransmitters (e.g. ACTH, vasopressin and oxytocin) differ between females suffering from dog phobia and non-phobic females. The effect of psychotherapy on these plasma concentrations will also be investigated.

An animal phobia is a subtype of specific phobias which is characterised by an extreme fear of specific objects - in this case a specific kind or group of animals. Exposure to the stimulus nearly always produces intense anxiety or a panic attack. Specific phobias are more prevalent in women than in men.

Research has been conducted on the role of the autonomic nervous system and “fight-or-flight” response in the symptoms of snake and spider phobias. However, up to now only a few studies have been done which specifically investigated the role of neurotransmitters and/or hormones in animal phobias. Various researchers have found that serotonin, epinephrine, norepinephrine, adrenocorticotrophic hormone (ACTH), cortisol, antidiuretic hormone (ADH, vasopressin), oxytocin and β -endorphin play an important role in the general stress response.

4. DESCRIPTION OF PROCEDURES

You should understand that this study involves research.

This study involves the following procedures:

1. The completion of the following questionnaires:
 - The Fear Survey Schedule - it evaluates a person's expected fear reactions in different imaginary situations; completion of the questionnaire will take approximately 20 minutes at the onset of the study
 - A biographical questionnaire requiring basic personal information (e.g. name, age, etc.) - it will take approximately 10 minutes to complete at the onset of the study
 - A Stressor Schedule - it evaluates the stressors experienced by the research participant at a particular stage; to be completed at the onset of each project session; completion of the questionnaire will take approximately 5 minutes
2. The first project session (one morning between 8:00 and 11:00) - 10ml blood will be drawn from all research participants after a relaxation period of 30 to 45 minutes.
3. The second project session (a morning between 8:00 and 11:00):
 - all research participants will be submitted to a behavioural approach test. During this test you will be exposed to a real dog under controlled conditions. Blood (10ml) will be drawn directly after exposure to the dog.
4. Between the second and third project sessions those research participants suffering from dog phobia will receive free systematic desensitisation treatment. The treatment consists of weekly 60-minute therapy sessions for seven to eight weeks. The aim of the therapy is to help phobic patients to overcome their fear of dogs through relaxation techniques and information on dog behaviour. A registered psychologist will supervise the treatment program.
5. The third project session (a morning between 8:00 and 11:00):
 - all research participants will again be submitted to a behavioural approach test identical to that of the second project session. Blood (10ml) will be drawn directly after exposure to the dog.

5. RISKS AND DISCOMFORTS

1. As it is expected that research participants in the phobic group may experience panic attacks during exposure to the dog stimulus, these persons will only be exposed to the dog stimulus under controlled conditions (i.e. professional dog handler in control of the dog) in the presence of a registered psychologist. The psychologist will closely monitor the behavioural and emotional reactions of all research participants during the behavioural approach test.
2. Blood will be drawn by a registered nurse according to accepted medical principles to minimize risks of infections.

6. CONTACT PERSON

Mr. WA Hoffmann (researcher) can be contacted at the Department of Biological Sciences, Technikon Pretoria, Tel.(012) 3186267.

7. BENEFITS

It is not possible to predict whether or not any personal benefit will result. Possible benefits for the phobic research participants are successful psychological treatment of their phobic condition.

Potential benefits for the scientific community include a better understanding of the physiology of fear behaviour and the stress response in phobic persons. Also it will lead to a better understanding of the physiological reactions associated with humans' negative interaction with a mammalian animal generally seen as one with which humans have a positive interaction in terms of a potential companion animal.

8. VOLUNTARY PARTICIPATION

Participation in this study is voluntary. Each research participant in the project will receive financial compensation for participating in the project:

- research participants in the control group will receive R100-00 each
- research participants in the dog phobia group will receive R150-00 each.

You are free to withdraw your consent to participate in this research project at any time.

Withdrawing your consent will involve no penalty or loss whatsoever.

9. CONFIDENTIALITY

All data and personal information will be kept in a confidential form at the Department of Biological Sciences, Technikon Pretoria, and in a computer file in the researcher's office at the Technikon Pretoria. During the formal evaluation of the research project by the University of Pretoria, designated examiners may have access to records which contain your identity. However, no information by which you can be identified will be released or published. If the results of the project are significant, it may be presented at a scientific meeting and in a refereed journal.

I have read all of the above, had time to ask questions, received answers concerning areas I did not understand and I willingly give my consent to participate in this research program. Upon signing this form, I will receive a copy.

Research participant signature

Date

Witness signature

Date

Researcher signature

Date

ADDENDUM E: DOG BEHAVIOUR

DOG BEHAVIOUR

1. BASIC PRINCIPLES

1. Be careful for **fighter dogs** - e.g. Pitt-Bull Terrier and Bull Terrier
2. Be careful for dogs that **growl**. Dogs that **bark** are OK
3. Take note of the dog's **lip** when growling/barking:
 1. if the **front lip** is lifted up, it is an indication of **fear based aggression**, i.e. a fearful dog
 2. if the **side lip** is lifted up, it is an indication of a **aggressive dog**
4. If the dog's **back and neck hairs** raise, it is an indication of **dominance**
5. Take note of the position of the **tail**:
 1. if the **tail is lifted up higher than the body**, it is an indication of **uncertainty or dominance**
 2. if the tail is held in the **normal position**, it is OK
 3. if the tail is held **lower than the body** or **between the legs**, it is an indication of **subservience**
6. **Human aggression** will provoke **dog aggression**, e.g. to scream at a dog, to lift your hands, to have an object (stone or stick) in your hands, to hit a dog with an object, direct eye contact, to corner a dog

2. TO ENTER A YARD WITH DOGS

1. Stand still close to the gate (1-2 meters) and keep your hands at your side
2. Evaluate the dog's behaviour:
 1. if the dog begins to **growl** close to the gate, be careful. If the **front lip** is lifted up, it is an indication of **fear based aggression**, i.e. a fearful dog. If the **side lip** is lifted up, it is an indication of a **aggressive dog**
 2. if the dog **retires** from the gate, it is an indication of an **anxious dog** which may easily feel threatened when you enter the yard. This dog may **bite** because it quickly feels cornered when someone enters the yard
 3. if the **tail is held above the body**, the dog is **growling/barking** and the **back hairs raised**, it is an indication of an **aggressive dog** and you must be very careful to enter the yard. The dog will regard it as his/her territory to be defended against an intruder
 4. if the dog is not getting up from where it is laying, it is an indication of a **quiet, lazy dog**



3. Go up to the gate and **put your one hand on the gate** without opening it and evaluate the dog's behaviour:
 1. if the dog begins to **growl** close to the gate, be careful. If the **front lip** is lifted up, it is an indication of **fear based aggression**, i.e. a fearful dog. If the **side lip** is lifted up, it is an indication of a aggressive dog
 2. if the dog **retires** from the gate, it is an indication of an **anxious dog** which may easily feel threatened when you enter the yard. This dog may **bite** because it quickly feels cornered when someone enters the yard
 3. if the **tail is held above the body**, the dog is **growling/barking** and the **back hairs raised**, it is an indication of an **aggressive dog** and you must be very careful to enter
 4. if the dog is not getting up from where it is laying, it is an indication of a **quiet, lazy dog**
 5. if the dog **stops barking** without retiring and with its tail in the normal position, it is probably safe to enter the yard
4. The gate can also be opened slightly **towards you**. Note that the gate shouldn't be opened towards the dog as this might be perceived as a threat by the dog. Again evaluate the dog as described above
5. When you feel it is fairly safe to enter the yard:
 1. walk at a normal pace
 2. keep your hands at your sides. Do not lift your hands when the dog approaches you as this might be interpreted as aggression from your side
 3. do not stare the dog directly in the eyes, as this might be perceived as threatening by the dog
 4. never scream at a dog. The dog will interpret this as aggression, and will react with aggression. Rather keep quiet or speak with a toned down and "friendly" voice

3. BEHAVIOUR WHEN ENCOUNTERING A DOG IN THE STREET

1. Never try to run away or walk faster. This will only provoke the dog to chase and attack you. Rather stand very still until the dog retreats by itself
2. Never lift your hands or try to hit the dog with a stone/stick. The dog will interpret this as aggression from your side, and react aggressively. Rather keep your hands down at your sides
3. Never scream at a dog. The dog will interpret this as aggression, and will react with aggression. Rather keep quiet or speak with a toned down and "friendly" voice
4. Avoid direct eye contact. By staring the dog in the eyes, will be perceived as threatening by the dog. Rather look away completely, or focus on another part of the dog

ADDENDUM F: SYSTEMATIC MUSCLE RELAXATION

SYSTEMATIC MUSCLE RELAXATION

1. “Tension-relaxation contrast” technique
 - individual closes eyes and experience the peace and calmness of the direct environment
 - take a few deep breaths, followed by slow exhalation
 - systematic relaxation entails the conscious tension and relaxation of different body parts. The person must each time notice the difference between tension and relaxation, as well as the relaxed feeling associated with relaxation
 - the following routine is followed for each muscle group:
 - i increase the tension of the specific muscle group
 - ii keep the muscle group tensed for approximately 5 seconds
 - ii slowly relax the muscle group
 - iv notice the difference between tension and relaxation
 - v every now-and-again a deep breath is taken and slowly exhaled. Notice the difference between the inhalation and exhalation
 - vi on completion of the relaxation routine, the person must experience the completely relaxed condition for a while. The person can now open his/her eyes.
 - routine for different muscle groups:
 - i right hand
 - ii right arm
 - iii left hand
 - iv left arm
 - v neck and shoulders (at the same time)
 - vi neck (only)
 - vi face, jaw and scalp
 - vii neck and shoulders (repeat)
 - viii thorax (chest), lungs and back
 - ix abdomen (stomach)
 - x complete upper body (chest, back, lungs, stomach, face, neck, both arms)
 - xi take a deep breath and slow exhalation
 - xii. stomach (repeat)
 - xiii buttocks
 - xiv right thigh muscles
 - xv right lower leg and foot
 - xvi complete right leg
 - xvii left thigh muscles
 - xviii left lower leg and foot
 - xix complete left leg
 - xx complete body
 - by repeating the systematic relaxation technique on different occasions, one can strive towards direct relaxation of the different muscle groups without first having to tense the muscles before relaxation



ADDENDUM G: RAW DATA

HONDE-FOBIE PROJEK: DATA

NOMMER	Eks/Kontr	ACTH										FSS-Animal		FSS-Dog		FSS-Blood-Inj		FSS					
		ACTH	ACTH	ACTH	SS - I			SS - II			SS - III		A - II		A - III		AS - II		AS - III		Gem	STD	Total
		Fase I	Fase II	Fase III	SS - I	SS - II	SS - III	A - II	A - III	AS - II	AS - III	Gem	STD	Gem	STD	Gem	STD	Gem	STD	Fear			
1	K	12.1	10.1	9	25	20	19	0	0	1	1	1.33	0.65	1	0	1.67	0.82	102					
2	E	10.3	10.4	10.8	54	44	29	0	0	2	1	3.67	1.5	4.5	0.58	1.17	0.41	214					
3	E	24.1	14.1	14.8	38	59	61	4	0	7	2	4.33	0.78	4.75	0.5	3.83	1.47	250					
4	E	15.3	15.7	16.2	21	19	35	0	0	2	0.5	3.08	1.51	3.75	1.5	2.17	0.75	193					
6	K	13	10.2	12.5	21	20	24	0	0	4.5	1	2.83	1.4	4.25	0.5	1.67	0.82	161					
7	E	15.6	17.4	21.6	58	60	41	4	0	5	1	3.08	1.88	4.75	0.5	3.5	0.55	244					
8	K	9		14.4	18	16	17	0	0	1	1	1	0	1	0	1	0	74					
9	K	9	12.2	10.5	38	30	27	0	0	1	1	1.75	0.97	1	0	1	0	130					
10	K	18.1	15.7	13.7	55	54	36	1	0	2	1	1.33	0.65	1	0	2.33	1.03	158					
11	E	9	9	20.8	55	59	54	3	1	10	1	3	1.21	3.25	0.96	3.33	1.63	211					
12	E	14.1	10.3	15.5	65	66	54	3	0	7	7.5	4.33	0.89	5	0	4.5	0.84	283					
13	E	36.3	33.2	26.9	54	56	42	3	1	7	4	4.75	0.45	5	0	4.33	1.21	241					
14	K	17.4	9		49	43	53	0	0	1	1	2	1.04	2.5	0.58	2.5	1.97	201					
15	K	12.6	12.2		20	19	19	0	0	1	1	1	0	1	0	1.17	0.41	92					
16	E	14.1	17.3	14.8	37	20	20	0	0	5	2	4.25	1.54	5	0	3.33	1.03	247					
17	E	16.6	14.1	17.4	71	69	54	3	1	10	10	3.58	1.24	4.25	0.96	3	1.26	185					
18	E	21.2	21.9	28.3	27	27	27	0	0	6	1	2.25	1.48	3.75	1.5	1.5	0.84	139					
19	K	18.8	15.9	9	58	60	54	0	0	3	1	2.83	1.27	2.5	0.58	3	1.67	238					
20	K	10.5	9	12.4	17	19	19	0	0	1	1	2.42	1.78	1.25	0.5	1.17	0.41	136					
21	K	17.4	20.2	13	60	50	50	0	0	2	2	2.08	1	2.5	0.58	1.83	0.75	169					
22	K	19.4	10.3	10.6	21	20	17	0	0	1	1	1	0	1	0	1.33	0.82	112					
23	E	29.8	27.8	27	65	67	51	2	0	5	3	3.25	1.14	4	0.82	2.83	1.33	221					
24	K	13.5	14.6		34	29	44	0	0	1	1	2.5	1.31	2.25	0.5	4.33	0.82	206					
26	K	26.1	11.9	12	30	23	31	0	0	1	1	1.83	0.72	1.5	0.58	1.33	0.52	121					
27	K	26.5	28.3	27.1	42	24	29	0	0	1	1	1.83	0.58	2	0	1.83	0.75	120					
28	E	14.7	9	10.5	35	24	33	0	0	4	2	3.83	1.64	4.75	0.5	1.33	0.52	202					
29	K	12.6	19.1		39	36	44	0	0	1	1	2	1.04	1.5	0.58	1.67	0.82	122					

ACTH - absolute waardes pg/ml

SS - "stressor schedule" telling tydens elke eksperimentele fase. Som van 15 items (waardes 1 tot 5). Minimum waarde = 15, Maksimum waarde = 75

A - afstand (m) van hond vanaf persoon toe die naderingstoets gestaak is tydens elke eksperimentele fase. Maksimum afstand = 5 m. minimum afstand = 0 m.

AS - self-gerapporteerde angs-telling aan einde van eksperimentele fases II en III. Minimum telling = 1, Maksimum telling = 10.

Animal = 12 items. Gemiddeld (Minimum waarde = 1, Maksimum waarde = 5) en standaard-afwyking

Dog = 4 items. Gemiddeld (Minimum waarde = 1, Maksimum waarde = 5) en standaard-afwyking

Blood-Inject = 6 items. Gemiddeld (Minimum waarde = 1, Maksimum waarde = 5) en standaard-afwyking

Total Fear. Minimum waarde = 72, Maksimum waarde = 360.



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