



Canine PTSD

An inquiry study on psychological trauma in dogs

PTSD hos hund

En enkätstudie om psykiskt trauma hos hund

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Skara 2017

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I denna serie publiceras olika typer av studentarbeten, bl.a. examensarbeten, vanligtvis omfattande 7,5-30 hp. Studentarbeten ingår som en obligatorisk del i olika program och syftar till att under handledning ge den studerande träning i att självständigt och på ett vetenskapligt sätt lösa en uppgift. Arbetenas innehåll, resultat och slutsatser bör således bedömas mot denna bakgrund.

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Abstract

Canine post-traumatic stress disorder (PTSD) is a subject in need of scientific attention, as dogs suffer greatly from traumatising. Previous animal studies prove the disorder not only to be a human phenomenon. This study investigates canine symptoms of PTSD, and if the Diagnostic and Statistical Manual of Mental Disorder 5th edition (DSM-V) can be used as a guideline when diagnosing dogs. Another aim was to research the characteristics of the traumatising incidents, the so called stressor. Furthermore, sleep disturbance and gastrointestinal issues were studied as well as the dog owners' perception on the effectiveness of training methods and the use of punishment. Data was collected via an online questionnaire.

The results are based on 57 cases of dogs, the dog owners state their dogs to have experienced a potentially traumatising incident, subsequently developing symptoms such as; increased reactivity, vigilance, self-destructive behaviour, sleep disturbance, startle responses, fear induced behaviours, general stress symptoms, avoidance, withdrawal, avoidance of triggers and aggression. Both active and passive coping strategies were detected. These symptoms resemble the key criteria required when diagnosing PTSD in humans.

The traumatising experiences catalysing PTSD symptoms in dogs had humans as a common denominator; harsh handling, domineering training attempts, attacks, abuse and/or neglect. Being attacked by other dogs, accidents and experience of fireworks were other recurrent incidents. In regards of training, tattling and BAT were perceived effective and very effective by the dog owners. Methods such as positive punishment and CAT were often perceived as ineffective or even stated to have a bad effect.

The reported use of punishment, attempted to control extrovert symptoms, was alarming and strongly advised against when dealing with dogs in general, and in PTSD dogs in particular, since harsh handling and domineering was a common stated stressor leading to the onset of PTSD. The suffering experienced by PTSD dogs is extensive and in many cases easy to prevent. The strongest preventive tool being the understanding of dogs' emotional life.

Keywords:

canis familiaris, ethology, canine PTSD, post-traumatic stress disorder, dog psychology

1. Introduction

People experiencing an extreme stressor risk suffering from an anxiety disorder called post-traumatic stress disorder (PTSD), detrimental mental health and suffering being a serious consequence (Breslau and Kessler 2001). During years of working with dogs with behavioural problems, it has become obvious that anxiety, aggression and fear induce behaviours are common. This is a significant welfare concern, especially if the distress is persistent and vast, as is often the case if the symptoms are catalysed by the experience of an extreme and stressful incident. Can dogs suffer from post-traumatic stress disorder such as humans? What are the cardinal symptoms relevant for diagnosis? These are questions this study aims to answer, in purpose to enlighten the welfare concern for traumatised dogs.

2. Background

2.1. Post-traumatic stress disorder

PTSD was first classified in the 1980's fifth edition of the Diagnostic and Statistical Manual of Mental Disorder (DSM-V), a diagnostic tool used worldwide to diagnose psychological illness. But the concept of the disorder goes back further in time. It was first defined by Kardiner (1941) in his book *The Traumatic Neuroses of War*, where he described the patients to be in a state of readiness, in constant alert for expectation of the trauma to return as the memory had become pathogenic. PTSD is often associated with victims of war, torture, natural disasters, catastrophes, accidental injury, abuse, kidnapping and rape (van der Kolk 1987).

Most people recover from initial symptoms of shock after experiencing an extreme stressor (Kessler 1995). Epidemiological studies indicate that most will adapt within 1-4 weeks following exposure, whereas PTSD sufferers do not (Bryant 2006; Foa et al. 2006). 20-30% of people exposed to intense stressors develop PTSD (Breslau et al. 1991) and will feel a sense of ongoing threat even when out of harm (Dunmore et al. 1999). People with PTSD are heavy laden by persistent vigilance and a heightened sensitivity to threat or perceived threat (Kardiner 1941). Symptoms such as agitated behaviour, lethargy, passivity, numbing, avoidance, hyper-reactivity and withdrawal are common (Mineka and Hendersen 1985). PTSD is complex and to understand the nature of this memory disorder one needs to look into the correlation of the stressor, the stressed, the individual's experience and the symptoms that follow and persist (Schneiderman et al. 2005).

PTSD is a psychological as well as physiological disorder (Kardiner 1941). Research on PTSD patients has involved the limbic system (Bremner et al. 1995, Rauch et al. 1996) and show how persistent stress reactions cause hormones and neurochemicals to emit into the bloodstream at a

higher extent than the norm, risking immunological changes as a result (Anisman et al. 1999). The subject is a matter of patho-physiology as emotional changes due to traumatisation alters the neurobiological regulation. There is a vast difference between a normal stress response, conditioned fear, acute shock and the complexity of PTSD with its bio-behavioural changes.

2.2. Diagnostic and Statistical Manual of Mental Disorders – number 5 (DSM-V)

When rehabilitating dogs with behavioural problems such as fear and aggression, one notices that some canines do not follow the norm (authors unpublished observations). They may not respond to rehabilitative attempts as expected and some seem unable to form new associations to previous fear conditioned stimuli. Moreover, a high level of stress is prominent in these dogs, symptoms are often severe and the dog's overall health is affected. These dogs have often been subjected to an extreme stressor and thereafter developed severe symptoms of distress.

At first it may seem far-fetched to diagnose canine PTSD using a diagnostic tool relevant for mental disorder diagnosis in humans, such as the Diagnostic and Statistical Manual of Mental Disorder 5th edition (DSM-V by American Psychiatric Association 2013). However many of the symptoms are comparable across species, studies on rats, mice, cats dogs, monkeys and humans show equivalent results (Seligman 1967; Maier 1973; Osborne et al. 1975; Maier 1987; Foa et al. 1992; Beerda et al. 1997; Yamamoto 2003; Peremans 2009; Nagasawa et al. 2012; Cohen et al. 2014).

DSM-V clarifies that a traumatic incident (referred to as “the stressor” in DSM-V) is often perceived as a life threatening incident, there is a perceived endangerment of serious injury or a sexual violation.

One or more of the scenarios listed below are needed for classification in humans:

- the individual directly experiences the traumatising incident
- the individual witnesses the traumatic incident in person
- the individual learns of the traumatic incident which affected a close family member or friend (cases of actual or threatened death being violent or accidental)
- the individual experiences first hand repeated or extreme exposure to details of the traumatic incident (not through media)

The DSM-V (Appendix 1) was updated in 2013 and diagnostic criteria for PTSD are classified into four categories:

1) Intrusion symptoms

A cardinal manifestation of PTSD is re-experiencing the traumatic incident (DSM-V, APA 2013). When diagnosing PTSD by the category intrusion, symptoms below are common (DSM-V, APA

2013):

- Recurrent, involuntary and intrusive memories
- Traumatic nightmares
- Dissociative reactions, flashbacks
- Intense and prolonged distress
- Marked physiological reactivity after exposure to trauma-related triggers
- Other intense and prolonged psychological distress.

(one of the symptoms above is required for a positive diagnosis)

People with PTSD often have anxiety and fear responses in the form of reactions to primary and sometimes even secondary trauma-triggers (a trigger being an experience causing someone to recall a traumatic memory). These triggers symbolise or resemble the traumatic incident. Studies show how PTSD victims react to triggers with increased heart rate, increased skin conductance, increased blood pressure and intense psychological distress (Bessel and van der Kolk 2001; Foa et al. 1992; Cohen et al. 2014).

Re-traumatisation is common, and can occur if the PTSD sufferer experiences a situation resembling the initialising traumatic incident (Duckworth and Follette 2012). This situation can initiate relapse, resulting in worsening and/or new symptoms (Duckworth and Follette 2012).

2) Avoidance

Behaviours elicited by a memory of the trauma can be seen as active or passive avoidance. When diagnosing PTSD by the category avoidance, symptoms listed below will be common (DSM-V, APA 2013):

- Trauma-related thoughts or feelings
- Trauma-related external reminders, avoidance of triggers
- Psychological numbing such as disassociation
- Analgesia

(one of the symptoms above is required for positive diagnosis)

3) Negative alterations in cognitions and mood

When diagnosing PTSD by the category negative alterations in cognition and mood, the symptoms below are fundamental for diagnosis (DSM-V, APA 2013):

- Inability to recall key features of the traumatic incident
- Persistent (and often distorted) negative beliefs and expectations about oneself or the world

- Persistent distorted blame of self or others for causing the traumatic incident or for resulting consequences
- Persistent negative trauma-related emotions (e.g., fear, horror, anger, guilt, or shame)
- Markedly diminished interest in (pre-traumatic) significant activities
- Feeling alienated from others
- Constricted affect: persistent inability to experience positive emotions
(two of the symptoms above is required for positive diagnosis)

Furthermore, people with PTSD often meet the criteria for depression (Davidsson et al. 1985).

4) Symptoms of alterations in arousal and reactivity

Retrospective studies show that exaggerated startle response, continuous preparedness, aggression, self-destructive behaviour, increased and persistent psychological arousal and hyperarousal is prevalent in PTSD sufferers (Bessel and van der Kolk 2001).

When diagnosing the disorder by the category alterations in arousal and reactivity, the symptoms below are commonly noted (DSM-V, APA 2013):

- Irritable or aggressive behaviour
- Self-destructive or reckless behaviour
- Hyper-vigilance
- Exaggerated startle response
- Problems concentrating
- Sleep disturbance

(two of the symptoms above is required for positive diagnosis)

All symptoms required for diagnosis need to be onset immediately or 1 month subsequent to experiencing the stressor. Furthermore, persistence of the symptoms are required for more than one month. A full diagnosis is not possible until at least six months after the trauma, due to the possibility of delayed expression (DSM-V, APA 2013).

2.3. Gastrointestinal symptoms

Chronic stress tends to be damaging to health and can affect the function of the gut by altering the microbiota (Konturek 2011). Thus risking the development of gastrointestinal complications and diseases such as ulcers, IBS, overgrowth of bacteria, compromised intestinal barrier and leaky gut syndrome (Lyte 2011; Bowe and Logan 2011). Corticotropin releasing factors coordinates an organism's response to stress and modulates inflammation, gut permeability, pain reception and gut

motility among others (Konturek 2011). An overly stressed individual can therefore have an affected digestion, nutrient uptake and excretion (Konturek 2011). Approximately 36% of patients with the diagnosis irritable bowel syndrome (IBS) also meet criteria for PTSD (Irwin et al. 1996).

2.4 Sleep disturbance

Sleep disturbance is a central symptom for PTSD patients, as repetitive nightmare and dysfunctional rapid eye movement (REM) sleep mechanisms is common (DSM-V, APA 2013). Dysfunctional REM sleep is argued to be a sleep disturbance specific for this disorder (Ross et al. 1994). A study of combat veterans show how repetitive anxiety dreams occurred during REM sleep, indicating that a dysregulation of the REM sleep control system may be involved in the pathogenesis of PTSD (Ross et. al. 1994).

2.5. Translational studies

Even though most PTSD research is done on humans, the disorder has shown to be just as prevalent in animals. Experimental neurosis, abundantly researched using animal models, show results most relevant for the understanding of PTSD in animals (Foa et al. 1992). These animal studies have allowed pre- and post trauma exposure observations, giving more detailed information of the characteristics of stress disorders caused by shock and trauma (Mineka 1985).

Research has been done on rats (*Rattus norvegicus*) (Maier 1973; Brennan 1975; Osborne 1975; Baker 1976; Fanselow 1982; Abbott 1985; Maier 1987), rhesus monkeys (*Macaca mulatta*) and dogs (*Canis familiaris*) (Hollis and Overmier 1973; Rush 1982). Masserman (1943) addressed psychological trauma in cats (*Felis catus*) by subjecting them to shock that was both uncontrollable and unpredictable, two parameters highly relevant in the outcome of PTSD (Foa et al. 1992). The results showed the cats to exhibit great fear, defensive responses, agitation, phobias, passivity and irregular and rapid pulse (indicating the development of an emotional disorder) when shocked and unable to predict and control circumstances important to their welfare. Masserman noted that the symptoms lasted over time, without the presence of triggers, validating the long lasting effects prominent for PTSD. Animal studies on experimental neurosis thus emphasises that PTSD is not solely a human phenomenon.

Regarding the characteristics of the stressors commonly causing PTSD in animals, studies show how weak uncontrollable shock leads to habituation of fear, whereas strong uncontrollable shock does not (Annau and Kamin 1961). Rats exposed to unpredictable shock, regardless of strength, showed more freezing response and ulceration, higher levels of plasma corticosterone levels, greater weight loss, greater rise in body temperature and more generalised fear and arousal than rats exposed to

predictable shock (Seligman 1968; Weiss 1970). Furthermore, loss of control is more stressful than lack of control (Mineka and Kihlstrom 1978), as it leads to greater levels of arousal, stomach ulcers and higher corticosterone levels than lack of control, in rats (Tsuda and Hirai 1975).

Dogs exposed to unpredictable and inescapable shock subsequently, developed a generalised learning deficiency in regards of escape and active avoidance of shock (Overmeier and Seligman 1967, Seligman and Maier 1967). Such studies indicate that anxiety disorders such as PTSD, may impair cognitive performance and affect learning (Overmeier and Seligman 1967; Seligman and Maier 1967; Hollis and Overmier 1973).

Previous research highlights how dogs can develop PTSD like symptoms, Yamamoto (2003) found that 15 out of 82 dogs exhibiting abnormal behaviour after experiencing an earthquake in western Japan. Yamamoto reported symptoms such as persistence tremor, anorexia, intermittent howling, excitement or repeated diarrhoea. After another earthquake in Fukushima in Japan, 2011, a rescue centre received stray dogs as a result. A sample of these dogs and a control group of abandoned dogs, from other areas (not earthquake affected), were included in a study on PTSD in dogs (Nagasawa et al. 2012). Behavioural characteristics as well as urine cortisol levels were compared, and the dogs affected by the earthquake had 5-10 fold higher cortisol levels. Nagasawa argued that not only the earthquake, but also the separation from their family, and the unusual living environment following affected the dog's ability to maintain normal behaviour and endocrine stress response (Nagasawa et al. 2012).

In the author's experience it has been observed that dogs pathologically change with the development of PTSD. This is often a gradual process, resulting in a disability to function as before experiencing the trauma, PTSD being a degenerative psychological condition if untreated, according to the author.

The reaction to, and avoidance of triggers, is of importance when diagnosing PTSD in dogs. One author argues that trauma-trigger responses in animals are intrusion symptoms, as the response and avoidance of the triggers are likely to be expressions of re-experiencing (Wagner 1979, 1981). Primary triggers, in this study, are defined as a first hand fear associations to the stressor, the trigger often resembles something memorised from the traumatic incident. For example a dog attacked in a park by a large and screaming man can develop fear reactions to large men, or screaming. In this study, secondary triggers are defined as second hand associations to the stressor. A secondary trigger may symbolise something indirectly associated to the traumatic incidents, surroundings being a common example. In the scenario above a fright of parks can develop.

A gap between the knowledge among practitioners and scientifically proven facts occur in many areas of expertise. When investigating the opinion on canine PTSD, among experts, some of the world's

leading canine behaviourists are convinced dogs can develop PTSD. Canine behaviourist Grisha Stewart, specialised in dog reactivity says “*Yes I would say that dogs have similar symptoms to humans in response to trauma. Obviously we cannot speak to dogs in the same way that we can with humans, but they certainly develop long-lasting behavioural responses to trauma and sensitivities to triggers similar to that of PTSD in humans.*” (personal communication 2017-4-27). Dr. Nicholas H. Dodman, director of The Animal Behaviour Clinic at the Cummings School of Veterinary Medicine at Tufts University, believes dogs never really recover from the result of traumatisation. “*It is more management. Dogs never forget.*” (Dao 2011). In an interview with the New York Times Dr. Walter F. Burghardt Jr., chief of behavioral medicine at the Daniel E. Holland Military Working Dog Hospital at Lackland Air Force Base, who specialises in canine PTSD, states that “*5 % of the approximately 650 military dogs deployed by American combat forces are developing canine PTSD. Of those, about half are likely to be retired from service.*” (Dao 2011). His experience is based on US military dogs used in bomb detection, as well as search and rescue dogs.

Overall, the subject of canine PTSD is sparsely investigated. There is debate on the adequacy of translational research and the transfer of conclusions regarding mental health issues in humans on to other species. Nevertheless, as argued by Cohen et al. (2014) if animal models for PTSD research are relevant to humans the conversely should be considered. Therefore, the DSM-V could be a valid guideline for diagnosing PTSD even in dogs, as similarities between the species in regards of cognitive functions have been found. For instance, dogs with anxiety disorders, used in a single-photon emission computed tomography study on serotonin receptors, gave results similar to humans (Vermeire et al. 2009). Furthermore, Peremans et al. (2003) revealed results on how dogs’ impulsive aggression can be concordant with those in humans as our limbic systems have similarities.

When evaluating the cardinal symptoms for PTSD in humans from a canine perspective, one sees that many of the symptoms can be transferable into behaviours noticeable in dogs, for instance; aggression, restlessness, self-destructiveness, fear induced behaviours, reactions to and avoidance of triggers, loss of interest in previously enjoyed activities, depression, development of/or increase in overall stress symptoms, increased arousal, reactivity, vigilance, startle responses and withdrawal.

In regards of the categories; intrusion symptoms and negative change in cognition and mood, feelings, thoughts, dreams and flashbacks are common symptoms of PTSD in humans (DSM-V 2013). These criteria need to be excluded when diagnosing dogs, as we cannot get first-hand information on observed pictures or memories of the trauma and prove for instance flashbacks. When diagnosing PTSD in dogs, non-verbal observations can only be taken into account. Since one (the category of intrusion) or two (the category of negative change in mood and cognition) symptoms from each category are required for full diagnosis, eliminating symptoms concerning thoughts, feeling,

memories does not jeopardise a correct diagnosis, as long as the dog exhibits a sufficient amount of symptoms.

3. Aims

The aim of this study is to investigate psychological trauma in dogs. The following questions will be investigated:

- 1) Is the DSM-V a relevant diagnostic tool for canine PTSD?
- 2) What are the cardinal symptoms of PTSD in dogs?
- 3) What sort of stressors commonly traumatises dogs?
- 4) Does traumatisation affect dogs sleeping pattern and gastrointestinal health?
- 5) What training methods are perceived effective by the dog's owners?
- 6) Is the use of punishment common, among dog owners, when trying to handle PTSD symptoms in dogs? If so, to what extent and of what sort of punishment is typical?

4. Material and method

To find dogs for the study, data was collected from dog owners via an online questionnaire consisting of 65 questions (Appendix 2). The questionnaire was never headlined “PTSD in dogs”, and questions when formatted short and objective to increase the chance of reliable answers, minimising the risk of dog owners drawing their own conclusions regarding their dog’s diagnosis, as this would risk proper diagnosis. The survey was distributed via outlets such as the author's website, the website of the Swedish University of Agricultural Sciences, Facebook forums and email addresses acquired by the Nationwide Swedish Kennel Club. Participants ranged from all over Sweden and data was collected over a 5 month period, October 2015 to February 2016.

4.1 Diagnosis

Each received questionnaire was first checked if it was completely filled in. Five telephone interviews were carried out to gain further information as gaps occurred in these survey replies. Thereafter each case was assessed in regards of the criteria below. An excel process chart with the diagnostics questions listed was used as a template to gain an overview of the results. As soon as a case failed to fulfil one of the diagnostics steps (see step 1-6 below) it was excluded from the study. Dogs included in the study, had to meet the criteria for PTSD according to the DSM-V.

- 1) The owner's description of the initialising incident (question 11) had to validate the stressor to be a direct exposure possibly perceived as life threatening, or a risk of serious injury. The characteristics of the stressor was judged according to whether the incident could have been

experienced as uncontrollable, unpredictable and/or inescapable shock, as well as potential feelings of lack or loss of control, in accordance to important findings in the animal literature regarding PTSD.

- 2) 6 month needed to have passed since the dog experience of the stressor (question 12). The symptoms had to have developed post-trauma and been persistent for more than one month (question 13, 44).
- 3) There had to be one or more signs of re-experience such as intense and prolonged distress and marked physiological reactivity when exposed to trauma-related triggers (question 15:1, 15:2, 15:3, 17:1, 17:2, 25, 30). Excluded from the list of symptoms were flashbacks and nightmares considered to unreliable for diagnosis. However nightmares were looked into in a separate section, since being a cardinal symptom for PTSD.
- 4) At least one symptoms of avoidance was required such as trauma-related external reminders, avoidance of triggers, psychological numbing, dissociation or analgesia (question 16, 17:1, 17:2, 32). With the exception of avoidance of thoughts associated to the trauma, being irrelevant in this study as solely non-verbal observations by dog owners are taken into account.
- 5) Two or more signs of negative alterations in cognitions and mood were required, such as a persistent (and often distorted) negative expectations, persistent negative trauma-related emotions (e.g., fear or anger) and markedly diminished interest in previously enjoyed activities (questions 14, 18, 19, 20, 21, 28, 29, 32, 38). Excluded from the list of symptoms are beliefs, feelings of blame, feeling alienated from others, persistent inability to experience positive emotions since being hard to validate via the opinion of the owner.
- 6) Two or more symptoms of alterations in arousal and reactivity was mandatory, such as irritable or aggressive behaviour, self-destructive or reckless behaviour, hypervigilance, startle responses (question 16, 18, 19, 20, 21, 23, 24, 29, 37). Sleep disturbance was looked into, but excluded as a criteria for diagnosis, since considered to be a factor to unreliable to determine via dog owner observations.

See Appendix 2 to view the diagnostic questions in detail.

Survey answers were assessed by the author, a certified dog psychologist with over 12 years of experience working with dogs with problematic behaviours, including traumatised dogs.

To minimise false diagnosis, the following groups were excluded:

- 1) Dogs with ongoing diseases, history of injury, dogs with stated pain, or dogs under medication,

as the effects on behaviour can be similar to symptoms of trauma.

2) Dogs given minimal amount of physical and mental stimulation in regards to age, breed and life stage. In the author's experience it has been observed that under-stimulation can cause behavioural symptoms resembling canine PTSD. Standardising insufficient levels of exercise and mental activity cannot be done, since being dependent on the individual need of each dog. A three year old Alaskan Malamute living in an inner city environment will need an entirely different set up to a 12 year old Toy Poodle living on a farm.

3) Dogs indirectly exposed to a potentially traumatising incident, such as witnessing a stressor.

Dogs with unknown or incomplete background information, were not excluded as long as they showed significant symptomatology. Even in human PTSD research pre-observations are not always possible. Studies on children subjected to trauma at an early age, war veterans without pre-observations or PTSD sufferers with memory loss in the form of blackouts from the trauma, leaves blanks regarding the stressor or previous mental health status. An inability to recall key features of the traumatic incident is in itself a symptom for PTSD (DSM-V, 2013). Thus, dogs with little or no background information were kept in the case sample if additional diagnostic criteria were met.

To gain deeper knowledge regarding what commonly traumatises dogs, question 11 (Appendix 2) addressed the stressor. Recurring incidents were of interest as well.

4.2. Physical symptoms

4.2.1. Gastrointestinal symptoms

Due to the occurrence of gastrointestinal symptoms in stress related mental health issues in humans, question 27:1 and 27:2 addressed this topic (Appendix 2).

4.2.2. Sleep disturbance

As sleep disturbance is fundamental when diagnosing PTSD in humans, the issue was addressed in question 15, 22, and 25 (Appendix 2).

4.3. Owners approach to the dog's behavioural changes after traumatic incident

To view the topic from an anthrozoological perspective question 33, 46, 50 (Appendix 2) screened owner's management of their dog's behavioural problems in regards of an aversive or affirmative approach.

4.3.1. Attempted training and punishment

Question 46, 47, 48, 49, 50 and 61 (Appendix 2) addressed training methods used in attempt to control or alter the dog's mental health issues. The training used, aimed to reduce aggression- or fear induced behaviours such as; lunging at other dogs when on a walk, thunder fright, aggression towards people. For detailed descriptions of the training methodologies see Appendix 3.

The use of punishment addressed in this study, was defined (by the dog owner's perception of the concept) as presenting an aversive consequence during or after an undesired behaviour, or as the removal of something desired as attention or social presence.

4.4. Data management

Data was primarily managed by compilation into categories of percent. The frequency of occurrence was calculated to enhance comprehension of some of the data. Questions containing descriptive answers were evaluated and compared to the DSM-V list of relevant symptoms. In regards to the diagnostic questions asking the dog owners to describe the potentially traumatising incident, the answer was evaluated with focus on the stressors characteristics in form of predictability, weak or strong shock, the possibility of perceived lack or loss of control. The incidents likelihood to be perceived as; life threatening or risking serious injury, by the dog was also looked into as being parameters relevant when diagnosing PTSD.

The results concerning dog owner's perceived effectiveness of different training methods were managed by categorising the alternative answers into negative or positive scores to make the results more comprehensible and easy to survey. Answer five (stating no effect), was given a score of 0. Answer 4 to 1, stating different degrees of bad effect, was given scores from -1 to -4. Answer 6 to 10, stating different degrees of good effect, was given scores from +1 to +5. The results are presented in a graph illustrating the total sum of each training methods positive or negative load. As the optional answers ranged from 1-10 with a neutral middle number, there will be an overweight of positive load. To correct this error in the questionnaire form, the values of answer ten have been converted into values of the answer nine.

5. Results

78 answered questionnaires were received, 21 of the cases were dismissed. 4 of these cases contained factors affecting reliable diagnosis and 17 of the received cases tested negative for PTSD (see section 4.1). The remaining 57 cases included dogs who showed to have symptoms relevant for a positive PTSD diagnosis (see section 4.1).

42% of the dogs had, according to their owners, been subjected to trauma early or before coming into the owner's care, leaving uncertainties on the exact cause of traumatisation. 46% of these dogs came from rescue centres abroad. 88% of the dogs with an uncertain initiating stressor, came from substandard living environments involving; neglect, suspected abuse, unsanitary homes, shortness of food, according to the dog owners. The reported symptoms in all dogs with uncertain background were so distinct, that the dogs remained in the study as the question was never if they were traumatised, only by what and when.

5.1. Diagnosis

58% of dog owners reported a traumatising incident to which the dog had been directly exposed. Owners stated that the dog had reacted to the incident with extreme stress, possibly perceiving it as life threatening or risk of serious injury. In the majority of cases the incident may well have been perceived as uncontrollable, in some cases unpredictable, and in all cases inescapable and therefore feelings of lack or loss of control are probable.

Regarding criteria for persistency and duration of symptoms, all dogs had experienced the stressor a minimum of six month prior to the owner answering the questionnaire. The symptoms had been persistent over a month, in most cases for many years, and had been consistent in severity or worsened over time according to the owners.

Among dogs with known traumatising incident or incidents, the onset of symptoms was most often reported as being immediate after the experienced stressor, or within 1-6 month (Figure 1).

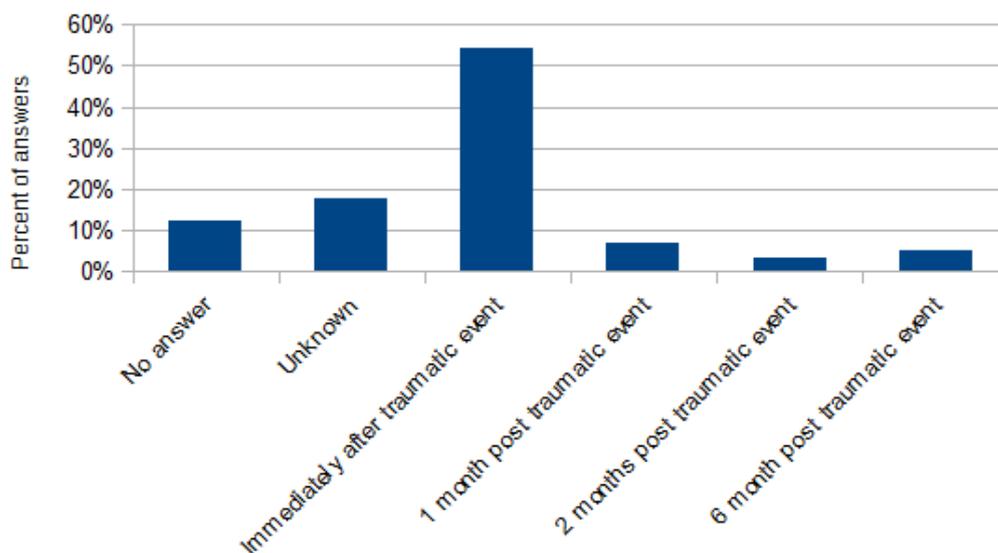


Figure 1. Onset of PTSD symptoms, in temporal relation to the experienced trauma, according to the dog owners.

The 57 dogs in this study showed required symptoms from the four categories relevant for diagnosis. One or more symptoms from the categories of intrusion and avoidance and two or more symptoms from the categories negative alteration in cognition and mood, and alteration in arousal and reactivity, were present according to the answers received from the dog owners.

5.1.1. The stressor

The top five most common stressors leading to traumatisation, according to the answers received from dog owners were; 1) subjected to domineering dog professional, 2) beaten or frightened by human, 3) attacked by unknown dog/dogs, 4) involved in an accident, 5) experienced fireworks. Rarest stressors reported included; a jester spitting fire over the dog's head, a dog setting of the house alarm when home alone, being emitted to animal hospital, experience of domestic fire, and a wolf attack.

The distribution of stressors when categorised, show 44% to included harsh handling, beating or physical/psychological threatened by humans (Figure 2). 12 % involved the dog's living environment (Figure 2).

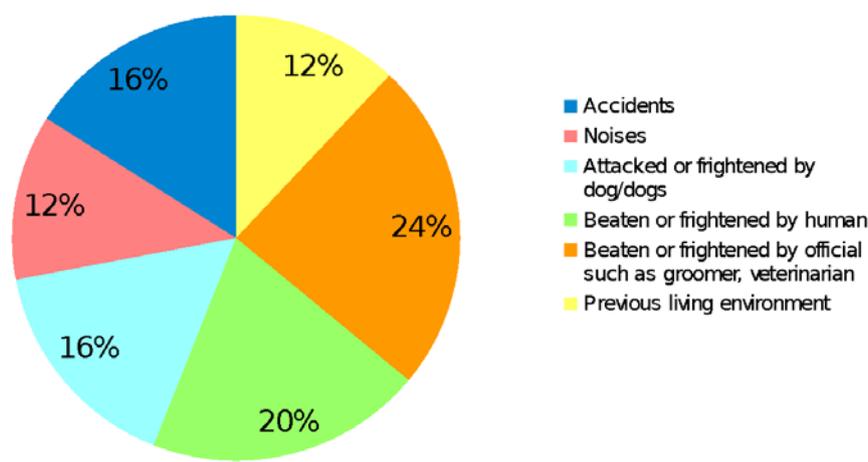


Figure 2. Distribution of traumatising experiences, noted by dog owners, categorised into six groups; accidents, noises, attacked/frightened by dog, beaten/frightened by human, beaten/frightened by dog professionals, previous living environment.

The interviewed dog owners explained how they had not avoided nor taken their dogs out of the traumatising situation, unaware of the risk. First when symptoms of chronic distress became apparent, the seriousness of the situation was apprehended.

5.1.2. Intrusion symptoms

All owners reported their dogs to have, or to have developed, reactions to primary triggers post-

trauma, examples being; thunder, strangers, dog trainers, animal nursing staff, loud voices, fireworks, cars, dogs in general, specific breed, eye contact, patting, brushes/claw clippers, belts and leashes, children's voices and slippery or polished floors (Table 1).

The owners experienced their dog's reactions to triggers to be constant or to have gotten worse over time. They also felt unsuccessful in training their dogs to form new associations to previously fear conditioned triggers. Moreover, 23% (13 of 57) of the dog owners stated their dogs to have formed negative associations to secondary triggers (Table 1).

Table 1. A selection of primary and secondary triggers noted by dog owners.

Traumatic incident	Primary triggers	Secondary triggers
1. Attacked by drunk man	Drunk people, men	People making eye contact, loud voices, crowds
2. Shut in car during new year's eve/fireworks	Fireworks, cars	Non-related object from above, lights, camera flash, isolation
3. Attacked by dog on a walk, no serious physical injury	Dogs, sight of dogs running towards	Loud noises, going for walk, movement from above, the sound of running dogs/people
4. Painful veterinary treatment concerning claws	Clinics, claw clippers	Clinker floors, white coats
5. Attacked by big dog and it's owner (a man) during a walk	Big dogs, dogs off leash, men	Doorbell (the attacking dog's owner visited after the attack, he rang the doorbell), being outside
6. Harshly handled by dog trainer	Dog trainers, yanking on the lead, prong collars	People standing in a circle, strangers, people in vests with whistles, training field, owners insecurity in such situations
7. Attacked by wolf in the forest	Wolf-like dogs, scent of wolf	Forest, unfamiliar dogs
8. Kicked by men of colour after being lured close to them	Humans displaying luring behaviour, men of colour, feet	Dogs, loud noises, sudden movements, strangers
9. Strung up in prong collar by	Groomers, prong collar,	People in general, all collars and

groomer, who harshly grabbed the dog repeatedly by the flank	clinics, being handled, constraint	harnesses, leashes, closeness, narrow spaces, clippers, brushes, tables, feeling cramped
10. Living environment involving neglect, owners being drug addicts or alcoholics	Being indoors, intoxicated people, sudden movement, dogs, the clicking of a lighter, foul smell, scraping of feet, raised arms	Darkness, unfamiliar objects, people in general, closeness, being handled/stroked, feeling sleepy
11. Attacked by large, black dogs on a walk. Grabbed over the back and shaken repeatedly, injured badly, complicated recovery	Large black dogs, sudden encounters, intense eye contact from other dogs, sudden movement, touch on back, being picked up	Dogs in general, going for walks, cats, sudden and loud noises, fireworks, lights, crowds of people, unfamiliar people acting stringently
12. Car accident. The dog and her mother locked in a crate, then run over by the owners car (the mother dog died as a result of the accident). Dog owner went into shock and behaved hysterical.	Cars (in or in close contact with), crates, people acting agitated or wound up, cramped spaces when shared with other dogs	Trolleys, grocery bags, bikes, anything on wheels, dogs, being isolated, noises, thing falling of shelf, objects from above (or the anticipation of such happenings), car noises, smell of cars
13. Mental description test, section including rattling chains (Swedish MH-test)	Sudden noises, metallic noises, chain, rope or lead pulled along the ground.	Breaking of twigs, doors slamming shut, doors in general, any movements along ground, rattling, cutlery dropped

5.1.3. Avoidance

Active or passive avoidance of triggers was present in 88% (50 of 57) of the dogs according to owners. The avoidance was also thought to be persistent and had often gotten worse over time.

5.1.4. Negative alterations in cognitions and mood

98 % (56 of 57) of the owners stated their dogs to have gone through an overall negative change in cognition and mood post-trauma. 91 % (52 of 57) declared their dogs to exhibit either increased insecurity, aggression and or fear post-trauma (Figure 3). When interviewed, five dog owners explained how their dogs had become uninterested in previously enjoyed activities post-trauma. The dogs had, according to owners, become more introvert and even withdrawing from people they had previous positive relationships to.

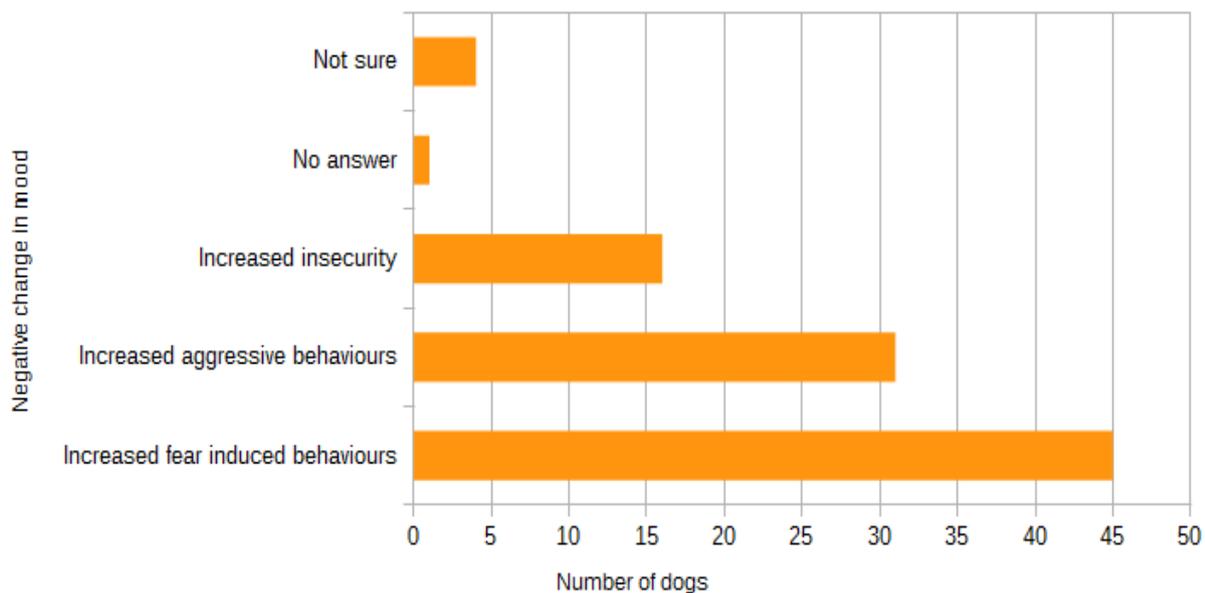


Figure 3. Number of dogs showing increased insecurity, aggression and/or fear, post-trauma, according to the dog owners. More than one answer could be chosen when filling in the questionnaire, therefore the total exceeds 57.

Additional mood changes were described as; low key, depressed, easy to block out, pendulous between low- and high key, hyper and tense.

5.1.5. Alterations in arousal and reactivity

All owners with a pre- and post-trauma assessment of their dogs had noticed a change in the dog's level of arousal post-trauma. Increased reactivity and vigilance was most common. Some owners stated more than one change, for example; increased vigilance and stress, or increased reactivity and vigilance (Figure 4). 10% of the dog owners stated to be unsure or chose not to answer whether their dogs had developed an increase in vigilance, reactivity and/or stress level post-trauma. However they all stated to have noticed an increase or decrease in arousal post-trauma (Figure 4).

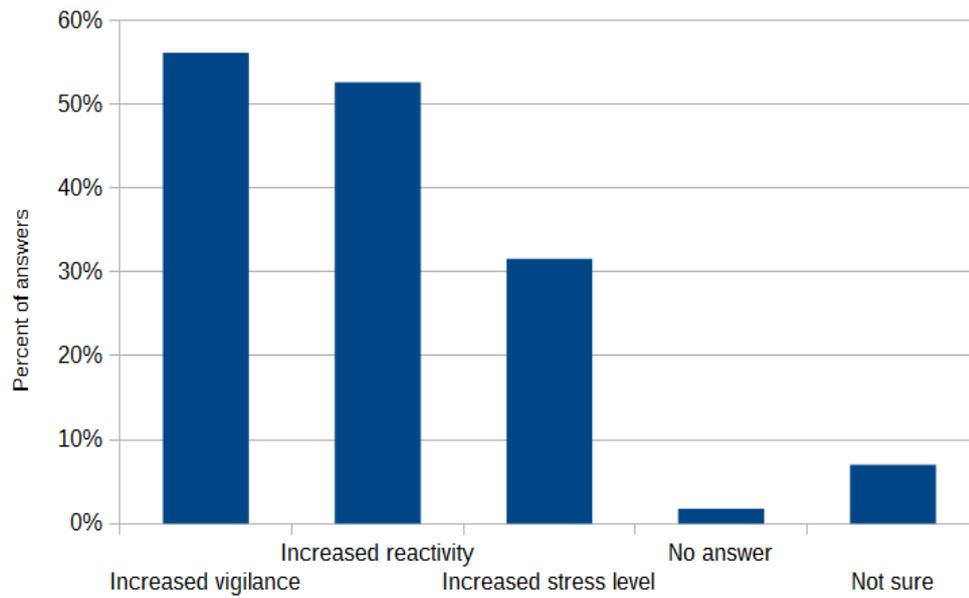


Figure 4. Distribution of increased vigilance, reactivity and/or stress, post-trauma according to the dog owners.

80% (45 of 57) of the owners thought their dogs to exhibit disproportional reactions in form of startle responses post-trauma, in general as well as when exposed to triggers. When asked to account for their dogs overall stress symptoms, 98% (56 of 57) of the dog owners had noticed a development of, or increase in stress symptoms, post-trauma, often being multiple symptoms (Figure 5).

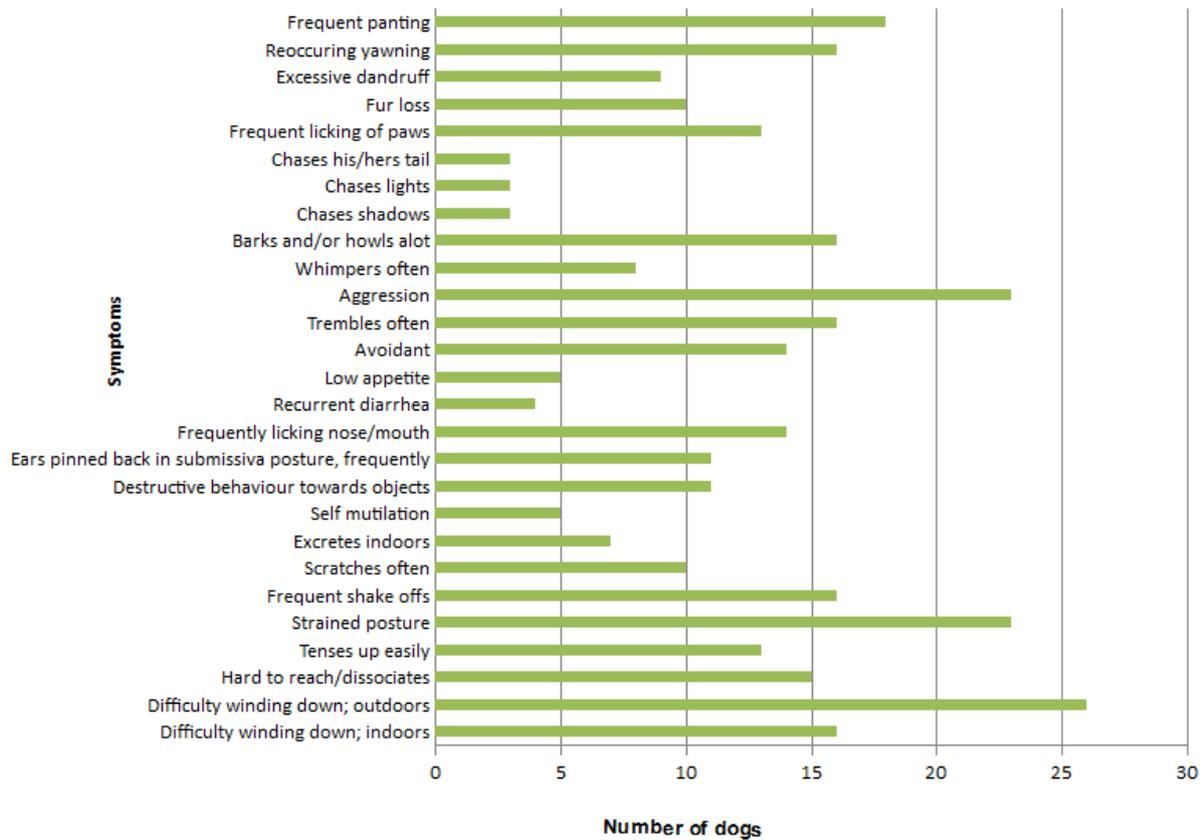


Figure 5. Number of dogs showing various symptoms of stress, post-trauma, according to owners.

5.2. Physical symptoms

5.2.1. Gastrointestinal symptoms

35% (20 of 57) of owners considered their dogs to have gastrointestinal issues. The most common being diarrhea, thereafter constipation (Figure 6).

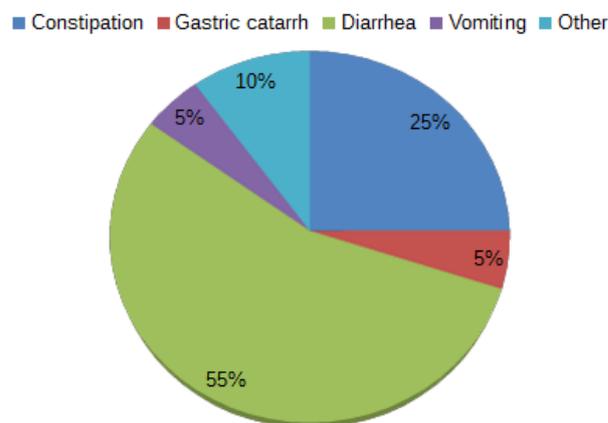


Figure 6. Distribution of gastrointestinal symptoms, noted in 35% of the dogs, according to the owners.

5.2.2. Effect on sleeping pattern

44 % (25 of 57) of the owners were unsure if their dogs sleeping pattern had been affected post-trauma. However, 11 % (6 of 57) noticed a marked and considerable change in sleeping pattern directly linked to the traumatic experience and was reported as:

- sleeps more superficial
- wakes up more often
- lays half-awake guarding
- sleeps shorter periods of time, naps instead of coherent sleep as pre-trauma
- sleeps under furniture, hides to sleep
- does not want to sleep alone
- easily frightened/disturbed when asleep
- wakes up easily
- sleeps more
- whimpers, howls during sleep

When the dog owners were asked if they considered their dogs to dream nightmares, no and unsure were the most common answers. 21 % (12 of 57) of the owners suspecting nightmares, stated their dogs to; run, whimper, howl, bark, and scream in their sleep. These owners also believed their dogs to have difficulty coming to rest as they noted wandering behaviours in the evenings before going to sleep as well as a difficulty falling asleep as the dogs frequently woke up, assumed by dog owners to feel the need to keep an eye on their surroundings.

5.3. Dog owners approach and management

5.3.1. Attempted training and perceived effectiveness

When investigating perceived effectiveness of attempted training, multiple dog owners stated to have tried one or more of the suggested methods. Some dog owners said to have done nothing to adjust the dog's behavioural problems.

13% (7 of 57) of the dog owners reported a noticeable relaxation around triggers over time, these dogs had been trained using Behavior Adjustment Training (BAT) and/or counterconditioning. Overall tattling, BAT and counterconditioning were thought of as most effective by owners, in contrast positive punishment, CAT and negative reinforcement were thought of as least effective or having a bad effect (Figure 7).

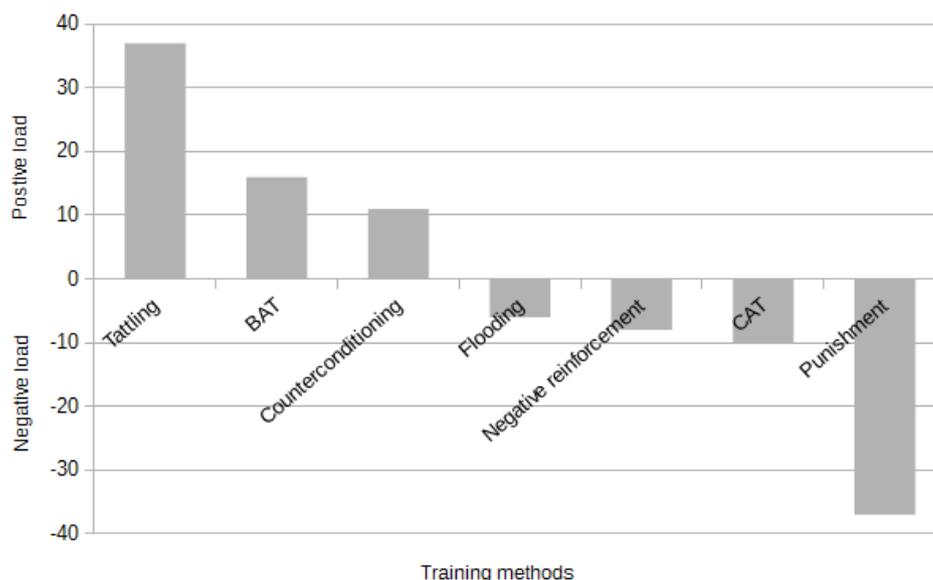


Figure 7. Owner's perception on effectiveness of attempted training methods. Each methods was valued via answer alternatives 1-10 in regards of perceived effectiveness, 1 stating bad effect, 5 no effect and 10 very effective. Above the sum of each training methods score is illustrated in the form of a negative or positive load.

5.3.2. Use of punishment

61% (35 of 57) of the owners described having punished the dogs at some point post-trauma, in attempt to control and/or reduce behavioural symptoms. The reported punishment was used on dogs with extroverted, offensive outlet such as aggression, most often in the form of lunging at dogs when on a walk. The most common forms of punishment used are stated in table 2. The punisher was often the owner, a partner, neighbour or dog trainer.

When analysing the form of punishment in detail, the definition of punishment is not in accordance to positive punishment as stated in the four principles of operant conditioning. Some scenarios tend to resemble negative reinforcement.

Table 2. Form of punishment used and the extent of usage by the owners.

Form of punishment	No of dog owners
Yanking the leash	25
Poking the dog in ribs/side	21
Grabbing dogs cheeks, staring into dog's eyes and verbal scolding	17
Yelling at	17
Ignoring the dog	17
Pressing the dogs towards the ground/floor	14
Growling at the dog	14
Taking hold of or twitching the scruff of the neck	12
Throwing water at the dog	12
Grabbing the dog's nasal bridge	10
Pushing the dog	8
“Alpha roll”, physically domineering the dog into submissiveness, pinning the dog on his/her back	6
Lifting the dog of the ground by collar/leash (front paws lifting of ground)	6
Pinching the dog	6
Social isolation (from the family/pack)	5
Shutting the dog in another room or partition	5
Throwing rattling cans after/at the dog	5
Use of bark control collar	4

32 % (18 of 57) of the dog owners who attempted to control the problematic behaviours with aversive methods had tried to dominate the dog (Figure 8). 33% had used physical beating or other abusive methods (Figure 8).

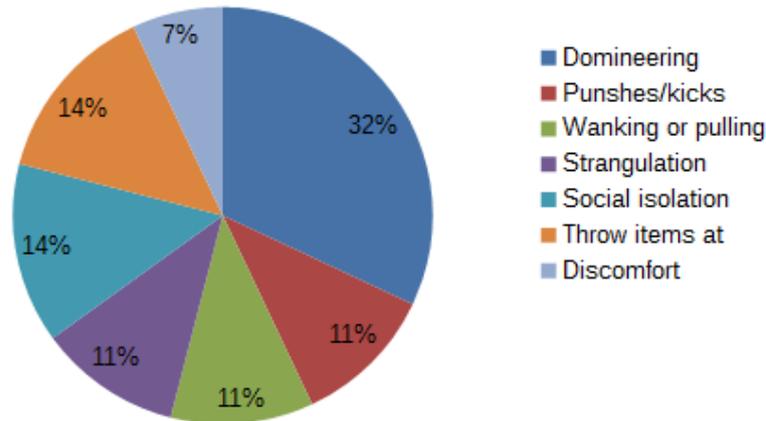


Figure 8. Categorise of aversive approaches, used by dog owners, when trying to control their dog's behavioural problems.

6. Discussion

The overall aim of this study was to obtain deeper knowledge concerning canine PTSD by answering a series of questions.

- 1) Is the DSM-V a relevant diagnostic tool for canine PTSD?
- 2) What are the cardinal symptoms of PTSD in dogs?
- 3) What sort of stressors commonly traumatises dogs?
- 4) Does traumatisation affect dogs sleeping pattern and gastrointestinal health?
- 5) What training methods are perceived effective by the dog's owners?
- 6) Is the use of punishment common, among dog owners, when trying to handle PTSD symptoms in dogs? If so, to what extent and of what form of punishment is typical?

6.1. Diagnosis and symptoms of canine PTSD

When diagnosing the dogs in this study the author assessed all the survey answers by first evaluating the stressor in terms of criteria stated in the DSM-V. Thereafter symptoms which had appeared post-trauma, according to the dog owners, were assessed, making sure the required symptoms in sort and amount was present. Thereafter duration and persistence was assessed.

Regarding the stressor, it was found that the protocol used for trauma assessment in humans, was transferable to the stressors stated by dog owners. For instance, onset of symptoms most often appeared immediately or were apparent within 1-6 months post-trauma. In the cases with a 6 month delay in symptom onset (Figure 1), an absence of triggers was often the case. One example being a dog who lived secluded on a farm, not re-encountering city environment until 6 month post-trauma

(traumatic incident occurred in a city environment). According to the author, symptoms of traumatisation can be significant, or subtle, if the dog has a more introvert personality. This can make assessment of onset of symptoms difficult. In many cases signs of distress unfolded successively over time, possibly making it hard for dog owners to determine exact onset. In retrospect however, there is a distinct difference pre- and post-trauma.

The DSM-Vs four categories of symptoms: intrusion symptoms, avoidance, negative alterations in cognitions and mood, alterations in arousal and reactivity could be comparative to canine behavioural expressions of distress of various degrees. The symptoms noted by dog owners correspond to the criteria of importance regarding PTSD diagnosis, stated in the DSM-V, thus shedding light on the cardinal symptoms of PTSD in canines. The dog owners in this study also reported their dogs to have remained affected over time and to have developed long-term psychopathology with adequate symptoms for diagnosis.

In regards of **intrusion symptoms**, the author wishes to propose re-experience, as a behavioural response resembling that produced by the initial traumatic incident, re-occurs in association to a similar or reminding stimulus. Dogs seem to re-experience their trauma through sensory memories and the study results show owners to believe their dogs to have developed reactions to triggers post-trauma. Owners often stated the dog to “exaggerate” in relation to triggers, the emotional response being vast.

Most trigger reactions had gotten worse over time indicating fear conditioning failing to extinguish, causing pathological fear responses long after the trauma experience. This is a cardinal symptom in human PTSD, and the study results showed it to be just as relevant for dogs. This is thought to be a welfare concern of importance, since triggers can be present in the dog’s everyday life, repetitively emitting stress responses on a regular basis, without adequate time for recuperation, possibly putting the dogs in risk of fatigue syndrome, a phenomena being common in humans (Heim et al. 2005).

Active or passive **avoidance** of primary triggers was noted in 88% of the dogs, thus considered a fundamental symptom. The avoidance of secondary triggers, observed by owners in 23% of the cases, can seem more or less logical to us, nevertheless the emotional response being real to the dog. The author regards the development of reactions to secondary triggers to show that fear learning has been generalised, thus indicating an even greater severity of the disorder. Dogs who are triggered by seemingly unassociated cues (as secondary trigger may be to us), are likely to experience distress more often than dogs with fewer and more distinct and logic triggers. It is also likely that dog owners are more successful in safeguarding dogs from primary triggers, as they are most often, understandable and few. In some cases the responses seemed contextualised as no other signs of

distress other than avoidance were present in the dogs. More often an overall degeneration of the dog's mental health was noted by owners, in accordance to previous research on experimental neurosis (Tsuda and Hirai 1975).

98% of the dogs had, according to owners, gone through **negative alterations in cognitions and mood** post-trauma. Foremost an increase in stress related problematic behaviours was noted by owners, as well as the development of aggression, fear and anxiety induced behaviours. Passive coping strategies very less frequently observed by dog owners. In a few cases passivity and low key tendencies had developed, and some owners even suspected depression. It is probable that there is hidden statistics in regards of passive stress copers, as introvert behaviours such as a resigned body postures, licking of paws, cohesive breathing, hiding tendencies are more difficult to notice than extrovert output such as growls, barks and bites.

When interviewed, five dog owners stated their dogs to have become uninterested in previously enjoyed activities, an increase in withdrawal as well as an increase in submissiveness towards people and/or dogs. Long term stress may have affected the dogs overall mental health leading to a depression-like state decreasing joy of life in general. Untreated trauma is likely to generate a persistently overactive stress response, continuing to produce hormones and other physiological neurotransmitters accelerating pathophysiology. This could lead to a dysfunctional regulation of the mechanisms involved in maintaining homeostasis in the stress regulatory system (Mc Ewan 2002), this could explain the results as similar responses are found in humans and other animals as an effect of traumatisation.

In some cases the owner could not state a change in cognitions or mood since the dogs were traumatised very early or before coming into their care. However the dog's state of mind was clearly not a harmonic one, due to traumatisation or not is up for speculation. But these dogs had; severe startle responses, developed hyper-arousal, showed persistent avoidance of triggers, and had developed fear, aggression and/or other stress related behavioural problems. These dogs symptomatology indicated PTSD, even though the cause was unknown.

Alterations in arousal and reactivity were noted by all dog owners, and 80% of the dogs had exaggerated startle responses, according to the owners, thus considered another important expression of canine PTSD. Dog owners described their dogs to often display fear potentiated responses seemingly out of context as if in expectancy of another traumatic experience. According to owner these dogs acted as if their surroundings were no longer safe. These observations correspond to Kardiners (1941) description of PTSD patients. Nevertheless, passive stress coping should be taken into consideration, as results show that some owners experienced their dog to have become more low

key and numbed post-trauma. These findings may indicate that PTSD can impact the arousal level both by an increase or a decrease, noteworthy for future studies on canine as well as human PTSD.

When looking into alterations in arousal, behavioural symptoms indicating stress, are of importance. However, some of the questionnaires listed signs of stress, may imply more than just that. For instance stress and pain are both common reasons for panting (Light et al. 1993; Beerda et al. 1997) and paw licking (Beerda et al. 1997; Bufalari 2007). No professional pain assessment was carried out on these dogs. Canines with suspected disease or pain were excluded, however leaving the judgement in the hands of dog owners gives a margin of error.

In conclusion, the author finds the DSM-V to be a valid diagnostic tool for canine PTSD, when altered to fit the species in mind. Present-day it is difficult to draw conclusions on clinical factors involving; thoughts and memories, when assessing dogs, without risking anthropomorphism. Therefore, these parameters are advised to be excluded, making diagnosis more reliable.

6.2. The stressor

The questionnaire answers identified a variety of incidents leading to PTSD in dogs. In all cases the stressor was experienced directly and the character of the situation was likely to have been perceived as life threatening or as a potential risk of serious injury. Furthermore, the experiences could often be classified as uncontrollable and unpredictable to the dogs, and in many cases a loss of control could very well have been felt. For instance; being lured close only to be attacked and kicked by strangers, shut in a cage and accidentally run over by a car, subjected to strangulation by groomer disregarding submissive signals, pinned down by veterinarian resulting in expressions of learned helplessness by the dogs.

56% of the stressors involved interactions with humans, domineering being a fundamental issue, and often carried out by the dog owners themselves or by dog professionals. Since dogs are dependent on us for their care and survival one can argue that threat or injury inflicted by the dog owner, or with the dog owner as an observer, may result in more severe traumatisation, due to the state of dependence. As highlighted by Tuber et al. (1996) the companionship of family members is crucial for dogs to maintain normal behavioural and endocrine stress responses. Human literature also pinpoints increased severity and development of complex PTSD in children abused by a parent (McLeer et al. 1988).

Furthermore PTSD is more likely to develop if the incident takes place in an environment where the victim has a previous impression of being safe (Perloff 1983). The severity of traumatisation is increased when loss of control is present as argued by Weiss (1971). One can argue that if the dog

formerly felt in control and safe in the environment where the traumatic incident took place, strong feelings of loss of control can be the result when experiencing a severe stressor in that environment. This is likely to have been the case in car accidents, attacks in the home environment or neighbourhood, or the dog experiencing domestic fire.

In some cases the owners reported their dogs to have experienced multiple incidents after the initial traumatising incident, making it hard to draw conclusions on which experience led to the psychological distress presently observed by the owners, as it is difficult to eliminate possible affecting factors. The observed state of the dog's mental health is the consequence of the sum of all experienced, as recurrent fear conditioning is thought to enhance fear memory (Parson and Ressler 2013), therefore likely to worsen symptoms.

According to the authors previous experience there is lack of knowledge concerning what traumatises dogs, as owners put their dogs in traumatising situations without insight of the risk. The interviewed dog owners in this study support these previous observations, as they state how they could not foresee the severity of an experience as it happened, yet understood the gravity in hindsight when symptoms of vast distress became apparent. This finding is of great importance, as one way to minimise PTSD in dogs is to avoid and safeguard dogs from traumatising incidents. Furthermore, education and raising awareness is an important proactive tool when aiming to reduce PTSD among dogs.

The methodology used in this study, to gain information regarding stressor characteristics has its limitations. The answers given represents dog owner's retrospective retelling of incidents, in some cases many years had passed. Before and after studies with inflicted traumatising by standardised incidents, would give more precise results, however being totally unsuitable from an ethical point of view.

In future studies on canine PTSD, stressors should be investigated further, giving more detailed information regarding the characteristics of importance. For instance comparing severity of symptoms to stressor specificity is of interest. Van der Kolk (1987) argues that the degree of traumatising depends on; a) the psycho-biological maturation of the victim, b) the severity of the stressor, c) the presence of prior trauma, and d) the quality of social support (owners management and approach). These factors show how the individual's subjective perception is directly coupled to the severity and the likelihood of developing PTSD. These factors and their correlations to each other are of interest to study further. A deeper etiological comprehension of the disorder, as why some dogs become frightened and others become traumatised, is important knowledge when trying to minimise PTSD in dogs.

6.3. Sleep disturbance and gastrointestinal issues

44% of dog owners felt unsure if their dogs had changed their sleeping pattern post-trauma, a considerable quantity reducing the likelihood of valid assumptions. The noted uncertainty may be explained by sleep monitoring being unusual in everyday life with a dog. Thus pre-trauma perception of the dogs sleeping pattern is unattainable. Dog owners are more likely to oversee their dogs eating habits, temper, preferred activities, energy level and so forth.

However 11% noticed a marked change in their dog's sleeping pattern and 21 % of dog owners suspected their dogs to have developed nightmares post-trauma indicating that sleep disturbance as a symptoms of PTSD, may be of importance even in dogs. Dysregulation of the REM sleep control system seem to be a part of the pathogenesis of PTSD. Winson (1972) recognised that theta rhythm is observed in awake animals engaged in behaviours central for survival as well as during REM sleep. He argues that animals re-process information during sleep, which was experienced when awake (Winson 1993). The available data cannot provide a definite answer to whether PTSD dogs have intrusive nightmares due to traumatisation or not, but the results supports it to be the case. This study has limitations as results are based on dog owner's observations, and the risk of anthropomorphism should be taken into account. Further studies including sleep monitoring is of interest, to gain deeper knowledge of intrusion symptoms and re-experiencing in PTSD dogs.

Gastrointestinal health problems were noted in 35% of the dogs. Unfortunately, the question in the enquiry did not specify if the symptoms manifested post-trauma, therefore no conclusion can be drawn regarding a correlation. Human studies show connections between IBS and PTSD, the impact of overall stress on gastrointestinal health sheds further light on these findings (Cohen et al. 2006). Regarding dogs, further studies pre- and post-trauma is needed, as well as thorough veterinary examination to rule out physical illness as a cause, before correlations to PTSD can be made. The results would be of interest when considering optimal holistic treatment for these dogs.

In conclusion, the results of this study, suggest that traumatised dogs may develop psychological and physical symptoms similar to humans and the distress can therefore be argued likewise.

6.4. Attempted training and perceived effectiveness

Often more than one training method had been used to try to adjust the dog's problematic behaviour, making the assessment of individual methods difficult, as it is hard to evaluate which method affected the training process and results in relation to when the owner started to perceive the effect as effective or ineffective. One must take into account the level of knowledge among dog owners in Sweden regarding these training methods. According to the author, counterconditioning, positive punishment

and tattling are widespread methods whereas BAT, CAT and flooding may be less known. This may explain the difference in answer frequency per training methods, making the less known methods harder to evaluate via an enquiry study.

Moreover, the results are solely the owner's perceived effectiveness and thus not a standardised evaluation of the methods at hand. The training methods researched addressed extrovert behaviour, such as lunging at other dogs when on a walk. As this was often one of several symptoms the perceived effectiveness is not the effectiveness of the method as a treatment for PTSD, rather the effect on the extrovert output in focus, not the dog's entire mental health status.

Tattling and BAT gave the highest score of positive load. The concept behind the methods may explain the results, as changing an emotional state and therefore the dogs approach to triggers, is done via a process of conditioned emotional response and reinforcement of behaviours indicating relaxation. The dog's symptoms are viewed as signs of distress and the motivational forces behind the behaviours, being emotions, are taken into account. Furthermore tattling and BAT are constructional orientated, the training leading to new experiences, perhaps reinstating functions which have been lost due to traumatisation.

Tattling, scoring a positive load of 37, uses the dog's natural startle response, thereafter counterconditioning the emotion which caused a fear- or aggression induced output. There is also an active owner-dog interaction where the dogs hands over the situation and together they move away from the trigger. These methods is likely to give the dog a feeling of control as the trigger is reinforced as a safety cue, previously being perceived as the opposite. The dog may also experience a sense of protection from the owner, who takes over the situation as the dog returns to his/her owner after observing the trigger, a feeling likely to help reduce stress and anxiety responses in relation to triggers.

If aggression or fear induced behaviours such as escape or attack is an issue, one must take into consideration the possibilities of the behaviours' self-reinforcing capacity. Thus making sure that these dogs are trained below threshold level of reactivity would be optimal. For this reason BAT, scoring a positive load of 16, is likely to be effective, as perceived by 13% of dog owners, who experienced a relaxation in their dogs around triggers post BAT training. Dogs exposed to experimental neurosis display a deficit in learning to escape and actively avoid shock as a result (Overmier and Seligman 1967) thus BAT can be a constructive way to rehabilitate these dogs, as avoidance and to some extent escape is part of the reward when encountering triggers in a relaxed state. Regaining a lost function, such as escape, is what rehabilitation is all about.

Methods such as positive punishment and CAT focusing on the elimination of unwanted behaviours, were considered to be the least effective, even stated by dog owners, to have a bad effect. A possible

explanation is that positive punishment, scoring a negative load of -37, is likely to enforce more stress as fright and pain is re-associated to the trigger. Previous studies on dogs trained with the help of shock collars gives insight in how dogs develop or increase in stress and fear responses during training, in non-training situations as well as in neutral environment (Schilder and van der Borg 2004). The usage of positive punishment when dealing with canine PTSD symptoms risks re-traumatisation. Pain and threat will cause fear and is therefore not very likely to cure fear.

CAT, scoring a negative load of -10, may be counterproductive when used to train dogs with pathological anxiety, since it intermittently involves training the dog over threshold level for reactivity (Appendix 3). Exposure to a stressful experience is more likely to impair fear extinction (Akirav and Maroun 2007). One needs to understand the risk of re-traumatisation and always make sure the dog chooses to participate in the rehabilitation process. CAT may cause the dog to enter a highly emotional state, as re-experiencing is probable, a counterproductive state in terms of relearning or rehabilitation. When assessing CAT and positive punishment we do not know if the few owners who thought the methods effective, valued the dogs being quiet instead of barking, submissive instead of aggressive. As these methods tend to overload the dog's emotional state, passive coping or learned helplessness is likely, not solving the problem, solely interchanging the response.

Results concerning flooding, scoring a low negative load of -6, was expected to be lower. This since the idea of flooding, involving forced, prolonged exposure to a trigger, is that the dog will realise that there is no actual threats and associate this new experience to the trigger. PTSD dogs are not likely to benefit from this training since having a reduced susceptibility to extinction and due to the risk of re-traumatisation. Stress following traumatic experiences has even shown to enhance fear learning in rats (Long and Fanselow 2012). Moreover, post-traumatic reactions such as stress-enhanced fear learning (SEFL) has shown to be non-responsive to extinction treatments, even thought of as resistant to extinction (Long and Fanselow 2012). Furthermore Morganstern (1973) argued that there is no convincing evidence of the effectiveness of flooding and argued the method to be unethical, as learned helplessness rather than extinction, is a probable result. Aversive methods focusing solely on a blockade of unwanted behaviours, disregarding the motivational force behind the behaviours, are therefore likely to be ineffective at best, detrimental at worst (Hiby et al. 2004; Herron et al. 2008). The results may be explained by their only being four cases in which flooding had been used to try to alter the dog's behaviour, and we have no way of knowing if the training was carried out according to the standard mentioned above.

When analysing the results regarding training, one needs to take into account, that the dog owners may have a symptom based perspective. Neither can we be sure that owners carried out the training in accordance to standard. However, the results indicate methods perceived effective on extrovert

aggression in PTSD dogs are methods focusing on the dog's motivational force and emotional distress rather than the output. Only by changing the emotion can we alter the dogs approach and thereby change the behaviour.

A holistic perspective on PTSD dogs is emphasised by the author, as symptom based behavioural treatment alone will not lead to long lasting results. One needs to understand that PTSD treatment is much more complex than counter conditioning. Fear conditioning might explain the development of PTSD to some extent. PTSD being the only anxiety disorder to involve an explicit conditioning episode with the effect lasting for decades after the experience (van Elzaker et al. 2014). However this does not make counterconditioning the easy solution, due to the psycho-physiological changes PTSD dogs are likely to suffer from. People with PTSD show hyper-responsivity in brain regions controlling fear association and expression while, a hypo-reactivity manifests in regions controlling fear extinction and extinction recall. Fear development is speeded up and fails to turn off at the same time as deceleration is affected (Bremner et al. 2005). Sustained fear is evident since the ability to learn that a cue or context that used to signal threat no longer does, is impaired. The human literature theorises on failure to extinguish conditioned fear as a model of pathological anxiety (Eysenck 1979; Pitman and Orr 1986), as extinction learning is defect in PTSD sufferers and directly linked to the severity of the trauma (Milad et al. 2008, 2009).

It is more likely that new associations can be learnt, without the previous one being extinguished or forgotten, coming back to Dr Dodmans statement on how these dogs never forget (Dao 2011). A new association might not replace the old one, but a stronger one can reduce or neutralise it at best.

6.5. Use of punishment

In attempts to control or reduce extrovert expressions of distress, 61% of dog owners had punished their dogs. An alarming result, as similar treatment reoccurred as a cause for traumatisation. Even in cases when harsh handling had been the stressor initialising PTSD, dog owners nevertheless tried aversive methods in attempt to control the symptoms. Animal literature suggests that once traumatised the organism is sensitised to future traumatic experiences (Chemtob et al. 1988). Thus aversive methods are most likely to re-traumatise the dogs over and over again. Results show how some owners used punishment, perceived it effective, but at the same time stated that the dog had not improved but worsened over time. This might indicate the effectiveness of punishment as being short term and seemingly. The output is occluded as the motivation and stored stress is merely redirected.

Unawareness is a probable explanation to why multiple owners used punishment. The owners stated to have been instructed to punish the dog's behaviours foremost by neighbours, trainers and partners, unfortunate and highly questionable recommendations. According to Herron et al (2009)

confrontational methods, as to stare the dog down, beating the dog or intimidating the dog by domination such as alpha rolls, will not correct improper behaviour but elicits aggression. The data in this study cannot answer that follow up question why some people try to solve aggression with more aggression. An anthrozoological study would be of interest to investigate this issue further, as this is a common reason for traumatising and a huge misconception regarding how problematic behaviours in dogs should be dealt with. The long term consequence and effect on prognosis, when punishment is used, should be further looked into, to once and for all abolish this sort of dog training culture.

Future studies evaluating holistic treatments in contrast to symptom based training is of interest. Changes in physical and mental health status pre- and post-treatment/training (the dogs being their own control group), with measurable parameters directly emitted by the dogs is recommended. In humans psycho-physiological measures of the sympathetic nervous system often include measure of perspiration of the skin, heart rate, eye blink response when evaluating fear response or anticipated threat (Mauss and Robinson 2009). Further parameters being endocrine responses as persistent high cortisol levels and urine cortisol levels when exposed to triggers, could be of value.

Measurable is also the distance of avoidance when subjected to triggers, suppression ratio in relation to trigger (be observant on the different effects of passive and active stress coping in regards to suppression ratio), overall stress symptoms, decreasing of signs of distress, urinary oxytocin, improved sleep, reduction in startle responses, increased signs of relaxation and improved self-esteem and courage can be valid measurements of interest. Evaluating the effect of treatment is of importance to make sure the dog is healed and not hardened.

When researching canine PTSD, what causes it, and how it shows one needs to understand the difference between a set of questions in a questionnaire and real life. In the name of science we try to standardise incidents and frame causes to measure the different criteria's impact on one another, to find correlations. In real life, the affecting parameters are far more than an enquiry study can grasp, especially in regards of retrospective research. Relevant information can be lost, regarding how individual dogs handle frightening experience, how personality, upbringing, training, genetics and pre-existing memory network influences the dogs receptivity to stressors, as well as the owners management of the dog and the symptoms that follow trauma and so forth. It is probable that all these and more factors interact and determine if a dog will become traumatised or not by an experience, and if so, the severity of the disorder.

6.6. Practical implications

There is little research done on canine PTSD in general, even less is on the rehabilitation these dogs

are in great need of. The practical implications and recommendations below are based on the study results and influenced by the author's (certified dog psychologist) 12 year work experience, with expertise in rehabilitation of PTSD dogs. Further studies validating these recommendations would be of great value.

The author recommends the diagnostic tool to be used by dog psychologist, behaviourists and other canine professionals, as an adequate diagnosis can distinguish PTSD from general fear and aggression. Etiological knowledge is often crucial when setting up a therapeutic treatment plan for dogs. Correct diagnosis, adequate treatment and raised awareness are key components when trying to reduce canine PTSD and improve the welfare of these dogs.

As to trigger training, it is common that dogs associate an aversive incident with a context, rather than a distinct cue (Van Elzakker et. al. 2014). In this study, this can be seen as dogs seem to have made a generalisation of the surroundings, sounds, smells, visual environment when experiencing a traumatic incident, the result being the response to or avoidance of secondary triggers. Pitman et al. (1993) explained how the critical issue in PTSD is that the trigger does not have to be directly conditional, a number of triggers, not directly associated to the trauma can precipitate extreme agitation. This explains why a dog brutally attacked on his morning walk subsequently tries to avoid going out in the morning, fears the attacker as well as people in general and becomes agitated by birdsong and sidewalks.

When rehabilitating these dogs, the issue can be address trigger by trigger using tattling, BAT or counter conditioning. Therapy should be initiated with secondary triggers remotely coupled to the experienced incident. The dogs' progress may also benefit by training session being conducted in an environmental set up unlike the environment in which the trauma took place. Successively adding environmental components, making the setup resemble that of the traumatising incident.

Regarding training aimed to reduce lunging, the author recommends the reward to be delivered so the dog is positioned on the opposite side of the handler in relation to the trigger. The handler becoming a safety barrier showing the dog that the handler deals with the trigger if necessary. This is done to signify who is the defender if an encounter with the trigger is unavoidable. This does not tend to reinforce the dog's agitation, it already being a fact, instead it seems to reduce worry. PTSD dogs are likely to benefit from a sense of safeguard and protection especially during initial stages of rehabilitation, since regaining control, predictability and a feeling of safety, is of great value for PTSD canines (authors previous and unpublished observations).

Another perspective of importance when training these dogs may be to make the previously unpredictable shock, predictable. Re-establishing the control once lost. This can be done via a cue

forewarning the presence of a trigger, for instance repeating “there is a dog coming our way” to a dog previously attacked by a dog, every time another dog is in sight. This is a backward conditioning procedure. People with PTSD often disregard safety cues and feel fear despite of their presence (Peri et al. 2000; Jovanovic 2012), regaining trust in these signals is therefore a probable part of the solution.

Furthermore, if the dog gains access to activate the emission of the safety cue, more control is likely to be felt. One way to do this is to teach dogs, for example scared of loud noises, to first associate a US (unconditioned stimulus) to the CS (conditioned stimulus) = loud noise, emitted fear being the CR (conditioned response) triggered by loud noise. The CR is in turn associated to a reward according to the theory of counter conditioning. Thereafter the dogs in taught to activate to US, the training becoming based on the dog’s intrinsic motivation to gain access to the reward by activating the US, knowing the emission of the noise will be the result.

In practice, teaching a dog to press a red lever emitting a trigger (if working with the sound of firework, the sound is initially muffled to minimise risk of re-traumatisation). When the lever is pressed the sound is emitted and the dog gains a reward and counter conditioning takes place. If the lever turns green, trigger is never set off, re-establishing a safety cue. This form of training gives a clear picture of how and if the dogs chooses to experience the trigger, often done when the motivation for reward overcomes the fear of the trigger. This sort of training is likely to lower the emotional intensity around the trigger as predictability, control and counter conditioning is intertwined. Controllability being a crucial determinant of habituation of fear when dealing with strong shock (Foa et al. 1992).

According to the authors previous unpublished observations, for training to be effective the dogs needs to be receptive, severe PTSD may inhibit learning even making training counterproductive. General PTSD symptoms and the dogs overall mental health often needs to be addressed prior trigger training. Adequate treatment with a holistic approach is encouraged, were physical and psychological health is looked upon as one. This as indications on how sleep, gastrointestinal health and PTSD can be correlated. In regards of humans, Ross et al. (2013) stated “*Clinicians need to consider that the chronic sleep disruption associated with nightmares may affect the efficacy of first-line PTSD treatments, but targeted sleep treatments may accelerate recovery from PTSD.*” Even in dogs the lack of sleep is most likely to further burden the dog and aggravate rehabilitation if not taken into consideration. If the dog's gastrointestinal health is affected and nutrient uptake is reduced, a new diet may be favourable just as food supplements aimed to reduce stress and improve energy levels may improve dogs in the risk zone of fatigue syndrome.

Likewise physiotherapy may be of importance if muscular tensions are presents as a result of persistent strained body postures. In future studies on canine PTSD collaboration with veterinarians and dog physiotherapists is advised. In particular to exclude pain as a reason for PTSD like symptoms or to spot pain as a result of PTSD. There may be a correlation between fear and aggression postures becoming rigid and persistent in these dogs, resulting in muscular tensions caused by psychological strain. This theory is of interest for future studies to gain a deeper and holistic perspective on canine PTSD to optimise adequate therapy for these dogs.

7. Conclusions

This study concludes that the DSM-Vs criteria for PTSD are of value when diagnosing the disorder in dogs, when adjusted to fit the species in mind. In this way the tool helps to differentiate between overall problematic behaviours and PTSD. Further studies are needed to further validate the diagnostic tool.

Symptoms of importance include increased arousal in form of increased reactivity, vigilance, self-destructive behaviour, sleep disturbance and fear induced behaviours such as startle responses. PTSD canines show signs of re-experiencing as reactions to primary and secondary triggers. Persistent avoidance is noted in the form of trigger avoidance and withdrawal. An overall change in mood is observed in PTSD dogs as an increase in aggressive behaviour, fear induced behaviours, increase in general stress symptoms and even development of depression. Both active and passive coping strategies were detected.

Recurring stressors leading to PTSD in dogs was noticed, the common denominator being humans; harsh handling, beating and domineering (by people within the dog's family, acquaintances as well as dog officials). Other common experiences leading to PTSD were accidents, experience of fireworks, dog attacks as well as neglectful living conditions.

Furthermore there may be a correlation between canine PTSD and gastrointestinal issues such as diarrhoea, constipation, vomiting and gastric catarrh. This study identified a marked change in sleeping pattern in some of the dogs, this may indicate the development of sleep disturbance and to some extend nightmares post-trauma.

Further pathopsychological studies are necessary preferably with physiological parameters in combination with behavioural analysis conducted by ethologists and dog psychologists or dog behaviourist. A close collaboration between ethologist, professional clinicians, veterinarians and physiotherapists is recommended, to gain a holistic perspective on a subject in need of a broader view.

Regarding training methods dog owners seemed to perceived tattling and BAT most effective or very

effective. Methods such as positive punishment and CAT seemed to be perceived as ineffective or having a bad effect. The use of punishment to control or reduce symptoms of trauma such as aggression was alarming and strongly advised against when dealing with dogs in general, PTSD dogs especially.

Individually customised, holistic oriented, treatment plans are most effective according to the author. However, becoming completely symptom free may not be a realistic goal. Dogs as us, are a sum of their experiences and memories, some being harder than others to forget.

Summary in Swedish

PTSD hos hund - en enkätstudie om psykiskt trauma hos hund

Posttraumatiskt stressyndrom (PTSD) hos hund är ett ämne i behov av vetenskaplig uppmärksamhet då trauma som orsak till aggression och rädsla hos hund är vanligt. Diagnosen är i dagsläget sparsamt tillämpad vid utredning och beteendeterapeutisk behandling av hundar. Dock är risken vid feldiagnostisering att hundar utsätts för inadekvat behandling som riskerar att förvärra prognos och symptom. Detta kan i sin tur resultera i än mer lidande. Ökad kunskap om bakomliggande orsaker till aggression och rädsla, samt ett relevant diagnostiseringsverktyg för PTSD är av stor vikt för angripa problemet. Syftet med denna studie var att undersöka PTSD hos hund, ringa in relevanta psykiska symptom, undersöka förekomsten av fysiska symptom och se över möjligheten att kliniskt diagnostisera PTSD hos hund. Av intresse var även att hitta gemensamma nämnare inom de händelser som traumatiserat hundarna. Allt för att bidra till reducering av ett allvarligt syndrom med psykiska så väl som fysiska hälsoskadliga konsekvenser.

Fenomenet PTSD är välkänt hos människa och studier visar att även övriga djur kan utveckla PTSD efter att ha upplevt en allvarlig stressor. Denna studie undersökte DSM-V (Diagnostic and Statistical Manual of Mental Disorder, 5e utgåvan av American Psychiatric Association) som riktlinje vid diagnostisering. Redskapet anpassades till arten genom att kriterier innefattande tankar och minnesbilder togs bort, då vi i dagsläget inte kan bevisa förekomsten av dessa hos hund. De händelser som initierat utvecklingen av PTSD undersöktes, samt förekomsten av rubbad sömn och mag- och matsmältningsproblem, då det visat sig vara vanliga bieffekter hos människor som lider av PTSD. Vidare studerades hundägares uppfattning om olika träningsmetoders effekt på hundarnas utlopp samt nyttjandet av bestraffning.

Data samlades in via ett frågeformulär, av 78 inkomna enkätsvar uppfyllde 57 fall kriterierna för diagnosen PTSD. Dessa hundägare redogjorde för hur deras hundar upplevt en grav stressor, en händelse som mycket väl kan ha upplevts som en livsfara. Därefter har de enligt ägarna utvecklat symptom som enkäten bekräftade var PTSD indikationer. Symptom såsom ökad vaksamhet och reaktivitet, skyggande, självdestruktiva beteenden, stress- och ångestrelaterade beteenden, rädsla och aggression, reaktion på och undvikande av triggers, nedstämdhet och oro påträffades. Både aktiv och passiv stresshantering noterades. Dessa symptom överensstämmer med viktiga kriterier för PTSD hos människa, enligt DSM-V. Återkommande orsaker till traumatisering och därmed utvecklandet av PTSD hos hund var hårdhänt hantering och dominansbaserad hundhållning eller träning, misshandel eller vanvård. Att attackeras av en annan hund (inom eller utom familjen), olyckor och upplevelser av fyrverkerier var även vanliga orsaker.

Gällande träning ansåg hundägare att skvallerträning och BAT var effektiva respektive väldigt effektiva. Metoder såsom positiv bestraffning och CAT ansågs ineffektiva samt att ha dålig effekt. Vi fann även att bestraffning användes i försök att kontrollera utåtagerande beteenden såsom aggressions- eller rädsloinducerade utfall. Förekomsten är alarmerande då aversiva metoder bör undvikas i relation till hundar i allmänhet, vid hantering av PTSD hundar i synnerhet. Eftersom en återkommande orsak till traumatisering är just hårdhänt hantering och dominerande, kommer detta förhållningssätt riskera åter-traumatisering och är därmed troligt att förvärra symptombilden och öka lidandet hos hunden.

Av djurvälferds-skäl är det av stor vikt att belysa ämnet, då PTSD-hundars lidande är omfattande och i många fall enkelt att förebygga. En viktig faktor i förekommande åtgärder är att sprida kunskap om hundars känsloliv och effekten av psykiskt trauma. Därutöver behöver hund-yrkesverksamma adekvata, etiska och moderna redskap att hantera hundar i allmänhet, aggressiva och rädda hundar i synnerhet. Vidare behöver hundpsykologer ett konkret diagnostiskt redskap för PTSD hos hund samt holistiska och orsaksorienterade rehabiliteringsåtgärder för dessa hundar.

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Appendix 1

DSM-Vs criteria for PTSD

From the American Psychiatric Association. (2013) Diagnostic and statistical manual of mental s, (5th ed.). Washington, DC: Author.

Criterion A: stressor

The person was exposed to: death, threatened death, actual or threatened serious injury, or actual or threatened sexual violence, as follows: (one required)

1. Direct exposure.
2. Witnessing, in person.
3. Indirectly, by learning that a close relative or close friend was exposed to trauma. If the event involved actual or threatened death, it must have been violent or accidental.
4. Repeated or extreme indirect exposure to aversive details of the event(s), usually in the course of professional duties (e.g., first responders, collecting body parts; professionals repeatedly exposed to details of child abuse). This does not include indirect non-professional exposure through electronic media, television, movies, or pictures.

Criterion B: intrusion symptoms

The traumatic event is persistently re-experienced in the following way(s): (one required)

1. Recurrent, involuntary, and intrusive memories. Note: Children older than six may express this symptom in repetitive play.
2. Traumatic nightmares. Note: Children may have frightening dreams without content related to the trauma(s).
3. Dissociative reactions (e.g., flashbacks) which may occur on a continuum from brief episodes to complete loss of consciousness. Note: Children may re-enact the event in play.
4. Intense or prolonged distress after exposure to traumatic reminders.
5. Marked physiologic reactivity after exposure to trauma-related stimuli.

Criterion C: avoidance

Persistent avoidance of distressing trauma-related stimuli after the event: (one required)

1. Trauma-related thoughts or feelings.
2. Trauma-related external reminders (e.g., people, places, conversations, activities, objects, or situations).

Criterion D: negative alterations in cognitions and mood

Negative alterations in cognitions and mood that began or worsened after the traumatic event: (two required)

1. Inability to recall key features of the traumatic event (usually dissociative amnesia; not due to head injury, alcohol, or drugs).
2. Persistent (and often distorted) negative beliefs and expectations about oneself or the world (e.g., "I am bad," "The world is completely dangerous").
3. Persistent distorted blame of self or others for causing the traumatic event or for resulting consequences.
4. Persistent negative trauma-related emotions (e.g., fear, horror, anger, guilt, or shame).
5. Markedly diminished interest in (pre-traumatic) significant activities.
6. Feeling alienated from others (e.g., detachment or estrangement).
7. Constricted affect: persistent inability to experience positive emotions.

Criterion E: alterations in arousal and reactivity

Trauma-related alterations in arousal and reactivity that began or worsened after the traumatic event: (two required)

1. Irritable or aggressive behavior
2. Self-destructive or reckless behavior
3. Hypervigilance
4. Exaggerated startle response
5. Problems in concentration
6. Sleep disturbance

Criterion F: duration

Persistence of symptoms (in Criteria B, C, D, and E) for more than one month.

Criterion G: functional significance

Significant symptom-related distress or functional impairment (e.g., social, occupational).

Criterion H: exclusion

Disturbance is not due to medication, substance use, or other illness.

Specify if: With dissociative symptoms.

In addition to meeting criteria for diagnosis, an individual experiences high levels of either of the following in reaction to trauma-related stimuli:

1. Depersonalization: experience of being an outside observer of or detached from oneself (e.g., feeling as if "this is not happening to me" or one were in a dream).
2. Derealization: experience of unreality, distance, or distortion (e.g., "things are not real").

Specify if: With delayed expression.

Full diagnosis is not met until at least six months after the trauma(s), although onset of symptoms may occur immediately.

Appendix 2

The inquiry

Thank you for your commitment and participation in this study!

Please fill in the questionnaire below. It contains 65 questions and will take you approximately 40 minutes to go through.

- State your dog's behaviour and well-being the three last month if nothing else is stated.
- State month and year, when information regarding time is asked for.
- Questions you do not have answers to you leave blank.
- Answer truthfully. If unsure do not answer

GLOSSARY

You will come across vocabulary such as:

Traumatic event: referring to when an individual experiences one or more situations that are overwhelming and perceived impossible to effect and constitutes a vast psychological stress for the individual. This can be a singular incident or repeated happenings.

Psychological trauma: a psychological harm affecting one who has experienced a traumatic event interpreting it as an uncontrollable crisis. The emotional distress is too vast for the individual to recover on its own.

Event: refers to the event that traumatised the dog

Trigger: a stimuli generating an emotional distress. In this sense coupled to the memory of the trauma. For example the sound of fireworks creating distress in a dog traumatised by fireworks. The sound triggers the fear.

QUESTIONS

- 1) Your name
- 1:2) Are you male/female
- 2) Your civic number
- 3) Your phone number
- 4) Your email address
- 5) The dog's name
- 6) The dog's date of birth (year and month)
- 7) The dog's gender, male/bitch
- 8) Is your dog hormonally altered?
 - No
 - Neutered
 - Hormone microchip (such as suprelorin)

- Chemical castration (hormone injection)
- 9) When was the dog hormonally altered? (month and year)
- 10) The dog's breed or breeds?
- 11) What do you believe has traumatised your dog? Describe the incident.
- 12) When did this happen? (month, year)
- 13) When, post the event, did you experience changes in your dog? (month, year) And in what ways?
- 14) If you experienced a change in your dog's mood post trauma, describe it.
- 15:1) Do you believe that your dog's dreams nightmares? Yes No Unsure Other
- 15:2) If other, describe
- 15:3) If you believe your dog to have nightmares, how do you notice this? And how often do you think your dog has these nightmares?
- 16) Do you think your dog over reacts in some/many situations? If yes, describe how.
- 17:1) Is there anything your dog avoids after the event? (situations, environments, people, things)
Yes No Unsure Other
- 17:2) If yes describe what and how your dog reacts
- 18:1) Does your dog show any signs of aggression after the event?
Yes No Unsure Other
- 18:3) If so, towards what/who and in what situations?
- 18:4) Describe your dog's behaviour in these situations (posture, vocalisation, actions etc.)
- 19:1) Does your dog show any signs of fear after the event? Yes No Unsure Other
- 19:2) If so, what is your dog scared of and in which situations does this show?
- 19:3) Describe your dog's behaviour in these situations?
(posture, vocalisation, actions etc.)
- 20) Do you consider your dog being more stressed (in general) after than before the event?
Yes No Unsure Other
- 21) Do you consider your dog as more insecure (in general) after than before the event?
Yes No Unsure Other
- 22:1) Has your dog changed his/her sleeping pattern after the event?
Yes No Unsure Other
- 22:2) If yes, in what way?
- 23:1) How would you grade your dog's vigilance (in general) the time before the event?
1,2,3,4,5,6,7,8,9,10 1=low, 5=average, 10=high
- 23:2) How would you grade your dog's vigilance (in general) the time after the event?
1,2,3,4,5,6,7,8,9,10 1=low, 5=average, 10=high
- 24:1) How would you grade your dog's reactivity (in general) the time before the event?

1,2,3,4,5,6,7,8,9,10 1=low, 5=average, 10=high

24:2) How would you grade your dog's reactivity (in general) the time after the event?

1,2,3,4,5,6,7,8,9,10 1=low, 5=average, 10=high

25) How many hours of sleep does your dog get per day and night? (this involves sleep, not rest)

<4 hours 13-15 hr

4-6 hr 16-18 hr

7-9 hr 19-21 hr

10-12 hr >21 hr

26) Describe your dog's physical health, any history of disease or injury?

27:1) Does your dog suffer from stomach issues? (diarrhea, constipation, bloated stomach, undigested foods in faeces or other digestion problems)

Yes No Unsure Other

27:2) If yes, describe your dog's stomach issue?

28) How would you grade your dog's level of energy?

- Low key - Pendulating between low key and hyperactive

- Normal considering breed and age - Other

- Hyper active

29:1) Has your dog's level of energy changed since the event?

Yes No Unsure Other

29:3) If yes, grade the change.

1,2,3,4,5,6,7,8,9,10 1=low, 5=average, 10=high

30) Are there any obvious stimuli that seem to remind your dogs of the traumatic event and triggers stress? Describe. (It can be people, objects, environments etc.)

31) When did you first notice the symptoms you consider to be caused by the traumatic event? (month, year)

32:1) Can you find your dog to be numb, staring out into space? (this can be perceived as mentally blocked, hard to reach) Yes No Unsure Other

32:3) If yes, in which situations does this happen?

32:4) How often does it happen?

33) What has previously been done to solve your dog's problems?

34) Of the attempted treatments/training, what has rectified the symptoms, and what has had no effect?

35) Of the attempted treatments/training, has anything worsened the symptoms or helped momentarily?

36) Grade your dog's stress tendency before the event

1,2,3,4,5,6,7,8,9,10

1= my dog is calm and collected in most situations

5= my dogs gets worked up in situations that are stressful, but is calm in general

10= my dog gets stress easily and has difficulties winding down

37:1) Does your dog exhibit any of the following:

The behaviours can be elicited in specific situations or in general. Choose the behaviours your dog show, regardless of the extent.

- has difficulties winding down indoors
- has difficulties winding down outdoors
- blocks out, dissociate
- stiffens up easily and freezes
- has a compressed and constrained posture
- shakes a lot
- itches a lot
- urinates and/or defecates indoors
- is self-destructive (bites, gnaws, licks, pulls fur)
- destroys furniture, objects
- holds ears pinned back often
- licks his/her mouth or nose often
- has diarrhea often
- has a bad appetite
- is avoidant
- trembles a lot
- shows aggression
- whines a lot
- bark and/or howls a lot
- chases shadows
- chases sunspots
- chases his/her tail
- licks his/her paws a lot
- sheds fur often
- has dandruff
- yawns a lot
- pants a lot

37:2) Do you wish to explain or add something in regards of the questions above.

38:1) Does you dog have other behavioural problem or divergent behaviour noticed post-traumatic event?

38:2) Did your dog have any behavioural problems before the traumatic event? Specify what kind.

39) Are you the dogs first owner? Yes No

40) If your dogs is a rescue dog or has been re-homed into your care, when did you take over the dog? (Month and year)

41:1) Do you think your dog is easily frightened? Yes No Unsure Other

41:2) If other, describe

42) How much exercise does your dog get per day?

(exercise meaning an outdoor activity aiming to activate the dog physically, walks in addition to short pee and poop rounds)

- 5-30 minutes

- 35-55 min

- 1-2 hours

- 3,5-4 hours

- 2,5-3 hours

- > 4 hours

43:1) Does your dog get any sort of mental activation? Yes No Unsure Other

43:2) If others, describe.

43:2) If yes, what sort and how often and for how long? Describe.

44) Do you think that your dog's issues have become better or worse over time? Describe what you think can have improved or worsened the dog's problems.

45:1) Have you tried to solve your dog's problems using counter conditioning?

(a training method were you associate triggers with something rewarding. The aim is to change the dog's feelings in relation to triggers). Yes No Unsure Other

45:2) State your perception of the effect of counter conditioning.

1,2,3,4,5,6,7,8,9,10 1= bad effect, 5= no effect, 10= very effective

46:1) Have your tried to punish the dog's behavioural problems?

(have you used an aversive methods, physical or psychological to try to control or stop the problematic behaviour) Yes No Unsure Other

46:2) If yes, describe in what way.

46:3) Grade your perception of the effect of punishment.

1,2,3,4,5,6,7,8,9,10 1=bad effect, 5= no effect, 10= very effective

47:1) If your dogs, as an effect of the event, has developed fear or aggression towards dogs, have you tried "tattling"?

(the dog is trained to ta contact with you when spotting another dog)

My dog has no such problems Yes No Unsure Other

47:2) Grade your perception of the effects of tattling

1,2,3,4,5,6,7,8,9,10 1= bad effect, 5= no effect, 10= very effective

48:1) If your dogs, as an effect of the event, has developed fear or aggression towards dogs, have you tried Behavioural Adjustment Training (BAT)? (the dog experiences how the exhibition of neutral or calm signals are reinforced by an increased distance to the other dog)

My dog has no such problems Yes No Unsure Other

48:3) Grade your perceived effect of BAT?

1,2,3,4,5,6,7,8,9,10 1= bad effect, 5= no effect, 10= very effective

49:1)If your dog as an effect of the event, has developed fear or aggression toward dogs, have you tried Constructional Aggression Treatment (CAT)?

(the dogs is subjected to a dog and fear or aggression is elicited, when the behaviour ends the dogs is reinforced by an increase of distance to the other dog)

My dog has no such problems Yes No Unsure Other

49:2) Grade your perceived effect of CAT?

1,2,3,4,5,6,7,8,9,10 1= bad effect, 5= no effect, 10= very effective

50:1) Have you tried to solve the problem using corrections of any kind?

(any aversion to try to diverge the dog's behaviour) Yes No Unsure Other

50:2) If yes, describe how.

50:2) If yes, grade you perceived effect of correction training.

1,2,3,4,5,6,7,8,9,10 1= bad effect, 5= no effect, 10= very effective

51:1) Have you treated your dog with homoeopathic remedies to try to solve your dog's issues?

Yes No Unsure Other

51:2) If yes, with what sort and what dosage and potencies? What effect did you experience?

52:1) Has your dog's been treated with any other natural remedies to solve the dog's issues?

Yes No Unsure Other

52:3) If yes, what sort and which dosage and potencies? What effect did you experience?

53:1) Has your dog been treated with any veterinary medicines?

Yes No Unsure Other

53:3) If yes, what sort and which dosage and potencies? What effect did you experience?

54) Is your dog currently on any medication? (veterinary medicine or natural remedies)

Yes No In periods Unsure Other

55:1) Does your dog perform any sort of activity including balancing exercises? (such as dog parkour, balancing on tree trunk, benches, agility etc.)

Yes No Unsure Other

55:3) If yes, how often? Daily basis Weekly Once a week A few times a month

56) Do you consider your dog to be quiet or to bark a lot?

- | | |
|----------------------|---|
| - Never barks | - Barks only with apparent purpose (to alarm, guard, communicate) |
| - Barks seldom | |
| - Quiet | - Barks a lot |
| - Barks occasionally | |

57) Does your dog appreciate games of tug and war with you or anyone else?

(pulling and yanking on a toy or other object with you as counter force)

Never Seldom Occasionally Often Always

58:1) Is there any situations you avoid due to your dog's problems?

Yes No Unsure Other

58:2) If yes, describe which scenarios?

59:1) Have you or anybody else used one or more of the methods below on your dog?

- Grabbing the dog's cheeks, staring into dog's eyes and verbal scolding

- Grabbing/yanking/shaking dog by the scruff of the neck
- Pressing the dogs down towards the ground/floor
- Alpha role
- Hit
- Kick
- Whip
- Twist/pull ear
- Grab/pull on tail
- Yank on lead
- Lifting dog of the ground by collar
- Pressing the dogs head to the ground/floor
- Scolding until submissive
- Social isolation
- Thrown dog to the ground/floor
- Pushed dog away
- Locked away
- Shouted at
- Laid on top of
- Grabbed by the nasal bridge
- Use of bark control collar
- Use of prong collar
- Ignored the dog
- Choked with chain or rope
- Thrown water at
- Thrown a chain at
- Thrown rattling cans at
- Growled at
- Poked
- Pinched

59:2) When was the above carried out:

- before the event
- after the event
- independent of the event
- other

59:3) Who carried out the methods mentioned above?

(do not state name, state relation to you/your dog for example: my partner, neighbour, our dog trainer etc.)

60:1) Does your dog's behaviour vary depending on who is present, holds the lead?

(for example; does your dog lurch towards other dogs when on walks with you partner but not with your daughter) Yes No Other

60:2) If yes/other, describe the change in your dog's behaviour dependent on who is present.

61:1) Have you tried flooding to treat your dog's behavioural problems?

(a form of therapy where the dog is subjected to stress/fear/aggression triggers to great extent, the aim is to reach behaviour extinction) Yes No Other

61:2) If yes, how was the training conducted, describe.

61:3) If yes, grade you perceived effect of the flooding.

1,2,3,4,5,6,7,8,9,10 1= bad effect, 5= no effect, 10= very effective

62:1) Does the dogs live together with other dogs? Yes No Other

62:2) If yes, how many?

62:3) Do you believe that the other dog/dogs in the family have been affected by your dog's problem?

63:1) Do you believe your dog to suffer from the current situation?

Yes No Unsure Other

63:2) If other, describe.

64) How often is your dog trauma triggered?

(how often do you believe your dog to be reminded/triggered of the traumatic event causing stress, fear, aggression, worry and so forth)

- daily

- occasionally/monthly

- many times a day

- many times a month

- occasionally/weekly

- seldom

- many times per week

- never

65) Other: feel free to inform us of anything else you feel can be of importance

Thank you for your participation and time!

You have contributed to the development of knowledge in the field of canine psychology.

Appendix 3

Description of training methods

Counter conditioning: a training technique aimed to change the response to a stimuli. In the case of dogs emotional rehabilitation a bad or unpleasant emotional response to a stimulus is attempted to be replaced with a more pleasant, adaptive response (Pearce and Dickinson 1975). This can result in changing an unwanted behavioural response to a stimulus into a wanted behaviour or response. The trigger (for instance a dog) is introduced at a sub-threshold level and classically condition the sight of the dog with a desired treat (if eating the treat emits a feeling of pleasure for the dog being trained). If the sight of a dog makes our dog growl, the growl being the unwanted response, counterconditioning can result in a calm state with the decoy dog still in sight. The emotional state behind the growl is replaced with a new feeling, perhaps a feeling of positive anticipation. This process is called conditioned emotional response (Pearce and Dickinson 1975).

BAT: Behavior Adjustment Training was first introduced in 2009 by Grisha Stewart, and uses systematic desensitisation together with a functional reward such as moving away from the triggering decoy dog when the trained dog displays calm behaviour. Again the dog is made aware of his/hers coping strategies and functional rewards is key. The functional rewards is more often a removal of the dog being trained instead of the removal of the decoy dog. In comparison to CAT, BAT advises you to stay sub-threshold-level (Figure 1) at all times to create an emotionally safe interaction with minimal intrusion. The absence of distress is a critical component to BAT.

If the dog becomes reactive the training is aborted by taking the trained dog out of the environment or by removing the triggering dog. When training according to BAT you start the training session at such a distance that your dog can not see the decoy dog, the training environment chosen should inspire the dog to explore the surroundings, the dog handler moves forward preferably by following the dogs

illustrated by Lili Chin for the book "Behavior Adjustment Training". Copyright Grisha Stewart

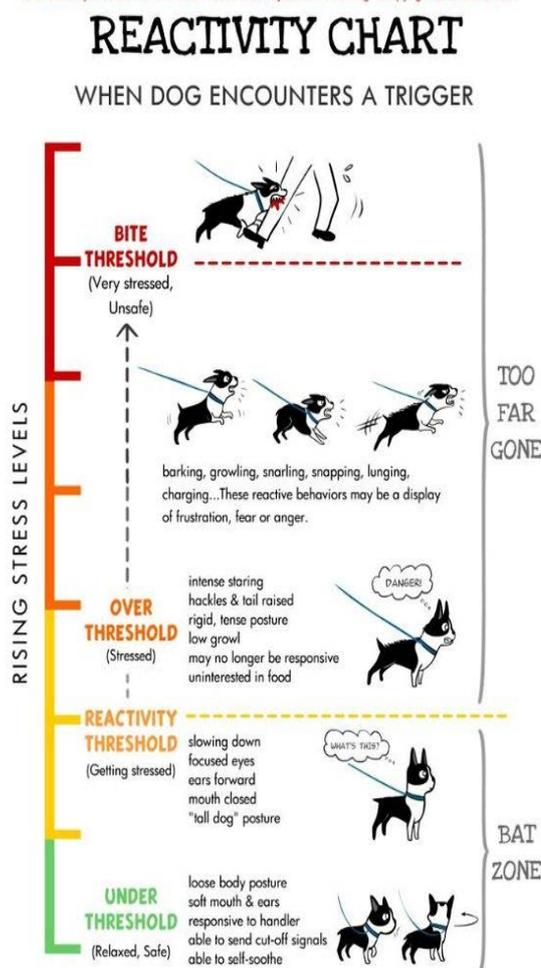


Figure 1. Dog reactivity chart by Grisha Stewart

initiatives to roam the grounds (Stewart 2016). This is done until the trained dog sees the decoy dog and mildly reacts to it. As soon as the trained dogs shows calm body language such as looking away, leaning back, lowering tail to neutral position, sniffing the ground and so forth the dog is rewarded by being encouraged to move away from the trigger (Stewart 2016). Setting of a sense of relief, and control over the exposure of the trigger. BAT also uses desensitisation to advance training results by making the environment successively more challenging to desensitise the dogs gradually. The trainers main focus is on assessing the dog's behaviour and stress level, striving to minimise it. Grisha Stewart revised the techniques in 2014, for current information on B.A.T. see the second edition of the published book (Stewart 2016). BAT is all about giving the dog control over the situation a key component in PTSD rehabilitation. It is not just about marking and reinforcing social behaviour but also about arranging the context and training environment so that the dog is inspired to explore and revise his or her perspective and alter the emotional state of conflict into one based on a sense of regained security.

CAT: Constructional Aggression Treatment was first presented in 2007 by Dr. Jesus Rosales-Ruiz and Kellie Snider, M.S. at the University of North Texas. The training is a form of operant conditioning as the dog needs to act to gain a reward, and is therefore thought to be made aware of his/her strategies. How the dog tries to resolve the perceived conflict is key in the this type of training. It is all about functional rewards, the trigger is removed when the dogs chooses to handle the situation in a new and improved way.

The dog's aggressive behaviour stops being reinforced as the trigger stays in place if aggressive behaviour or tendencies such as; intensified breathing, erect ears and stiff highly held tail, stiffening of the body, intense eyeing are displayed (Ruiz and Schnider 2007). If the trained dog reaches reactivity-threshold-level (Figure 1) training is not aborted, instead the dog is continuously exposed to the trigger until an alternative behaviour is displayed (such as sniffing the ground, looking away, shifting his/her weight back). If aggressive behaviour or arousal increase as the triggering dog walks away the decoy dog will turn back and stop at the last practicable distance from the trained dog and again a shift in behaviour is awaited (Ruiz and Schnider 2007). The goal is however to keep the trained dog at lowest level of arousal possible. Preferably aggression is prevented by rewarding desired behaviour (like relaxation) before reactivity occurs.

Tattling: A training method introduced by Eva Bodfäldt, in 1998 based on operant conditioning and the dogs spontaneous tendency to startle and stop when a trigger is in sight (Bodfäldt 2011). Counter conditioning is the initial stage of training changing the dog's emotional state of mind in relation to the trigger. Thus resulting in an expectancy of a reward when a trigger is seen. Stage two uses this expectancy behaviour by reinforcing the dogs inclination to return to his/her handler for a reward

(Bodfäldt 2011). Additionally one can increase the distance between the trained dog and the trigger by rewarding away from the trigger or by one's side Bodfäldt E (personal communication 2017-4-29).

Trigger = dog turns away from trigger = the handler turns around & walks off together with the dog

The cue for tattling can be another dog, a sound, a car and so forth. The criteria for reinforcement is when the trained dog turns away from the trigger. Tattling dogs keeps an eye on his/her surroundings and tattles on triggers. When training fearful/aggressive dogs, stage one, is important to fortify before attempting stage two.

Flooding: The purpose of flooding is to change a certain behaviour in a given situation. The dog is for instance exposed to a trigger at a close proximity over-threshold-level and during a long exposure time (Morganstern 1973). The idea is that the dog will realise that there is no actual threat and couple this new experience to the given situation/trigger. A change in response to the stimuli is expected. For example: a dog scared of other dogs is set in an environment with many other dogs. The scared dog should not be taken out of the scenario. Time passes, and eventually a “calm” dog should subside. The direct confrontation with a trigger that has evoked fearfulness/aggression is thought to, if exposure time is long enough, give the dog a new experience in relation to the trigger.

Negative reinforcement: Is a consequence that is thought to enhance a dog's future behaviour, in relation to the perceived or taught antecedent (Skinner 1951). We are looking to increase the rate, prolongation, probability of a behaviour in relation to the antecedent in the case of trauma rehabilitation being a trigger. Negative reinforcement is when a behaviour is enhanced due to an incident/stimuli being removed or prevented from happening (Skinner 1951). A negative reinforcement must be contingent upon the behaviour to be successful and motivate the dog to act in order to escape it. Operant conditioning and shaping behaviours is key. For example: the fearful/aggressive dog lunges at a bystander, the handler starts prodding the dogs side as soon as the lunging starts. When lunging ceases so does the prodding. Passing the decoy dog without a reactive response is the correct response resulting in the removal of the negative reinforcement.

Positive punishment: is a learning principle which aims to suppress behaviour, in relation to an antecedent (Skinner 1951). When training with the use of positive punishment the trainer adds something that motivates the dog to act to avoid. This is thought to lessen the frequency of, or reduce the behaviour, often of unwanted sort. For example: a fearful or aggressive dog barks at a dog passing by, the fearful/aggressive dog is kicked in attempt to stop the lunging. The methods demands the punishment to be contingent upon the behaviour to have the predicted outcome.