Evidence Based Canine Behaviour Interventions for aggression and fear/anxiety in Sweden

Evidensbaserade beteende interventioner för hundar med aggression och rädsla/ångest i Sverige

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Abstract

Aggression and fear/anxiety are behaviour problems that dogs is Sweden experience and behaviour interventions are primarily conducted by behaviour counsellors. A systemic literature review was conducted to map the scientific literature available about the efficacy of behaviour problem intervention for canine aggression and fear/anxiety. Seven articles that only investigated behaviour modification intervention without additions such as medications could be included in the review. This illustrates the lack of and need for research in this area. All studies except one were granted low internal validity based on the present confounding factors, biases, and experimental methodology.

A survey was created in google forms and sent via email to 144 identified canine behaviour counsellors in Sweden with an answering rate of 39%. The majority of behaviour counsellor's educational background was high school, and they had attained their behaviour counselling education through a private school enterprise. The behaviour counsellors have been active for a median 2-5 years and works approximately 12 h/week in the profession. The behaviour problems in canines probably far extend the cases seen by the behavioural counsellors. Methods identified and used by the behaviour counsellor for behaviour modification interventions were many and varied. Counterconditioning was used by 43% for aggression intervention and by 34% for fear and anxiety. Desensitization was mentioned as a method for aggression intervention by 21% while 34% used it for behaviour interventions for fear and anxiety. Management changes was only used by 5% (aggression) and 16% (fear and anxiety). Owner compliance with the behaviour intervention plan was identified as a hinder for the efficacy by 96% of the behaviour counsellors.

A model is proposed for evidence based clinical canine behaviour interventions based on the findings in this thesis. This model explains the environmental context and the equally important context of both the canine and its owner, the scientific evidence and the expertise and experience of the behaviour counsellor. It illustrates the need for more research in clinical canine behaviour interventions as well as the need to remake the professional behaviour counsellor.

Keywords: *canine behaviour problems, interventions, arousal, management, learning theory, behaviour counsellor*

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Abbreviations

ABC	Animal Behaviour College
ABS	Animal Behaviour Society
ABT	Animal Behaviour Technician
ABTC	the Animal Behavioural Training Counsel
ACAAB	Associate Certified Applied Animal Behaviourist
APEL	Accreditation of Prior Experience and/or Learning
CAAB	Certified Applied Animal Behaviourist
CAB	Clinical Animal Behaviourist
CBCC-KA	the Certified Behaviour Consultant Canine-Knowledge Assessed
CCPDT	Professional Dog Trainers and Behaviour Counsellors
CER	Conditioned Emotional Response
DACVB	the Diplomate of the American College of Veterinary Behaviour
H-branding	The Swedish dog professional's quality branding for behaviour counsellors and other dog professionals
LIMA	Least Intrusive, Minimally Aversive, Effective behaviour Intervention

1. Introduction

Many canines suffer from behaviour problems of aggression and fear/anxiety and therefore it is an extensive animal welfare issue (Stafford 2008). Humans have moral obligation to dogs because we made them dependent on us (Enger 2009). Dogs are created by humans, and as such, they command special moral consideration (Hens 2009). In the western world, most dog-owners have powerful emotional relationships with their dogs and believe them to be family members (Pirrone et al. 2015). The death of a dog can be as upsetting as the death of a spouse, child, or losing a job (Thomas and Sours 2007), thus granting dogs essentially the same importance as other humans in the dog owner's life. With this in mind, it is surprising that canine mental health and behaviour medicine is in general neglected in modern veterinary medicine (Roshier and McBride 2012). Not to mention that the Swedish Animal Welfare act states that animals should be protected from suffering, allowed to behave normally and vitally for this purpose is that behavioural disorders should be prevented (SFS 2018:1192). Behaviour problems of aggression and fear/anxiety in dogs also affect their owner and sometimes other dogs and people and are thus also becoming a societal issue (Buller and Ballantyne 2020) as well as a moral and legal issue.

Dog behaviour counselling is a non-regulated profession, and anyone can claim the profession and expertise (McBride and Montgomery 2018). Canine behaviour medicine is a new domain of expertise and there is a need to conduct research to establish scientific validity and to improve and develop the practical knowledge among canine professionals, veterinarians as well as dog-owners (Overall 2005).

This master thesis is an investigation of the Swedish Behaviour Counsellors demographics and interventions, and it is also a systematic review of the scientific evidence of efficacy of behaviour modification interventions of canines with fear/anxiety and aggression disorders. In the background the biological consequences of fear/anxiety and aggression disorders are discussed and learning theory, management, behaviour modification techniques are presented. Special focus is on arousal and reactivity and its manifestations in canines and consequences for interventions in canines with fear/anxiety and aggression disorders. By surveying the demographics and interventions of practicing behavioural counsellors, areas of advantages and drawbacks are identified and analysed. A systemic literature review of the efficacy of behaviour interventions for canine with aggression and fear/anxiety are performed and results of any gaps in the scientific knowledge base are presented and analysed. The end result is a proposed model for scientific evidenced based clinical canine behaviour interventions that could be utilized in Sweden. This model proposes several changes into the approach to clinical canine behaviour interventions.

2. Background

2.1 Living with a dog with behaviour problems

Living with a dog that has behaviour problems affects the quality of life of the dog owner and its family. Fear, excitability and separation anxiety in dogs can significantly cause stress and affect Quality of life as a dog owner (Doane and Sarenbo 2019). Dogs' behavioural problem are often not curable but lifelong conditions. With behaviour treatment and management of the dog's environment they are however in different degree remediable (Overall 2013). The effect on the owner should not be disregarded as it has many commonalities with the human caregiver's burden. (Buller and Ballantyne 2020). Day to day life with a dog with serious behaviour problems requires extra time for training, management, and attention to details to ensure safety for the dog and the public. The cost for behaviour counselling is an important factor and the dog-owner describes reduced time out of the house because of their dog's behaviour problem (Buller and Ballantyne 2020).

2.2 How common are the behaviour problems in dogs caused by aggression fear and anxiety

Behaviour problems have been reported to be present in approximately 75-85% of our pet dogs (Dinwoodie et al. 2019; Salonen et al. 2020). The leading cause of mortality in dogs under the age of three have been reported to be behaviour problems (Boyd et al. 2018; Yu et al. 2021). Bamburger and Houpt (2006) determined that the average age when a dog is diagnosed with a behaviour disorder is 2.5 years. The most common behaviour problem diagnosis is aggression (Bambeurger and Houpt 2006; Fatjo et al. 2007) probably because severely aggressive dogs are hard to cope with. Aggressive behaviour problems are a serious animal welfare problem and public health concern (Bennett and Rohlf 2007).

However, Doane and Sarenbo (2019) found that canine fear was affecting the dog owner's quality of life.

There is comorbidity between certain behaviour disorder (Bamburger and Houpt 2006). Separation anxiety have been coupled to thunderstorm phobia (Overall 2001). Other associations between overall aggression and fear as well as owner directed aggression and fear/anxiety have been reported (Luescher and Reisner 2008; Dinwoodie et al. 2019).

According to Blackwell et al. (2013) the prevalence of fear of noise is not well understood however, there are studies suggesting that it is present in between 10-74% of the domestic dog. Behaviour problems are considered problems when the owner labels it as a behaviour problem, regardless of if it is a welfare problem for the dog (Murray et al. 2021). This result in some dogs being considered having behaviour problems when they really are exhibiting normal canine behaviours. However, the owner's tolerance for their dog's behaviour problem might also disregard aggression or fear for instance as being a problem for society or the welfare of the dog.

How many of the dogs in Sweden need intervention for behaviour disorders such as fear/anxiety and aggression? No such official estimate exists. By using data from scientific articles around the world, a rudimentary estimated approximation with great uncertainty is possible to estimate and to perhaps recognize the magnitude of the problem (Table 1). The by law required registered dog population in Sweden are 1095000 number of dogs (Jordbruksverket 2023, March 2023).

Canine animal welfare matters and minimizing behaviour problems such as aggression and fear/anxiety is important. Animal welfare is part of sustainable development, and the relationship humans have with animals are important both for the environment and human health. In the sustainability goals it should also be stated that the experiences of non-human animals' matter (IISD 2022) and that supports the idea that we are morally responsible for our dogs and that includes their mental health.

Table 1. Calculated estimation of problem behaviours in the Swedish canine population based on scientific publications and a dog population of 1095000

Behaviour disorder	References	Prevalence of disorder in study	Estimation of problem in Swedish canine population (no of dogs)
Fear and anxiety	Dinwoodie et al. 2022	44%	481800
Stress anxiety	Blackwell et al. 2013	10-74%	109500-810300
Noise sensitivity	Salonen et al.2020 Tiira et al. 2016	32% 39%	354000 427050
Separation anxiety	Martinez et al. 2011 Tiira, et al. 2016 Sherman and Mills 2008	14-16% 17% 14-16%	153300-175200 186150 153300-175200
Fear of dogs	Martinez et al. 2011 Tiira et al. 2016, Sherman and Mills 2008 Salonen et al. 2020	20-25% 17%	219000-273750 186150
Fear of veterinary care	Mariti et al. 2015	53%	580350
Hyperactivity	Salonen et al. 2020	15%	164250
Aggression	Salonen et al. 2020	14%	154300
Stranger aggression	Tiira et al. 2016 Salonen et al. 2020	6% 43%	65700 470850
Aggression toward family member	Salonen et al. 2020 Tiira et al. 2016	6% 16%	65700 175200
Dog aggression	Tiira et al. 2016	32%	350400
Fear of surfaces	Salonen et al. 2020	23%	251850

2.3 Biology and genetics of aggression and fear/anxiety

2.3.1 Dog personalities

Dog personalities are well established and they are constant, distinct, and displayed by individual differences in behaviour (Fratkin et al. 2013). Personality traits such as fearfulness versus boldness expand into varied canine behaviours. A sociable and also curious dog frequently exhibit less fearfulness (Svartberg and Forkman 2002). Boldness and fearfulness vary substantially between dog groups. Boldness is higher in Terriers than in Hounds and Herding dogs (Turcsán et al. 2011) while Starling et al. (2013) found that the companion dog group were most fearful/shy and guardian dogs were the boldest. Examples of behaviour problems, and their associated factors, these dogs can demonstrate are illustrated in figure 1.

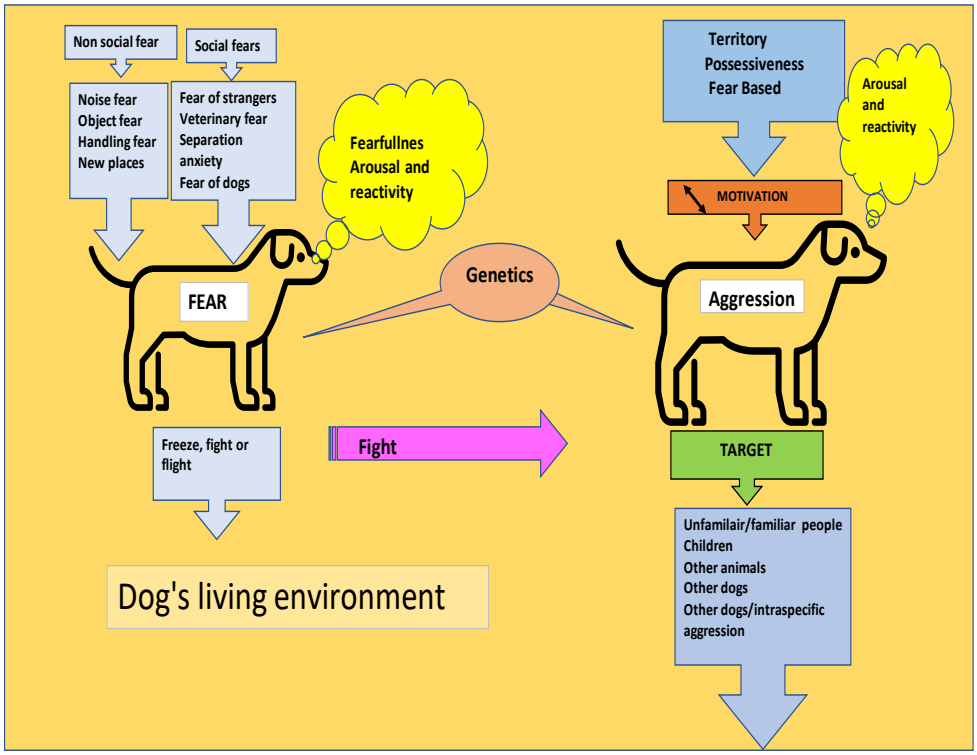


Figure 1. Some examples of dog's behaviour problems and their associated factors.

2.3.2 Fear and Anxiety

There are different emotional states underlying fear and anxiety. Fear is temporary in response to an upsetting event while anxiety is continuing and result in widespread general apprehension (Lindsey 2001b). It is important to note that the emotion of prolonged fear or anxiety is per definition aversive (Grandin and Deesing 2002) and thus an impairment on animal welfare.

Dinwoodie et al. (2022) reports that dogs experience fear every other time they meet a stranger and a fourth of dogs a are fearful in new places. Fear and anxiety are prevalent and commonplace and is a considerable canine welfare problem. Fear is a motivational component of canine aggressiveness towards the owner (Dinwoodie et al. 2021).

Fear of strangers both people and other dogs are characterized as social fear while fear of new situations, heights, floorings, noises and more are considered non-social fears (Lindsay 2001b; Tiira et. al 2016). Phobias in dogs to multitude of objects and situations develop more often in fearful dogs, but any dog can develop lifelong fear and anxiety in reaction to frightening conditions (Lindsay 2001a).

The second most common behaviour issue in dogs is fear and anxiety-related behaviours that lack aggression, with separation anxiety being the most common (Bamberger and Houpt 2006). Both genetics and the environment are important factors in separation anxiety (Storengen et al. 2014) with symptoms of distress, when left alone, such as vocalization, destruction, and elimination (Overall et al. 2001) and effective treatment and prevention are still not well understood.

2.3.3 Aggression

The ethological purpose of aggression is according to Miklósi (2015) to split up resources between group individuals. It is an essential basic component of canine behaviour and Svartberg and Forkman (2002) consider it a personality trait. The factors and causes of aggression are varied and many (Figure 1) and understanding these are fundamental for canine welfare and for the safety of society (Kleszcz et al. 2022).

Aggression is the behaviour response of dogs during specific conditions, and these differ between individual dogs depending on genetics and experiences and is susceptible to changes during the canine’s life (Lindsay 2001a). Example of

behaviour of an aggressive dog is growling, snapping, and biting but the motivational background of such is variable and includes among others fear and territorial guarding (Houpt 2006).

Individual environmental experiences are probably a fundamental reason for canines' aggressive development. There is small genetic variance between aggressive and non-aggressive dogs supporting environmental factors primarily determining whether dogs are developing and showing aggression or not (Eken et al. 2014). It is inherited independently from other behaviour traits (Saetre et al. 2006). Various dog breeds display different variation in level of aggression (Duffy et al. 2008; Hsu and Sun 2010; Svartberg 2006). Despite this, dog breed might be an inferior determent of aggression since the genetic variation within breed is extensive (Casey et al. 2014; Serpell and Hsu 2005). Morphological differences in canine breeds leads to that some breeds when aggressive are a greater risk of causing serious injury (Duffy et al. 2008).

Despite that dog-owners might have different perceptions of dog bites and their causes (Mehrkam and Wynne 2014) the most common described aggression type in dog bites is owner directed aggression (Overall and Love 2001). Small to medium sized dogs are the most common culprits in owner directed aggression (Duffy et al. 2008; Hsu and Sun 2010).

Interestingly, there are behavioural differences in conspecific aggression depending on the familiarity of the dogs. Between dogs that are familiar with each other the aggressive behaviour is substantially ritualized and seldom leads to serious attacks while alterations between stranger dogs might more often end in serious consequences (Lindsay 2001a). There is no or low correlation between dog directed aggression and human directed aggression, and this proposes that the underlying factors are different (Casey et al. 2013; Hsu and Sun 2010).

A fearful dog has a larger risk of developing aggression (Wormald et al. 2016) and fear is often an intricate component of aggression (Klausz et al. 2014). Other factors that influence dog's aggressive behaviours is age, sex or if neutered and numerous other environmental factors (Dinwoodie et al. 2021).

2.3.4 Difference in genotype and phenotype

Behaviour happens on a phenotypic level, and it is complicated to understand the path from genotype to the expressed phenotype. The genetics of behaviour is certainly a function of the interaction between the genotype and its environmental exposure. Some behaviour traits are associated to a single locus (Zapata et al. 2016),

but the majority of behaviours are quantitative with individual phenotypic variation. The phenotypic variation is indicated by genetic polymorphisms at many interrelating loci (Mackay and Anholt 2007). The actual expressed phenotype depends on their environmental sensitivity and the actual environmental exposure (Mackay and Anholt 2007). Another way of explaining the multitude of behaviour outcomes especially in behaviour disorders such as aggression and fear/anxiety is by thinking of behaviour as expressed genotypes (Figure 2). A canine with a certain genotype has different possible genomic expression depending on the environment the canine is exposed to such as early socialization, trauma and a multitude of everyday common and not so common triggers and events (Overall 2013). Displayed behaviours also show individual variation in animals' expressed genomics (Werkhoven 2011). The genomic expression in mammals affects the neurochemistry and certain genotypes have different type of neurotransmitter responses (Overall 2013) as well as differences in magnitude (Dang et al. 2013). The phenotypic behaviour response finally emerges after temporal environmental influences on the gene expression affecting neuroanatomy as wells as neurochemistry (Overall 2013).

2.3.5 Genetic influences versus environmental influences

Different dog breeds have distinct genetic variations and 99% of dogs could, based on its genotype, be assigned to the correct breed (Parker et al. 2004). The genetic variation within a breed is quite large, however genetic differences does exist between breeds (Houpt 2007).

The genetics of behaviour is complicated and requires some understanding in gene expression. Certain behaviour such as separation anxiety, touch-sensitivity, owner directed aggression and dog rivalry are coupled with small size in canines and its genetic base is in 2 locis in small sized dogs (Zapata et al. 2016). This means that small dogs with these 2 locis in their genotype are more susceptible to develop the previously mentioned phenotypes for that behaviour. Nonetheless, for the phenotype to emerge certain environmental factors need to be present and these can be highly variable. One can claim that small dogs with these genotypes have a greater chance of developing fear and anxiety related behaviour problems (Zapata et al. 2016). There is also a heritability element in dogs' fearfulness which is positively correlated to aggression and simultaneously negatively correlated to sociability (Eken et al. 2014).

A dog's puppyhood environment will have great consequence on the dog's behaviour development and behaviour as socially mature (Harvey et al. 2016). A dog should have numerous and continuous positive environmental and social

experiences from puppyhood (Foyer et al. 2014) and throughout adulthood These interactions are only advantageous if they are positive while negative experiences might predispose aggressive behaviour problems (Wormald et al. 2016).

2.3.6 Arousal and reactivity and its effect on behaviour

The affinity to experience frequent and intense emotional arousal is described as emotional reactivity (Karimi et al. 2022). A reactive canine has a greater propensity for excessive arousal. The threshold for an arousal response in a reactive canine is greatly diminished as well as the fact that the acceleration of arousal response is great (Overall 2013). All canine anxiety is founded in arousal of different levels and severity in the dog. Arousal amplification impedes cognitive observation, neural integration and impair processing and learning and can deter any efficacy of behaviour modification plans (Overall 2013). Dogs' arousal levels impact their behaviour and aggressive reactive dogs often show extremely low self-control capabilities (Gobbo et al. 2022).

Reactivity or reactive behaviours probably have a multitude of causes. Included are environmental factors such as owner circumstances (Sundman et al. 2019) inferior socialization (Puurunen et al. 2020) as well as aversive training methods (De Castro et al. 2020).

A normal behaving canine has a high reaction threshold and arousal level increase and reactive behaviours are fairly rare in this dog (Figure 2A). The reactive dog rarely behaves normally while it is easily aroused, and reactive behaviours are common (Figure 2B). A reactive canine will probably never become a normally reacting dog, but the arousal level and reactivity behaviours can be decreased with training (Figure 2C) (Overall 2013). The end result after behaviour modification training of a reactive dog should be a dog that is significantly more normal behaving while still becoming aroused, the arousal more seldom results in reactive behaviours. (Figure 2D) and only a small time is spent in arousal with vigilant observation and warning.

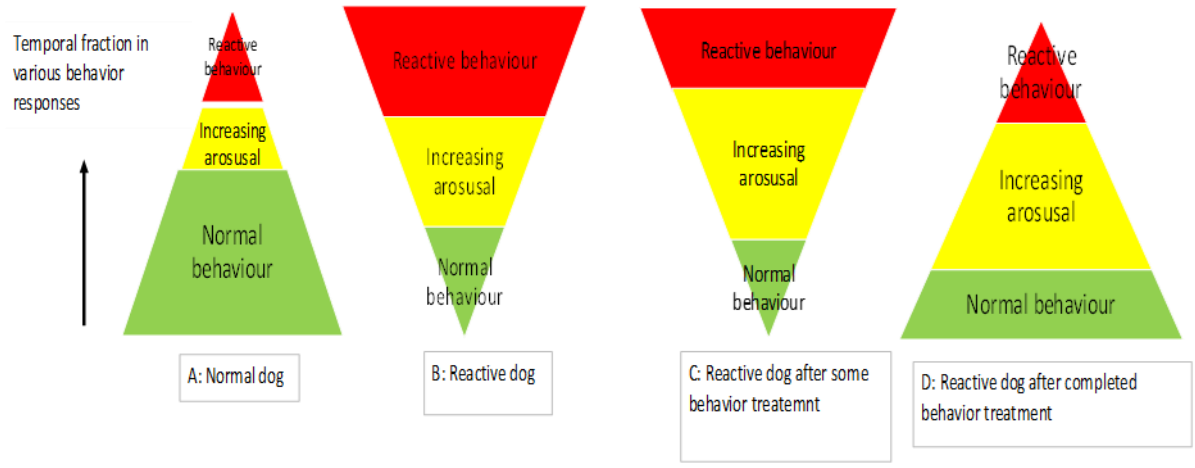


Figure 2. Description of how reactivity and arousal in canine behaviour problems such as aggression and fear/anxiety changes with behaviour interventions. Modified from Overall (2013).

A dog with aggression and or fear/anxiety spend less time behaving normally compared to a canine without serious behaviour problems (Overall 2013). In an aggressive dog the arousal state and the significance of the stimulus are the determining factors for if the aggressive behaviour response will have the threatening, defending, or attacking characteristics (Lindsay 2001a).

2.4 Learning theory and behavioural intervention in canines with aggression and fear/anxiety disorders

2.4.1 Basic learning theory

Canines are learning like all mammals according to learning theory through single event learning such as habituation and sensitization and through operant conditioning, classical conditioning, and social learning (Reid 1996).

2.4.2 Habituation and sensitization

A misleadingly simple form of non-associate learning is habituation that is the reduction in response intensity with repetitive exposure to a specific stimulus. The other component of this learning is sensitization, which is the increase in reaction intensity with repeated exposure to a distinct stimulus (Domjan 2013). Habituation

can be used in behaviour modification to decrease reactions to stimulus that are novel and non-threatening (Overall 2013). It is useful for instance to get the puppy used to the vacuum cleaner and TV while it should not be used to familiarize the puppy with the family baby. Instead of habituation, sensitization could occur as the baby easily can startle the dog and evoke a fear reaction.
Sensitization can be explained as an aversion due to a definite traumatic incidence but just as often the aversion can be ascribed to repetitive stimulus exposure and recurrent minor stress responses (Overall 2013). An example is thunderstorm fear that starts with an appropriate fear during a thunderstorm that progresses to more severe fear and anxiety during successive thunderstorms (DePorter et al. 2012). Often generalization happens with the dog starting to react with fear to other loud noises as well.

2.4.3 Operant Conditioning

Operant conditioning is the method by which a dog learns by consequences of their behaviour. In operant conditioning an antecedent precedes a behaviour that is followed by a consequence. The learning outcome depends on the consequence that can be described in four different quadrants as shown in (Figure 3). A behaviour can increase in frequency by reinforcement (R) and decrease by punishment (P) and this is accomplished by adding (positive) or removing (negative) a stimulus (Skinner 1938).

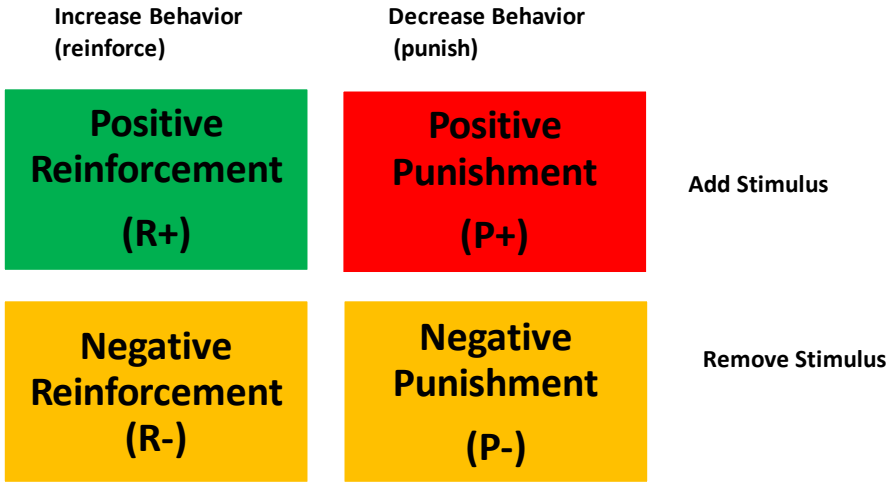


Figure 3. The four different contingencies in operant conditioning.

Training methods using aversives such as negavtive reinforcement (R-), negative punishment (P-) and positive punishment (P+), especially P+ impacts dogs

welfare negatively with dogs displaying stress behaviours in varying degrees (De Castro et al. 2020). Other studies also show that training methods using punishment are jeopardizing the dogs welfare (Arhant et al. 2010; Schalke et al. 2007) and increases the risk of development of behaviour problems (Blackwell et al. 2008). More frequently than their larger counterparts, small dogs respond to punishment-based training with fear and aggression. (Arhant et al. 2010). Research show that positive reinforcement is more efficient and ethically superior with less adverse effect (Hiby et al. 2004; Ziv 2017) and is the recommended operant condition training method. When it comes to aversive training methods there are data demonstrating them ineffective for interventions of behaviour problems in canines. In actuality, the risk for aggressive behaviours are increased when aversive methods are employed (Herron et al. 2009).

2.4.4 Classical Conditioning

Classical conditioning is when animals learn by associations between different stimuli. The traditional example is Pavlov's dog, where dogs in the experiment made the association between the sound of a bell (conditioned stimuli (CS)) and food (unconditioned stimuli (US)) and started salivating when the bell made sounds (conditioned response (CR)) regardless of if food was present (Raven and Johnson 2002). Classical conditioning is the mechanism in the development of canine conditioned emotions response (CER) in which any negative emotional response, typically fear or anxiety, becomes associated with a neutral stimulus as a result of the classical conditioning (Lindsay 2001b).

2.4.5 Counter Conditioning and Desensitization

Counter conditioning (CC) and Desensitization (DS) are methods used for the behaviour modification intervention for canines suffering from behaviour problems (Overall 2013) from aggression problems (Kakuma and Kinoshita 2010; Orihel and Fraser 2008) and fear and anxiety (Butler et al. 2011; Stellato et al. 2019; Monteny and Moons 2020).

The purpose of using counter conditionings is to change the canine's emotions by relearning that a distinct stimulus that earlier created a negative emotion after relearning produces a new and hopefully positive conditioned emotional response (CER) (Davison and Neale 1998). An example of counter conditioning would be a puppy scared of the doorbell noise. Every time the doorbell rings the puppy gets a great treat and in this simple case the puppy relatively soon replace the fear with happy anticipation when the doorbell rings.

Systemic desensitization is grounded on the principles of counter conditioning (Davison and Neale 1998) and is vital in behaviour modification when strong negative emotions are present (Overall 2013). In systematic desensitization exposure to the fear generating stimuli is incremental when the animal is totally relaxed and comfortable. The goal is to never induce fear during the process and when completed the emotion of fear and anxiety have been substituted to being relaxed and comfortable (Bouton 2018). If the puppy in the counter conditioning example before is too scared when exposed to the doorbell systematic desensitization can be employed. A recording of the fearful noise is played on low volume while the puppy is still relaxed and gradually increased as the puppy remains relaxed and calm. Counter conditioning can also be added, and the puppy receives treats as the scary noise is playing.

2.4.6 Social learning

Social learning is when the interaction between two individuals results in learning (Kubinyi et al. 2009). To date, there is a debate about the specifics of social learning that exists in canines (Serpell and Duffy 2014). It is however unquestionable that dogs comprehend many aspects of human communication (Hare and Tomasello 2005; Schwab and Huber 2006). An example of this is canines' abilities to follow direction signs such as pointing (Bräuer et al. 2006; Kaminski and Nitzschner 2013). By watching another dog or human dogs can understand certain tasks (Pongrácz et al. 2001; Heberlein and Turner 2009) and interestingly highly trained dogs are better problem solvers (Marshall-Pescini et al. 2008).

2.5 Behaviour modification interventions

All behaviour modification interventions plans (Figure 4) for aggression and fear/anxiety should start with a visit to the veterinarian (ABTC 2022b; Daniels et al. 2023). Many behaviour problems have an underlying medical reason or component and Mills et al. (2020) found that 15 to 82 % of behavioural referral cases had painful physical conditions.

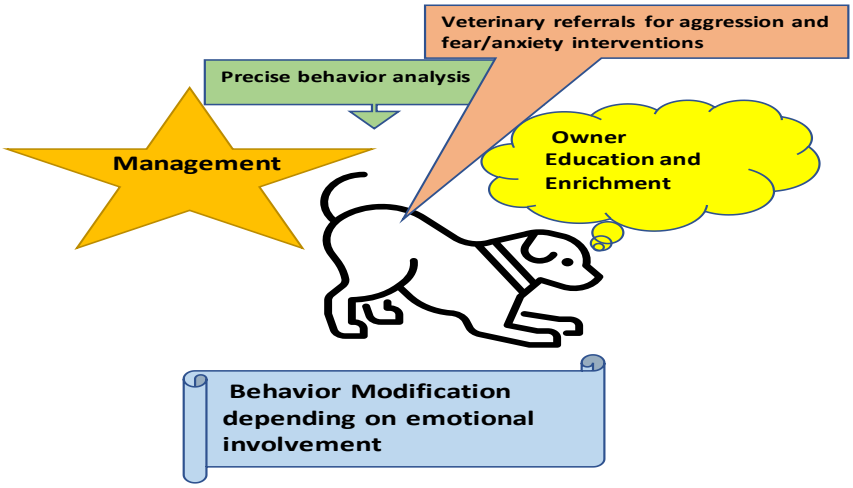


Figure 4. Components of a behaviour modification intervention plan.

After a veterinary visit where pain has been ruled out or been treated, the next intervention is management. The purpose here is multiple and starts with the termination of the dog practicing or experiencing the problematic behaviour and is the base for an implementation of behaviour modification intervention (Pike 2018). The idea is that every time a dog performs a behaviour it is reinforced thus, for example, a dog with separation anxiety should not be left alone. Some problem behaviours such as biting aggression towards children must be considered untreatable although they might respond to behaviour interventions. They are 'untreatable' since testing their effectiveness on children is impossible and for these behaviour problems changes in management is the only option (Lindsay 2001b). Alteration of the physical environment is often neglected while it is the first measure to be addressed to reduce a canine's arousal level and improve probabilities of successful intervention (Overall 2013). Total management of the dog's environment is the goal so that the dog is not performing the problematic behaviour and both the dog and others in the environment are safe. Many times, this might be the only required action. Dogs with barrier frustration symptoms are no longer left in the backyard and a dog with firework phobia is not exposed to fireworks. Appropriate changes in the management of the dog's environment will decrease the dog's arousal and thus making it possible for the dog to cognitively process information and thus learn (Horwitz 2008).

Depending on the behaviour problem, the management plan will be individually tailored based on the behaviour counsellor's ability to perform an accurate behaviour analysis (Horwitz 2008). This behaviour analysis should include thorough history of the behaviour problem that answers where, why, and how the problem started (Pike 2018). It is especially important in aggression and fear/anxiety cases that the emotional bases and reactivity are determined (Overall

2013). Overall (2013) is suggesting what she calls “contextually discrete diagnosis”. This is a phenotypical diagnosis that includes the following analysis: a) identification of what specific behaviours or event that elicited the behaviour, so it can be avoided, b) identify which behaviour that can be modified, remember that the owner is the trainer and last c) abstain pseudo analysis of the behaviour problem.

The next step is owner education and enrichment. Owner education is central piece in behaviour modification intervention plans. However, Ballantyne and Buller (2015) registered great difficulty in owner compliance with the behaviour intervention plan and regarded this as the greatest obstacle to the dog’s behaviour improvement.

The behaviour counsellor’s capacity to effectively give guidance is affecting the efficacy of the behaviour intervention (Daniels et al. 2023) as well as how well they manage to convince the dog-owner about benefits of the behaviour intervention (Abood 2007). The owner or the dog’s caregivers is the person who is going to implement the behaviour modification plan therefore the education should ensure that the owner receives adequate education in canine behaviours, signalling and behaviour intervention plans (McLean and McGreevy 2010). Daniels et al. (2023) found that the owner needs to believe that the plan is the correct one for their dog and the behaviour modification plan must be mutually agreed upon while the behaviour counsellor is supporting the owner through the entire behaviour modification implementation.

While very little is known scientifically about behaviour counsellors’ ability and techniques for implementing owner education however, it is known that the quality of the teacher’s pedagogical and communication ability has great influence in the learning of the students (Araghieh et al. 2011; King-Rice 2003) and is a potential problem area in behaviour intervention. Many associations between owner and their dogs have been scientifically investigated and problematic dog behaviours can have a negative impact on the dog-owner relationship (Bennett and Rohlf 2007). Owner’s attachment type affects the dogs and for example increased separation anxiety in dogs can be linked to owners insecure-avoidance attachment type (Konok et al. 2015). Owners of aggressive dogs have a higher prospect of being emotionally unstable (Gobbo and Zupan 2020).

While it seems self-evident that the dog owner needs to be educated on the reasons for their dog’s behavioural problems, the communication methods for this owner education is important for success (Ballantyne and Buller 2015). The relationship between the behavioural counsellors and the owner is crucial for the successful implementation of behaviour intervention (Lindsay 2001b).

Meyer and Forkman (2014) argue that the canines' behaviour or problematic behaviour is of lower importance regarding their owner's satisfaction with the dog ownership than the dog's fit in the lifestyle of the owner. This is important to remember when educating the owner and choosing between different clinical behaviour interventions. Perhaps the owner sometimes is not concerned with their dog's aggressiveness/fear of other dogs, however it might be a massive problem if it infers with their idea of having their dog off the leash when running with the dog. Enrichment is very important for all dogs and is included for canines with behaviour problems such as aggression and fear/anxiety. Examples of enrichment are dog walks, feed puzzles and any activity that the dog like to engage in. Even better is if the owner and the dog is engaged together in training and exercise (Bennet and Rohlf 2007). Enrichment can also, for some behaviour problems, decrease the frequency of exhibited behaviour problems (Kang 2022).

The last step in the behaviour modification intervention is the behaviour modification plan. It is vital that the behaviour counsellor understands the science and can explain the scientific validity of the behaviour modification plan and the intervention to the dog-owner. The behaviour counsellor should be fluent in translating the science of learning theory into a plan that is simple and easy to understand and follow. Then they must teach the owner, who then implement the plan into their daily life (Shaw and Martin 2014). As mentioned earlier the behaviour modification plan should be based on learning theory with counter conditioning, desensitization, and operant training of alternative behaviours.

The behaviour intervention plan can command a commitment for the owner for the rest of the dog's lifetime (Overall 2013). It is the owner who nearly exclusively implements the behaviour intervention plan and the compliance with the plan is necessary for improvements in serious behaviour problems (Casey and Bradshaw 2008; Landsberg et al. 2013). To improve compliance the behaviour intervention plan should be simplified (Takeuchi et al. 2000) and it is advantageous to separate the intervention into different phases (Hart et al. 2006). Regular follow-ups are vital for owner adherence to the behaviour intervention plan and should be an essential part of the plan (Hart et al. 2006).

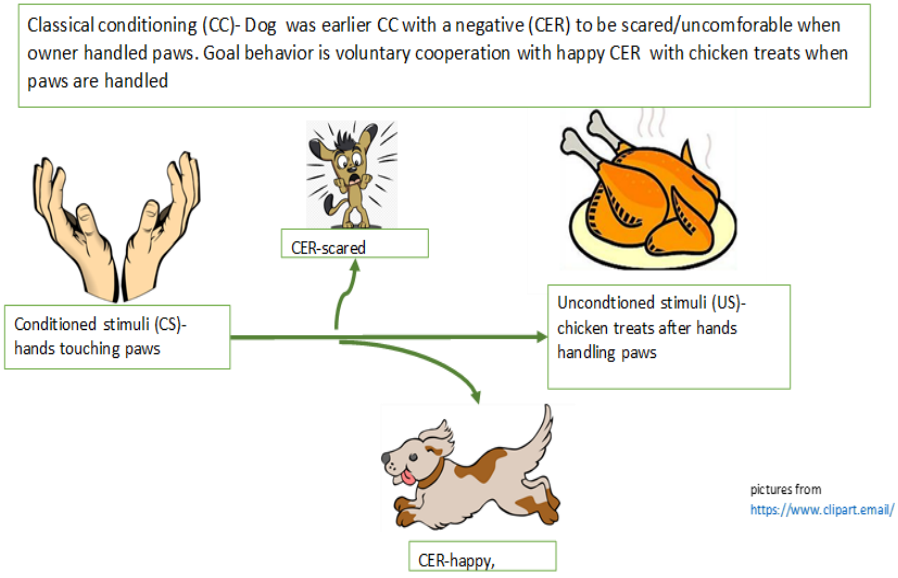
2.5.1 Example of behaviour modification to change a CER

Classical conditioning and operant conditioning are often used in tandem for behaviour modification intervention. The following scenario is an example developed by the thesis author. The dog had become scared or uncomfortable with the owner's hand touching the paw (Figure 5A) and a negative CER (conditioned emotional response) had developed. To reduce the dog's fear of paw handling a

combination of counterconditioning and desensitization can be used together and be executed together with operant conditioning. This procedure is easy to follow, and most dog-owner will understand and be able to perform this training.

The owner is told to have a palatable food reinforcer. The owner starts with a light touch on a part of the dog where the dog likes to be touched. The owner touches the dog (Figure 5B) and quickly gives a treat if the dog remains in position. The dog is allowed to move away and will probably do so if uncomfortable. Repeat this step approximately five times and if the dog is mostly successful then progress with successive steps where touch gets closer to the dog's paw. Each step is repeated approximately five times. If the dogs move away or pulls the leg away reverse to the prior step. To ensure desensitization and counter conditioning it is essential not to progress to a step closer to the paw until the dog happily stays still and eats the treat. This is accomplished in this operant conditioning training by repeating approximately five times at each step and reversing, to the prior step if the dog moves or pull away the leg. The final behaviour is the dog happily eating chicken when the owner can handle the paws. This entire procedure is repeated multiple times over several weeks.

5A



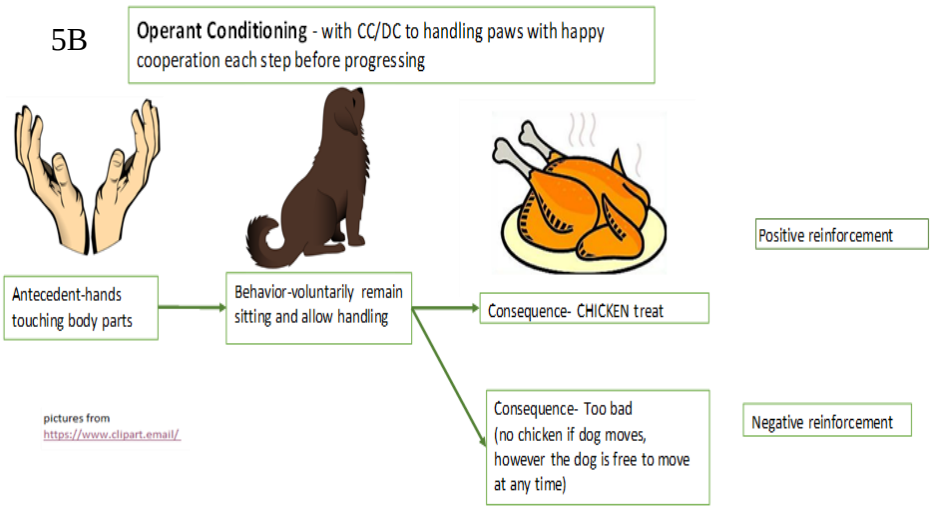


Figure 5. Example of how classical conditioning can change CER (5A), of a dog that fears having its paws handled, when trained through counter conditioning and desensitization performed in a mixture with operant conditioning technique (5B).

2.5.2 Medical treatment of canines with fear/anxiety and aggression disorders.

There has been prejudice associated with the use of pharmaceuticals among dog-owners as it could be viewed as they lacked control over their dog and that its use could alter their canine's personality (Horwitz and Houpt 2020). It is outside the scope of this thesis to incorporate medical treatment for canines with fear/anxiety since the Swedish behaviour counsellors are not medical professionals and therefore cannot prescribe nor recommend medical treatment (SJVFS 2019:25).

2.5.3 LIMA and the humane hierarchy

Various methods are used to train dogs however, the Swedish behaviour counsellors that are qualified members of The Swedish Dog Professional (Sveriges Hundföretagare) are obliged to follow LIMA (Least Intrusive, Minimally Aversive, Effective behaviour Intervention (Sveriges Hundföretagare 2023).

Modern dog behaviour counselling and interventions as well as dog training have the philosophical idea that the behavioural interventions and training methods used should be LIMA, developed by Friedman (2010) and the humane hierarchy (Friedman 2022) explains this further. Friedmans (2010) idea is that behavioural

intervention is executed in stages (Figure 6), (she labels them exits) and the goal should be to always use the least amount of intervention possible to create the desired positive behavioural changes. The first stage (exit) is to ensure the dog is healthy or if needed receives medical and dietary treatment. Underlying medical problems can contribute to behaviour problems (Mills et al. 2020) and should be ruled out as cause of behaviour problem before continuing up in the hierarchy.

The next stage is to arrange the antecedents which changes the dog's environment and in many behaviour modification plans this is what management is all about. What factors should be changed or added/removed to discontinue the behaviour from happening? Change the environment for the dog, it should be comfortable, and dogs and the people should be safe. For many behaviour problems antecedent arrangement is all that is needed. If this is not enough for the preferred behaviour change proceed to the next stage.

The next step is training the dog with positive reinforcement. This is the preferred stage, and one should not proceed if difficulties arise, until many different behaviours and antecedents have been tried. When it comes to behaviour modification for dogs with fear/anxiety or aggression problems only positive reinforcement should be employed (Overall 2013). Counter conditioning and its relative desensitization belong at exit 3, always positively reinforced.

The goal should be to never go beyond this positive reinforcement exit, however, training a differential reinforcement of alternative behaviour can be ok. An example of this is a dog that jump on people will only be allowed to greet people if he sits down.

The next step according to Friedman (2022) is questionable as it enters into aversive methods, such as extinction, negative reinforcement and negative punishment, and they should only be used if the earlier exits are not working. And the last exit positive punishment such as hitting can only be used if all other options have been depleted. When working with dogs that are exhibiting behaviour problems such as aggression fear/anxiety, aversive procedures should not be utilized as they can exacerbate the problems (Herron et al. 2009).

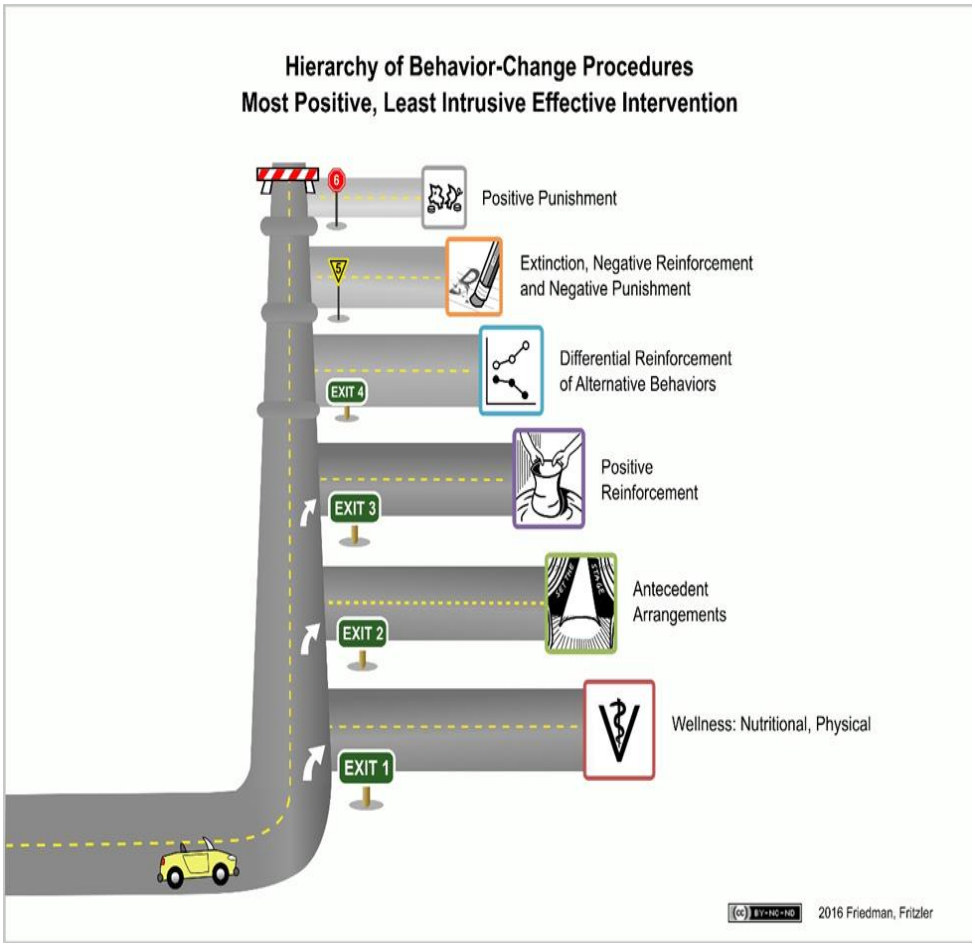


Figure 6. Hierarchy of behaviour change procedure: Least intrusive, Minimally Aversive, Effective Behaviour Intervention (LIMA). Reproduced with permission from Dr Friedman.

There is disagreement on the details on what are humane methods in dog training and behaviour counselling (Mills 2005; Friedman 2018). The model of the humane hierarchy of LIMA classifies negative reinforcement and negative punishment as equally aversive and thus in this model negative reinforcement, positive punishment and negative punishment are all aversive. Other states that negative punishment is not aversive and can be used together with positive reinforcement. In positive reinforcement training the withholding of reward when the dog fails a trial is in fact negative punishment (Mills 2005). Positive reinforcement is used together with negative reinforcement as a partnership in training while the aversive positive punishment and negative reinforcement are aversive and should not be utilized (Greenebaum 2010; Guilherme et al. 2017; McBride and Montgomery 2018; Ziv 2017). To make the situation even more complicated, in horse training negative reinforcement is used as one of the major learning tools, actually it is very difficult if not impossible to ride a horse not utilizing negative reinforcement (McLean and Christensen 2017).

Equally important as training methods is the person training or modifying the behaviour. Any method can become aversive in the hands of an incompetent trainer or behavioural counsellor (McBride and Montgomery 2018).

2.5.4 Behaviour problems that are hard to treat

Despite a comprehensive plan for behaviour modification intervention where the canine's environment is altered and the owner implements all required changes in training and interaction with the dog, it is very possible and, in many cases, probable that the dog will not be cured. Maybe the most important aspect of a plan for behaviour modification intervention is to help the owner to modify their expectations. The dogs with aggression or fear/ anxiety problems will probably improve with the intervention but it is most probably a chronic condition that must be managed for the rest of the dog's life (Overall 2013).

There are dog factors that makes resolution of aggression and fear/anxiety behaviours very difficult if not impossible. Examples of such are inattentive behaviour regarding people, displaying behaviour that require their owner to spend excessive time and effort (one example is constantly cleaning rugs) and behaviour with early onset that have persisted (Overall 2013). Another important factor associated with poor resolution is dogs biting people or other dogs regardless of severity or causation (Overall 2013). Horwitz (2008) states that aggression where the dogs have bitten are hard to resolve and especially if the bite was severe. An additional factor causing bad outcome is if the dog has underlying medical problem causing pain or disease in conjunction with bad owner compliance with the behaviour modification intervention plan (Overall 2013).

There are of course many owner related factors that impedes the improvement in aggression and fear/anxiety behaviour problems (Overall 2013). The behaviour modification intervention requires a time commitment and changes in environment and routines and this is sometimes difficult for the owner. Frustration with the behaviour problem itself might impede progress and management solutions to minimize the problem are imperative and can function as a motivator to keep implementing the plan (Howitz 2008).

Sometimes owners have feelings of shame, guilt or fear of change which are felt when serious behaviour problems are diagnosed, and this can affect the compliance of the behaviour intervention plan (Canino et al. 2007) and this should be addressed by the behaviour counsellor.

2.6 Behaviour counsellors licencing and certification

Behaviour counsellor and other animal experts should have competences in practice, current scientific knowledge, education in animal training, animal behaviour and human educational practices. This should be executed with the welfare of the animal and human at the centre of the practice. The public should have access to and easy means of evaluating animal professionals' expertise including behaviour counsellors and proficiency should be independently assessed (McBride and Montgomery 2018). However, this is not the case, behaviour counsellor is a non-licensed profession which means that anyone regardless of educational and practical skills can call themselves an expert in most countries such as Great Britain (McBride and Montgomery 2018) and the same lack of rules apply in Sweden. No country at this time has, to the author's knowledge a state board required certification/license for service in the profession Clinical Animal (canine) Behaviourist or as labelled in the thesis Behaviour Counselling. Following are some examples of certification systems.

2.6.1 United States behaviour counsellors licencing and certification

United States of America have a board-certified veterinary specialty, the Diplomate of the American College of Veterinary Behavior (DACVB). This specialty requires a completion, post veterinarian licensing, of a 3-year residency program approved by the American College of Veterinary Behaviors (ACVB). Participating veterinarians are obliged to see over 200 behaviour cases that are supervised by a mentor, write three peer reviewed case reports and author, and publish a scientific paper based on their own research. When the requirements are fulfilled, the national board is testing their knowledge in their specialty (ACVB 2023), although this specialty is still in its infancy and very few schools offer the training (Horwitz and Houpt 2020).

American veterinary technicians can also pursue a certification after becoming licensed veterinary technicians (AVBT 2023).

Another honoured certification scheme in the USA is Certified Applied Animal Behaviorist (CAAB) and Associate Certified Applied Animal Behaviorist (ACAAB). They require a minimum of a PhD or a master's degree in an applicable

field with at least 30 credits in animal behaviour and learning. Research experience is required as well as practical case studies and long-term mentored experience in practicum. Certification are rewarded after all requirements including a written exam as well as a scientific presentation has been fulfilled by the Animal Behavior Society (ABS 2022).

There is also independent assessment certification testing. The most known one in USA is the certification council for professional dog trainers and behavior consultants (CCPDT 2014a) they offer a couple of different independent certification testing assessment. For this certification no specific formal education is required, however the assessments for the different certifications are extensive and require education in both training, learning theory and behaviour. They have requirements on practical experiences and for the Certified Behavior Consultant Canine-Knowledge Assessed (CBCC-KA) certification 500 hours of real-life behaviour counselling is required (CCPDT 2014b).

Then there are many different examples of private enterprise creating educational courses of varying level degree and content leading to their own branded certification. Examples of these private schools are too numerous to mention but a few well-known schools are the Karen Pryor Academy (2023), The Academy for Dog Trainers (2019) and Animal Behavior College (ABC 2023).

2.6.2 Great Britain's behaviour counsellors licencing and certification

Great Britain has another type of certification scheme. There is no state mandated certification instead an umbrella organization has been developed, the Animal Behavioural Training Counsel (ABTC) which function as an independent encompassing authoritative governing body representing trainers and behaviour counsellors among others. Their mandate includes the responsibility to admit and discipline trainers and behaviour counsellors, determine the applicable education content and level as well as the practical skills that the prospective behaviour counsellors have to fulfil (McBride and Montgomery 2018).

The ABTC has two certifiable types of behaviour counsellors, Animal Behaviour Technician (ABT) and Clinical Animal Behaviourist (CAB) with different requirements on education as well as practical skills. The theoretical skills and the performance criteria are assessed in accordance with and detailed in the ABTC Standards, one specific for ABT (ABTC 2021c) and another for CAB (ABTC 2021d). There are two different paths to fulfil the educational requirements. The first is to enrol at an approved university or through a specific approved private

education company and after successful completion the educational portion is fulfilled. The other is called APEL (Accreditation of Prior Experience and/or Learning) and is the path for the practitioner with an extensive experience that have taken many different private courses or university classes from colleges not pre-approved by ABTC.

The content and depth of study differs between Animal Behaviour Technician and the Clinical Animal Behaviourist. The Animal Behaviour Technician depth of education is in Great Britain labelled level 5 while the Clinical Animal Behaviourist is level 6 (ABTC 2021a). Level 5 is approximate to the equivalent of university studies in the second year of a three-year bachelor degree while level 6 is approximately at post graduate level or the last year of a bachelor degree (UNI Britannica 2023). There are approved practitioner organizations with the assignment among others to prepare the member candidate with practical mentorships for the practical skills assessment against the Performance Criteria detailed in the ABTC Standards. The practitioner organization assess the student's practical skills after extensive mentorships. When the student has fulfilled the theoretical and then the practical skills, he/she is then granted an ATB or a CAB and registered and listed at the ABTC for the public to access.

2.6.3 The Swedish behaviour counsellors licensing and certification

The Swedish behavioural counsellors have a dog industry organization called The Swedish dog professionals and they provide H-branding, which purpose is to give consumers of dog services such as training, groomer, behaviour counselling and physical rehabilitation a chance to pick providers that have a validated educational background to perform such services. The individual Behaviour counsellor with a business is the one that applies for H-branding and get their credentials evaluated (Sveriges Hundföretagare 2021). H-branding is not a certification and lack standards besides LIMA (Sveriges Hundföretagare 2023). Private enterprises provide the behavioural counsellor education with no educational prerequisites, however, most require or provide dog trainer education. The Swedish dog professionals provides a list of content requirements but lacks requirement of depths and analysis of the subject. No assessment is required but the private school creates their own student assessments. There is a requirement that a portion of the education is done in person, and it should include 20 hours of mentorship when the candidate is working with cases at home (Sveriges Hundföretagare 2021).

3. Aim and questions

The aim of this master thesis was to survey the demographics of the Swedish Behaviour Counsellors and to evaluate the scientific evidence for efficacy of behaviour interventions of canine aggression and fear/anxiety. The intention was to propose a model for evidence based clinical canine behaviour interventions.

3.1 Research questions

1. What scientific evidence exists for the efficacy of behaviour modification interventions for canine fear/anxiety and aggression?
2. What are the demographics of the Swedish canine behaviour counsellor regarding background, education, and experience?
3. What methods are the Swedish canine behaviour counsellors using and what intervention difficulties are they identifying for behaviour modification interventions of canine fear/anxiety and aggression?
4. What scientific studies and changes to the behaviour counsellor are needed to attend to missing knowledge for the efficacy of behaviour modification interventions for canine fear/anxiety and aggression?
5. Can a model for evidenced based clinical canine behaviour treatment be developed and proposed, that identifies areas for improvement and development.

4. Materials and methods

4.1 Systematic Literature review

Two search engines were used to find relevant scientific papers. PRIMO, the search engine from SLU's library, was used and Web of Science. The PRIMO search words were CANINE, AGGRESSION and separately CANINE, FEAR AND AGGRESSION. The Web of Science search words were EFFICACY, CANINE, AGGRESSION, TREATMENT and, separately, EFFICACY, CANINE FEAR, ANXIETY, TREATMENT. Figure 7 illustrates the search methodology. The vast majority of the articles described characteristics and other aspects of canine anxiety/fear and aggression behaviour problems whereas behaviour interventions studies were rare. The result was 7 articles that measured the efficacy of behaviour modification intervention. Excluded were articles including medication and other supplements as part of the behaviour modification intervention. Only articles from year 2000 and forward were included.

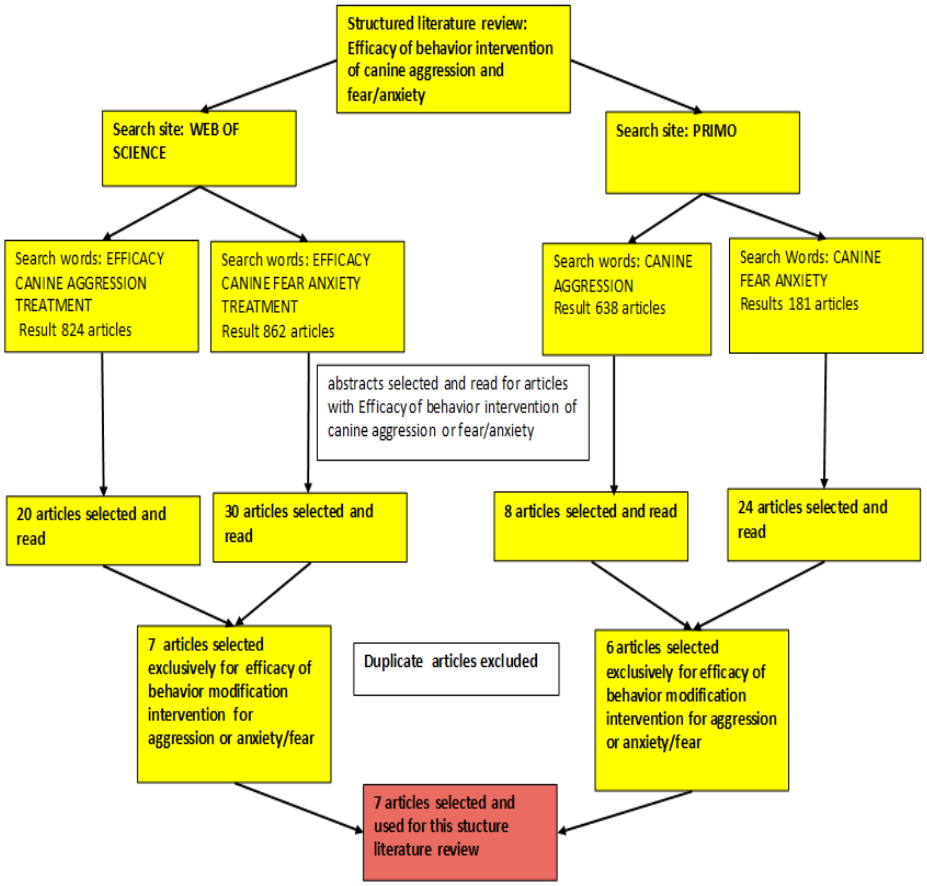


Figure 7. Illustration of the process of article selection for efficacy of behaviour modification intervention for aggression and fear/anxiety.

4.1.1 Methods for evaluation of included articles

Internal validity is a measure of a study's design reliability and describes among other factors whether the study is controlled and has accounted for confounding factors, biases and is replicable. It is not a computed value, instead it is subjectively evaluated (Andrade 2018). As internal validity is a measure of experimental methodology and for the efficacy of behaviour intervention for aggression and fear/anxiety replicability, confounding factors and biases are critical factors. Factors such as study design and clarity of behaviour modification plan were also included. Table 2 describes the evaluated factors that are included. The study was assigned an x if the factor was present. The studies were evaluated as low, medium and high internal validity depending on how many experimental design factors as well as confounding factor that was not addressed and present in the study. The purpose of this systematic literature review was to describe and evaluate scientific studies regarding efficacy of behaviour modification interventions for canine aggression and fear/anxiety. It should be noted that other factors also can affect a study's internal validity and that the purpose of most included studies in this literature review are not exact analogues with intention of this systematic literature. External validity determines if the study results are valid for generalizations (Andrade 2018). Since no study was given high internal validity for assessing the efficacy of behaviour modification interventions for aggression and fear/ anxiety, none was given anything but low external validity.

Table 2. Elected and defined factors for evaluation of internal validity for the selected studies of efficacy of behaviour intervention for aggression and fear/anxiety

Defined confounding factor, biases, and experimental design	**Description / why affecting study validity**
Owner reported (OP)	Owner surveys are problematic. The owner can for instance overestimate their ability to interpret the dogs' behavior
Owner bias (OB)	A belief for instance that their dog is different from other dogs
Owner compliance (OC)	Owner might not comply with behaviour modification, while reporting as complying or not
Caregiver placebo (CP)	When investing time and money into treatment there will be a placebo effect and the owner might believe that the dog has improved regardless
Controlled study (CL)	For a study's validity it should be a double-blind controlled study. However other study designs might be warranted
Lacking behaviour modification plan description (LBW)	If lacking adequate description makes the study replicability impossible
Variation in behaviour modification methodology(VBM)	Behaviour modification interventions should be individual, and if missing is detrimental for scientific validity
Behaviour modification efficacy not primary hypothesis (EBM)	The measurement purpose of the study was not clearly the efficacy of behaviour intervention

4.2 Survey of Swedish behaviour counsellors

A survey was created through Google form with a mix of multiple-choice questions and short open answers and an email was sent out to all H-branded behavioural counsellors located though Sveriges Hundföretagare (2023a).

An additional search was also initiated to locate any other additional behaviour counsellors. The search word “hundpsykolog” (behaviour counsellor in Swedish) was paired with a name of a county. All 290 Swedish counties were included in individual searches.

4.2.1 Data analysis

The demographics of behavioural counsellors were analysed using descriptive statistics through Excel. Means, averages, and distributions were calculated and displayed in tables and diagrams.

To display the number of total treated cases of a behaviour problem, the individual behaviour counsellor's average number of cases was multiplied by the number of counsellors that had chosen that specific distribution. While the distribution of cases is displaying the number of cases (as a group) each behaviour counsellor has treated.

The short answers where analysed and coded in the following way:

1. Identical and very similar answers were grouped together.
2. Each group was given a code.
3. Each code was identified and described.
4. Each code was summarized and displayed in a table/figure.

Only answers mentioned by more than one behavioural counsellor were presented in the results. No further information was given than the questions for both the multiple choice as well as the short answers.

5. Results

5.1 Systematic literature review

Seven articles, based on the search criteria, could be included in the systematic literature review from the search. The articles were evaluating efficacy of behaviour modification interventions for aggression and fear/anxiety in dogs. The behaviour problem and behaviour modification intervention methods used in the studies are listed in table 3.

Table 3. List of included articles, the behaviour problem of target and the utilized intervention method, from the systemic literature search on efficacy of canine behaviour modification interventions for the behaviour problems aggression and fear/anxiety

Author	**Behaviour problem**	**Intervention method**
Butler et al. 2011	Separation anxiety	Systematic use of desensitization and counterconditioning
Herron et al. 2014	Separation anxiety	Counseling prior to adoption
Monteny and Moons 2020	Fear of family member	Desensitization, operant conditioning, management, owner education and enrichment
Stellato et al. 2019	Fear of veterinary situations	Systematic use of desensitization and counterconditioning
Pfaller-Sadovsky et al. 2017	Resource guarding (objects)	Operant conditioning with clicker and back chaining
Mehrkam et al.2020	Resource guarding (food)	Functional analysis and consecutive differential reinforcement of different behaviour
Orihel and Fraser 2008	Inter-dog aggression in shelters	Systematic use of desensitization and counterconditioning

The seven studies all had different study interventions, they all measured different parameters and the outcome/efficacy of the studies are all different (Table 4).

Table 4. List of number of dogs, study intervention, measurement, and outcomes from the systemic literature review of efficacy of behaviour problem interventions for canine aggression and fear/anxiety

Author	No (dogs)	Study intervention	Measure	Outcomes
Butler et al. 2011	8	Efficacy of systematic counter conditioning and desensitization, for separation anxiety	Survey owners grade separation symptoms before/after interventions	Significant decrease in frequency and severity of symptoms
Herron et al. 2014	133	Preadoption owner counseling of separation anxiety	Owner survey interview (1 month post adoption) of symptoms of separation anxiety	Separation anxiety reduction not significant when given preadoption counseling
Monteny and Moons 2020	5	Improve social fear with management changes, owner education and desensitization	Owner survey and interview describing perceived behaviour improvement	Short-term increase in relaxation and decrease in coping behaviours
Stellato et al. 2019	37	Efficacy standardized counter conditioning and desensitization on preexisting veterinary fear	Compliance and weekly clinic visits and exam at 2 and 4 weeks including physiological and behavioural measurements	44% of owners noncompliant and displayed reduction in fear as indicated by decrease in posture
Pfaller-Sadovsky et al. 2017	4	Efficacy of resource guarding intervention with back-chaining and clicker	Recorded owner trainings success rate of releasing object and object guarding behaviours	Object guarding behaviours decreased and object releasing increased
Mehrkam et al. 2020	1	Efficacy of functional analysis and differential reinforcement of different behaviour on food guarding	Frequency and duration of food guarding during a feeding session	Decreased frequency and duration of food guarding when fed
Orihel and Fraser 2008	16	Efficacy of counter conditioning and desensitization to decrease inter-dog aggression at shelters	Recording of duration aggressive behaviours in dog while stimulus dog passed by using counter conditioning and desensitization methods	Temporary decrease in inter-dog aggression that return after cessation of treatment

The confounding factors and the experimental methodology were identified and recorded, and the internal validity was evaluated for the seven studies (Table 5). Five of the seven studies were controlled studies, however the majority of studies

had confounding factors and biases present. Several of the studies had variations in the prescribed behaviour modification thus making comparisons difficult. All studies except one were granted low internal validity based on the present confounding factors, biases, and experimental methodology. Mehrkam et al. (2020) was granted low validity due to the sample size of one dog.

Table 5. Results of estimation of confounding, biases, and experimental methodology factors from the systemic literature review of efficacy of behaviour problem interventions for canine aggression and fear/anxiety

Author	**Confounding factors and biases** OR=owner reported OB=owner bias OC=owner compliance CP=caregiver placebo					**Experimental methodology** Cl=controlled study LBW= Lacking behaviour modification plan description VBM= Variation in behaviour modification methodology EBM= Behaviour modification efficacy not primary hypothesis			
	OR	**OB**	**OC**	**CP**	**Validity**	**cl**	**LBW**	**VBM**	**EBM**
Butler et al. 2011	x	x	x	x	low	present		x	
Herron et al. 2014	x	x	x	x	low	present	x	x	x
Monteny and Moons 2020	x	x	x	x	low	missing		x	
Stellato et al. 2019	x	x	x	x	low	present			
Pfaller-Sadovsky et al. 2017	x	x		x	low	missing			
Mehrkam et al. 2020					low	missing			
Orihel and Fraser 200					medium	present			

5.2 Survey of Swedish Behaviour Counsellors

The survey had an answering rate of 39% (n=56). Of the 146 potential survey participants 19% were not H-branded and of those 58% were employed by businesses that had H-branding for behaviour counselling. Among the participating behaviour counsellors only 7 of the 56 were not H-branded however all participating behaviour counsellors had qualifications to be H-branded. Three

percent of the potential participants were male while five percent of the survey participants were male.

Most participating Swedish behavioural counsellors had attended Swedish private enterprises that provide behavioural counsellors education while 13% had acquired their education from other means, for example abroad. The largest behaviour counsellors education provider was Hundens Hus with 45% of the behaviour counsellors being graduates from the school (Figure 8).

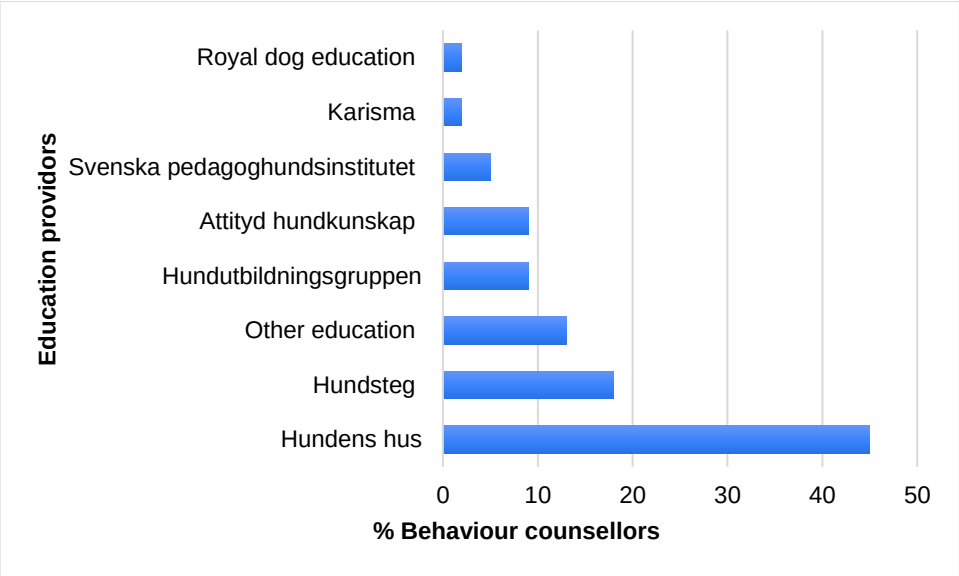


Figure 8. Educators of behavioural counsellors where the respondents had received their education shown as % of participants (n=56).

There was variation in how long the participating behavioural counsellors had worked as such (Figure 9). The average behavioural counsellors have worked from 5-10 years (mean 7.8 years). The median behavioural counsellors have worked 2-5 years in this survey.

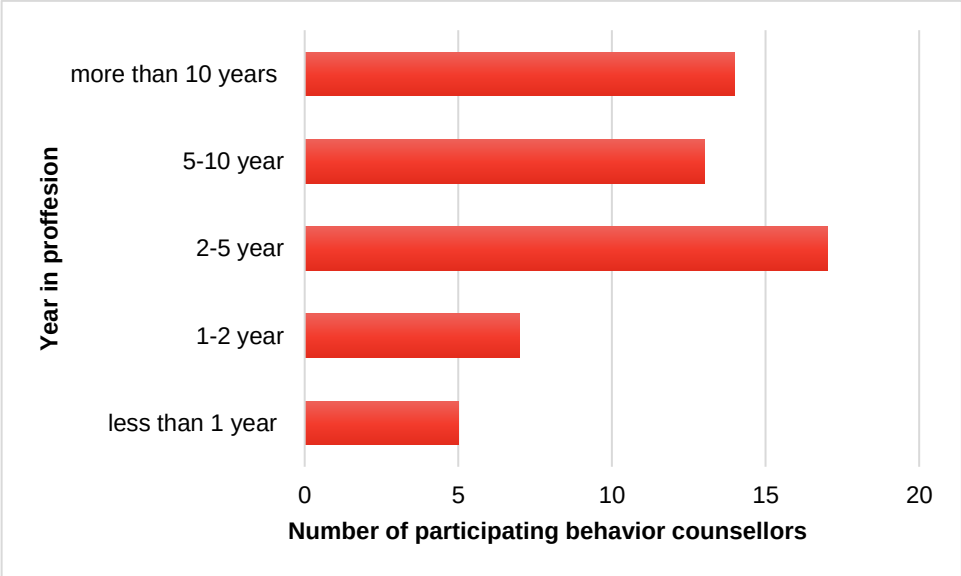


Figure 9. Number of years working as a professional behavioural counsellor in Sweden (n=56).

The majority of the Swedish Behavioural Counsellor's formal education level was high school degree with the variation from basic school all the way to a PhD (Figure 10).

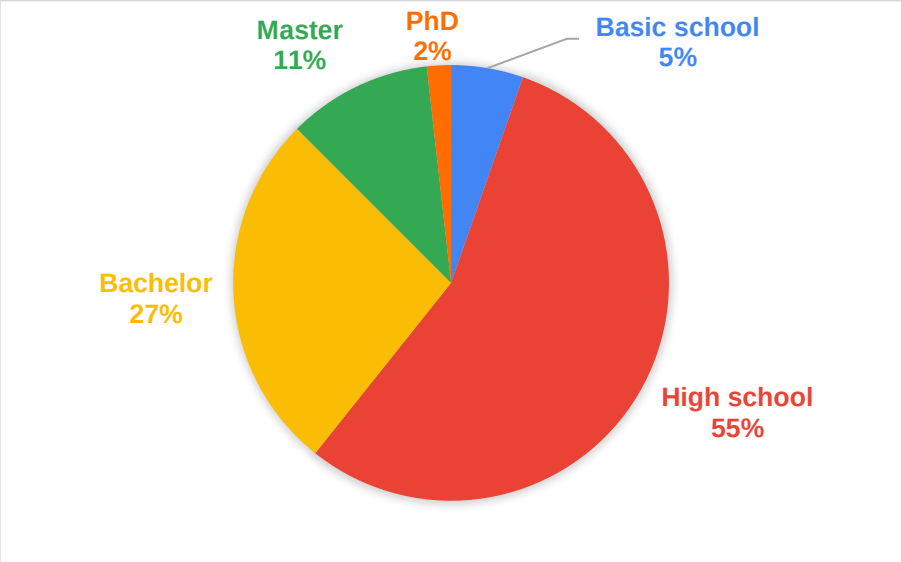


Figure 10. Percentage of the Swedish behaviour counsellors' highest educational level (n=56).

There was a great variation in how much the behaviour counsellors were active in the profession in Sweden (Figure 11). A majority worked parttime with behaviour counselling averaging 17.5h/week. The median working time is approximately 30% of a 40-hour week (12h).

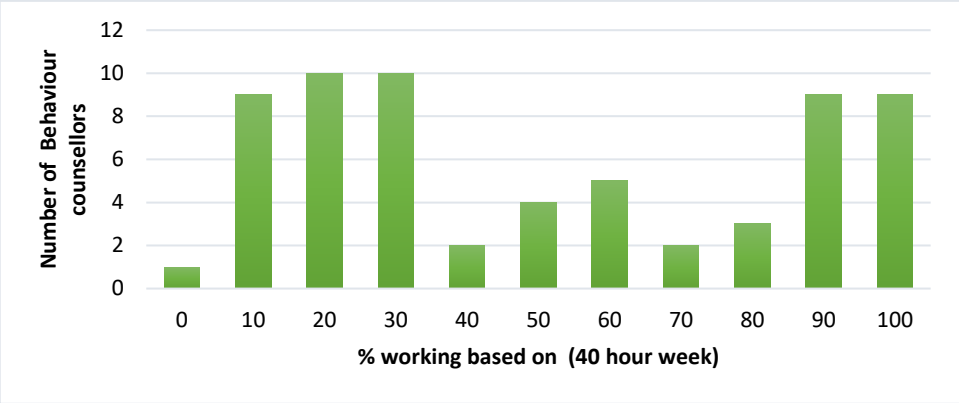


Figure 11. Number of behaviour counsellors in Sweden and their percentage of working time based on 40h/week (n=56).

The total number of different types of aggression interventions the behavioural counsellor had treated during their career were estimated to around 9200 (Figure 12). This number includes all aggression cases treated by behaviour counsellors with both extensive as well as limited experience. A large proportion of all cases, regardless of behaviour problem are treated by experienced counsellors that have been active for a longer time and thus has treated more than 50 cases. Fear aggression and dog aggression are the cases that has been handled the most while predation and barrier frustration have been treated the least. It should be noted that some behaviour counsellors did not answer all questions, and this explains why n differs from the participating n=56.

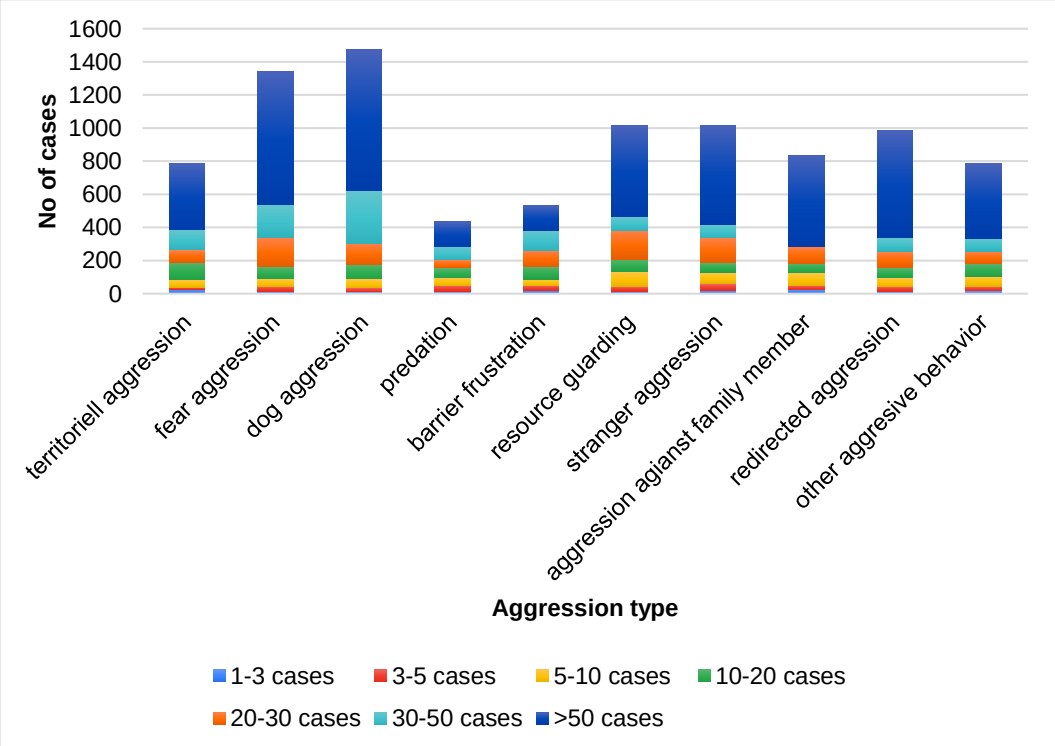


Figure 12. Number of total cases treated by the behaviour counsellor per aggression type (n=53-55).

Another way of presenting this data to get a visual understanding of how many cases each behaviour counsellor has treated during their career is to look at the distribution of the number of cases that the individual behaviour counsellor has treated during their career (Figure 13).

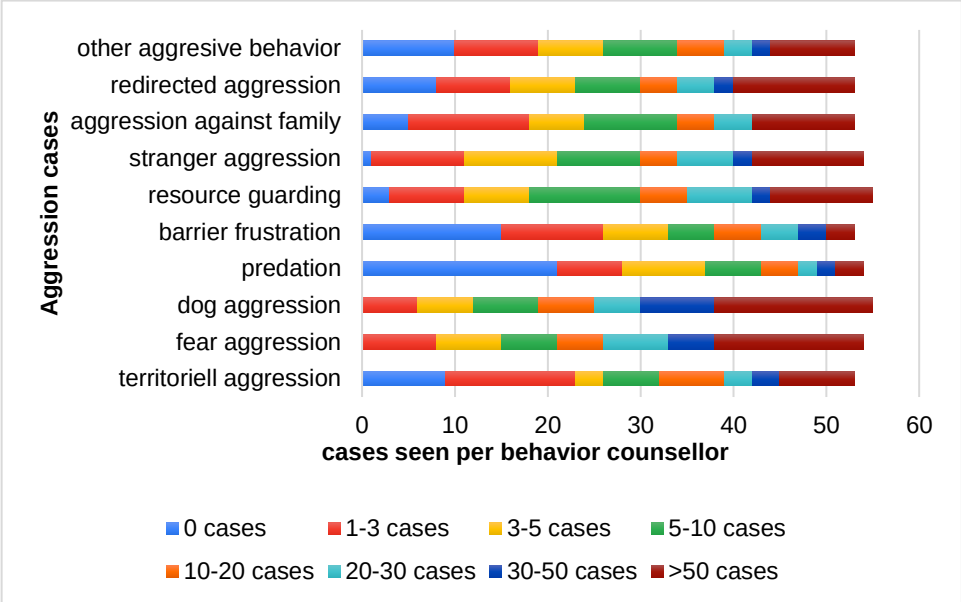


Figure 13. Distribution of aggression cases treated per individual counsellor during their career (n=53-55)

More than 50% of the behaviour counsellors answering the survey have treated up to 10-20 cases of fear aggression and 20-30 cases of dog aggression in their career. Aggression problem behaviours such as redirected aggression, aggression against family members, stranger aggression, resource guarding and territorial aggression are cases that a majority of behaviour counsellors have treated 5-10 number of cases in their career. Predation and barrier frustration are the aggression behaviour problem treated the least with 3-5 cases through their time in the profession.

In this survey, the behaviour counsellor had treated approximately 9500 cases of anxiety and fear during their entire career (Figure 14).

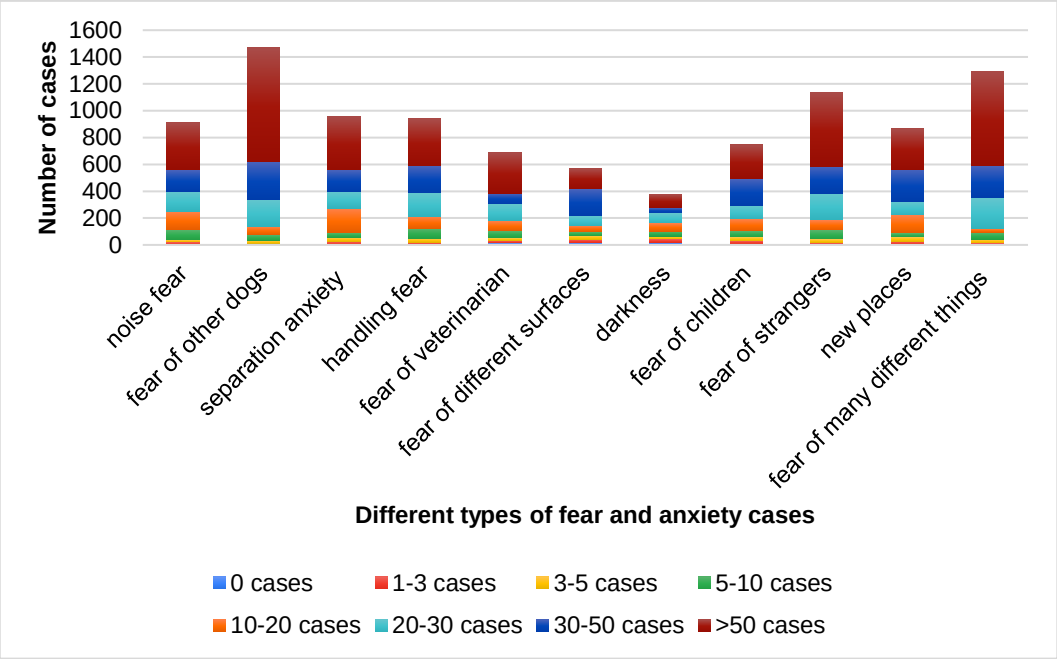


Figure 14. Total number of fear and anxiety cases treated by individual behavioural counsellor during their career (n=54-56).

Fear of other dogs stands out as the fear/anxiety behaviour problem that have been treated most commonly by behavioural counsellor during their career followed by fear of many things and fear of strangers. While fear of different surfaces, darkness, and veterinarians where less frequently treated.

If this data is instead presented as cases handled per individual behavioural counsellor several interesting facts appear. All behavioural counsellors regardless of experience had treated separation anxiety cases, however separation anxiety cases are (totally over the career) not the fear anxiety behaviour that are handled the most (Figure 15). Fear of other dogs and fear of many things stand out whereas the majority of the behavioural counsellors had treated up to 20-30 cases (Figure 15).

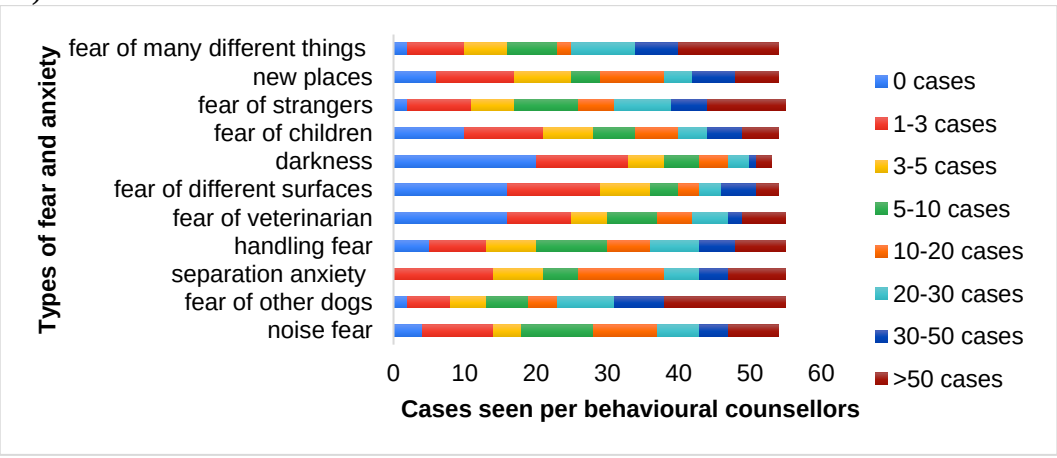


Figure 15. Distribution of cases of fear and anxiety treated by individual behaviour counsellor (n=54-56).

The total number of behaviour problems (other than aggression and fear/anxiety) in this study where approximately 9300 totally handled by behaviour counsellors. Fifty percent or more of the cases (not housebroken, digging, begging and escaping) were treated by behavioural counsellors that has handled >50 cases. Other behaviours where not defined in the survey. The identified behaviour cases seen in the highest frequency was leash pulling and mouthing (Figure 16).

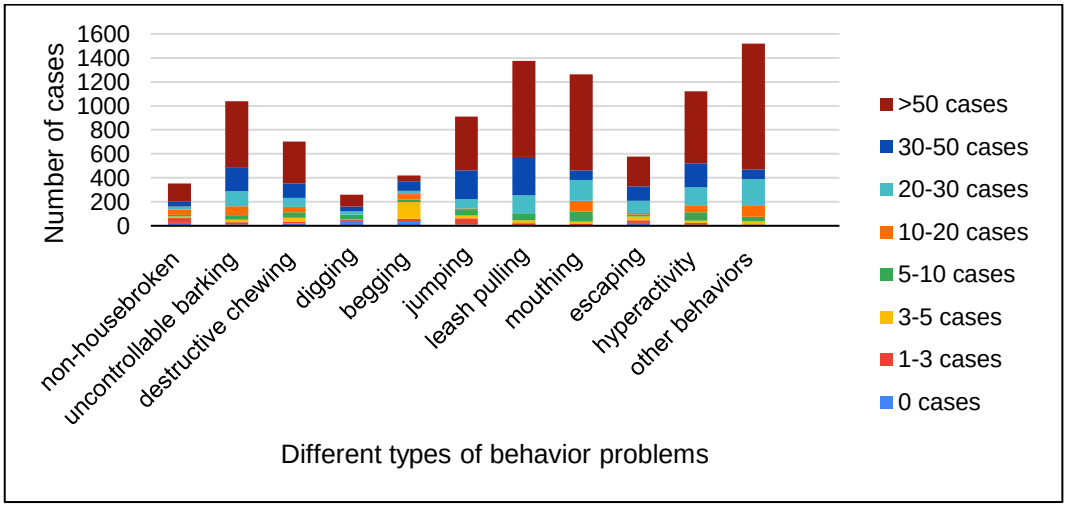


Figure 15 Total number of behaviour problems other than aggression and fear/anxiety treated by the behaviour counsellors during their career (n=56)

By analysing how many cases are seen by the individual behavioural counsellor other data becomes evident (Figure 17). Uncontrollable barking and hyperactivity are problem behaviours that the majority of behaviour counsellors had treated 5-10 cases of. No cases of digging and escaping had been handled by the majority of behaviour counsellors while 10-20 cases of mouthing has been treated by the majority of BC. Leash pulling had the most cases handled by the majority of behaviour counsellors with 20-30 cases.

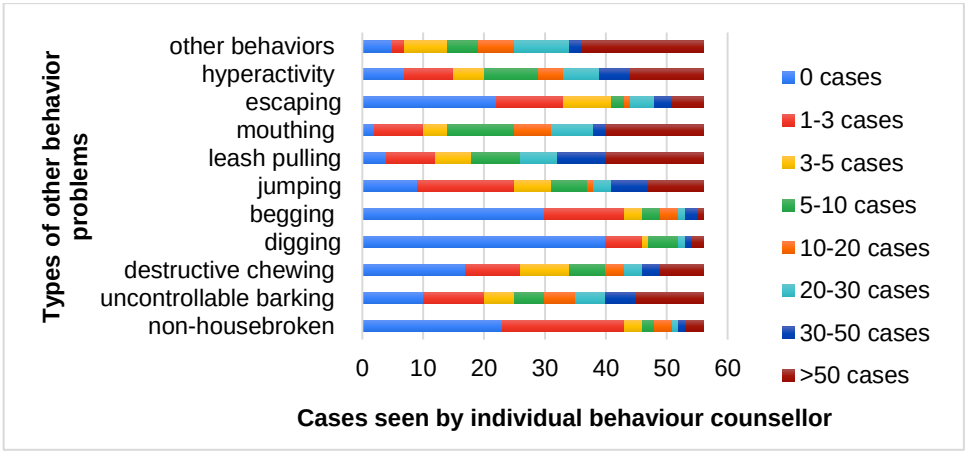


Figure 16. Distribution of cases of behaviours problems other than aggression and fear/anxiety treated by the individual behaviour counsellor during their career (n=56).

The last four questions of the survey were short open answers, where the behavioural counsellors were encouraged to summarize their answers even using lists instead of sentences. No further information than the questions were provided. Their answers were categorized and coded into different categories and presented in figures (18-21).

Figure 18 displays the coded answer to the following short answer questions: "What factors do you believe have the greatest impact on the efficacy of behaviour counselling?" Of the behaviour counsellor 96% state that the owner's motivation and engagement are a major factor affecting the efficacy of behaviour counselling. An additional 31% stated that a very important factor was owners understanding of the commitment necessary for the intervention of serious behaviour problems. The owner's ability, such as knowledge base and prior dog training experience was considered an important factor by 13% of the behaviour counsellors. Only a fourth (24%) considered that the management of the dog's environment or lack thereof as a key factor affecting efficacy of treatment. The dog's genetic makeup was only deemed important by 9% of behaviour counsellors, and 19% regarded the dog's health problems affecting efficacy of behaviour counselling. The ability of the behaviour counsellors to teach the owner was only thought an important factor of 4% of behaviour counsellors, while 9% recognized the importance of the behaviour counsellors' ability to accurately analyse and diagnose the behaviour problem.

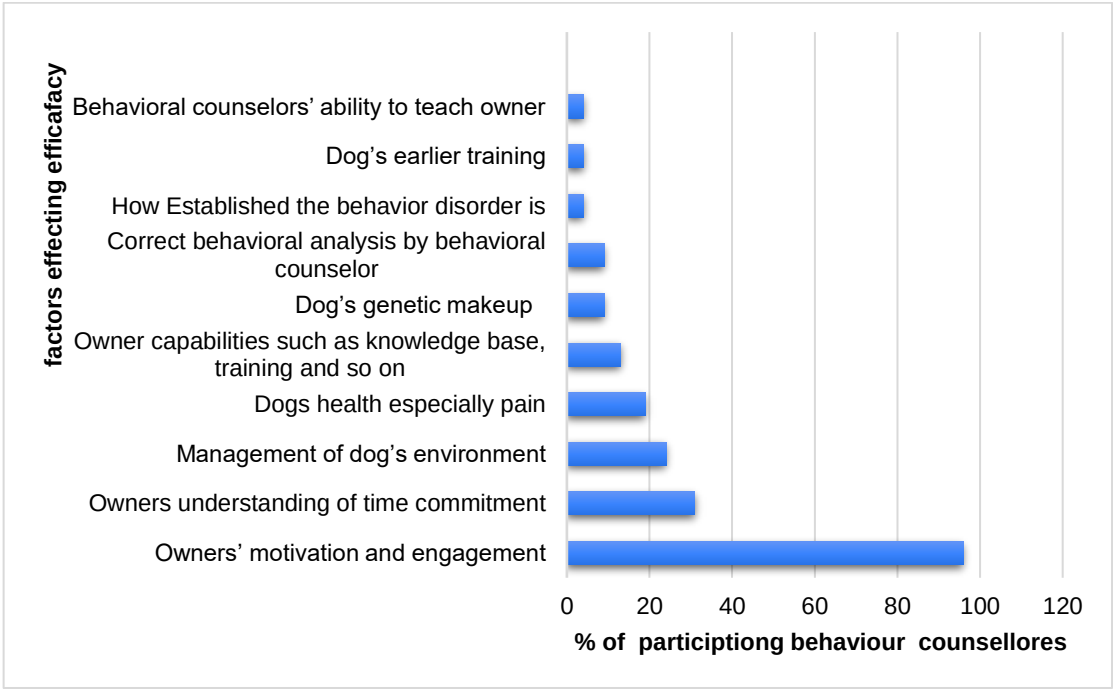


Figure 17. Factors affecting the efficacy of behaviour counselling according to % of the participating behaviour counsellors.

Figure 19 displays the distribution of behaviours that the participating behaviour counsellors considered hard to treat. Thirty-seven percent of behaviour counsellors regarded noise fear and phobia hard to treat/change, while separation anxiety was difficult to treat according to 31% of the behaviour counsellors. Uncontrollable barking was deemed challenging by 15% of the behaviour counsellors, the same percentage was determined for owner compliance. Nine percent mentioned aggression without further categorization as a behaviour hard to remediate. Aggression against strangers, aggression against family members and dog bites without warnings were all hard to treat/change by 7% of the behaviour counsellors. Post traumatic stress syndrome (PTSD) was mentioned as hard to treat by 6% as well as predation, resource guarding, behaviours with underlying pain, genetic predisposition, and many different environmental fears. Only 4% referred to repeated biters and severe anxiety as difficult to remediate.

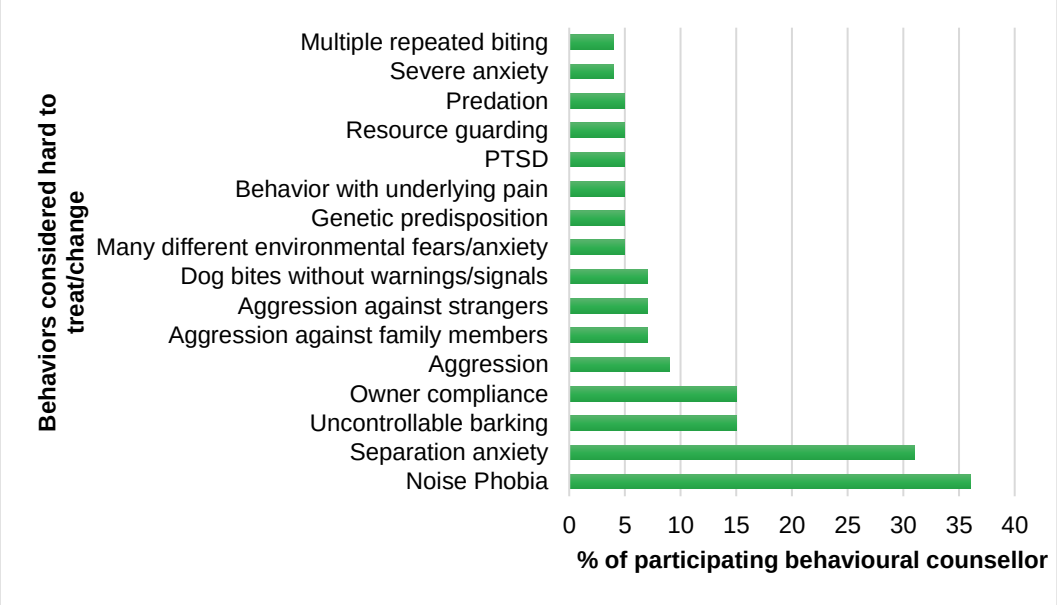


Figure 18 Behaviour problems that % of participating behaviour counsellors consider hard to treat/change.

To ensure that the behaviour counselors were not influenced by the survey question information short anwers with no further instructions were used. The question was simply "What methods do you use to treat aggression". Figure 20 is showing the distribution of methods that the behaviour counsellors are using to treat aggression cases in dogs. There was variation in the number of methods each behaviour counsellors listed, some only listed one while others mentinoed several.

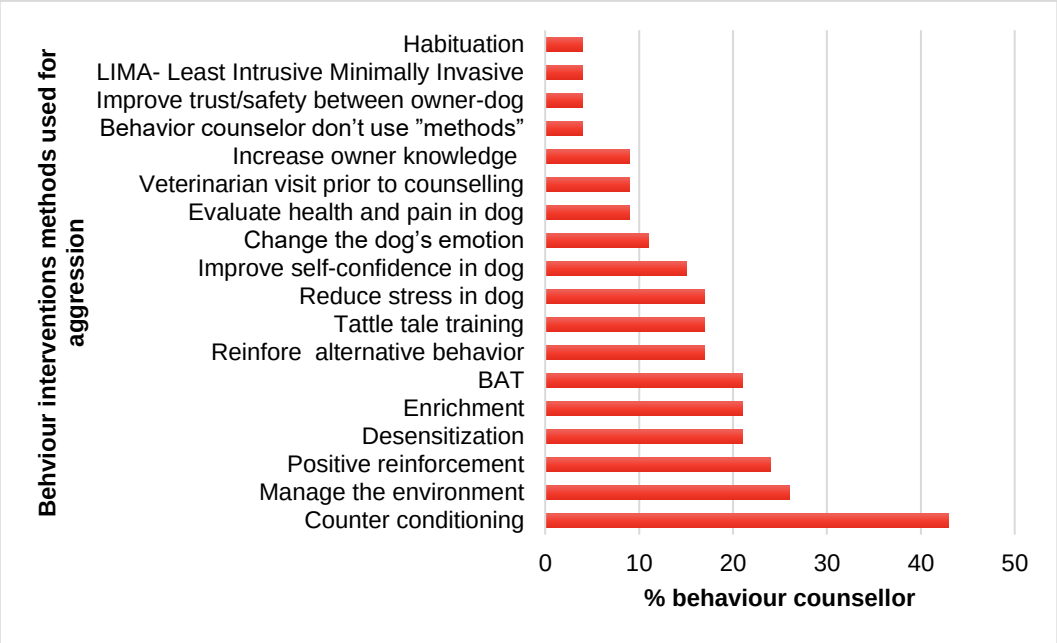


Figure 19 Methods used for behaviour modification intervention/treatment for aggression by % of participating behaviour counsellors.

Forty three percent of the survey participants said that they used counter conditioning as one method to amend aggressive behaviors while 26% stated that management of the dog's environment was an important method. Positive reinforcement was used and mentioned by 24% of the behavior counsellors. Desensitization, enrichment and BAT (Behavior Adjustment Techniques) were methods for aggression interventions applied by 21% of the behaviour counsellors. BAT is a type of method for treatment of dog aggression developed by Grisha Steward (Steward 2013). In BAT the dog is allowed freedom to approach and distance from an emotional evoking stimulus while the trainer is maintaining the dog under threshold. If any negative reaction occurs then the dog is removed from the stimulus (Stewart 2013). Seventeen of the behaviour counsellors used Reinforcement of incompatible alternative behavior, tattle tale training and reducing the dogs stress as aggression behavior interventions. In Tattle tale training the dog is looking to you when it sees the stimulus you have been training, this was initially developed by Eva Bodfäldt (2016). Constructional aggression treatment (CAT) methods were independently applied by 15% of the behaviour counsellors. In CAT the dog is essentially exposed to stimulus that would trigger an aggressive behavior below the threshold for the behavior. The dog is kept in the position waiting for an alternative behavior besides aggression to be displayed by the dog. The dog is then rewarded by being removed from the situation (Snyder and Rosales-Ruiz 2007). Only 9% of the behaviour counsellors recommended a visit to the veterinarian before commencing intervention while another 9% themselves made a health status evaluation of the dog. Nine percent listed that it was very important to educate the owner about aggression. "I don't use methods for aggression

intervention" was stated by 4%, while another 4% individually mentioned improving trust between owner and dog and using LIMA. In addition another 4% stated that they use habituation for intervention of aggression behavior problems.

The behaviour counsellors were asked what methods they use for behaviour interventions of fear and anxiety. A third (34%) said they used counter conditioning and desensitization as behaviour intervention methods (Figure 22). Positive reinforcement was used and mentioned by 24% of the behaviour counsellors. Desensitization, enrichment, and BAT were methods for fear and anxiety interventions applied by 21% of the behaviour counsellors. Management was a method used by 16%. Recommendation of nutritional supplement was a method applied by 13% of the behaviour counsellors, while 9% used psychopharmacological medication. Tattle tale training, change dogs' emotions (CER), operant conditioning and evaluate the pain was methods used individually by 7% of the behaviour counsellors, while 5% used CAT and start stop behaviour. Finally, 4% stated that they used one of the following, reinforcement of alternate behaviour, enrichment, LIMA and "don't use methods".

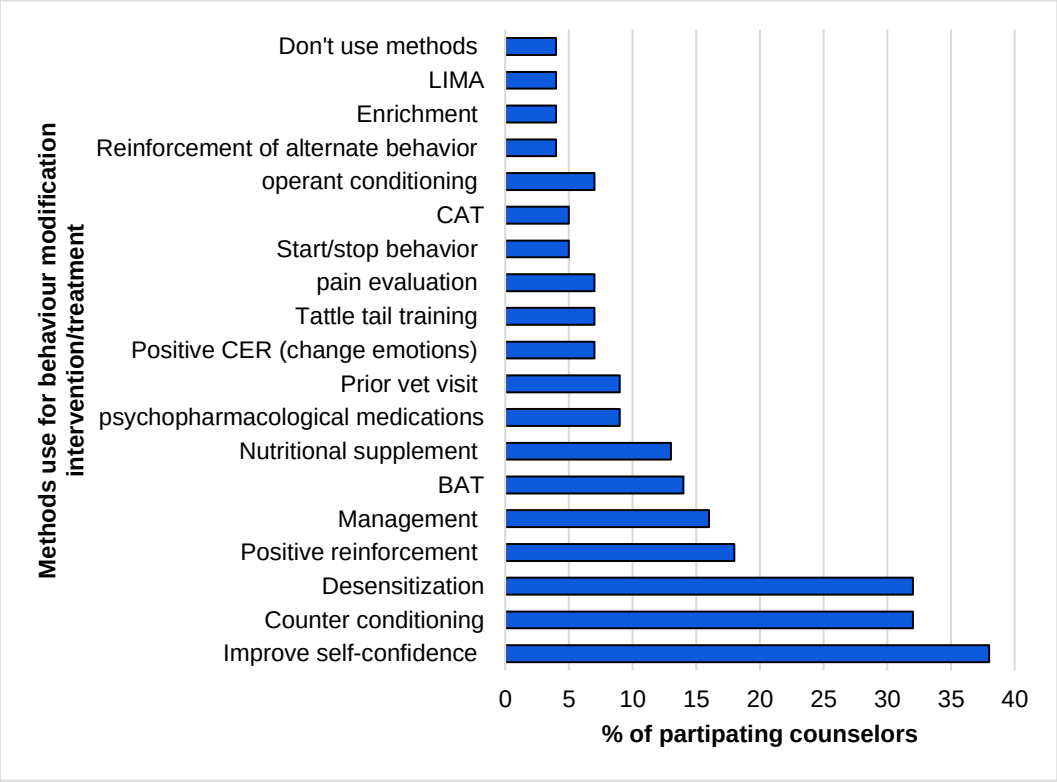


Figure 20. Methods used for fear and anxiety behaviour modification interventions cases by % of participating behaviour counsellor.

6. Discussion

The discussion composition format follows the methods and results to facilitate organization. First, a discussion of the scientific evidence on the efficacy of behaviour modification intervention for aggression and fear/anxiety is conducted. The results of the survey of the Swedish behaviour counsellors are thereafter discussed. Finally, the discussion advances to a proposed evidence-based model for canine behaviour intervention for aggression and fear/anxiety.

6.1 Systemic Literature Review

There is surprising lack of research into the effectiveness of behaviour modification programs in canine aggression and fear/anxiety. Only 7 articles since year 2000 were found that fulfilled the inclusion criteria and were included in the structured literature review. The scientific evidence for efficacy of behaviour modification interventions for aggression and fear/anxiety without medications in canines are almost non-existent. Even including medications, the evidence is poor and often non-existent. All studies except one were granted low internal validity based on the present confounding factors, biases, and experimental methodology.

There were no articles that have investigated the same behaviour problem intervention, hence a comparison of efficacy and results are impossible between articles. Therefore, in this review the focus is on scientific methodology and confounding factors with the idea of reviewing the existing scientific evidence.

6.1.1 Review of articles

There is one article of the seven that really stands out with none of the confounding factors and with an excellent experimental procedure including being a controlled study (Orihel and Fraser 2008). This study was taking place in a shelter where conspecific aggression is one of the reasons dogs are turned in for adoption. The behaviour intervention against conspecific aggression consisted of a counter conditioning and desensitization procedure. In essence, the aggressive dogs were exposed to a stimulus dog and during the trial the distance to the stimulus dog decreased as well as the stimulus dog was changed. The control dogs received no behaviour modification. The study was performed by the shelter staff who changed

roles in the experiment during the study, in a balanced way. This study could be replicated and has none of this review's identified confounding and methodology problems. The largest problem with this type of study is that unless performed on a shelter the cost is probably limiting and one must remember that in reality it is the dog-owner that perform the behaviour modification intervention.

There is a second study that displays none of the review's identified confounding and methodology problems (Mehrkam et al. 2020). This is not a strong scientific study since it is a case study of resource food guarding in one single dog. Functional analysis is a method used in human psychology but never implemented in intervention of canine food guarding. Functional analysis is an interesting approach and can be used for identifying and organizing for instance, environmental factors associated with stereotypic behaviours in dogs (Hall et al. 2015). The author is not well versed in functional analysis and the study description and experimental design is somewhat confusing further, it is not clear why certain contingencies were chosen. However, the reinforcement of incompatible behaviours were successful using the intervention of functional analysis and additional operant conditioning. The intervention was performed by the experimenter and confounding owner factors were well controlled. It is problematic that the dog was put over the threshold of behaviour and displayed resource guarding during the intervention and this is counterintuitive in comparison to traditional desensitization. Progressively the frequency of food guarding did decrease and was for this single case an effective intervention. The experiment was based partly on negative reinforcement as the removal of the hand was used as one reward for not guarding. Negative reinforcement is an aversive training method according to LIMA and as such should not be implemented as a training method if alternatives exist. An alternative is presented in the book MINE by Donaldsson (2002a) to resolve or improve resource guarding.

The second article that investigate the efficacy of behaviour modification intervention against food guarding is using operant conditioning in the form of clicker and back chaining. Back chaining is a series of operant trained behaviours starting with the final behaviour and adding the next preceding behaviour in succession as the dog becomes proficient. This is a rather novel approach to resource-guarding intervention. Medina and Hurtado-Parrado (2017) used four dogs and started with training a back-chained object release on a neutral object, followed by training on a guarded object. The owner performed all the training. The training sessions were filmed and scored by the researchers as to the success of releasing the object, while the owner scored any object guarding behaviours. After training, all dogs initially decreased the severity of their object guarding behaviours, but there was a recurrence of the object guarding when retested after

three months. This is a very interesting study and since many trainers find it difficult to use classical conditioning the approach with operant conditioning will appeal to many. This is a well performed case study, however the fact that the owner recorded the object guarding behaviours are problematic and there is always a great risk of owner bias and even a caregiver placebo effect when an invested owner record results. An improvement of the study would be to only assess results based on the video, to exclude the owner, however this might not make sense. Maybe the fact that the sessions were recorded works as an owner bias reduction.

Another frequent approach to behaviour modification intervention is to give short instructions and a handout, perhaps at dog training class such as puppy classes, for the prevention of dogs' behaviour problems. One can wonder if that is an effective method. In the study by Herron et al. (2014) it was found that, a 5-minute educational session and a handout on how to prevent separation anxiety was not significant in reducing separation anxiety in shelter adopted dogs. Separation anxiety is a difficult disorder to address, and the simplified instructions were not adequate for its treatment. It would be very interesting to see more research on owner education to prevent and manage behaviour problems. Maybe the understanding and management of behaviour disorders are all in the hands of the owners understanding of the problem (McLean and McGreevy 2010)? This study had all the identified problems in confounding and experimental methodology factors. It was conducted using a retrospective owner survey which can have great confounding and bias problems (Choi and Pak 2005). These problems can be reduced by the fact that it was a randomized controlled study and both groups show the potential same confounding and methodological problems. It requires great care when constructing a survey so that the answers does not reflect and enhance biases (Choi and Pak 2005).

The next article was using a combination of survey and interview data, and this somewhat decreases the risk of confounding factors and biases. In this case study by Monteny and Moons (2020), a behaviour modification plan was used on five dogs with social fear of their owners. The plan included three sections, teaching the owner dog behaviour knowledge, managing the dog's environment including enrichment and finally a systematic behaviour modification plan. The research behaviour counsellors helped the owners understand that their dogs were socially fearful as they learned about dog behaviours. The management plan's focus was to reduce overall stress as well as including enjoyable enrichment. The behaviour modification plan started with teaching the dog a predictability game and thereafter a safety cue was installed. Subsequently systematic desensitization was included. All dogs displayed improvement and decrease in their social fear after the treatment. This study describes in an excellent way the process of clinical canine

behaviour intervention with the help of behaviour modification and owner education. It displays the necessity of individual behaviour modification plans depending on the owner-dog dyad needs and exhibits how improvement is possible. However, individualized intervention plans reduces the replicability of the scientific study and illustrates a part of the problems between science and practice. There is a need for many more case studies that describes the canine behaviour modification process. This is the first step until more advanced studies with higher scientific vigour such as double-blind studies and decreases in confounding factors and biases can be carried out.

The following study was also an owner survey conducted by Butler et al. (2011) investigating separation anxiety with behaviour modification intervention of classic counter conditioning and desensitization. The owners to varied degrees followed the concurring treatments of counterconditioning and stay training. The author of this paper is very critical of stay training for separation problems or anxiety. The behaviour staying still, have nothing to do with the behaviour being left alone. Why dogs would make this generalization does not make sense. Of course, all training in accordance with LIMA (Friedman 2022) is helpful for the dog's overall welfare and should be encouraged. There is no research performed on stay training as separation problems intervention, so the effectiveness of such is an educated guess, like most in this field unfortunately. There is extensive behaviour counsellor and dog trainer experience that has not been scientifically evaluated (Hall et al. 2021). All eight dogs in this article had experienced some sort of trauma and developed separation anxiety. One could question if the neurological background developed through trauma is the same as the neurology of dogs that very easily develop separation anxiety if they have not extensively been trained through puppyhood. In this study, co-morphology is not discussed so the dog's problem with other types of fear and anxiety is unknown. Seven of the eight owners reacted with aversive treatment of the dog when they returned home after a separation event. By participating in this study, the owners where given education and instructions about canine behaviour and were told not to punish the dog. Punishment for dogs displaying separation anxiety is a main reason for collapse between the owner-dog bond (Landsberg et al. 2008) and can affect the entire family. Aversive treatment should be avoided (Todd 2018) and are especially problematic in the intervention of separation anxiety (Sargisson 2014). In the case of separation anxiety and aversive treatment it really is illuminating. When owner return to the home time had passed since the dog for instance ate the couch. There is a temporal separation of the behaviour and the consequence, and the dog will not make the connection of being punished and the destruction of the couch. Instead, the dog will learn that when its owner comes home it gets aversive treatment (Herron et al. 2009). It is hard to distinguish between care giver placebo effect or whether the owners feel

and understand their dog's behaviour better and thus grade their behaviour less severe regardless of the factual improvement. However, one can discuss whether this matter, if in fact the dog's behaviour have improved while the owners experience is such. The Quality of life for both dog and owner are probably improving when dog-owners understanding of the behaviour is improving.

The last study investigated veterinary fear that is very common among canines, with more than 50% displaying behavioural signs of fear when visiting a veterinary clinic (Mariti et al. 2015). Stellato et al. (2019) are doing pioneer scientific work when testing counter conditioning and desensitization for intervention for dogs with fear and anxiety when visiting a veterinary clinic. However, there is an entire movement called fear free (Fear free 2023) available in the world of practice dog training and behaviour counselling dedicated to fear at the veterinary clinic. In the study, the owners were after education given a counter conditioning and desensitization plan to train their dogs during a 4-week period. The dog returned to the clinic every week and at week 2 for an exam and finally after 4 weeks for a total exam and a final behavioural and physiological assessment. Interestingly the only parameters with significant result were fewer low body postures, while panting and lip licking increased. Compliance with the treatment can be a problem (Abood 2007) and in this study owner compliances with the training program despite volunteering for the study was dismal with 44% non-compliance. The result was somewhat disappointing but not surprising. Dogs with veterinary fear have often experienced this fear for a prolonged period and while handling training at home is excellent as well as visiting the clinic without an exam, it probably does not remedy the fear. However, one can suspect that every time the dog entered the clinic it was above threshold for reaction and the fear returned with original strength back to the original level of fear (Lindsay 2001a). Owner involvement is critical and maybe a plan to increase the training compliance are to involve and invite the owner to partake in the development of the behaviour intervention plan. Medications, while outside of this thesis, are important in the intervention for these dogs with veterinary fear (Riemer et al. 2021).

6.1.2 Confounding factors and the future of behaviour modification intervention

A very interesting comparison when looking at behaviour modification interventions, is despite methods and who provided the service, is the overall satisfaction and efficacy reported by the owner (Daniels et al. 2023). In a, what must be considered old school study by Cameron (1997), confrontational methods such as leadership and alpha rolls were suggested as treatment in the majority of aggression cases and the results were very satisfied owners with aggression

behaviour problems improving. There is evidence that aversive behaviour modification techniques worsen the outcome of aggressive behaviour's (Herron et al. 2009) and despite this the owner's perception was improvement. In a more recent investigation, similar levels of satisfaction were reported with the use of modern training methods (Dinwoodie et al. 2021). This suggest that the placebo effect that originate in a dog-owner relationship is substantial and that owner regardless of behaviour efficacy report improvements, maybe due to increased understanding or just maybe it is the fact that they have received help that imposes this perceived improvement.

To avoid the problems associated with surveys such as confounding factors and biases (Choi and Pak 2005) it would be of great scientific value to consider controlled experiments with dogs as research animals. Performing methodically sound research with animals can be ethically challenging and using research animals is subject to its own regulations (SJVFS 2019:9). It is questionable if clinical behaviour studies using research canines are ethically acceptable. However, dogs are used in other types of clinical studies and these studies could in many cases simultaneously include behaviour modification studies. This would have a twofold purpose as it could reduce stress in the research setting and provide much needed results for behaviour modification interventions, while reducing the financial cost for clinical behaviour studies.

It would also be of great interest in the future to investigate different levels of arousal and the behavioural outcomes in fear/anxiety and aggression. No such research has been performed in canines. One can wonder if the phenotypic behavioural and biological expression of the reactive canine really is identical to a normally reactive dog. An example is the poor correlation between dog directed aggression and human directed aggression and this proposes that the underlying factors and triggers are different (Casey et al. 2013; Hsu and Sun 2010). This raises the question whether the same type of behavioural interventions should be recommended.

For the future, this thesis shows clearly that there is a great need for research on the efficacy in behaviour modification interventions for aggression and fear/anxiety, and the used best practices needs to be scientifically validated. The field is in its infancy and there is a need for a collaboration between the practitioners and researchers to ensure that the scientific knowledge is using the vast practical experience available in the field (Hall et al. 2021; Roshier and McBride 2012). Practical experience is extremely valuable but until it has been scientifically validated it is only personal experience. There is also a responsibility of the higher educational institutions to recognize the importance of higher education in this field

and to appropriate the suitable research. This master thesis illustrates clearly, that studies in all aspects of efficacy in canine behaviour interventions need to be performed. To ensure progress it would be recommendable if interdisciplinary research teams all around the world decided specific areas for research (Bennett and Gadlin 2012) as well as similar methodology (Miklósi 2015). The One-Welfare platform is one appropriate context for this purpose (Pinillos and Garcia 2018). Funding for this research could come from state funded initiatives however, there should be an interest in funding from both pet health insurance companies as well as multinational pharmaceutical and healthcare companies.

6.2 Survey of the Swedish behaviour counsellors

6.2.1 The survey participants and their demographics

The number of participants in the survey was 56 (39% response rate) which is considered acceptable according to Wu et al. (2022). All H-branded behaviour counsellors were invited to participate and all others that were found by the web-search. This should include a large majority of the practicing behaviour counsellors and thus making the participating contributors an applicable reflection of the population of behaviour counsellors in Sweden. However, since it is not a licensed profession anyone can call them-self a behaviour counsellor regardless of experience or educational background which makes it hard to accurately determine their numbers. In this study 19% of the potential participants were not H-branded, but all had the requisites to become H-branded. Google search through all of Sweden's 241 counties using the search word of the county name and "hundpsykolog" generated mostly H-branded behaviour counsellors. However, this might be a poor method to locate non H-branded behaviour counsellors. Perhaps their services are not marketed in this way or maybe the search terms were limiting the outcome. Maybe social media should have been employed? Another possibility is that many dog trainers are providing behaviour counselling without advertising nor necessarily explicitly naming it behaviour counselling. It is definitely problematic for the behaviour counsellor, that they are not a licensed profession and that anyone can call themselves a behaviour counsellor.

The first part of the survey was multiple choice questions and primarily demographics. The average education level of a canine behaviour counsellor was a high school degree, but the variation was from basic school to PhD. This could be problematic because no prerequisites are required in educational background.

Scientific literacy (Howell and Brossard 2021) should be a requirement for behaviour counsellors since the profession should be scientifically based and scientific literacy is a necessity and facilitates the understanding of research. A large burden falls on the schools that educate the behaviour counsellors to educate in scientific literacy as well as everything about canine behaviour counselling.
Canine behaviour counsellor is a new profession, and it is very possible that the behaviour counsellors, in this survey, that have worked for 10+ years have been active in the profession from the onset. Several of them are now educating the new professionals and are maybe the owners of some of the educational schools. Looking at the results, these experienced behaviour counsellors have not surprisingly seen the majority of the behaviour modification intervention cases. The median behaviour counsellor has been in the profession between 2-5 years and works approximately 12 hours a week in the profession.

6.2.2 Inadequacy of behaviour intervention for dogs with aggression and fear/anxiety problems

Without a doubt, there is a great need for behavioural help with problem behaviours in canines. Aggression behaviour problems in dogs are fairly common and the most frequent diagnosed behaviour problem (Bamberger and Houpt 2006) and are in many cases an end-of-life event for a dog. Fear and anxiety are common in dogs (Blackwell et al. 2013) and have the potential to affect the welfare and quality of life for both dogs and owners. Many times, there is correlation between aggression and fear as fear often is an intricate component of aggression (Klausz et al. 2014) and a fearful dog has a higher probability of developing aggression (Wormald et al. 2016). An uncertain estimation of the percentages of Swedish dogs having potential behaviour problems with aggression and fear/anxiety was presented in the background of this MSc thesis. The potential need is enormous and far extending past the services provided by Sweden's behaviour counsellors today. It is then surprising and informative that the behaviour counsellors only work part time despite a potential need. There are several possible explanations for this. There is a stigma attached to having a dog with behaviour problems. In Sweden, the dog is entirely the responsibility of the owner (Lag 2007:1150). Many of the behaviour problems dogs' display have a strong genetic component (Eken et al. 2014; Zapata et al. 2016). Many dog-owners feel guilty and carry a caregiver's burden (Buller and Ballantyne 2020) and probably feel responsible and ashamed for their dog's behaviour problems, which may lead to that they find it hard to request help. Another factor is probably the high cost for behaviour counselling (Buller and Ballantyne 2020) which could be addressed with an involvement of the pet health insurance companies in Sweden. Today behaviour interventions are not covered by the insurance. Perhaps there should be greater coverage to ensure that dogs'

behavioural welfare is addressed. Rehabilitation of dogs can be covered so why not clinical behaviour treatment. However, since the number of possible affected dogs are staggering the insurance business is probably fearing soaring costs. They could extend their coverage for example with behaviour problem intervention under certain conditions and for prevention. With the behaviour counsellors only working part-time, most have other jobs to earn their living, and many are dog-trainers, business owners and all-around jacks of all dog trades. However, the multifaceted profession of behaviour counsellor requires specialization for excellence. There are voices even suggesting that behaviour counsellors need to pick specialties within behaviour problems (Tudge et al. 2019).

6.2.3 Behaviour counsellor educators and suggestions for furtherance

Hundens Hus is without a doubt the leading educator of behaviour counsellors in Sweden and in this survey. Numerous other private education enterprises offer the education as well. There is H-branding that offers behaviour counsellors qualification guaranties to the public (Sveriges hundföretagare 2021). However, this qualification requirement is vague with a list of content topics and a statement that education should be in accordance with scientific knowledge with no further requirement of educational depth. There is no formal educational requirement for entering into schools providing education to become a behavioural counsellor however, most require that you are a dog trainer and have had education as such. Several of the schools offer a path including dog trainer when becoming a behaviour counsellor. The prospective behaviour counsellor purchases the education and chooses among several competing companies. Experience from the private Swedish educational system tells us that financial profit competition between schools creates grade inflation (Skolverket 2021). Without a degree of difficulty level on the content subject and no educational prerequisites of their students, the school are probably adjusting the level of difficulty to ensure that their customers are successful. This means that there is no way of knowing what quality of education and hence knowledge base the prospective behavioural counsellors have achieved through their education. Some of the results in this thesis might reflect the variation in educational knowledge of the Swedish behaviour counsellors.

The Swedish behaviour counsellor's educational system should probably be changed. The first change that is going to be required is a name change required by a governmental proposition. Today in Sweden the professional title is "dog psychologist" (Swedish; hundpsykolog) and with this title there is a risk that the dog-owners mistakenly believe that the behaviour counsellor actually is a psychologist (SOU 2022:58). Maybe the name canine behaviour counsellor is a

professional name designation for the future (Swedish; hundbeteendekonsult)? Another possible change could be to adopt a Swedish version of Great Britain's ABTC (2021a) which is an independent accreditation governing body representing trainers and behaviour counsellors among others. Their mandate includes the responsibility to admit and discipline trainers and behaviour counsellors. They also determine standards of the applicable education content and level as well as practical skills that the prospective behaviour counsellor must fulfil. Both educational knowledge and practical skills are assessed in accordance with the standards and are thoroughly transparent. It requires candidates to have a certain set of education in an increasing set of difficulties. It allows for private entities to educate the future behaviour counsellors. Several organizations are having educational programs and mentorships. The higher education of special clinical behaviour counsellors requires the scientific literacy of a bachelor's and master's degree. An essential part of ABTC (2021a) requirement is extensive practical skill developed under extensive mentorship. This would make the Swedish behaviour counsellors a more reliable ensured profession. Of course, there are other ways of addressing this and the Swedish behaviour counsellors should find their way.

6.2.4 Types of behaviour interventions implemented by the behaviour counsellors

Looking at what type of behaviour problems the behaviour counsellors are seeing is informative. It should be mentioned that no definitions of the certain behaviour problems, aggression and fear/anxiety was given in the survey. This cause a potential risk that different behaviour counsellors classify the cases differently, which could cause some uncertainty in the numbers, but the behaviours are typical problem behaviours. The behaviour counsellors were told to estimate their case experience and there is an inherent bias risk in self-assessment. Among college students, it has been found that the poorer performers are overestimating their effort in self-assessments (Tejeiro et al. 2012). Another problem with this type of questions is recollection. Is the recollection accurate or are we prone to biases here as well? However, the choice of questions can be justified with the fact that there has never been an estimate of the number and types of cases a behaviour counsellor oversees and no estimation of the actual need of canine behaviour intervention have been attempted according to the author's knowledge.

Summarizing the number of cases the behaviour counsellors have seen for all types of behaviour problems listed in the survey the total is, an uncertain, approximate 30000 cases that were seen during the entire career of the professionals and the profession. The need for canine behaviour modification intervention (Table 1) far extends the number of cases the behaviour counsellors have seen. The number of cases were illustrated in two different ways in this survey. The first one illustrates

the total number of cases the behaviour counsellors have seen during their career and looking at the results the experienced behaviour counsellors have, not surprisingly, seen the majority of behaviour modification intervention cases. The other way is to look at the individual (n=56) behaviour counsellor and the number of cases seen in each category. Interestingly many of the behaviour counsellors have not seen cases for barrier frustration, predation, fear of darkness, veterinarian fear, problem with being housebroken and escaping, despite all of these being potentially serious problem behaviours. It would be extremely valuable to do further investigations into why and for what behaviour a dog-owner in Sweden decides to invoke the help of a behaviour counsellor. As an example, fear of the veterinarian that is extremely prevalent among dogs (Mariti et al. 2015) is surprisingly not a problem dog-owners bring extensively to the behaviour counsellors. Maybe here, more behaviour counsellors could take charge and start offering classes. In this case the class could to a great part be without the dogs and be an education of behaviour and training for the owner.

6.2.5 Efficacy of intervention

The last portion of the survey was short open answers, and no further information was given than the questions for the short answers. Short answers can be problematic, maybe the behaviour counsellor did not take the survey seriously, or maybe they misunderstood the questions. However, with a thorough understanding of learning theory and its application on behaviour problem it could be argued that the answers of golden standard and best praxis should come almost as a reflex when asked. This of course, is a problem with a survey versus an interview. As mentioned earlier the intention of the survey taker and the limitation in creation of appropriate questions are biases as well as confounding factors. This study should be followed up by more research in the area and in this case, deep interviews would be appropriate. The answers in the short answers should only be regarded as tendencies and not as absolute answers among behaviour counsellors and they can be regarded as troubling trends valuable for further investigations. For instance, when asking for methods used by the behaviour counsellors for behaviour modification interventions for aggression and fear/anxiety, many different answers emerge. This can be due to misunderstanding of the meaning of methods or haphazardly answering the survey. Another argument is that it reflects the confusion among behaviour counsellors about what methods should be used and why. If this were the case, it would be very problematic. It could reflect the lack of educational standards within the behaviour counsellor's education and the risk possessed by not requiring education of a certain educational depths and level. Of course, survey fatigue is a real concern and maybe some participants did not take the time and reflect on questions before answering.

The first short answer was the question of factors affecting the efficacy of interventions. There was an almost unison statement of the behaviour counsellors that the owner's motivation and engagement is a factor that is affecting the efficacy of the intervention. Research from human medicine have shown that noncompliance with treatment is common and should be addressed with increased education and collaboration with the patient (Abood 2007). This illustrates the need to develop more effective teaching and collaboration methods for the behaviour counsellors. This is an area where they are undereducated along with many other professions that work with people. Maybe a multidisciplinary approach would be advisable involving educators and medical counsellors? There is a definite need for research to investigate why owners sometimes lack motivation and engagement for their dog's behaviour intervention and what could be done to remediate this. It was also interesting that only 19% of the behaviour counsellors identified dogs' health as a factor affecting efficacy especially since health problems are a significant factor in serious behaviour problems (Mills et al. 2020). Maybe it requires more education for the behaviour counsellors, but it is possible that this more reflects the lack of interaction between veterinary science and behaviour science. It should be advised that dogs should visit a veterinarian to exclude physical reason for behavioural problems or treatment of physical issues, before a behaviour modification intervention plan is created and implemented (ABTC 2022b). Only 9% of the behavioural counsellors acknowledged the genetic component in efficacy in behavioural problems interventions. It might perhaps be since the behavioural intervention may be identical independently of the underlying geno- and phenotypic expression. However, for canine welfare it is vital that the genetic component is acknowledged to ensure that predisposed dogs are not used in breeding programs and that prospective dog-owners become educated in this issue. An example would be education about small dogs' genetic propensity to fear (McGreevy et al. 2013) and methods for mitigating this.

In the question of behaviours that are hard to treat only noise phobia and separation anxiety was identified as hard to treat by more than 30% of the behaviour counsellors, which possibly corresponds to the owner compliance and the difficulty of keeping the dog under the threshold of reacting. It is really surprising that only 4 % mentioned repeated biting. This is a factor that has been associated with difficulty in behaviour modification (Overall 2013). Maybe this generates that biting dogs and dogs that bite hard are given several chances even though this behaviour is very hard to modify and only management is possible (Overall 2013). However, the welfare of a biting dog and the risk to other dogs and people should be included in a risk assessment as well as a welfare assessment on the future of these dogs. This should be part of a behaviour counsellor's knowledge skills and assessments. Behaviour counsellors with this expertise should probably be involved

when the county administrative board makes assessments on the future of dogs they have taken into their custody.

6.2.6 Methods used by behaviour counsellors for behaviour interventions

The last two short answer questions in the survey were about what methods the behavioural counsellors are using for interventions/treatments of aggression and anxiety/fear. These answers are probably the most concerning in the survey. As a reminder from earlier in this thesis, counter conditioning and desensitization are methods used for the behaviour modification intervention for canines suffering from behaviour problems (Overall 2013) of aggression (Orihel and Fraser 2008; Kakuma and Kinoshita 2010), and fear and anxiety (Butler et al. 2011; Stellato et al. 2019; Monteny and Moons 2020). They are considered the best praxis and should be part of any behaviour modification intervention together with management (Overall 2013). Only 43 % of the participating behaviour counsellors identified counter conditioning as a method they used for aggression intervention, while 34% used it as a method for fear and anxiety. Desensitization was mentioned as a method for aggression intervention by 21% while 34% used it for behaviour interventions for fear and anxiety. Management was only a used method for aggression by 15% and for fear/anxiety only 16% mentioned this of the behaviour counsellors. Maybe and hopefully, this is a problem of the survey like mentioned before. Perhaps the behaviour counsellors are confused as to what constitutes a method as no further information was given besides the question. However, with a thorough understanding of learning theory and its application on behaviour problem, it could be argued that the answers of best praxis should come almost as a reflex when asked. This could reflect the educational system of behaviour counsellors.

Another surprising result was that several counsellors said that they did not believe in treatment/ intervention methods. Many, if not all, of the behavioural counsellors in Sweden have websites and on those, they list their educational background. It is striking that many show a long list of education, courses, books, events and copyrighted methods demonstrating the entirety of everything that has to do with dogs. It is understandable that one somewhere among all these courses start thinking that they are different methods for behaviour modification intervention. Of course, further education is important, but it is questionable if all these courses or events really improve the knowledge base of a behaviour counsellor in the role of behaviour counselling. It comes across like ‘the more the better’. Perhaps, the purpose is to show that they are well rounded, and well educated in dogs which undoubtedly many are. Perhaps it would be more appropriate to advertise many

satisfied costumers results and descriptions of their treatment strategies. Of course, since the behaviour counsellor on average work part-time in the profession other skills are necessary.

There are several examples of copyrighted “tools”. These tools are developed copyrighted behaviour intervention systems that are easy to follow, and these are listed by the behaviour counsellors perhaps as behaviour intervention methods for aggression and fear/anxiety. Examples of such are BAT and CAT that some of the educators of behaviour counsellor are teaching. It is very questionable if these methods that are controversial and have serious drawbacks should be promoted and taught as part of the toolbox given to their behaviour counsellor students. They are working tools in the hands of an experienced dog trainer with great timing and understanding of canine behaviour. However, since behaviour interventions always includes the owner actually doing the training, especially CAT have some serious problems. Serious concerns are risk of flooding and dog welfare issues as the dog is held in place while waiting for the dog to display an alternate behaviour and then allowing it to leave (Overall 2013). However even BAT can be questioned especially in its earlier forms and in the hands of an inexperienced dog-owner. When asking for methods several behaviour counsellors where mentioning CAT and BAT as part of their treatment methods for both aggression and fear/anxiety. No matter how you look at CAT and BAT they are based on negative reinforcement and can cause welfare problems and suffering for especially fearful and anxiety troubled dogs (Overall 2013). However, there is a debate that BAT really is different from CAT and the dog is free to move away from the stimulus dog at any time (Stewart 2014). If BAT is utilized in this manner, then it is like Overall (2013) states “If this is true, this is nothing more than routine desensitization and counterconditioning, if the dog have to show relaxation and not just non reaction before moving to the next step”.

It is understandable that BAT training is very popular. It is an effective system, clearly explained with standardized procedures and promoted and sold all over the world. However, adherence to LIMA should be taken extremely seriously and any method not using the humane hierarchy should not be promoted (Friedman 2022). There is a great need for tools that are easy to follow and understand for behaviour interventions, especially if the behaviour counsellor is inexperienced and not fluent in learning theory. In Sweden, supervised extended experience and mentorships are not a requirement for becoming a behaviour counsellor. Some experience is granted during training, but it must be considered inadequate hence a great need for these tools. There are some available since the early 2000, for example MINE- a guide to resource guarding (Donaldson 2002a) and Fight -A Practical Guide to the Treatment of Dog-dog Aggression (Donaldson 2002b). Additional resources exist

and others should be developed firmly adhering at least to LIMA and the human hierarchy.

6.3 Evidence based behaviour modification interventions for canine behaviour problems such as aggression and fear/anxiety

Evidenced based medicine is based on the idea that the patient, the clinician, and scientific evidence all have the same weight in decision making of patient care (Hayes et al. 1996). It has since become the golden standard and many disciplines have adopted its standards. Canine behaviour medicine is still in its infancy and in most countries no professional standards are enforced for the profession (McBride and Montgomery 2018). It could be proposed that canine behaviour interventions ought to adopt evidence-based practice. A scientific evidence based clinical behaviour medicine or canine behaviour counselling modified from Satterfields et al. (2009) is proposed called Doane's model for evidence based canine behaviour modification. This modified model can be used to illustrate and identify gaps in knowledge and practice in canine behaviour modification interventions. Following is a description of what factors should be included in scientifically evidence based canine behaviour modification interventions as well as identification of knowledge and practice gaps, primarily factors identified in this thesis.

In this model, the environment is given a permeating role affecting all and everything. The other factors are the canine behaviour counsellor's experience and expertise, the best available research, as well as the dog-owner and dog characteristics and their resources. Together these combining factors should in equal parts determine behaviour modification intervention plans to improve aggression and fear/anxiety behaviour problems in dogs (Figure 22).

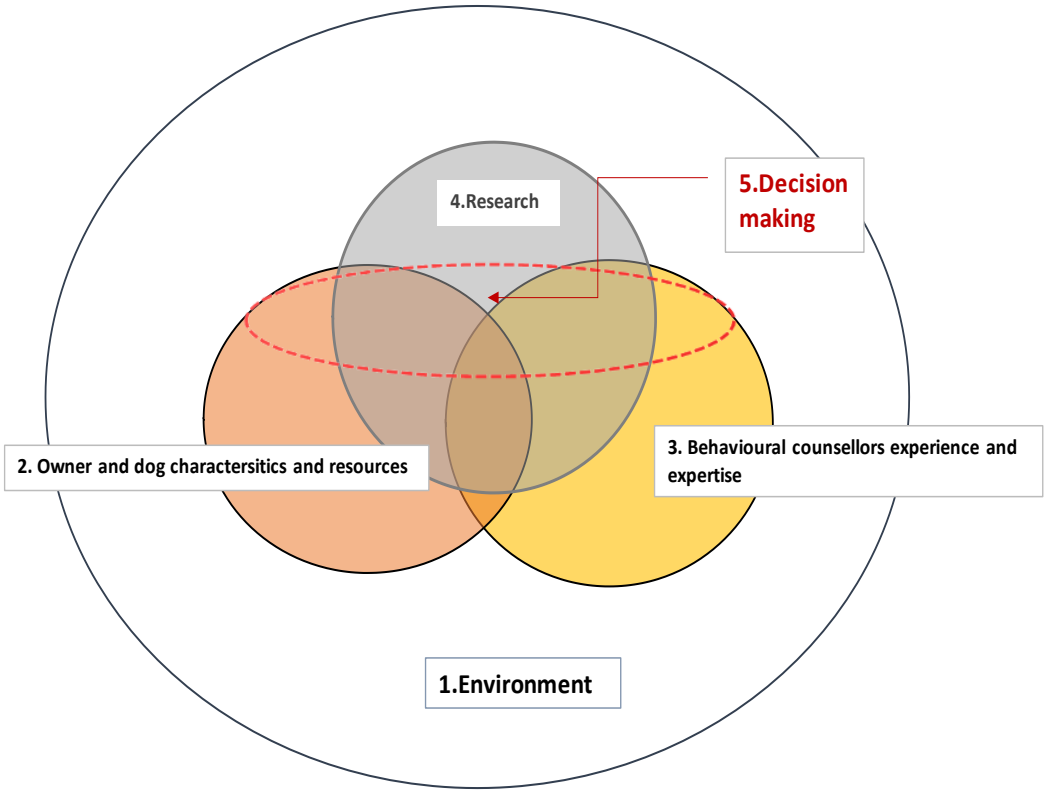


Figure 21. Doane's evidence based canine behaviour modification interventions, (modified from Satterfield et al. 2009).

1. The dog's behaviour intervention needs should first be evaluated in the environmental context of the dog and dog-owner. What types of modifications can be made to the dog's environment? In many cases the proposal is that maybe environmental changes are enough.
2. Owner and dog characteristics are the second circle in this model and is as important as the others. What type of dog is affected? The basic needs of dogs can vary depending on breed, size, lack of socialization and genetics. The owner's characteristics also vary, some are very motivated to follow through on behaviour modification plans, some not. Some dog-owners are interested in learning new things while others are stuck in their cultural biases. The dogowner needs immense education in how to carry out training to be able to be the dog's behaviour modification trainer. Education in dog ethology and mitigation is critical. A collaborate effort should already have been established with the dog-owner (Daniels et al. 2023b). This thesis has shown that the behaviour counsellors are identifying the dog-owners as the greatest obstacle for successful interventions. There is a need for a multi-professional approach, where educators and psychology counsellors could be involved with the dog-owners education and understanding. At least

there is a great need for further education and development in this field among behaviour counsellors.

3. The behaviour counsellor's expertise and experience should be strengthened. It is advised to remodel and transform the Swedish behaviour counsellors' education and this thesis is giving examples of such. However, it is vital that today's behaviour counsellors and their educator, together with the involvement of higher education and researchers are creating a future education path that is attuned to the Swedish needs. Perhaps some of the existing private educational enterprises that presently are providing the education could be the providers in the future? The future behaviour counsellor should be educated according to educational standards including levels of educational depths. They should be independently assessed for both scientific knowledge and practice. Extensive mentorships should be initiated as part of the education. Maybe a long-term process should be initiated to make the behaviour counsellors part of the animal health providers.
4. The best available research should be utilized. In the literature study of this thesis, it has become evident that there is a tremendous lack of research in the efficacy of behaviour modification interventions for aggression and fear/anxiety. This should be addressed initially with collaboration between practicing behaviour counsellors and researchers to identify necessary research areas and performing the research (Hall et al. 2021). Higher education institutions should also implement education in canine behaviour counselling. A plan should be developed for future research.
5. This is the platform in which the behaviour counsellor makes the practice decision for the behaviour modification intervention. All aspect of the model should be included, and the treatment decision should be made in collaboration with the owner. It is evident that the need for development of the canine behaviour counsellor is great, thus improving the behavioural welfare of our dogs. Perhaps a new licensing system should be implemented organized similar to the British system described earlier in this thesis where the ABTC serves as umbrella organisation responsible for educational standards and licensing.

7. Conclusion

This master's thesis concludes that there is very inadequate scientific evidence for efficacy of behaviour modification interventions for canine fear/anxiety and aggression. Future research needs are great, vital and should include every aspect of efficacy for behaviour interventions especially important is to ensure replicability with control of confounding factors, biases and methodology including controlled studies.

From the survey of the behavioural counsellors, it was found that the behaviour counsellor's educational background most often is high school, and their professional education was attained through a private education enterprise and the median work 12h/week. Methods identified and used by the behaviour counsellor for behaviour modification interventions were many and varied and not entirely in accordance with best practices. However, behavioural counsellors identified owner compliance as a hinder for intervention success.

A model was proposed for evidence based clinical canine behaviour interventions based on the findings in this thesis that illustrates the need for more research in clinical canine behaviour interventions as well as the need to remodel the education of the professional behaviour counsellor.

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Populärvetenskaplig sammanfattning

Idag finns det över en miljon registrerade hundar i Sverige och allt för många av dessa har allvarliga beteendeproblem. Det kan vara rädslor, exempelvis rädsla för åskväder och fyrverkerier eller ångest där hundar lider när de lämnas ensamma. Andra hundar är aggressiva och farliga, ofta baserat på rädslor, mot andra hundar och ibland mot människor. Många av dessa beteendeproblem orsakar stort lidande för de drabbade hundarna som leder till kraftigt nedsatt välfärd. Det är svårt att leva med en hund som är rädd eller aggressiv och det påverkar livet negativt för hundens familj. Det finns också en risk att andra hundar och människor drabbas om hunden är aggressiv och potentiellt farlig.

I Sverige finns det ingen veterinärspecialitet i beteende utan dessa hundar behandlas av ett oreglerat yrke som kallas hundpsykolog. Det betyder att vem som helst kan kalla sig hundpsykolog utan krav på yrket och erfarenhet. Det är inte så konstigt då det är ett nytt område och det ska sägas att det finns många kompetenta hundpsykologer.

Två områden undersöktes i denna uppsats. Vilka behandlingsmetoder för beteendeproblem utan medicinering finns det vetenskapliga bevis för? Vem är Sveriges hundpsykolog och vilka metoder använder hen?

En systematisk vetenskaplig sammanställning hittade enbart sju vetenskapliga artiklar som undersökte hur effektiva beteendemodifiering var för aggression och rädsla/ångest hos hundar. Det visar att området är relativt nytt och att det faktiskt inte finns vetenskapligt undersökta behandlingsmetoder för hund. Det finns trots detta, erfarenhet av beteendemodifieringsmetoder för aggression och rädsla/ångest som används av beteendevetare för olika djurarter världen över. Utan vetenskapliga belägg blir behandlingen svårbedömd och den enskilda hundpsykologens skicklighet och kunskap osäker.

En enkät skickades till de hundpsykologer i Sveriges som kunde lokaliseras via internet och av dessa svarade 56 stycken (39%). Resultaten visade att Sveriges hundpsykologer vanligen har varit verksamma i 2-5 år och att de arbetar deltid i yrket (cirka 12 timmar i veckan). Majoriteten av hundpsykologerna har en gymnasieutbildning och har därefter utbildats till hundpsykolog hos en av de privata aktörer som utbildar hundpsykologer. Antalet hundar som lider av beteendeproblem är antagligen mycket större än de som träffar en hundpsykolog. En stor majoritet av hundpsykologerna identifierade att det var svårt att få

hundägarna att följa deras plan och rekommendationer. Metoderna som hundpsykologerna använder för beteendemodifiering av aggression och rädsla/ångest var många och varierande. Enbart en minoritet använde sig av eller kunde identifiera inlärningsteorins metoder som anses vara bästa praxis i yrket.

Det vore önskvärt att utveckla ett vetenskapligt evidensbaserat arbetssätt för de som arbetar med hundars allvarliga beteendeproblem. Det är uppenbart att det behövs forskning på hur effektiva olika metoder och tillvägagångssätt är när beteendeproblem som aggression och rädsla/ångest behandlas. Det finns också ett behov av att förändra Sveriges hundpsykologutbildning, kanske borde yrket i förlängningen vara en del av djursjukvården.

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