



Sveriges lantbruksuniversitet  
Swedish University of Agricultural Sciences

Faculty of Veterinary Medicine and  
Animal Science

# **Presence of behavioural problems in previously active dogs subjected to convalescence**

Förekomst av problembeteenden hos tidigare aktiva  
hundar under konvalescens

*Sara Olby*

Department of Clinical Science  
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*Sara Olby*

**Supervisor:** Anna Bergh, Swedish University of Agricultural Science,  
Department of Clinical Science

**Examiner:** Lena Olsén, Swedish University of Agricultural Science,  
Department of Biomedical Science and Veterinary Public  
Health

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## Summary

Behavioural problems have previously been studied in several different species. Stereotypic behaviours, defined as abnormal repetitive behaviours have mostly been studied in captive wild animals while displaced behaviours, defined as misdirected normal behaviours, mostly have been studied in companion animals. Neither stereotypic behaviours nor displaced behaviours are wanted by owners and might also indicate a lower welfare of the individual performing the behaviour. Convalescence is defined as the time while a patient is recovering from an injury or illness. For dogs, convalescence is often related to a period of lowered activity and confined space. The aim of the study was to investigate the presence of behavioural problems in previously active dogs after the onset of convalescence. An online survey was conducted on Swedish dogs used to an active life by competing or training in agility and/or rally obedience. All dogs had experienced convalescence due to a musculoskeletal injury. A total of 75 dogs were used in the results. The results showed that presence of behavioural problems, both stereotypic and displaced behaviours, increased after the onset of convalescence. A majority of the owners did not believe they got the help they wished for from the veterinarian staff regarding how they could activate their dogs during convalescence. The results indicate that previously active dogs might alter their behaviour, by starting to display new behavioural problems, in order to cope with the new situation the convalescence implicates. The altered behaviours could indicate a lowered welfare during convalescence for dogs. Most dogs displaying behavioural problems were convalescent longer than three months, indicating that time might be an important factor. However, further studies are needed in order to verify these first results as well as to clarify if the results differ between dogs of different ages, with different activity levels and of different breeds.

*Keywords:* dog, convalescence, stereotypic behaviour, behavioural problem, veterinary nursing

## Sammanfattning

Problembeteenden har tidigare studerats hos flera olika arter. Stereotypa beteenden, definierat som onormala repetitiva beteenden, har främst studerats hos vilda djur i fångenskap medan ”felplacerade beteenden”, definierat som missriktade normala beteenden, har främst studerats hos sällskapsdjur. Varken stereotypa beteenden eller felplacerade beteenden önskas av ägarna och kan även vara tecken på en lägre välfärd hos individen som uppvisar beteendet. Konvalescens är den tid som en patient återhämtar sig från skada eller sjukdom. Hos hundar innebär konvalescens ofta en period med lägre aktivitetsnivå och begränsade ytor. Syftet med studien var därför att undersöka om förekomsten av problembeteenden hos tidigare aktiva hundar förändras i och med konvalescens. En online undersökning genomfördes av svenska hundar som var aktiva inom agility och/eller rallylydnad och därmed vara vana vid en aktiv livsstil. Alla hundar hade genomgått en period av konvalescens orsakat av en skada i rörelseapparaten. Totalt 75 hundar inkluderades i resultatet. Resultatet visade att förekomsten av både stereotypa och felplacerade beteenden ökade i och med konvalescensen. Majoriteten av ägarna ansåg att de inte fick den hjälp de önskat från personalen inom djurhälsovården gällande hur de kunde aktivera sin hund under konvalescensen. Resultatet indikerar att tidigare aktiva hundar kan förändra sitt beteende, genom att visa nya problembeteenden, till följd av konvalescens för att hantera den nya situationen. Det förändrade beteendet i form av ökade problembeteenden, kan indikera på en minskad välfärd under konvalescens. De flesta hundar som uppvisade problembeteenden var konvalescenta längre än tre månader, vilket indikerar att tid kan vara en viktig faktor. Det krävs dock vidare studier för att säkerställa resultaten samt för att se om andra faktorer kan påverka resultaten så som hundens ålder, tidigare aktivitetsnivå och ras.

*Nyckelord:* hund, konvalescens, stereotypa beteenden, problembeteenden  
djuromvårdnad



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# 1 Introduction

Sweden had a total of 858 984 registered dogs (*Canis familiaris*) at the end of January 2017 (Swedish Board of Agriculture, 2017). To many owners, their dog is not only a companion and family member, but also a partner in training and competing. In order to achieve results, dog and owner might spend several hours per week training, giving the dog a very active life.

Not all dogs live active lives and a variety of behavioural problems have been observed in dogs (Overall & Dunham, 2002; Kobelt et al., 2003; McMillan, Duffy & Serpell, 2011; Hall, Protopopova & Wynne, 2015). In order to try to detangle the different concepts of behavioural problems, Odendaal (1997) classifies different behavioural problems into categories as a help for the veterinary profession when trying to set diagnose. Into the category “adaption strategies”, which also is termed “true abnormal behaviours”, Odendaal (1997) fits both stereotypic behaviours and compulsive disorders together with other types of behavioural problems such as destructive behaviours. As well into “adaption strategies”, the type of behaviours which more often are seen as typical behavioural problems in dogs, such as aggression, misdirected sexual behaviour and hunting of objects, are placed. These behaviours are termed displaced or redirected behaviours and occurs when a normal behaviour is directed towards the wrong object. According to Odendaal (1997), all behaviours seen under “adaptions strategies” arise due to the individual’s lack of ability to adapt to its environment.

Convalescence has in a recent study on the recovery of colic horses been defined as “the time it took to return to athletic function after discharge” (Immonen et al., 2017). The same definition can be used in dogs being discharged from the animal hospital after surgery, injury or illness. However, it is not always possible for the individual to return to athletic function, but instead to return to the best function possible. For dogs, convalescence is often a time with lowered activity level in order to give the body time to heal and later to rebuild strength of the injured part of the body through the rehabilitation process. In many cases convalescence is also associated with a time of restricted movement and the dog might be needed to be

confined to a smaller area in order to achieve this. However, in Sweden according to the Swedish Board of Agriculture's provision and general advice regarding keeping of dogs and cats (SJVFS 2008:5 14§), it is not allowed to keep dogs confined to a cage or another confined area without a special permit from the board. Both confinement and lack of social interactions can lead to behavioural problems which has been found in dogs reared and kept in commercial breeding environments which later were adopted to new owners (McMillan, Duffy & Serpell, 2011). Behavioural problems has also been found in shelter dogs later adopted (Wells & Hepper, 2000). A review by Taylor and Mills (2007) states that the single most important factor regarding welfare within dogs environment is social contact, either with conspecifics or humans.

## 1.1 Behavioural problems

In many studies in dogs, the term "problem behaviour" is often used to describe all kind of behaviours displayed and seen as problematic. Behavioural problems have been studied in dogs kept in different environments. One study regarding ownership, environment and behavioural problems found that many behaviours were more likely to occur if the owner never had owned a dog before. The most commonly reported behavioural problem by the owners were overexcitement, jumping on people, rushing towards people and/or dogs and excessive barking (Kobelt et al., 2003). Kobelt et al. (2003) also found a negative correlation between occurrence of behavioural problem and the size of the yard the dog was kept in. A correlation was also found between walk frequency and behavioural problems, with more behaviours, such as running around and pacing, being more frequently displayed with a lower walk frequency. It was shown that the amount of time the owner spent with their dog also affected some of the behavioural problems and less time spent with the dog was correlated to running around, chewing and digging. The study also found that first-time dog owners spent less time with their dogs (Kobelt et al., 2003). Takeuchi et al. (2001) made a study regarding separation anxiety and found that dogs housed in apartments displayed more of the behaviour compared to dogs living in open areas such as houses.

## 1.2 Stereotypic behaviours

Stereotypic behaviour is one kind of behavioural problem (Odendaal, 1997). In Mason et al. (2007), stereotypic behaviours are defined as abnormal repetitive

behaviours which arise due to lack of ability for the animal to perform natural behaviours within the environment, inability to cope with the surrounding and/or dysfunction of the central nervous system. Stereotypic behaviours are also regarded as a sign on lowered animal welfare during some stage of life (Mason et al., 2007). Stereotypic behaviours are mostly studied in captive wild animals, such as in zoo exhibits (Mason et al., 2007; Mason, 2010). How animals respond to the captive environment varies between species (Mason, 2010). It has been found that carnivores having a natural wide home range and normally are travelling long distances show more stereotypic behaviours in captivity. However, factors such as having an active lifestyle or foraging does not seem to predict how well carnivore species are able to cope with captive environments (Clubb & Mason, 2007).

In dogs, stereotypic behaviours are not as well studied as in none-domestic species. Described stereotypic behaviours in dogs are self-mutilating behaviours (such as excessive grooming), locomotor behaviours (such as spinning or tail chasing), fixation or hallucination, sucking, digging and vocalization (Overall & Dunham, 2002; Goto et al., 2012; Hall, Protopopova & Wynne, 2015). Overall and Dunham (2002) describes these kind of behaviours as obsessive-compulsive disorders (OCD) instead of stereotypic behaviours and suggest that excessive repetitive behaviours in dogs are caused by a neurochemical or neurogenetic dysfunction making it similar to OCD in humans. Delleire (1993) suggest that stereotypic behaviours seen in dogs and other domestic species is a combination of environmental and predisposed components.

Furthermore, one study looked into behavioural persistence between dogs displaying stereotypic behaviours and a control group not displaying stereotypic behaviours. The dogs were taught a new behaviour, getting a reward every time it was performed. Stereotypic dogs showed a higher behavioural persistence displaying the new behaviour after the reward was excluded. The study also found a breed difference where herders and terriers were less persistent in the new behaviour compared to hounds and working dogs (Protopopova, Hall & Wynne, 2014). One study from Japan, focusing on tail chasing in dogs, found that some breeds such as the Shiba Inu and Jack Russel terrier were more likely to display this behaviour (Goto et al., 2012). Some studies have also been performed on kennelled dogs, often living in shelters. Normando et al. (2014) found in a study on kennelled dogs regarding behaviours and allowed living space that larger living areas resulted in more activity, exploring, positive social behaviour and less time resting. The difference found regarding time resting was even greater if the dogs went from living in a larger pen to a smaller one. An increased time resting might be a sign of less stress but could also be a sign of apathy, and to determine which it has to be considered in context with other performed behaviours. In a study by Hall, Protopopova and Wynne (2015), owners answered a questionnaire regarding their

dogs' stereotypic behaviours. Depending on which stereotypic behaviour, the frequency of occurrence varied between 18 % and 47 %. The owners were also supposed to specify what brought about the stereotypic behaviour and "lack of stimulation" occurred as an answer in three out of four stereotypies. All the above mentioned studies indicates that stereotypic behaviours exist in dogs living in different environments, from kennels and shelters to family homes.

### 1.3 Convalescence and behavioural problems

Until today, there are to the author's knowledge, no studies which have looked into convalescence and behavioural problems in dogs combined and how convalescence might affect behavioural problems. It is possible that convalescence is challenging to a normally very active dog since it causes a change from the dog's normal life. Activation by training in general is known to predict lower occurrence of behavioural problems (Bennett & Rohlf, 2007) and should be taken into consideration regarding convalescence in dogs and their welfare.

Agility is one popular canine sport where dogs compete on a course with a variety of obstacles in high speed. In a study on risk-factors for injury on agility dogs by Cullen et al. (2013), 32 % of the dogs included in the study had been subjected to one or more injuries related to agility. No matter how an active dog acquires an injury, injuries often lead to a period when the dog cannot be as active as before while healing. According to SLA Swedish Animal Health Care (2016), the turnover, investment in the veterinarian staffs' competence and investment in equipment at the clinics keeps on increasing. This could imply that more dogs in Sweden today might be subjected convalescence compared to ten or twenty years ago since the competence and technique in the field in Sweden continues to develop.

### 1.4 Aim of the study

During convalescence and while the dog is enrolled in a rehabilitation program, the veterinary team together with the owner are important with regard of the dog's health and wellbeing. This is since the dog is still a patient until it is declared as completely healed, although not housed at the veterinary hospital or clinic. Therefore, it is important to know if convalescence might have an influence on dogs' welfare. The aim of the study was to investigate if the presence of behavioural problems change after the onset of convalescence in dogs previously active in agility and/or rally obedience. Further to investigate if the owners get the help they need and want from the veterinarian staff regarding mental activation of their dogs during convalescence.

## 2 Material and methods

### 2.1 Definitions

Convalescence is defined as the time from injury to when the dog was termed healthy again, or as well as it could get with the help from possible surgeries and rehabilitation.

Stereotypic behaviours are defined according to Mason et al. (2007), as abnormal repetitive behaviours which arise due to the lack of ability to perform natural behaviours within the environment, inability to cope with the surrounding and/or dysfunction of the central nervous system. In the survey conducted stereotypic behaviours included: tail chasing, obsessive grooming, suckling on the flank or blankets/stuffed animals or other repetitive behaviours. The owners which described their dogs as lethargic/apathy were also included into the stereotypic category.

Displaced behaviours are defined according to Odendaal (1997), as behaviours in the dog's normal repertoire which are redirected or displaced. In the survey these behaviours included: aggression towards dogs or humans, fears and separation anxiety.

Further on, behavioural problems will be used when both including stereotypic and displaced behaviours.

### 2.2 The online survey

An online survey in Swedish was created using Google's online survey tool (Appendix 1). The survey included demographic questions regarding the dogs' breed, age and sexual status as well as questions regarding the dogs' behaviour prior and after the onset of the convalescence. Questions about how the owners perceived the convalescence were also included. The short link to the survey was posted in two Swedish Facebook groups, one with focus on agility and one with focus on rally

obedience. In the agility group the number of members were 3872 on the day of posting the survey and in the rally obedience group the number of members were 6266. These two groups were chosen because of the difference in intensity and speed between the two sports with the goal to reach as many different types of active dogs and owners as possible. Dog owners which had an active life style where the dog was regularly trained and had been subjected to convalescence due to a musculoskeletal injury were invited to answer the questionnaire. The survey was open to answers between 2017-02-27 and 2017-03-19.

## 2.3 Data analysis

All statistics were performed using Microsoft excel 2013. Distribution in percentage regarding the dogs' demographics were performed. Distribution of how the dogs fared during the convalescence according to the owners was calculated. Occurrence of behavioural problems were calculated as percentage of dogs displaying the behaviours before and after the onset of convalescence. Distribution of the owners' perception of the help they received from the veterinarian staff during convalescence were also calculated. The dogs were divided into different breed classes according to FCI's breed class system (Table 1) (Federation Cynologique Internationale, 2017). Dogs which could not be classified into one of the breed classes due to not being pure bred were classified as "mixed breeds".

Table 1. *Breed classification according to FCI's breed class system.*

<b>Breed class</b>	<b>Type of breeds included</b>
1	Sheepdogs and Cattle dogs (except Swiss Cattle dogs)
2	Schnauzers, Pinschers, Molossoid breeds, Swiss mountain and Cattle dogs
3	Terriers
4	Dachshounds
5	Spitzes and Primitive Types
6	Scenthounds and related breeds
7	Pointing dogs
8	Retrievers, Flushing dogs and Water dogs
9	Companion and Toy dogs
10	Sighthounds

## 3 Results

### 3.1 Demographics

A total of 86 answers were collected during the time the survey was opened and 75 was later used for analysis. All eleven were excluded due to illnesses or injuries not part of the musculoskeletal system. Figure 1 shows the distribution of breeds included in the results based on FCI's breed system (Table 1). The majority of the dogs (44 %) belonged to breed class one.

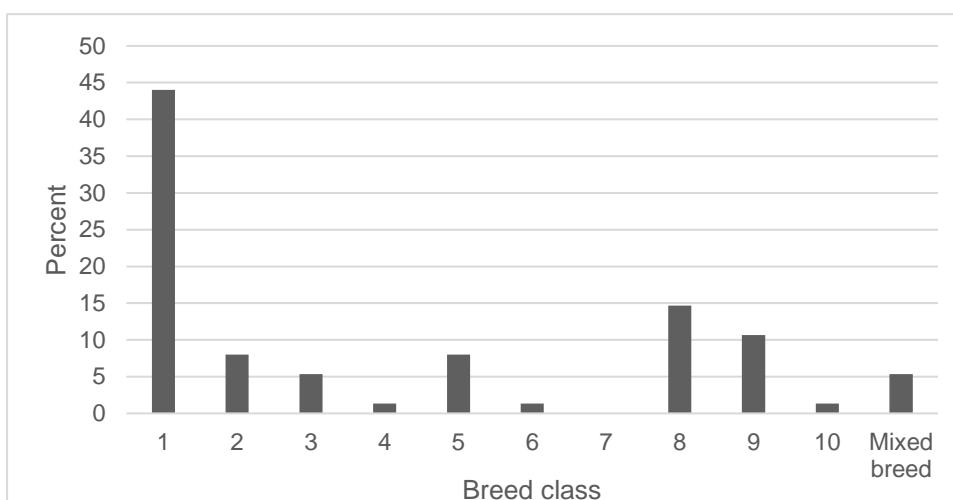


Figure 1. Breed distribution based on FCI's breed system (n=75).

An equal amount of intact males (31%) and bitches (31%) were represented in the results while the distribution of castrated males were 21 % and castrated bitches were 17 %. Most dogs were between one and three years of age and four and seven

years of age, both representing 40 % each of the results, 5 % were younger than one year and 15 % were older than seven years.

All dogs were trained regularly and the majority of the dogs were trained several times a week and competed several times a year (72 %), while 13 % were trained regularly and competed a few times a year and 15 % were only trained regularly but never competed.

### 3.2 The convalescence

The majority of the dogs, 47 %, was convalescence between three and six months and 29 % were convalescence for more than six months. Of the remaining dogs, 20 % were convalescence between one and two months and 4 % less than one month.

Most owners answered that their dogs mentally coped with the convalescence well (48 %), while almost the same amount answered that their dogs coped fairly well and the remaining owners answered that they did not think their dog coped well (figure 2).

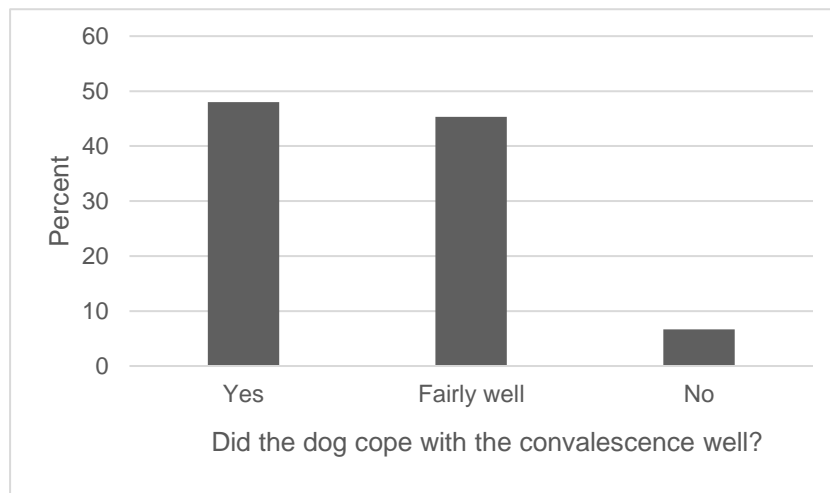


Figure 2. Distribution of how the owners thought that their dogs mentally coped with the convalescence (n=75).

Figure 3 shows the percentage of dogs which displayed stereotypic and displaced behaviours before and after the onset of convalescence. The figure also shows the percentage of dogs which showed both stereotypic and displaced behaviours, termed behavioural problems, before and after the onset of convalescence.



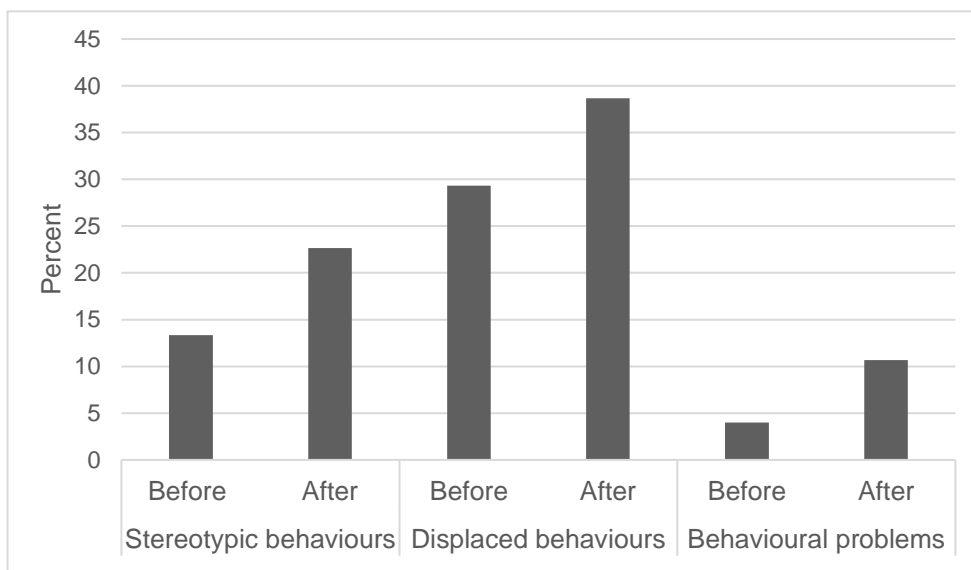


Figure 3. Percentage of dogs showing different behavioural problems before and after the onset of convalescence (n=75).

The amount of dogs displaying stereotypic behaviours increased with from 13 % to 23 % and the amount of dogs displaying displaced behaviours increased from 29 % to 39 %. The amount of dogs displaying both stereotypic and displaced behaviours (behavioural problems) increased from 4 % to 11 %.

Most of the behavioural problems displayed after the onset of convalescence were new behaviours which were not displayed before the onset of convalescence (figure 4 and figure 5).

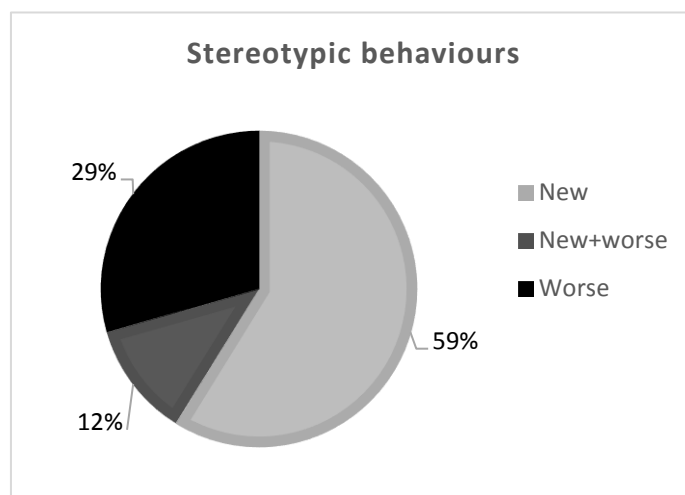


Figure 4. Distribution of displayed stereotypic behaviours after the onset of convalescence. New= new behaviours, not shown by the dog before. Worse = behaviours the dog displayed before which got worse during the convalescence (n=17).

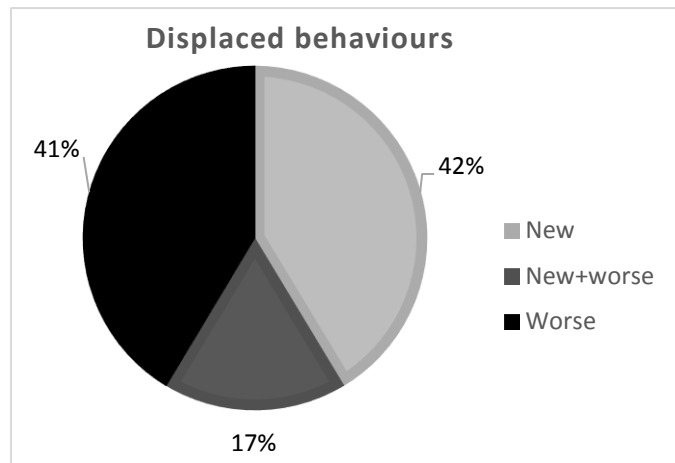


Figure 5. Distribution of displayed problem behaviours after the onset of convalescence. New= new behaviours, not shown by the dog before. Worse = behaviours the dog displayed before which got worse during the convalescence (n=29).

Table 2 summarise the information about the 37 dogs which showed any new and/or worsen behavioural problem during convalescence. Of these individuals, 30 out of the 37 dogs were convalescence for three months or longer. The majority of the individuals displaying behavioural problems belonged to breed class one (13 individuals) and a majority was between one and three years of age (17 individuals).

The owners who answered that their dogs showed behavioural problems during convalescence also specified what kind of behaviours the dogs showed. The most common stereotypic behaviour was exaggerated licking, but behaviours such as tail chasing and obsessive herding were also mentioned. Some of the owners also reported that their dogs showed apathy which was included into the stereotypic category. As for displaced behaviours, the dogs displayed behaviours such as aggression or fear towards dogs, increased fear in general, separation anxiety, excessive barking and difficulty relaxing.

Table 2. Summarised information about the 37 dogs which showed behavioural problems during convalescence. M=male, F=female, c=castrated

<b>Breed class</b>	<b>Sex</b>	<b>Age</b>	<b>Convalescence time</b>	<b>Stereotypic behaviour</b>	<b>Displaced behaviour</b>
Mix	cF	>7 yr	1-2 months	No	Yes
Mix	cF	1-3 yr	3-6 months	No	Yes
Mix	cM	>7 yr	>6 months	Yes	No
1	F	1-3 yr	3-6 months	No	Yes
1	M	1-3 yr	>6 months	Yes	No
1	cM	1-3 yr	3-6 months	No	Yes
1	M	< 1 yr	>6 months	No	Yes
1	cM	4-7 yr	>6 months	Yes	Yes
1	cM	1-3 yr	3-6 months	No	Yes
1	cM	1-3 yr	3-6 months	No	Yes
1	M	4-7 yr	3-6 months	Yes	Yes
1	cM	>7 yr	1-2 months	Yes	Yes
1	M	4-7 yr	>6 months	No	Yes
1	cF	4-7 yr	>6 months	Yes	No
1	cF	4-7 yr	3-6 months	No	Yes
1	F	4-7 yr	3-6 months	Yes	No
2	cF	>7 yr	3-6 months	No	Yes
2	F	1-3 yr	3-6 months	Yes	Yes
3	F	1-3 yr	3-6 months	No	Yes
3	cF	1-3 yr	3-6 months	No	Yes
5	F	1-3 yr	>6 months	No	Yes
5	F	>7 yr	>6 months	No	Yes
5	F	>7 yr	>6 months	No	Yes
5	F	>7 yr	3-6 months	Yes	Yes
6	M	1-3 yr	2-4 weeks	No	Yes
8	M	1-3 yr	3-6 months	No	Yes
8	M	1-3 yr	>6 months	Yes	Yes
8	cM	4-7 yr	>6 months	No	Yes
8	F	1-3 yr	>6 months	Yes	Yes
8	cM	4-7 yr	1-2 months	Yes	Yes
8	F	4-7 yr	3-6 months	No	Yes
8	cM	4-7 yr	>6 months	No	Yes
8	F	4-7 yr	1-2 months	Yes	No
9	cM	1-3 yr	3-6 months	Yes	No
9	cM	4-7 yr	1-2 months	Yes	No
9	M	1-3 yr	3-6 months	Yes	No
9	F	1-3 yr	>6 months	No	Yes

### 3.3 Support from the veterinarian staff

The majority of the owners (55 %) answered that they did not receive the help and support they wanted from the veterinarian staff taking care of their dog during the convalescence with regard of how they could activate their dog. Out of these 55 %, a majority with 71 % answered that they wished they would have received help and support from the veterinarian staff taking care of their dog during convalescence with regard of how they could activate their dog (figure 7).

## 4 Discussion

The results show that presence of behavioural problems increased after the onset of convalescence (figure 3). Analysing both behavioural problems separately, stereotypic behaviours and displaced behaviours, the presence of both increased after the onset of convalescence. As figure 3 shows, more dogs showed either stereotypic or displaced behaviours than dogs showing both types. More than one fifth of the dogs showed stereotypic behaviours during convalescence and more than one third showed displaced behaviours (figure 3). The results show that it was more common that dogs started to display new behaviours after the onset of convalescence, not taking into consideration if they had other behavioural problems already (figure 4 and figure 5), instead of worsening already existing behaviours. Even though no statistical analysis was performed, all results indicate that presence of behavioural problems increase after the onset of convalescence and even with a lack of statistical significance, the results are not to be discarded. Of the 75 dogs in the results, 37 showed some sort of behavioural problem during convalescence (Table 2), which make up for almost 50 % of the dogs in the study. Since, as far as the author knows, this is the first study which look into the specific subject, the importance in this step is to see in what direction the results point. Taking this into consideration the results indicate that dogs might alter their behaviour during convalescence to behaviours which often are unwanted by the owners and could indicate a poorer welfare.

Occurrence of behavioural problems as well as worsening of already existing behavioural problems could be signs of dogs not being able to cope with the new situation convalescence implicates. In captive wild animals, stereotypic behaviours are used as indicators of environments which causes a lower welfare due to confinement or poorer stimuli (Mason et al., 2007). Making the same implication in dogs, the present study indicates that some dogs get affected by the convalescence negatively. One way to develop the study could be by measure cortisol levels which might confirm an elevated stress level, which could be one reason to stereotypic behaviours (Mason et al., 2007). Measuring of urinary cortisol/creatinine levels has

been done in a study by Rooney, Gaines and Bradshaw (2007), when measuring stress in Labrador Retrievers moving from their puppy home to a predicted compared stressful military kennel facility. The study showed that cortisol/creatinine levels could be used as an indication of the predicted more stressful environment.

There are a lack of studies on how dogs are affected by convalescence, but how confinement and smaller living areas affect dogs have previously been studied. Smaller living areas, as dogs during convalescence often are subjected to, has been found to correlate with more behavioural problems, such as separation anxiety (Takeuchi et al., 2001; Kobelt et al., 2003). Clubb and Mason (2007) states that carnivores having a natural large ranging size predicts for stereotypic behaviour (i.e. pacing) in captivity. Stereotypic behaviours due to confinement has been seen in dogs as well. Beagles subjected to restrict spatial and social housing showed an increase in stereotypic behaviours such as auto-grooming and circling (Beerda et al., 1999). Apathy is not a stereotypic behaviour, but was mentioned by several owners in the present study. Apathy is however a behavioural problem as it deviates from the norm and should be considered as a sign of poorer animal welfare both in domestic species (Sambraus, 1998) and zoo animals (Salas & Manteca, 2016). Because of that, recorded apathy from the owners was included into the stereotypic category.

One possible source of error in studies regarding behavioural problem is how different behaviours are defined. In Kobelt et al. (2003), some of the recorded behavioural problems would be defined as stereotypic behaviours in the present study. In general, stereotypic behaviours are more studied in captive non-domestic animals and domestic farm animals, while unwanted behaviours in domestic companion animals more often are termed problem behaviours. Using the definition of stereotypic behaviour by Mason et al. (2007) these types of behaviours could be observed in companion animals as well, confirmed by Protopopova, Hall and Wynne (2014). In future studies it is of importance to define the behaviours studied and it would be optimal if a standard could be set for different definitions of the behavioural problems which Odendaal (1997) tried to do.

There are several factors which might have affected the results, one being the breed representation (figure 1). The majority of the dogs belonged to breed class one (sheepdogs and cattledogs) as well did the dogs displaying behavioural problems (Table 2). Many of these breeds are high in energy and bred for work and might therefore have harder to cope with the circumstances regarding convalescence. In one study, herders and terriers performing stereotypic behaviours were not as persistent in an extinction task as hounds and working dogs (Protopopova, Hall & Wynne, 2014). That does not confirm a breed difference in likelihood of developing stereotypic behaviours but implies that some breeds might

have a harder time to get rid of a taught behaviour. Other studies suggest that there is a breed difference in occurrence of some stereotypic behaviours, such as tail chasing (Goto et al., 2012) and flank/blanket sucking (Haupt, 1991), where inactivity was the most common trigger to flank sucking (Moon-Fanelli, Dodman & Cottam, 2007). Lund, Agger and Vestergaard (1996) studied breed influence on behavioural problems in Danish dogs and suggest that some breeds (i.e. German Shepherd Dogs, Cocker Spaniels and Collies) are more likely to develop displaced behaviours, especially aggression.

Another factor which might affected the results was the normal activity level of the dogs in the study. All dogs in the study were used to regular training but most of them were more active with training sessions every week and regular competing, making them used to both physical activity and mental stimulation before convalescence. This level of activation is hard to maintain during convalescence due to restrictions and these kind of dogs might be more subjected to develop behavioural problems when forced to a prolonged period of inactivity due to not being able to adapt to a lowered activity level compared to dogs with a lower activity level normally. Kobelt et al. (2003) found a correlation between lowered walk frequency and higher occurrence of behavioural problems, which support the theory.

The results represent adult dogs, the majority being more than one year but not older than seven years. Adult dogs usually have daily routines and are not going through developing stages and not many other factors in the dogs' daily life should affect the results, except from convalescence. Of the individuals displaying behavioural problems, the majority was between one and three years of age. In a study on behavioural problems in Danish dogs, the mean age of the dogs with reported behavioural problems varied between 18 and 33 months, varying between the behaviours analysed (Lund, Agger & Vestergaard, 1996). This is roughly the same age as the majority of dogs showing behavioural problems in the present study. This implicates that dogs in some ages could be more prone to develop behavioural problems. However, further studies are needed to see if a correlation can be made between convalescence, behavioural problems and age.

In the study, the distribution of intact males and females was equal as well as the distribution of castrated individuals. Of the individuals displaying behavioural problems, no sex was overrepresented (Table 2). This implicates that sex does not affect how dogs respond to convalescence with regard of behavioural problems. Some studies suggest that females are more likely to suffer from anxiety while males are more likely to show aggressive behaviours (Lund, Agger & Vestergaard, 1996). However, Beerda et al. (1998) looked into spatial restriction of dogs and found no effect on sex on how the dogs responded to chronic stress, but females seemed to be more subjected to acute stress.

The majority of the dogs were convalescent for more than three months and almost one third were convalescent for more than six months which was the same for the dogs displaying behavioural problems (Table 2). This both shows that many dogs often are convalescent during a long time but could also implicate that a longer convalescence increases the risk of behavioural problems. However, often the first weeks of convalescence are the ones which require most stillness from the dogs. It would be interesting to further investigate if the time as convalescent correlates to the presence or severity of behavioural problems.

Even though several dogs displayed behavioural problems during convalescence, most owners reported that their dogs coped with the convalescence mentally well. Almost the same amount of owners believed their dogs only coped mentally fairly well and together with the owners who believed their dogs did not cope well, these were a small majority (figure 2). This is interesting from several aspects, partly because it is important for the clinics to have pleased clients, but it is also important from a welfare perspective. One factor which affects the results since the study is a survey instead of observations based on an ethogram, is that the behaviours were not properly defined and observations were not objective. Better would have been to list the behaviours interested in in the survey together with a description to be more certain that correct behaviours were observed by the owners if objective observations not can be made. Stress is often studied with regard of welfare and is not wished for during a prolonged time and can be expressed in several ways. Mariti et al. (2012) showed that many owners could identify behaviours indicating stress which are commonly known by the public but few could identify more subtle behaviours as indicators of stress, which strengthens why the owners should know which behaviours to look for. Future studies should both take into consideration how the owners perceive the situation and optimally register the dogs' behaviours objectively based on an ethogram through video recording.

“Quality of life” is often discussed in animal welfare and is defined by Wiseman-Orr et al. (2006) as “the subjective and dynamic evaluation by the individual of its circumstances (internal and external) and the extent to which these meet its expectations (that may be innate or learned and that may or may not include anticipation of future events), which results in, or includes, an affective (emotional) response to those circumstances (the evaluation may be a conscious or an unconscious process, with a complexity appropriate to the cognitive capacity of the individual)”. Environmental enrichment such as exercise and training are known to enhance the quality of life in dogs as well to enhance calm behaviours (Kiddie & Colins, 2015) and has been studied in kennelled dogs (Schipper et al., 2008). As a consequence, when this is limited the quality of life could be reduced, which support the results from the present study. Feeding and chewing enrichments have been found to enhance wanted behaviours and lower stereotypic behaviours (Schipper et



al., 2008). It is important to educate owners in what type of activation the dogs are allowed to perform during convalescence in order to keep a high quality of life. More than half of the owners did not receive the help they wished for from the veterinarian staff responsible of their dog's rehabilitation and convalescence regarding how they could keep their dog stimulated. This is an issue which must be addressed by the clinics since the convalescence dogs with their owners are important customers, often making many visits at the clinic. It is often a physiotherapist or veterinary nurse handling the dog's rehabilitation and they might need further education in ethology in general and dog behaviour in special in order to be able to help the owners regarding this issue. A review by Wells (2004) concludes that social interaction with humans and conspecifics should be considered the most important environmental enrichment for confined dogs. This could be applied to convalescence dogs as well since these often are confined. It is important to inform the owners that social interaction might be the most important aspect in keeping their dogs at a high quality of life during convalescence even though other environmental enrichments could be applied as well. A possibility would be to have a team of a veterinarian, a veterinary nurse and a physiotherapist who are further educated in ethology to help these owners during convalescence. If needed, an ethologist could be consulted as well by the team. Some activities should maybe not be performed by one dog with respect of a specific injury why a combined knowledge of both physiotherapy, animal behaviour, specific injuries as well as veterinary nursing is needed to best meet these patients' needs in the home.

Having an injured dog could be stressful for the owner, which might increase if the dog starts to show behaviours not shown before which also could indicate poorer welfare. It is necessary that the veterinarian staff can support these owners properly. The results showed that not all owners who not received help from the veterinarian staff regarding stimulation of their dog wanted this help. It would have been interesting to be able to look further into these results and ask the owners why they would not turn to the physiotherapist or veterinary nurse for help. One possible reason is that the owners lack trust in the personnel taking care of their dog's convalescence in a greater aspect than the rehabilitation process. It would therefore be beneficial for the clinics to be able to offer special educated staff on this matter as mentioned above.

## 5 Conclusion

In conclusion, the results show that presence of behavioural problems increase in previously active dogs in agility and/or rally obedience subjected to convalescence. The majority of dogs displaying behavioural problems during convalescence, showed new types of behaviours, indicating the dogs trying to cope with the new situation convalescence implicate. The increased presence of behavioural problems also indicates that some dogs might fare less well during convalescence which could be a welfare issue. Most dogs were convalescence for three months or more and these were also the majority of those individuals which showed behavioural problems, indicating that time as convalescence might be an important factor. Many owners believed they did not receive the help they wanted from the veterinarian staff to handle their dog's convalescence with regard on how to keep their dog stimulated. A continued education of staff handling convalescence dogs is needed in dogs' behaviour as well as in the importance of environmental enrichment and how this can be used to keep convalescence dogs at a high quality of life. Further studies are needed to confirm these first results as well as to see if behavioural alterations as response to convalescence is the same depending on time as convalescence, breed of dog, age and normal activity level.

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# Appendix 1 – The questionnaire in the survey

## Beteendeproblem hos aktiva hundar under konvalescens

Konvalescens = Tiden från skada till dess att hunden friskförklarats.

Idag finns det stora möjligheter att behandla skadade hundar inom djursjukvården genom eventuell operation samt rehabilitering. Att genomgå rehabilitering är en tid med tvingad minskad aktivitet för den tidigare aktiva hunden. Begränsad aktivitet och begränsad yta vet man hos både hund och andra arter kan leda till beteendeproblem. Dock är detta ett ännu utforskat område inom djursjukvården. Det är troligt att risken är större att hundar som innan en skada levt ett aktivt liv upplever tiden med minskad aktivitet under konvalescensen som jobbigare och därmed löper större risk att utveckla beteendeproblem. Syftet med enkäten är därför att undersöka om aktiva hundar som tvingas till minskad aktivitet genom konvalescens på grund av skada utvecklar några beteendeproblem.

Frågor skickas via mail till: saoy0002@stud.slu.se

Tack för din medverkan

1. Vilken ras är hunden?\*

---

2. Vilket kön hade hunden vid konvalescensen?\*

- Hane
- Tik
- Kastrerad hane
- Kastrerad tik

3. Vid vilken ålder var hunden konvalescent?\*

- < 1 år
- 1-3 år
- 4-7år
- >7 år

4. Vilken aktivitetsnivå hade hunden innan konvalescensen?\*

- Tränades regelbundet men tävlades inte
- Tränades regelbundet och tävlades ibland
- Tränades flera gånger i veckan och tävlade flera gånger per år

5. Hur länge var hunden konvalescent?\*

- < 2 veckor
- 2-4 veckor
- 1-2 månader
- 3-6 månader
- > 6 månader

6. Upplevde du att hunden klarade tiden som konvalescent bra mentalt?\*

- Ja
- Nej
- Så där

7a. Hade hunden upprepande beteenden innan konvalescensen? (t.ex. svansjagande, överdrivet slickande av tassar/annat ställe på kroppen, sugande/snuttande på flank eller filt/gosedjur eller annat upprepande beteende)\*

- Ja
- Nej

7b. Utvecklade eller förvärrade hunden eventuella upprepande beteenden under konvalescensen? (t.ex. svansjagande, överdrivet slickande av tassar/annat ställe på kroppen, sugande/snuttande på flank eller filt/gosedjur eller annat upprepande beteende)\*

- Ja, hunden visade beteenden som den inte hade sen innan
- Ja, hunden hade beteenden som förvärrades under konvalescensen
- Ja, hunden både visade nya beteenden och förvärrade beteenden som den hade sen innan
- Nej

7c. Om ja, vilket eller vilka beteende såg du?

---

8a. Hade din hund problembeteenden (t.ex. hundaggressivitet, rädslor, separationsångest, aggressivitet mot människor) innan konvalescensen?\*

- Ja
- Nej

8b. Utvecklade eller förvärrade hunden eventuella problembeteenden under konvalescensen? (t.ex. hundaggressivitet, rädslor, separationsångest, aggressivitet mot människor)\*

- Ja, hunden fick problem som den inte hade innan konvalescensen
- Ja, hunden hade redan problem som förvärrades under konvalescensen



- Ja, hunden hade både problem sen innan som förvärrades och utvecklade nya problembeteenden
- Nej, hunden uppvisade inga problembeteenden under konvalescensen

8c. Om ja, vilket/vilka beteenden visade hunden?

---

9a. Tycker du att du fått hjälp och tips från djursjukvården så som veterinär/djursjukskötare/rehabpersonal på hur du kan aktivera din hund under konvalescensen?\*

- Ja
- Nej

9b. Om nej, hade du önskat att du fått information om hur hunden hade kunnat aktiveras under konvalescensen?

- Ja
- Nej