

## An evaluation of the strategies used to overcome separation anxiety in companion dogs

### Introduction and rationale

Separation anxiety (SA) is a common behavioural problem in companion dogs and is an issue that affects my daily practice. As the owner of a dog creche and home boarding business (🐕➡️🐕 🔄➡️ 🐕➡️🐕➡️🐕➡️🐕), many of our regular attendees suffer with separation related problems. In my role as a canine behaviourist, I also see clients seeking help with this issue. Many owners are hoping for a quick fix for unwanted behaviours, however, successful behaviour modification using current well-established techniques, require owners to invest considerable time and effort. Currently, my approach to modifying SA is affected by owners' quick-fix requirements, with many clients quitting before fully accomplishing their goal, despite making progress.

SA has been researched in a variety of ways over the last 20 years or so. Study areas include prevalence and co-morbidity, symptoms, medication, behaviour modification techniques and more recently, research into how human personality and caregiving strategies affect the problem.

For my research, I hope to discover the efficacies of different strategies used to alleviate SA symptoms, and to gain insight into how and why the problem manifests, including the effects of the dog-human relationship. Unlike other studies, I want to improve the welfare of these companion animals in a holistic way, by examining antecedents such as diet and exercise; the owners' interaction style with their dogs; and traditional exercises aimed at increasing the dogs' ability to feel comfortable in their owners' absence. I also propose to investigate targeted, individualised modification plans specific to the type of SA manifested in each participating dog.

To my knowledge, no study has investigated this subject using a mixed methods approach: by using quantitative methods to examine the problem from the dogs' perspective; and through qualitative methods when examining the problem from the humans' perspective. The main aim of this research is to evaluate different methods to inform tailored recommendations that are effective for both dogs and their owners.

## Indicative literature review

### Signs and symptoms

Symptoms of SA are well described in published literature (see Lund and Jorgensen (1999), Palestrini *et al* (2010), Rehn and Keeling (2011)) whose direct observational studies using filmed footage provide detailed information regarding frequencies and durations of common SA signs using ethograms, such as whining, barking, destruction, inappropriate elimination, as well as more subtle signs including trembling and paw lifting.

Although such studies provide direct data, they do not allow for full coverage as the camera is only placed in one room even if the dogs have free reign of the home. They also omit any influence from the owner, such as over enthusiastic greeting, or a lack of rules with their dog which could directly affect SA. Many symptoms occur before the owner leaves, such as shadowing the owner around the home, or aggressive behaviour when the owner attempts to leave, which again would not be captured during these studies.

Further studies use similar methods to investigate the efficacy of medication to alleviate SA symptoms, such as clomipramine (Cannas *et al*, 2014). Medication is likely to mask the problem of SA particularly as medications such as clomipramine cause side effects including lethargy (King *et al*, 2000) . However, when researchers examined the effects of fluoxetine on SA, they found improvements in the dogs' cognitive bias, which suggested a genuine change in the dogs' behaviours (Karagiannis *et al*, 2015). The study did not focus solely on medication, but included both medication and behaviour modification. As a result, it is not known how much the medication contributed to the change in behaviour.

SA symptoms and prevalence have also been researched through survey methods (See Storengen *et al*, (2014), Tiira *et al*, (2016)). Such research is likely to have underestimated the problem as owners will often only be aware of SA if their dog causes their neighbours to mention noise disturbances, or if the owner returns home to evidence of destruction or inappropriate elimination. Symptoms that occur before the owner leaves or upon their return may be misinterpreted by the owner, as is the case with stress in companion dogs (Mariti *et al*, 2012).

### Behaviour modification

Behaviour modification programmes involve desensitisation and counterconditioning techniques, and have been used for SA for 40-50 years (see Tuber *et al*, 1974). Although this technique has been shown to be highly effective (see Rogerson (1997)), it is time consuming for the owner and requires high levels of commitment. Moreover, owner compliance is often lacking (Takeuchi *et al*, 2000). The reasons behind the lack of compliance in behavioural modification has only recently been researched by Lamb *et al* (2018) who reported factors such as a lack of support at home; previous behavioural advice failing to succeed; too much/too complex information provided by the behaviourist; and welfare concerns for their dog in the long term due to the behavioural treatment.

### The Dog-Owner relationship

Lenkei, *et al*, (2018) studied underlying influences relating to SA, and concluded that owner behaviours/personality affect the problem, reporting permissive owners having dogs that displayed signs of frustration. This supports my experiences of SA dogs that attend behavioural consultations and daycare/boarding. Often a form of SA is fostered by the owners' behaviour of constantly giving in to demand behaviours from their dogs, resulting in a frustrated/anxious dog in their absence.

Dodman *et al*, (2018) also studied the relationship between owner personality and behavioural problems in dogs. To my knowledge there is no research examining the effect of changes in owner behaviour on their dogs' problem behaviours (aside from recommendations regarding greeting behaviours). The problem of SA concerns the dyadic relationship between owner and dog. Therefore, this may be a possible route to address underlying causes of SA, rather than focussing on symptoms alone.

### Antecedents

Few researchers recommend altering antecedents (such as diet, exercise and boundaries) to address SA behaviours in dogs. I have found however, that SA, along

with any behavioural problem, can be partly helped through changes in such antecedents. They, at the very least, ensure the dog is as calm as possible, and therefore more receptive to behaviour modification therapy. This in turn, increases the likelihood of successful rehabilitation.

### Diet

When dogs are provided with calories that are not then used up through exercise, not only can they gain weight, but they can be left with excess energy which is often used to fuel behavioural problems. Ensuring the amount of energy consumed equals the amount of energy expended (through controlled exercise), prevents adding to any behavioural problem.

Diet can also be used to naturally increase serotonin production which can in turn modify behaviour. Dogs with behavioural problems are often have low serotonin levels. Including complex carbohydrate meals in a dog's diet has been shown to increase serotonin levels (Gazzano *et al*, 2018), which may be beneficial for dogs with SA, although to my best knowledge this has not been specifically researched.

Recently, Thielke and Udell (2017) examined the role of oxytocin in the dog-human dyad, and suggested it had potential as a SA treatment. As oxytocin levels can be naturally enhanced through diet, this may also be promising from a nutraceutical perspective.

### Exercise

As with humans, exercise can have many mood-altering benefits in dogs. It can relieve boredom and frustration, increase serotonin production, increase endorphins, and make for a better dog-human relationship. Again, to my best knowledge, the specific effect of exercise on SA has not been researched, although the need to provide sufficient exercise is often recommended by behaviourists as part of the modification process (e.g. Landsberg, 2015).

## Rules

The nothing in life is free regime is a well-established technique used to alter the dog-owner relationship, usually in aggression cases (see Uchida, 1997). It can ensure dogs are aware of their owners' expectations in their daily lives, whilst reinforcing the requirement for the dog to follow their owners' direction. Such direction involves requiring the dog to perform a command (usually a sit) before they have access to any resource (e.g. food, access to outside etc). As with children, spoilt dogs can develop problems including attention seeking behaviour (or demand behaviours), nervousness, hyperactivity and aggression. They are given the impression that they are in charge of the household, and may deal with this responsibility in varying ways. By having a few simple rules, particularly around important resources, dogs are often calmer, happier and more respectful. This also indirectly alters the dyadic relationship – the dog now takes direction from the owner, and the owner learns to lead. This can be difficult for some owners, as they often feel they are being cruel to their dog by insisting on rules. However, it is not that the dog does not get what he wants, but rather he has to ask politely for it, by sitting, waiting, and for me, also providing eye contacting before being given food, affection, access to outside, toys, access to the sofa (if the owner wants to), and so on. To my best knowledge, this technique is not used for dogs with SA, however, only giving the dog attention when they are calm, is often a recommendation (Landsberg, 2015).

## SA or demand behaviour?

A study by Konok *et al*, (2019) suggested a caregiving strategy of insecure-avoidance attachment in owners with SA dogs. However, in my experience, owners of SA dogs are often overly concerned about their dogs, and give in to demanding behaviour. This would agree with Lenkei *et al* (2018) and their impression that permissiveness of owners correlates with frustration in SA dogs. It may, therefore, be that true SA dogs, i.e. those that are fearful when separated from their owners, have insecure-avoidant owners, and those who show more frustration have lenient owners with demanding dogs, rather than fearful ones. This could be supported by Lenkei *et al* (2018) who discovered different emotional states in SA dogs - fearful versus frustration. Such different causes of problem behaviours related to owner absences should require

different modification plans. However, I have not found different strategies in published literature.

### Indicative methodology/methods

#### Animal behaviour methodology

Research in the field of animal behaviour, along with their publishing journals, focus mainly on scientific paradigms, such as positivist or post-positivist epistemology. Their ontological perspective is one of objectivism. Often, as post-positivist research cannot control for all variables in a study, data is analysed through statistical tests which provide various correlations between the variables being studied. The aim is often to attempt to generalise results to the wider population, but this is often not possible due to the lack of sufficient controls and/or standardisation of sufficiently sized samples. Methodologies are always quantitative, and where humans are being studied as part of animal research, their feelings and opinions are often categorised through labels such as 'strongly agree' to given statements relating to the research question. There is a requirement to research at a distance so not as to influence the participants and retain objectivity. This approach to research has been successful in the field of natural biology, however, when researching companion animals, where research questions involve the animals' human owners' behaviour, it may be relevant to use social research paradigms.

Social studies often have a subjectivist ontology, and an interpretivist epistemology. Methodologies are qualitative and provide insights into thoughts, feelings and experiences.

For this study, objectivism is not possible if high levels of validity are required. Behavioural consultations depend on the subjective interpretation of the behaviourist (informed by their knowledge and experience) of the also subjective relay of information from the owner, as well as observations of the dog itself. The dog's behaviour is likely to differ in the owner's presence; the consultant's presence; and the environment in which the consultation takes place. For this latter reason, the Fitbark activity monitor (see below) will be used to provide direct data, collected from the dog's normal environment/situation. The activity monitor will also provide reliable numerical

data, which can be analysed to show improvements in behaviour, which will be particularly useful, as behaviourists often over-estimate modification successes (Lamb *et al*, 2018).

This could be seen as objective data, however it still relies on an element of interpretation as it does not provide the context in which the activity data was generated.

As the review of current literature suggests, there are no holistic studies of the problem of SA in companion dogs. Studies are focussed around symptoms in the dogs; and around direct modification of their behaviour and/or medication of the problem. The owners of the dogs are often omitted from study, despite the problem concerning the relationship between owner and dog. This research therefore aims to assess and modify all aspects of the problem of SA: from both the dogs' perspective and the owners'.

The research paradigm is pragmatic, using mixed methodologies (qualitative when studying owners; quantitative when studying dogs). It does not adhere to any specific research design, but instead aims to use the method most suited to answer the research question. It must also directly reflect the routine of my professional behaviour modification sessions in order for it to be of value to the business and provide high validity. This should therefore reflect valid procedures and protocols for assessing and modifying problem behaviours, rather than a stand-alone piece of research.

## Methods

The following diagram (Figure 1) illustrates the proposed stages of the research method:-

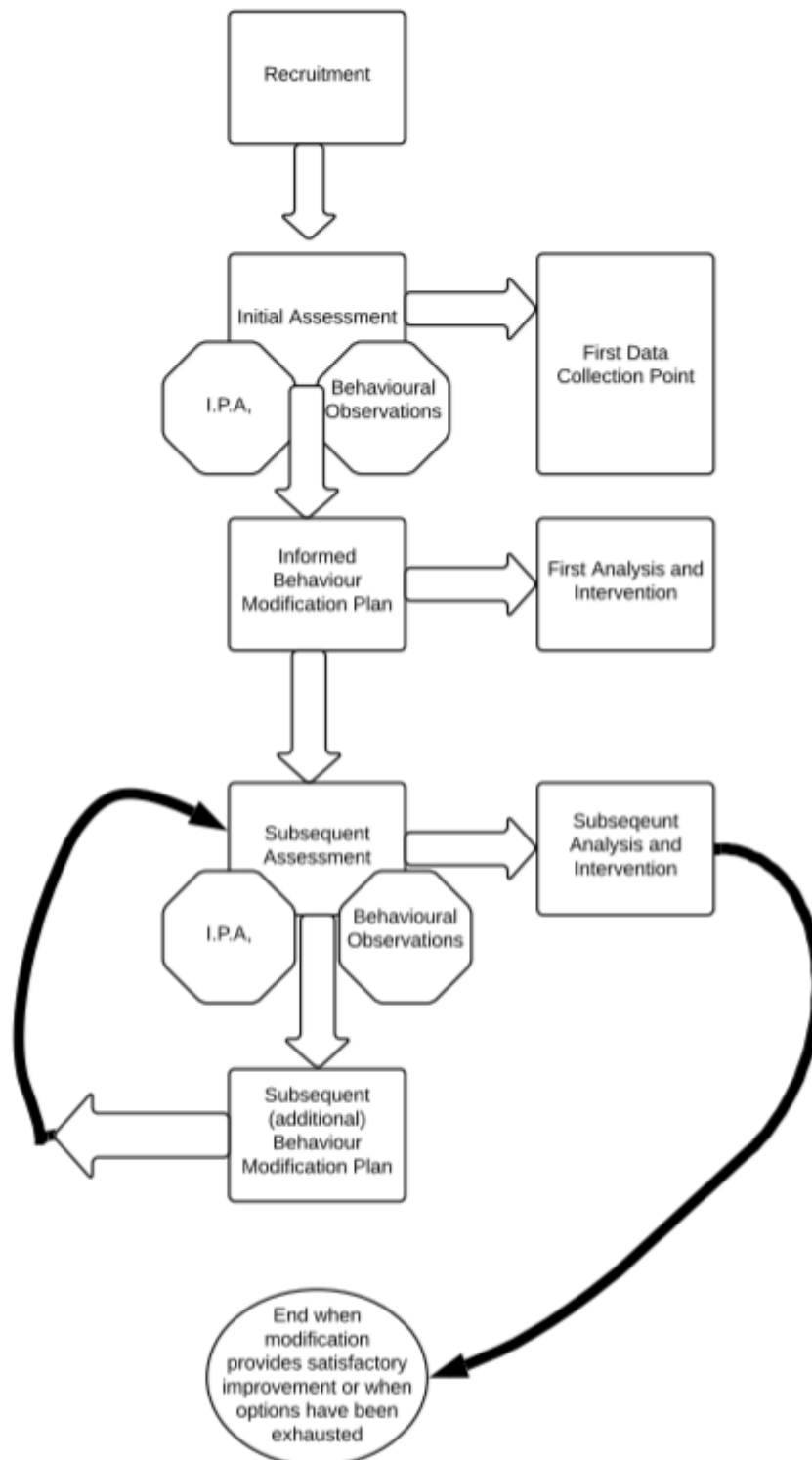


Figure 1 Stages of the research method

## Sample

A convenience sample of 10 participants (minimum) will be sought through the business,                                                                                                                                              

Owners and their dogs would be invited for an initial assessment at the dog's home. This would consist of a preliminary interview taking the form of an interpretative phenomenological analysis (see below), and an observational assessment of the dog's symptoms. This observation would hold more validity if it were at the owners' homes and filmed for ethogram assessment. However, this has been unwelcomed in the past by clients, who wish to retain their privacy. There will be a short period of direct observation of how the dog and owner behave dyadically during the initial stages of the session, with known signs such as shadowing by the dog, demand behaviours by the dog, and permissiveness by the owner being noted through an ethogram. The owner and researcher would also leave the dog in a room alone for no more than 5 minutes in order to gauge the level of SA without causing the dog too much anxiety. The dog would be filmed as the owner leaves, whilst the owner is gone, and while the owner returns. This is mainly to create baseline data to view how the dog behaves and progresses as they adhere to the modification plan.

The interpretative phenomenological analysis (IPA) method will be used, as it was proved to be of value when a mini IPA was undertaken as part of the qualitative research module as part of the DProf programme. This involves interviews where the participant is encouraged to share their experiences. Questions are open and kept to a minimum so that participants can freely share their thoughts and feelings without any leading remarks from the researcher. Questions will focus on general experiences of owning their dog; their experience of SA; and their experiences of behaviour modification. Thematic analysis of the interviews is used to provide insight into the experiences of the owner. During the mini study, the IPA illustrated the complexities of the relationship between owner and SA dog, and illuminated the barriers such a

relationship can provide to the modification of the problem of SA. Thematic analysis showed a humanising of the dogs, and a distinct lack of rules and boundaries between owner and dog. As the 3 dogs featured in the IPA study had all boarded and attended daycare at  $\mathbb{F} \triangleright \searrow \quad \mathbb{E} \updownarrow \rightarrow \quad \mathbb{U} \Rightarrow \triangleleft \triangle \Rightarrow \Rightarrow \triangleleft$ , the insider story showed a different picture than that provided by the interviews, which again suggests that the relationship between owner and dog heavily influences the severity and even the existence of SA in some dogs. The themes discovered during the IPA may point to training needs, difficulties to be overcome and possible barriers to behaviour modification. For example, one participating owner saw the severity of her dog's SA as an indicator of how much he loved her. It is possible therefore, that by modifying his behaviour, she may feel it could diminish the dog's feelings towards her and affect her desire to carry out any advisory training.

IPA research has been used to study experiences of humans with therapy and service dogs (for example, Krause-Parello, 2018), but to my best knowledge, this method has not been used to research owners' experiences of living with problem dogs.

As the modification plan progresses (see Table 1 below for details of possible interventions), fortnightly IPA interviews would be scheduled to see how the owner perceives any changes in behaviour; and point to any further difficulties. Thematic analysis would be compared to previous IPA interviews with the owners and would also look for common themes and differences between participating owners. Such commonalities and differences would be interesting to investigate. The IPA's qualitative approach to the possible lack of owner adherence differs from the research by Lamb *et al*, (2018) which used quantitative survey methods. This may have omitted important aspects of the problem by oversimplifying the situation.

The quantitative aspect of this research would involve the use of a dog activity monitor: the Fitbark 2. This activity monitor has been previously validated and used for published research (e.g. Patel *et al*, 2017). This attaches to the dogs' collar and provides )accelerometer data, which can either be downloaded as raw data and analysed via Excel/SPSS, or it can be analysed via the Fitbark app. The app provides details via Fitbark points and analyses the data via charts (see Figure 2 below). These points are similar to steps on a pedometer and provide data related to amounts of activity. It also provides a sleep score in the form of a percentage. The app provides

a daily amount of points, along with a target (usually more useful for those concerned with their dog's fitness). An hour section can be highlighted and a chart of activity for that hour, split into 5-minute intervals is provided in the form of a bar chart. The bottom left chart shows the dog's activity between 8am and 9am which was when the dog was walked, whereas the top left chart shows the activity between 1pm and 2pm where the dog has both time to rest and to play. Clear differences can be seen between rest, moderate activity and high activity.

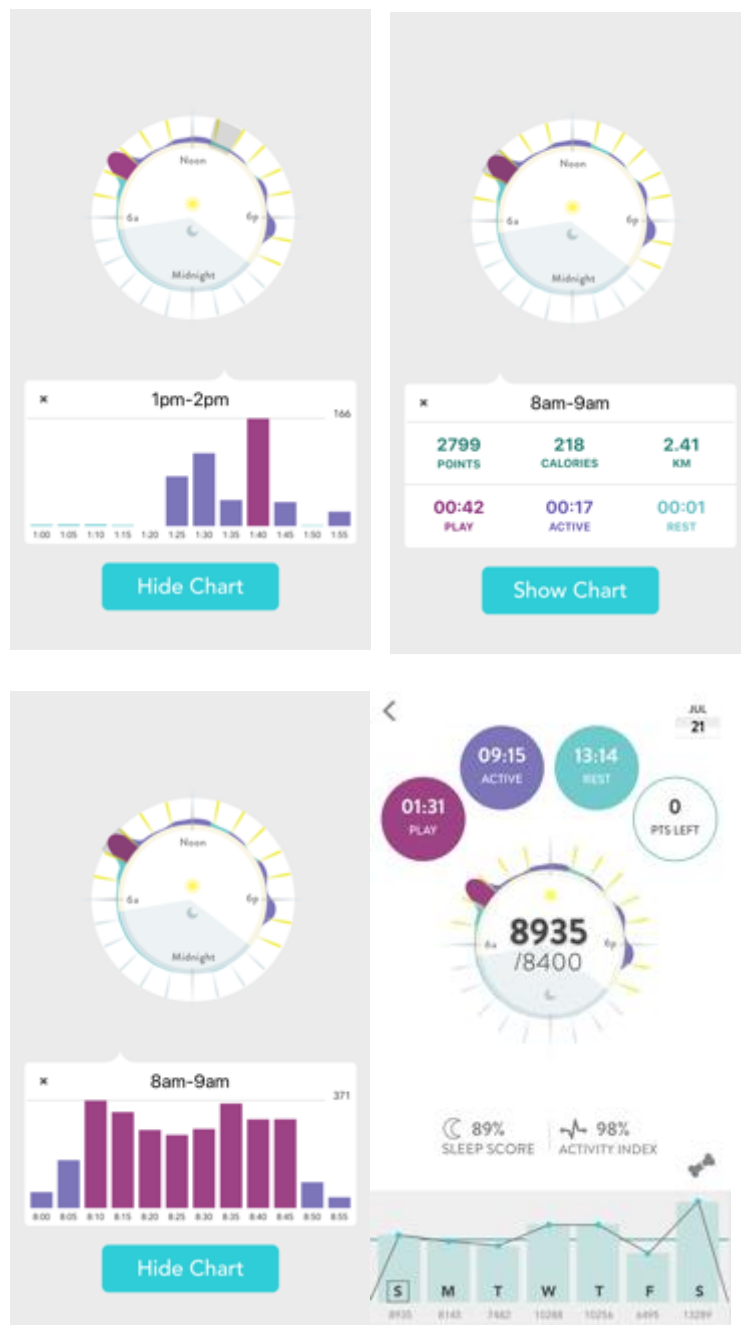


Figure 2 Fitbark app charts

The hypothesis for this data would depend on the type and severity of the SA. For example, some dogs may be too anxious to be left at all, but the data may still show a large amount of activity even when the owner is around as SA dogs tend to shadow their owners by following them around the house constantly. Others may not do this, and the owners may already be leaving them for short periods, but they may still show active data while they are alone, due to pacing behaviours. Other dogs may even have trouble sleeping unless they are in direct contact with their owners, which would affect their sleep score. A general hypothesis could be that dogs with severe SA show high levels of activity in the absence of their owners, but each dog would need its own hypothesis. The initial two weeks would therefore provide baseline data, and subsequent data can be compared to examine any improvements.

This activity data will also require the owners to provide some context. They would be asked to complete a diary of their own time in/out of the house. So that the data can be accessed remotely, the owners would also be given a Fitbark hub. This links to their WiFi and allows the data to be accessed through the app, provided the dog is in close proximity to the hub. Should the owner not want to use the hub, they would need to use the app on their own phone and sync with it at least once daily, which would also sync to the app on my own phone.

The behaviour modification plan would be drawn up depending on each individual case. It is difficult, therefore, to accurately outline the strategy here. For example, a recent client brought their dog to a behavioural consultation as he was destructive at home when left. From the initial assessment it became apparent that the owner was coming home during their lunch break and playing fetch with their dog in the garden before returning to work. It was only during the afternoon that the destructive behaviour occurred. The overstimulation of the game of fetch had resulted in frustration when the owner left. By changing their lunch time routine to calm interactions only, the behaviour stopped.

That being said, the following strategies are likely to be effective for some of the participants, and depending on who takes part, it could affect all of them. Antecedents such as diet, exercise and rules/boundaries at home are always worth addressing. A change in diet maybe advised if the dog is currently on a low-quality diet, or a high

protein food. Some dogs may have increased levels of anxiety because they lack an appropriate output such as adequate exercise, so an amended exercise regime may be suggested. Both diet and exercise can increase serotonin levels which can aid anxious behaviours. Oxytocin can also be increased through dietary means, which may also impact on SA. A lack of rules/boundaries may have influenced the dog and affected the relationship between dog and owner. To correct demanding behaviour, a 'nothing in life is free' approach can be used. It is also important that the owner ignores overly demanding behaviour and the dog should be sent to their bed (with a toy/long lasting treat) before the behaviour begins, thereby anticipating demanding behaviour and redirecting this whilst also giving the dog something to do.

Once any antecedents have been addressed, modification of the specific remaining problems must be addressed through training. This may involve gradual sit/stay exercises to avoid shadowing; desensitisation to the leaving ritual; ignoring of any excitement on return; and gradual random safe leaving periods. Again, such strategies may depend on the signs present. In my professional capacity, many SA dogs also show reactivity to unfamiliar people and/or dogs when in the presence of their owner. It will be interesting to see whether such associated behaviours will diminish as the SA is modified, or whether this will also need to be directly addressed as part of the problem.

Table 1 Possible behaviours and associated interventions

| Possible situation                        | Possible intervention                                                                                                          |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Destructive behaviour                     | Increased/different type of exercise<br>Food dispensing toy/slow feeding bowl<br>Rules<br>Engaging training such as scent work |
| Shadowing owner                           | Sit/stay exercises                                                                                                             |
| Increased anxiety as owner is leaving     | Desensitisation to leaving routine/train<br>alternative rewarded behaviour                                                     |
| Increased activity when left              | Gradual leaving exercises<br>Separate high carbohydrate meal                                                                   |
| Abstaining from eating/drinking when left | Gradual increase in distance from owner<br>when eating                                                                         |

|                            |                                                                                                                        |
|----------------------------|------------------------------------------------------------------------------------------------------------------------|
| Over-excited when greeting | Owner to ignore/train alternative rewarded behaviour                                                                   |
| General anxiety            | Varied additions to diet to increase health of gut microbiome (gut-brain axis)<br>Increased/different type of exercise |

All behaviour modification strategies will be demonstrated to the owner using their own dog during assessments. The owner will also be invited to practice during the session so that any problems can be addressed immediately. It may also be beneficial in some circumstances for a dog to attend residential training to begin routines and basic commands that the owner can carry on at home.

It will also be interesting to see whether the participating dogs have poor sleep quality, and whether the antecedents can improve this. This could be ascertained via the Fitbark.

#### Risks/Ethical considerations

The main risk would be the owners' commitment to the research. It is not necessarily the commitment to carrying out the modification exercises, as this in itself would provide information on the difficulties owners face when given the task of modifying canine SA. The risk is the onus on the owners to provide diary information; to attend interviews; and to provide an honest reflection during these interviews.

There is always the risk that any technology may fail. However, I have been using the devices for almost a year on my dogs, and on home boarding dogs. There was an incident where the data would not download to the app, but the manufacturers provide a good customer service for such issues and rectified the problem within an hour. The battery life is 6 months, so there is no dependency on the owner to charge the device.

## References

Dodman, N. H., Brown, D. C. and Serpell, J. A. (2018) 'Associations between owner personality and psychological status and the prevalence of canine behavior problems', *PloS one* 13(2). Available at: <https://doi.org/10.1371/journal.pone.0192846>

(Accessed 8<sup>th</sup> December 2018)

Gazzano, A. Ogi, A., Torracca, B., Mariti, C. and Casini, L. (2018) 'Plasma Tryptophan/Large Neutral Amino Acids Ratio in Domestic Dogs Is Affected by a Single Meal with High Carbohydrate Level', *Animals* 8(5) pp. 75-94. Available at: <https://doi.org/10.3390/ani8050063>

(Accessed 8<sup>th</sup> December 2018)

Karagiannis, C. I., Bruman, O. H. P. and Mills, D. S. (2015) 'Dogs with separation-related problems show a "less pessimistic" cognitive bias during treatment with fluoxetine (Reconcile™) and a behaviour modification plan', *BMC Veterinary Research* 11(1) p80. Available at: <https://bmcvetres.biomedcentral.com/articles/10.1186/s12917-015-0373-1>

(Accessed 21 May 2019)

King, J. N., Simpson, B. S., Overall, K.L., Appleby, D., Pageat, P., Ross, C., Chaurand, J. P., Heath, S. Beata, C., Weiss, A. B. and Muller, G. (2000) 'Treatment of separation anxiety in dogs with clomipramine: results from a prospective, randomized, double-blind, placebo-controlled, parallel-group, multicenter clinical trial', *Applied Animal Behaviour Science* 67(4) pp. 255-275. Available at: [https://doi:10.1016/S0168-1591\(99\)00217-6](https://doi:10.1016/S0168-1591(99)00217-6)

(Accessed 21 May 2019)

Konok, V., Marx, A. and Farago, T. (2019) 'Attachment styles in dogs and their relationship with separation-related disorder – A questionnaire based clustering', *Applied Animal Behaviour Science* 213 pp. 81-90.

Available at: <https://doi.org/10.1016/j.applanim.2019.02.014>

(Accessed 22 June 2019)

Krause-Parello, C. A. (2018) 'Military Veterans and Service Dogs: A Qualitative Inquiry Using Interpretive Phenomenological Analysis', *Anthrozoos* 31(1) pp. 61-75.

Available at: <https://doi.org/10.1080/08927936.2018.1406201>

(Accessed 21 July 2019)

Lamb, L. Affenzeller N., Hewison, L., McPeake, K. J., Zulch, H. and Mills, D. S. (2018) 'Development and Application of the Lincoln Adherence Instrument Record for Assessing Client Adherence to Advice in Dog Behavior Consultations and Success', *Frontiers in Veterinary Science*.

Available at: <https://doi.org/10.3389/fvets.2018.00037>

(Accessed 21 July 2019)

Landsberg, G. M. (2015) 'S25B Diagnosing and Treating Canine Separation Anxiety' 79<sup>th</sup> Western Veterinary Conference. Available at:

<https://www.researchgate.net/publication/238722221>

(Accessed 21 July 2019)

Lenkei, R., Gomez, S. A. and Pongracz, P. (2018) 'Fear vs. frustration – Possible factors behind canine separation related behaviour', *Behavioural Processes* 157(December 2018) pp. 115-124. Available at:

<https://doi.org/10.1016/j.beproc.2018.08.002>

(Accessed 23 March 2019)

Lund, J. D. and Jorgensen, M. C. (1999) 'Behaviour patterns and time course of activity in dogs with separation problems' *Applied Animal Behaviour Science* 63(3) pp. 219-236. Available at: [https://doi.org/10.1016/S0168-1591\(99\)00011-8](https://doi.org/10.1016/S0168-1591(99)00011-8)

(Accessed 18 March 2019)

Mariti, C., Gazzano, A., Moore, J. L., Chelli, L. and Sighieri, C. (2012) 'Perception of dogs' stress by their owners' *Journal of Veterinary Behavior: Clinical Applications and Research* 7(4) pp. 213-219. Available at: <https://doi.org/10.1016/j.jveb.2011.09.004>

(Accessed 22 April 2019)

Palestrini, C., Minero, M., Cannas, S., Rossi, E. and Frank, D. (2010) 'Video analysis of dogs with separation-related behaviors' *Applied Animal Behaviour Science* 124(1-2) pp. 61-67. Available at: <https://doi.org/10.1016/j.applanim.2010.01.014>

(Accessed 22 April 2019)

Patel, S. I., Miller, B. W., Kosiorek, H. E., Parish, J. M., Lyng, P. J., Krahn, L. E. (2017) 'The Effect of Dogs on Human Sleep in the Home Sleep Environment', *Mayo Clinic proceedings* 92(9), pp.1368-1372. Available at: <https://doi.org/10.1016/j.mayocp.2017.06.014>

(Accessed 26 July 2019)

Rehn, T. and Keeling, L. J. (2011) 'The effect of time alone at home on dog welfare' *Applied Animal Behaviour Science* 129(2) pp.129-135. Available at: <https://doi.org/10.1016/j.applanim.2010.11.015>

(Accessed 18 November 2018)

Rogerson, J. (1997) 'Canine fears and phobias: a regime for treatment without recourse to drugs' *Applied Animal Behaviour Science* 52 (3-4) pp. 291-297. Available at: [https://doi.org/10.1016/S0168-159\(96\)01129-X](https://doi.org/10.1016/S0168-159(96)01129-X)

(Accessed 28 June 2019)

Storengen, L. M., Boge, S. C. K., Strom, S. J., Loberg, G. and Lingaas, F. (2014) 'A descriptive study of 215 dogs diagnosed with separation anxiety' *Applied Animal Behaviour Science* 159(October 2014) pp.82-89. Available at: <https://doi.org/10.1016/j.applanim.2014.07.006>

(Accessed 22 March 2018)

Takeuchi, Y., Houpt, K. A. and Scarlett, J. M. (2000) 'Evaluation of treatments for separation anxiety in dogs' *JAVMA* 217(3) pp.342-345. Available at: <https://doi.org/10.2460/javma.2000.217.342>

(Accessed 21 May 2019)

Thielke, L. E. and Udell, M. A. (2017) 'The role of oxytocin in relationships between dogs and humans and potential applications for the treatment of separation anxiety in dogs' *Biological Reviews* 92(1) pp. 378-388. Available at: <https://doi.org/10.1111/brv.12235>

(Accessed 21 May 2019)

Tiira, K., Sulkama, S. and Lohi, H. (2016) 'Prevalance, comorbidity, and behavioural variation in canine anxiety', *Journal of Veterinary Behavior* 16(November-December 2016) pp. 36-44. Available at: <https://doi.org/10.1016/j.jveb.2016.06.008>

(Accessed 28 March 2019)

Tuber, D. S., Hothersall, D. and Voith V. L. (1974) 'Animal clinical psychology: A modest proposal' *American Psychologist* 29(10) pp. 762-766. Available at: <https://doi.org/10.1037/h0037426>

(Accessed 21 May 2019)

Uchida, Y., Dodman, N., DeNapoli, J. and Aronson, L. (1997) 'Characterization and Treatment of 20 Canine Dominance Aggression Cases' *Journal of veterinary medical science* 59(5) pp. 397-399. Available at: <https://doi.org/10.1292/jvms.59.397>

(Accessed 21 May 2019)