The assessment of shelter dogs to predict separation-related behaviour and the validation of advice to reduce its incidence post-homing.

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The assessment of shelter dogs to predict separation-related behaviour and the validation of advice to reduce its incidence post-homing.

Summary

- A temperament test designed to predict separation-related behaviour following re-homing was found to be 86% effective.

- The dog's behaviour when left alone in the test room was found to be a significant indicator of whether the dog would develop separation-related behaviour in the new home.

- Written advice was found to be effective in reducing the development of separation-related behaviour following re-homing, particularly in dogs over 18 months old.

- Owner compliance appeared to vary between different aspects of the advice given.

- The age of the dog was found to be the main factor contributing to the occurence of separation-related behaviour in the post-homed population. Few dogs over 4 years of age exhibited separation-related behaviour.

- Dogs that showed an adverse reaction to being shut in a different room to their owner and dogs whose owners reported that they frequently showed attention seeking behaviour, were found to be more likely to show separation-related behaviour when left alone.

- Dogs handed in to rescue due to the illness/death of the owner were less likely to develop separation-related behaviour than dogs handed in for other reasons. Dogs that were handed in to rescue due to the owner "not wanting" them or being "unable to cope" were found to be more likely to develop separation-related behaviour following re-homing, than those handed in for other reasons.

Introduction

Separation-related behaviour problems in dogs are categorised as unwanted behaviour that only occurs when the dog is separated from its owner. The most common behavioural signs are destructive behaviour, various types of vocalisation and inappropriate elimination (McCrave, 1991).Whilst inappropriate toileting may be a

symptom of generalised anxiety, it is thought that destructiveness and excessive vocalisation may be attempts by the dog to restore contact with the owner by escaping to join the owner, or maintaining vocal contact (Voith and Borchelt, 1985; McCrave, 1991; Serpell and Jagoe, 1995). Destructive behaviour usually involves chewing or scratching fixtures and fittings or objects, and often occurs near the site of the owner's most recent departure. Other less frequent signs include excessive salivation, self mutilation, repetitive behaviour and vomiting.

One of the main differentiating features between separation-related behaviour and other behavioural disorders with similar signs is that the separation reaction is displayed soon after the departure of the owner, normally commencing within 30 minutes, and often within the first few minutes (Voith and Borchelt, 1985). Although over-attachment to the owner, resulting in anxiety upon separation, is often assumed to be the main motivation for separation-related behaviour, there can be other causes, for example, a fear of specific events that generalises to whole contexts, or a lack of habituation to separation from other individuals. In a significant proportion of cases the development of separation-related behaviour appears to involve a combination of two or more of these factors (Blackwell et al., 2003a)

For the purposes of the studies described in this report, separation-related behaviour (SRB) refers to behaviour shown by the dog where **all** of the following criteria are met;

1. At least one of the following behavioural signs is shown by the dog;

    Vocalisation - barking, howling or whining.

    Destructive behaviour - Biting, chewing or scratching any non-food related objects, dustbins/food containers excluded.

    Elimination indoors - urination or defecation.

    Other signs of general anxiety - vomiting, excessive salivation, repetitive behaviours, excessive biting or licking.

2. The behaviour is shown only when the owner is absent, or access to the owner is denied.

3. The behaviour is shown within 30 minutes of the owner leaving the dog alone.

Recent surveys carried out at the University of Southampton have indicated that a substantial proportion of the general population of pet dogs in the UK, possibly more than 1 million, may react adversely to being left alone by their owners. In a longitudinal study of Labrador Retrievers and Border Collies, over 50% of dogs had displayed separation related behaviour by 18 months of age (Bradshaw et al., 2002b). Questionnaire surveys of dog walkers carried out in different locations in Southern

England revealed that 13% of dogs from the general population were currently exhibiting separation related behaviour and a further 11% had done so at some time in the past (Bradshaw et al., 2002a, b). These findings indicate that separation related behaviour problems represent a significant, although largely unrecognised, welfare problem for the UK dog population.

A large proportion of dogs are handed in to rescue organisations because they have displayed behaviours perceived as problematic to their owners (21% in the Ashley Heath based study described in this report). Where behaviour problems are given as a reason for handing dogs into rescue, it is estimated that 33% of these are related to separation (Bailey, 1992). In addition, the return of pets homed through rescue centres also poses a significant problem. Of dogs re-homed by RSPCA, 16% are returned, 68% of which are returned due to problem behaviour (Ledger et al., 1995). Advice given to the new owner at the time of re-homing could reduce the likelihood of the dog developing separation-related behaviour, and thereby reduce the number of dogs returned to the shelter. A method of predicting a dog's response to social isolation following re-homing would allow for improved dog-owner compatibility, as well as enabling targeted emphasis on preventative advice for the new owner.

- The first part of the study aims to use a standard temperament test to identify dogs in rescue kennels that will develop SRB following re-homing.

- The second part of the study is a clinical trial to evaluate the efficacy of behavioural advice in reducing the development of SRB in dogs re-homed by an RSPCA rescue centre.

- Finally, data from both parts was combined to identify factors which may contribute to the development of SRB in dogs re-homed by rescue centres, and also to examine aspects of the dog's behaviour when its owner is present, to identify behaviours which may reflect the fact that the dog shows an adverse reaction to being separated from its owner.

Part One: The validation of a standard behavioural assessment test to predict the occurrence of separation-related behaviour problems on re-homing.

Temperament tests in dogs aim to measure behaviour in one situation, at a point in time, and use this to reliably predict the animal's behaviour at a different time or age, or in another situation. In the past tests have been used, with varying success, in an attempt to predict inappropriate behaviour in the new home (Van der Borg et al., 1991; Ledger, 1995). In a previous study at Anthrozoology Institute, attempts were specifically made to predict the exhibition of separation-related behaviour in the new home

(McPherson, 1998). This test involved developing a superficial relationship between the tester and dog, prior to assessment of the dog's response to being left alone. This accurately predicted the development / absence of separation-related behaviour in the new home in 60 % of cases. In the present study the test has been adapted to increase the opportunity for a relationship between the dog and tester to develop, and modified to increase practicality within the shelter environment.

Some authors believe that certain behavioural traits are more reliably displayed when the dog is stressed (Rebecca Ledger, pers comm). However, it has also been suggested that stressors in the rescue kennel environment, such as high noise levels, an unusual environment and unfamiliar visitors, make predicting a dog's future behaviour in a home environment difficult, as the dogs are less likely to react to stimuli in a "normal" manner under these conditions (Weiss and Greenberg, 1996). In order to differentiate between anxious behaviour as a result of the test environment and anxious behaviour as a result of social isolation, in this study attempts have been made to keep additional sources of stress to a minimum.

Physiological evidence for the stressful nature of kennelling indicates that the greatest levels of stress occur during the first 3 days after entering kennels (Hennessy et al., 1997). From the fourth day onwards, levels of stress hormones gradually reduce, and tend to stabilise in dogs kennelled for more than 9 days. Behavioural studies have also found that signs of stress decrease over the first 5 days (Wells and Hepper, 1992). In the light of these findings the temperament test in this study was carried out on the tenth day following admission to the rescue centre to ensure that dogs were reasonably habituated to their surroundings.

Taking a dog from its kennel into an unfamiliar environment is likely to be stressful for it, particularly as the building used for testing at Ashley Heath was also the location of the veterinary facilities. In this circumstance it would be unclear whether any behaviours shown resulted from fear of the novel environment, rather than due to a reaction to social isolation. For this reason, in this study testing was carried out in a room to which the dog had previously been habituated. This was done by taking each dog into the testing room where it was petted and played with on two occasions prior to the test day.

The majority of temperament tests conducted in the past have been performed by a person unknown to the dog, to ensure that all dogs being tested have equal experience with the tester (Ledger, 1995). However these tests aimed to gain information regarding the dogs general tendencies towards humans and the likelihood of aggressive behaviour being displayed, whereas in this case, the behaviour concerned is most often the result of a specific dog-human relationship. The test in this study therefore aims to create a situation where the dog is reasonably familiar with the tester. To do this each dog was given an equal amount of time interacting with the same tester prior to the test. In practical terms this approach more closely resembles the situation where a member of RSPCA staff carries out the testing, as appears to be current practice.

Methods;

All dogs re-homed by Ashley Heath RSPCA animal centre over a 14 month period from January 2002, that met the inclusion criteria listed below,were included in this study. Dogs of any breed, sex, neuter status or size were included.

1. The dog must have been resident at the re-homing centre for 7 days.

2. The dog must have been in good health and not in receipt of prescribed medication likely to affect its behaviour.

3. For personal safety reasons, the dog must not have been highly aggressive towards people.

4. The dog must not be pregnant or lactating.

5. The dog must be at least 6 months of age.

6. During the study period the new owners of the dog must not have sought specific behavioural advice from an animal behaviourist, dog trainer or veterinary surgeon.

Prior to assessment the tester spent three 20 minute periods of interaction with the dog to familiarise the dog to the tester and habituate the dog to the test room. This took place on the three days prior to the date of the test (see appendix 1). Testing was carried out in the morning, approximately two hours following feeding.

Each dog was then tested in the indoor section of their kennel and in a separate test room and their behaviour recorded using a remote video camera.

Fig 1: The test room at Ashley Heath RSPCA centre.

The test involved components specifically targeted towards the disclosure of separation-related behaviour. Assessment consisted of recording the dog's behaviour when approached, spoken to, left alone, and reunited with tester. The test also measured the dog's reaction to movement of the tester and audio and visual cues to the tester leaving. Testing took approximately 30 minutes per dog. Full details of the test are included in appendix 2.

Fig 2: Dog being tested.

Upon completion of the 12 week period, all owners participating in the project who reported separation-related behaviour problems with their dogs were offered a behavioural consultation with Emily Blackwell.

Results;

104 dogs were tested at Ashley Heath RSPCA animal centre. At the end of the study period, 3 dogs had not yet been re-homed, and 8 of the dogs had been returned to the RSPCA during the first 12 weeks following re-homing. Questionnaires were sent to 93 adopters. 5 questionnaires were not returned and owners could not be contacted on the telephone. A further 7 owners did not leave the dog alone at all and were therefore unable to report the dogs behaviour when left alone. Information about the remaining 81 dogs was used for further analysis.

58% of the dogs re-homed were male and 42% were females. 63% of the dogs were neutered, slightly more of the males were neutered than the females (72% of the males and 50% of the females).

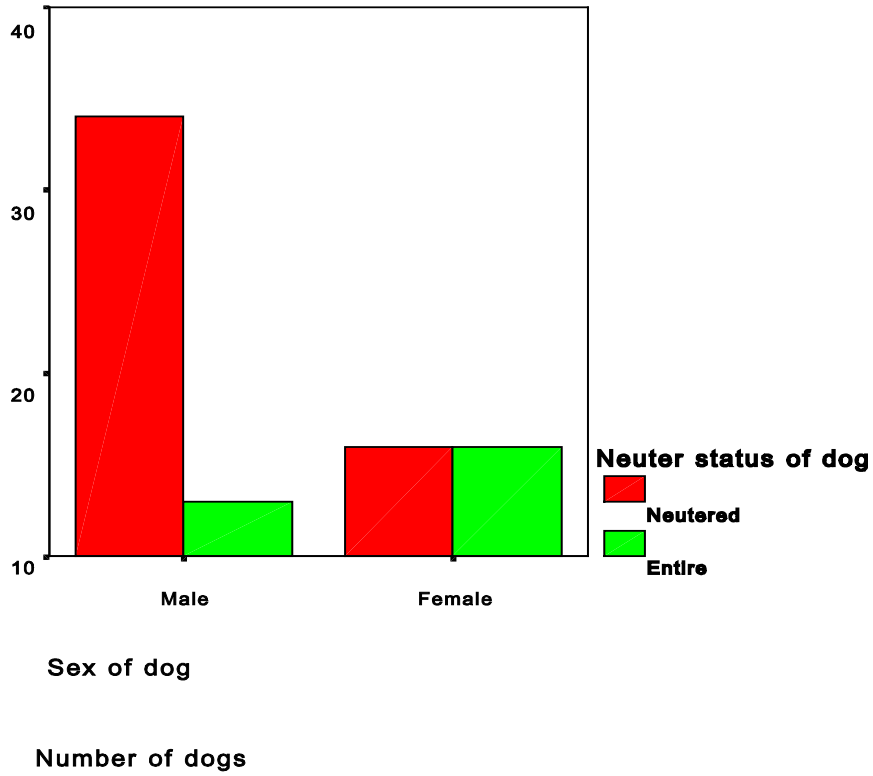

Fig 3: Sex and neuter status of dogs in the study

54% of the dogs were pure breeds, and slightly more of the males were pure breeds (55%) than the females (52%), however this was not statistically significant (χ^2 = 0.000; p = 1.00; df = 1).

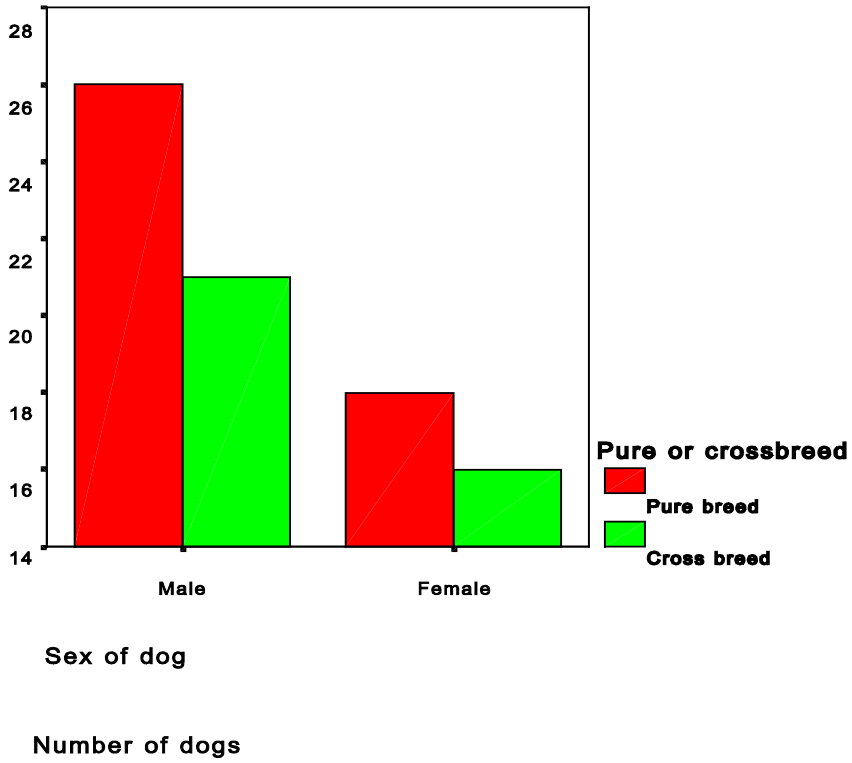

Fig 4: Sex and pure/cross breed status of dogs in the study

The ages of dogs rehomed ranged from 6 months to 12 years, with a median age of 36 months.

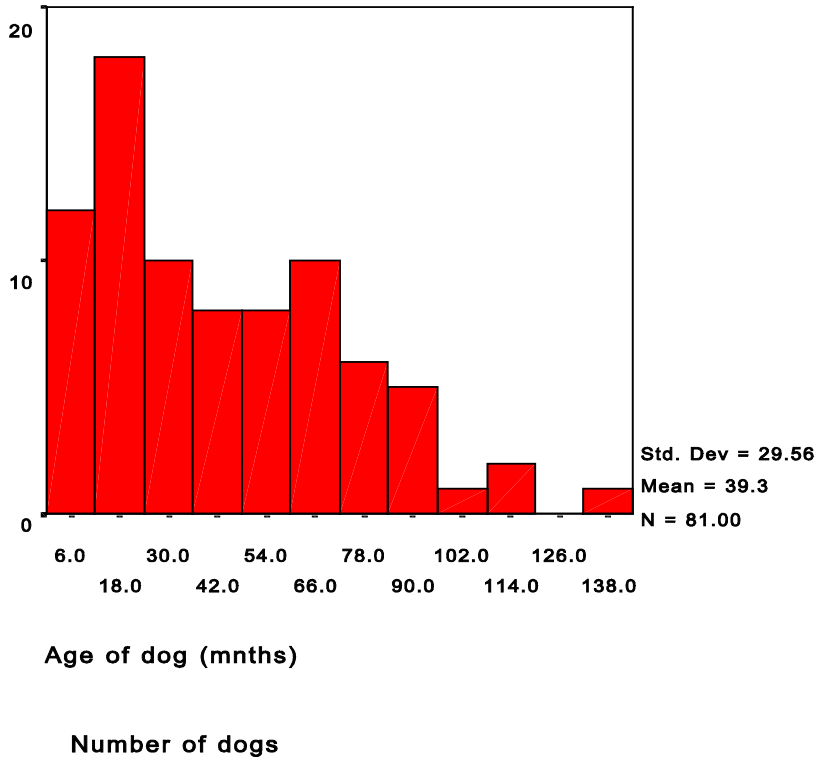

Fig 5: Ages of dogs in the study

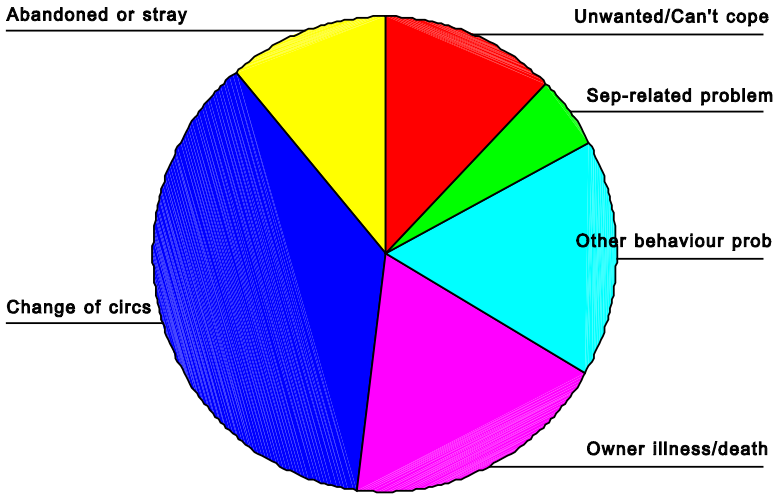

Fig 6: Reason dog handed in to Ashley Heath RSPCA centre

The most common reason for dogs to be handed in to RSPCA at Ashley Heath was a change in the owner's circumstances, such as a marriage split, or moving to accommodation where they were unable to keep pets (37%). The second largest category was dogs handed in due to behaviour problems (21%). Owners of 5% of dogs relinquished cited separation-related behaviour as the reason.

22 dogs (27%) were reported to show separation-related behaviour in the new home. 24 of the dogs in the study were reported to have shown separation-related behaviour in the past, however only half of the dogs that showed separation-related behaviour in the new home were reported to have shown this behaviour in their previous home.

Temperament test measures;

A total of 26 variables were measured in the temperament test. Variables showing less than 10% variation, and those which were highly correlated to another similar variable were eliminated.

The remaining variables are listed below;

Variable	Measurement
Did dog approach tester in kennel	1/0
Did dog interact with tester for full 30 seconds	1/0
Did dog cringe in kennel	1/0
Did dog jump up in kennel	1/0
Did dog try to leave test room with tester	1/0
Did dog jump on furniture when left alone	1/0
How did dog greet tester upon return to room	Delayed or did not approach/ Immediate approach
Duration of interaction with tester (talking period)	secs
Attention seeking score	Occasional/Frequent/Constant
Total time spent following tester	secs
Did dog vocalise in kennel	1/0
Duration of interaction with tester (play period)	secs
Duration of barking when alone	secs
Duration of howling when alone	secs
Duration of whining when alone	secs
Duration of scratching at exit door when alone	secs
Did dog eat treats when alone	1/0
Did dog lick lips in kennel	1/0
Did dog yawn in kennel	1/0
Did dog shiver in kennel	1/0

Fig 7: Variables measured in temperament test

Principal components analysis with varimax rotation was applied to the remaining 20 variables in an attempt to identify underlying relationships between them. This produced 6 meaningful components which jointly explained 56% of the variation in the data.

See below for details of components, variables and their loadings. Loadings less than 50% of maximum loading, irrespective of sign, are not listed.

Component 1: Sociable to people

Kennel phase

Did dog approach tester in kennel		0.897
Did dog spend full 30 seconds interacting with tester	0.815	
Did dog cringe	-0.714	
Did dog jump up at tester	0.521	

Component 2: Active reaction to separation

Room phase

Did dog try to leave room with tester	0.758	
Did dog jump on furniture when left alone		0.646
How does dog greet tester upon return	0.629	

Component 3: Attention seeking

Room phase

Duration of interaction with tester during talking period	0.806
Attention seeking score	0.734

Component 4: Vocal doesn't follow

Kennel phase

Does dog vocalise in kennel	0.636

Room phase

Does dog follow tester	-0.717

Component 5: Vocal during separation

Room phase

Duration of barking when alone	0.673
Duration of whining when alone	0.595
Duration of howling when alone	0.557

Component 6: Destructive towards exit door during separation

Room phase

Duration of scratching door when left alone	0.817

Questionnaire data;

The age of the dog (the significant causal variable from the owner questionnaires in the Cornwall study, see part 3) was further examined, along with other variables found to be important in previous research. Logistic regression was used, with separation-related behaviour as the dependent variable and the age of the dog, sex, neuter status, pure breed status and the six factor scores as the co-variates.

Three variables were found to be significant in the model; the age of the dog (Wald = 4.093; df = 1; p = 0.043), component 2 (Wald = 6.348; df = 1; p = 0.012) and component 5 (Wald = 7.915; df = 1; p = 0.005) from the temperament test. Dogs that showed separation-related behaviour in new home were younger than those that did not; the median age of dogs that displayed separation-related behaviour in this study was 16½ months.

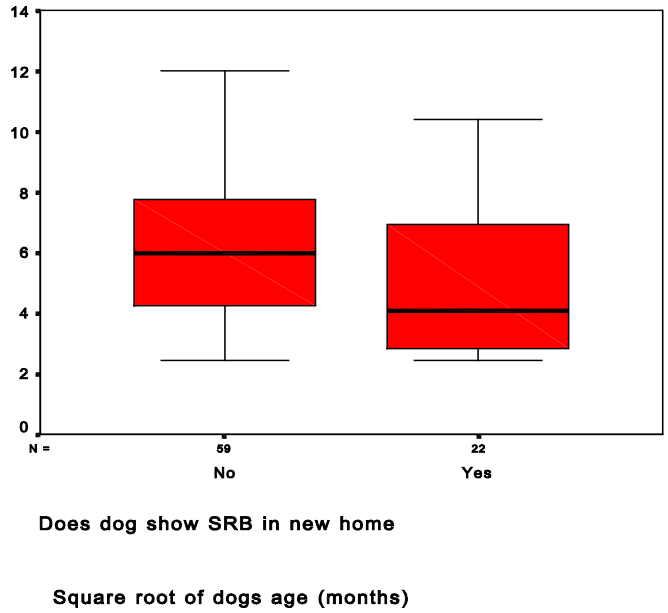

Fig 8: Box-and-whisker plot comparing ages of dogs displaying SRB with dogs not showing SRB. Horizontal lines (from top to bottom of each box-and whisker) indicate: maximum, 75th percentile, median (heavy line), 25th percentile, minimum.

Dogs scoring higher on component 2 (active reaction to separation) were more likely to develop separation-related behaviour following re-homing.

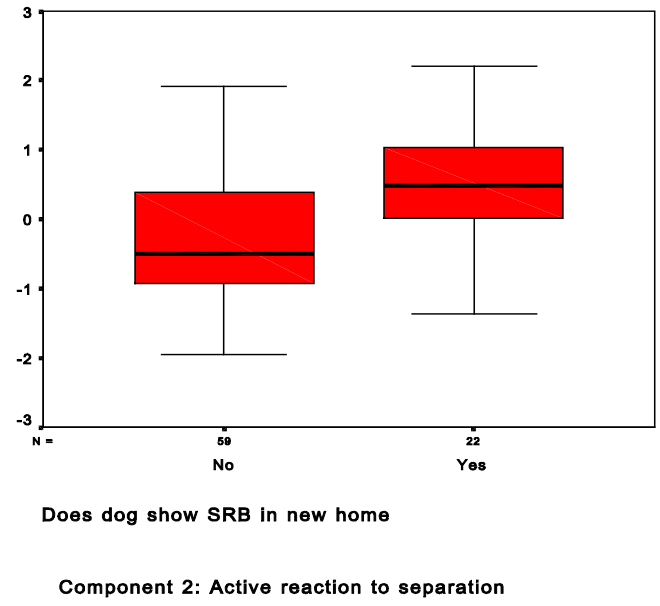

Fig 9: Comparison of component 2 scores of dogs displaying SRB with dogs not showing SRB.

Dogs scoring higher on component 5 (vocal during separation)were more likely to develop separation-related behaviour in the new home

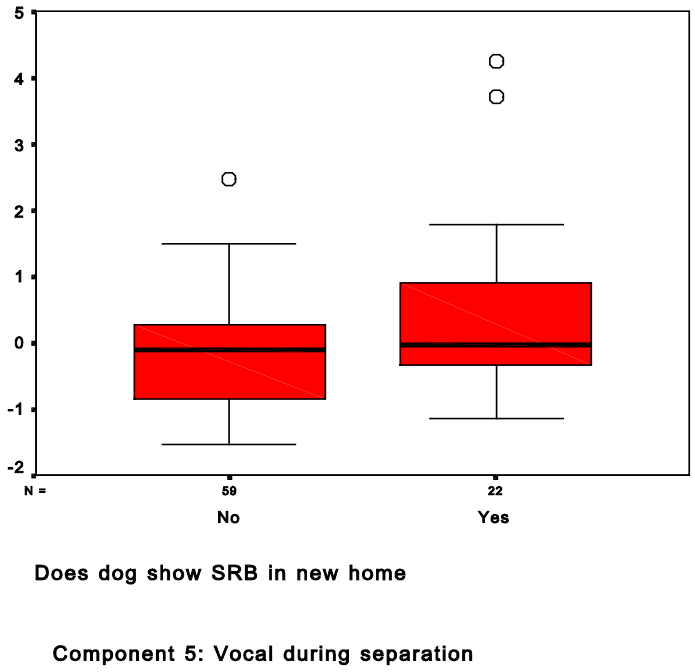

Fig 10: Comparison of component 5 scores of dogs displaying SRB with dogs not showing SRB. Single points indicate outliers.

Slightly more crossbreed dogs were found to show separation-related behaviour in their new home than pure breed dogs, however this was not statistically significant ($\chi^2 = 2.99$; p = 0.084; df = 1). Slightly more male dogs and more entire dogs than expected also displayed SRB in the new home, however neither of these were significant (($\chi^2 = 0.138$; p = 0.71; df = 1; $\chi^2 = 1.87$; p = 0.172; df = 1 respectively)

Further logistic regression did not indicate any significant interactions between the age of the dog and 2 components from the temperament test i.e. each acted independently. The younger the dog, and the higher its scores on vocal during separation and active reaction to separation, the more likely it was to exhibit SRB in its new home.

The predictive value of the test;

Does dog show SRB	Correctly predicted	False predictions	Total
Yes	13	9 false positives	22
No	54	5 false negatives	59

Sensitivity (percentage that show separation-related behaviour and are so indicated by test): 72%
Specificity (percentage that do not show separation-related behaviour and are so indicated by test) : 86%

Discussion;

The two factors found to be significant in the exhibition of separation-related behaviour in the new home consisted of measures of the dog's behaviour when left alone in the room, including vocal behaviour and attempts to escape from the room. These findings are in agreement with the behaviours found to be predictive by McPherson (1998).

The temperament test was found to be 86% predictive of separation-related behaviour in the new home. This was higher than in the previous study (McPherson, 1998) indicating that an increased opportunity for a relationship to develop between dog and tester may be beneficial in detecting an adverse reaction to separation from human contact at a later date. Reducing the level of stress under which the test was carried out may also have improved the predictability of the test.

The test procedure used in this study may also be more practical in the shelter environment, as the dog and tester had a similar relationship to that of the dog and kennel staff 10 days after admission to the centre. This would be advantageous where shelter staff carry out routine testing, as was the case at Ashley Heath.

The larger number of false positives than false negatives are possibly due to inaccurate reporting by the owners. I.e. some dogs show separation-related behaviour, but the owner does not report it as it has not been detected. Using video recordings rather than owner reports to assess the development of separation-related behaviour in the new home may further improve the accuracy of the test.

The fact that only half of the dogs showing separation-related behaviour in their new home were reported to have shown it prior to going in to rescue, and less half of the dogs that were reported to show separation-related behavior in their previous home, went on to show the same behaviour following re-homing, suggests that information provided by the previous owner provides a less useful indication than the temperament test used in this study. This is

not surprising given that the behaviour is only shown when the owner is absent and therefore can be difficult to detect. Furthermore, some people handing in dogs may withhold details of their dog's problem behaviour as they do not wish to reduce the chances of their dog being accepted by the shelter or re-homed from the shelter.

Dogs have been shown to react differently to different people. Their behaviour is affected by the gender of the person, as well as other features of their appearance and behaviour (Wells and Hepper, 1999) and this must be considered if this test is used in the future.

Although only specific components of the test predicted whether the dog would display separation-related behaviour in the new home, it is unclear as to whether preceding components of the test influence the outcome of the isolation phase of the test and this requires further investigation, before reducing the duration of the test can be considered.

Part Two: A trial to determine the efficacy of written behavioural advice to prevent/treat separation-related behaviour problems in dogs re-homed from rescue centres.

Clinical treatment of separation problems by behaviour therapies has been used for a considerable period of time and appears to be effective (Podberscek et al., 1999). We have recently formally validated a treatment programme for clinical cases of separation-related behaviour (Blackwell et al., 2003). Components of this programme have been compiled into a written format, suitable for reducing the development of separation-related behaviour following re-homing. The main aim of this part of the study was to validate this advice programme.

Methods;

All dogs, of any breed, sex, size or neuter status, re-homed by the William and Patricia Venton RSPCA animal centre in Cornwall over a 13 month period were recruited, and were divided into two groups, experimental and no treatment control. Dogs were allocated alternately to the groups at the time of re-homing. Owners of dogs in the experimental (treatment) group received behavioural advice, based upon a behaviour modification programme validated for the treatment of separation-related behaviour problems (Blackwell et al., 2003). The advice was designed to be implemented immediately upon collection of the dog. Owners of dogs in the control group were given general advice about vaccinations and worming.

Efficacy of the advice was measured by the use of owner questionnaires. Owners were contacted 12 weeks after re-homing and asked to complete and return a questionnaire. They were required to report details of their dog's behaviour when left alone, as well as its behaviour when they were present. Questions were also included to examine the owner's

compliance with the treatment advice. These included questions about whether the owner punished the dog upon returning home if the dog had been destructive or toileted indoors and whether the time the dog was left alone had been increased over time.

All owners participating in this study who reported separation-related behaviour problems with their dogs were offered behavioural advice by Emily Blackwell.

Results;

306 dogs were re-homed from the RSPCA re-homing centre between 16th November 2001 and 21st December 2002. 207 adopters returned questionnaires regarding their dogs' behaviour during the 12 weeks following re-homing. 14 dogs were excluded from further analysis as they were never left alone and the new owners were therefore unable to provide information about their behaviour when alone. A further 17 dogs were also excluded from the analysis as their owners had received additional behavioural advice from an animal behaviour counsellor or RSPCA staff. Data from 176 dogs was retained for further analysis.

54% of the dogs re-homed were male and 46% were females. 78% of the dogs were neutered, with slightly more of the males being neutered than females (82% of the males and 74% of the females).

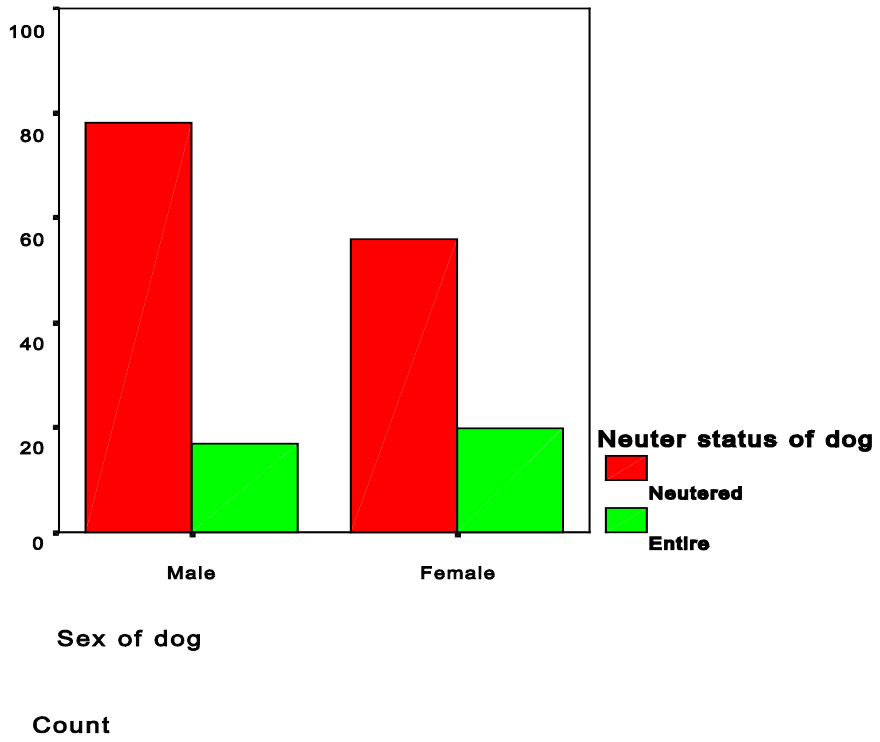

Fig 11: Sex and neuter status of dogs in the study

38% of the dogs were pure breeds, and slightly more of the males were pure breeds (41%) than the females (31%), however this was not statistically significant (χ^2 = 1.247; p = 0.264; df = 1).

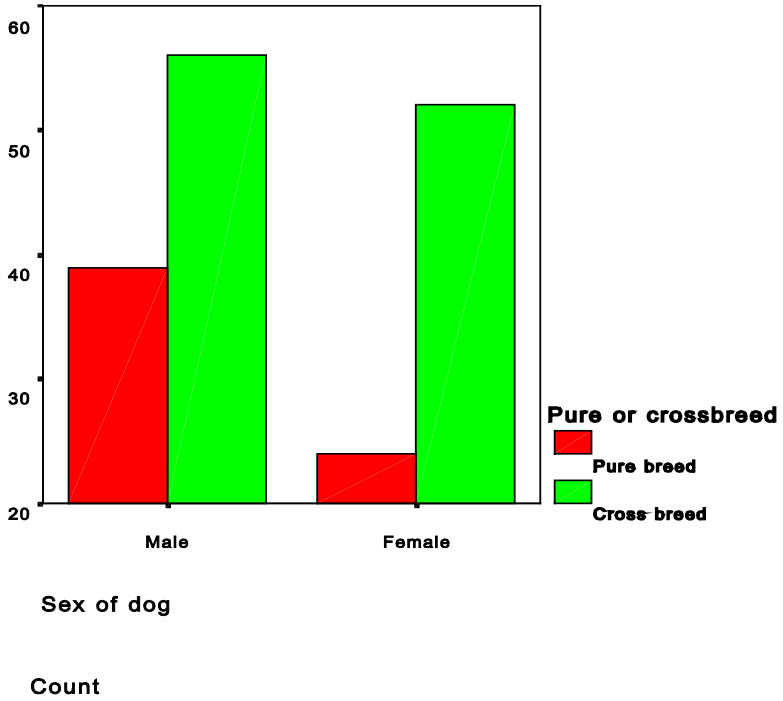

Fig 12: sex and pure/cross breed status of dogs in the study

The ages of dogs rehomed ranged from 4 weeks to 11 years, with a median age of 30 months.

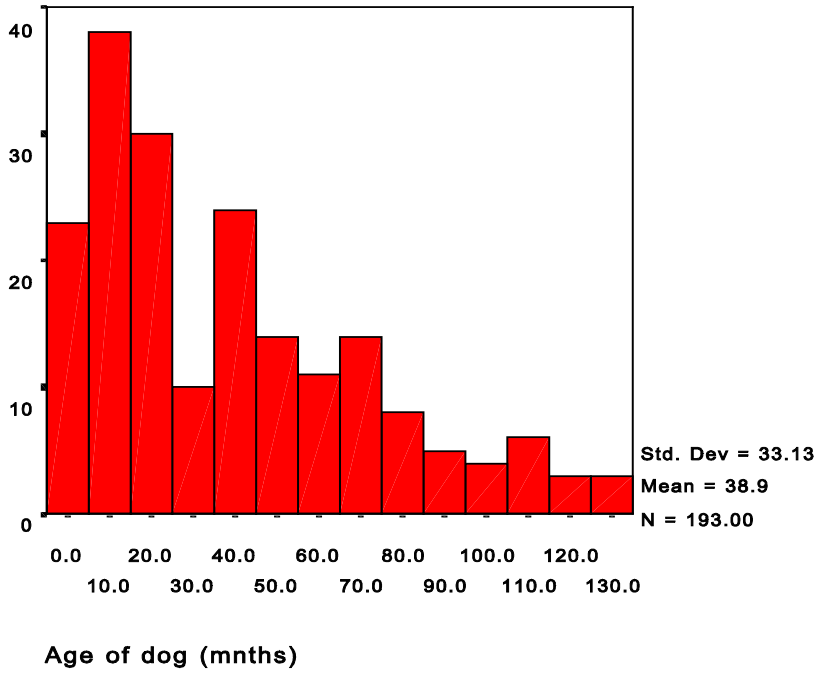

Fig 13: Ages of dogs in the study

The most commonly cited reason for handing dogs in to the Cornwall RSPCA centre was that the dog was unwanted or the owner could not cope with the dog (35%). This category may contain a proportion of dogs with behaviour problems that the owner felt unable to tolerate. The number of dogs handed in where behaviour problems were cited as the reason was 16%. Only one dog was handed in due to problems involving separation-related behaviour.

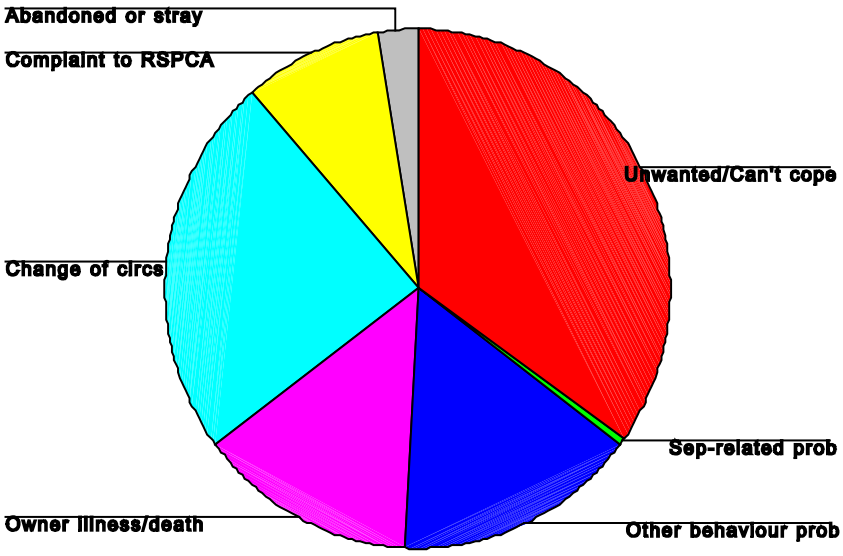

Fig 14: Reasons why dog handed in to rescue.

A total of 88 dogs was allocated to the treatment group and the same number to the control group. To ensure that the alternate allocation to treatment / control groups had resulted in balanced groups the two groups were compared. There were found to be no significant differences between the treatment and control groups for sex ($\chi^2 = 0.206$; $p = 0.65$; $df = 1$), age ($Z = -0.723$; $p = 0.470$), neuter status ($\chi^2 = 0.613$; $p = 0.434$; $df = 1$), and number of pure/cross breeds ($\chi^2 = 0.218$; $p = 0.64$; $df = 1$).

Overall 30% of the re-homed dogs were reported to show separation-related behaviour in the new home. Younger dogs were more likely to show separation-related behaviour than older dogs.

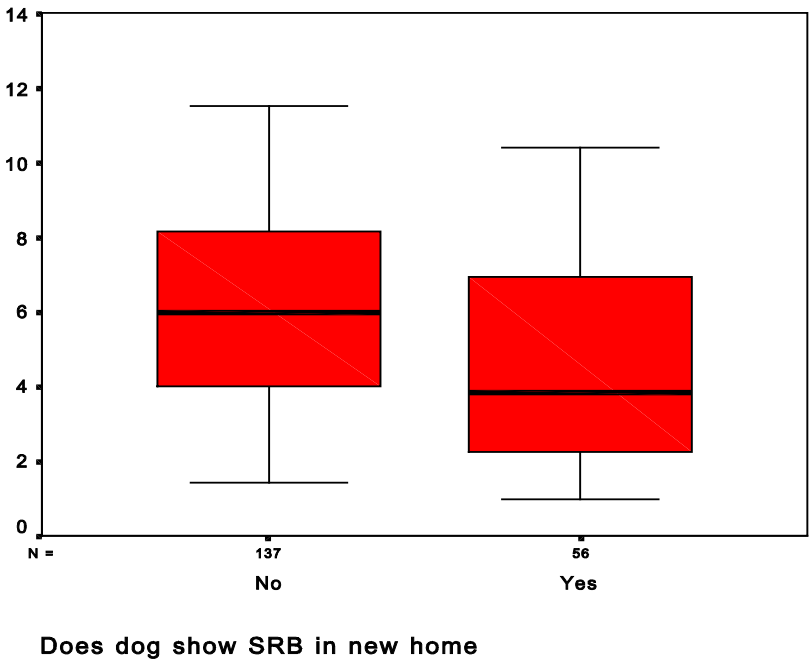

Fig 15: Ages of dogs showing separation-related behaviour in new home.

Efficacy of advice;

The efficacy of the treatment advice was examined by comparing the incidence of separation-related behaviour following re-homing between the treatment and control groups. Significantly more dogs in the control group displayed separation-related behaviour in their new home (38%) than in the treatment group (22%) ($\chi^2 = 3.888$; $p = 0.049$; $df = 1$)

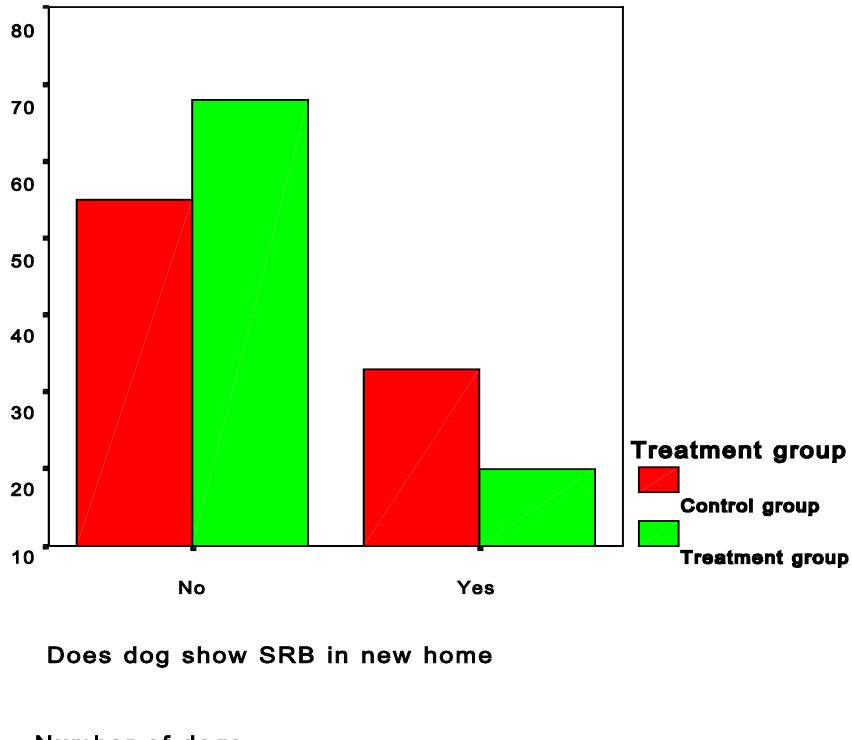

Fig 16: Efficacy of behavioural advice.

Binary logistic regression was used to investigate the data. As well as finding that age was a significant factor in the incidence of separation-related behaviour, the age of the dog was also found to interact with the efficacy of the treatment advice. Dogs in the treatment group showing separation-related behaviour in the new home (i.e. those for which the advice had been ineffective) were younger than dogs in the control group that had developed separation-related behaviour. The advice therefore appears to be most effective for dogs of about 18 months of age and older.

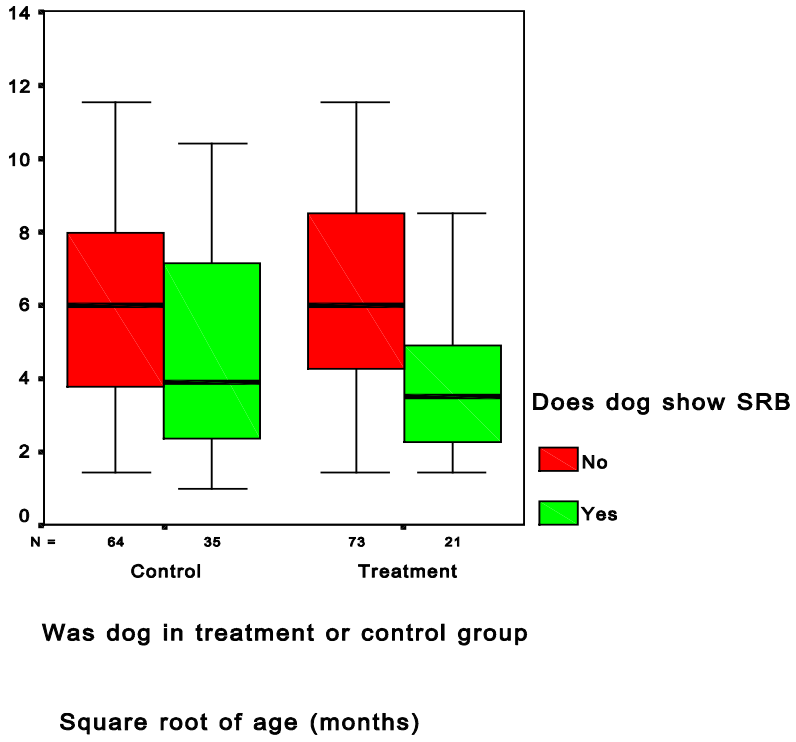

Fig 17: The development of separation-related behaviour and age of dog.

Owner compliance;

The treatment advice required owners to control all social interactions with their dog. They were asked not to punish their dog upon returning home, regardless of whether the dog had been destructive, toileted indoors etc. Owners were also asked to provide enrichment in the form of toys/treats, to occupy their dog when it was left alone, as well as exercising the dog before departing. A programme of leaving the dog for gradually increasing periods was included, to prevent the dog from becoming anxious from the first time it was left alone. Questions were included in the questionnaire completed by the owners to establish levels of compliance with various aspects of the advice.

28% of dogs in the study had never shown destructive behaviour or toileting indoors when left alone. Of the owners who had returned home to find that their dog had urinated/defecated indoors or been destructive, significantly fewer of the treatment group owners (57%) than the control group owners (79%), reported that they punished the dog (χ^2 = 5.801; p = 0.016; df = 1). The most common form of punishment was verbally “telling the dog off” (58%), frequently accompanied by “showing the dog the scene of the crime” (38%). Only one owner reported physically punishing the dog (“smacking”) upon their return home.

Slightly more of the treatment group owners (46%) than the control group owners (36%) reported that the time for which they left their dog had increased over the 12 week period.

General discussion;

Whilst the prevalence of separation-related behaviour in the Ashley Heath study (27%) is in line with the upper end of previous estimates of prevalence in the general pet dog population, the levels of separation-related behaviour in the control group of the Cornwall study (38%) seem higher than levels found in general (Bradshaw et al., 2002a). The difference in prevalence between the two centres may be due to differing admissions policies.

Data from the Cornwall centre appears to support the suggestion made by some authors that dogs originating from rescue organisations are more likely to develop separation-related behaviour than those obtained from breeders (Guthrie, 1999), although this has not been confirmed in surveys (Bradshaw et al., 2002a,b). However, higher reported levels of separation-related behaviour in this study, when compared to surveys of general pet dog owners, may be attributed to an unwillingness to admit to such problem behaviour by owners who have had their dog from a puppy and may therefore feel some responsibility for their dog's behaviour. Owners whose dogs separation-related behaviour has built up slowly over time may also have a greater tolerance of the behaviour and fail to report it as a problem.

The written behavioural advice programme appears to be effective in reducing the development of separation-related behaviour following re-homing, however there appears to be a difference in efficacy depending upon the age of the dog. In the treatment group, dogs showing separation-related behaviour in the new home were younger than dogs showing separation-related behaviour in the control group. This seems to indicate that the treatment advice may be more effective in older dogs. It is possible that younger dogs have different motivations for showing separation-related behaviour than older dogs, although there is no empirical evidence for this.

Owner compliance appears to have varied between different aspects of the treatment advice. More owners complied with stopping punishment than leaving the dog for shorter periods to begin with. Further investigation is required to determine why this was the case. It may be that some parts of the advice, such as leaving the dog for gradually increasing periods, were more difficult to implement. Whilst fewer owners in the treatment group punished the dog upon returning home to find evidence of separation-related behaviour, a significant number of owners (38%) ignored the treatment advice. Further investigation as to the reasons for this would be beneficial. It is possible that providing the advice verbally, in addition to written notes, may increase owner understanding and levels of compliance and this is worth further investigation.

As in the previous study video footage of the dogs when left alone in the new home may provide more accurate information about separation-related behaviours.

Part Three: Factors influencing the development of separation-related behaviour

Previous studies have identified various features of dogs exhibiting separation-related behaviours (McPherson, 1998; Voith and Borchelt, 1985; Takeuchi et al., 2001). However, there is conflicting evidence as to the importance of various aspects of the dog's environment and experiences that may predispose it to developing separation-related behaviour. For example, it has been suggested by some authors that dogs living in larger households, receiving more human attention, are more likely to develop separation-related behaviour (Merrill, 2000), whilst others have suggested that higher levels of separation-related behaviour are seen in dogs living in apartments, where there may be a greater tendency for the owner to be absent (Takeuchi et al., 2001). Some reports have indicated that male and female dogs develop separation-related behaviour equally (Wright and Nesselrote, 1987; Lund et al., 1996), whilst others have indicated that males are over-represented (Voith and Borchelt, 1985). These findings suggest that further examination of these factors is required. The main aim of this part of the study is therefore to identify underlying factors which may influence the development of separation-related behaviour.

Method;

Data was obtained on the breed, age, sex, neuter status, health and reason for handing in to rescue for dogs entering 2 RSPCA rescue shelters (Ashley Heath, Hampshire, and William and Patricia Venton, Cornwall). At the Ashley Heath shelter information was also obtained about the dog's history of separation-related behaviour. Twelve weeks after the dog was re-homed, a previously piloted questionnaire was posted to the adopters, asking for details of their dog's behaviour in its new home. The questionnaires sent to owners from both RSPCA centres were identical. The first part of the questionnaire was designed to obtain general information about the dog's home environment and household routines. Details of the dog's behaviour when left without human company was obtained in the second part of the questionnaire. This included details of how often separation-related behaviour was shown, and when the owner first noticed the behaviour. Questions were included to distinguish separation-related behaviour from other superficially similar behaviour, such as chewing of objects by young dogs. For example, owners were asked whether the dog showed the same behaviour when the owner was present, and whether the dog showed the behaviour more than 30 minutes after the owner left the dog. The final section of the questionnaire contained questions regarding other aspects of the dog's temperament, and asked about any other behaviours shown by the dog that were perceived as a problem by the owner.

Results;

Comparison of two centres;

Data from the two RSPCA centres was examined to identify any differences between the samples, prior to combining the data for further analysis. There was found to be no significant difference between the two sites in terms of the sex ($\chi^2 = 0.017$; $p = 0.897$; $df = 1$), or age of

the dogs (Z = -0.851; p = 0.395), however there were fewer neutered dogs (χ^2 = 6.89; p = 0.009; df = 1) and more pure breed dogs (χ^2 = 6.09; p = 0.014; df = 1) re-homed by the Ashley Heath RSPCA centre.

Data from Ashley Heath RSPCA centre was combined with data on the control cases only from the Cornwall study for further analysis.

In the combined data set 56% of the dogs were male and 44% were females. 72% of the dogs were neutered, slightly more of the males were neutered than the females (76% of the males and 66% of the females).

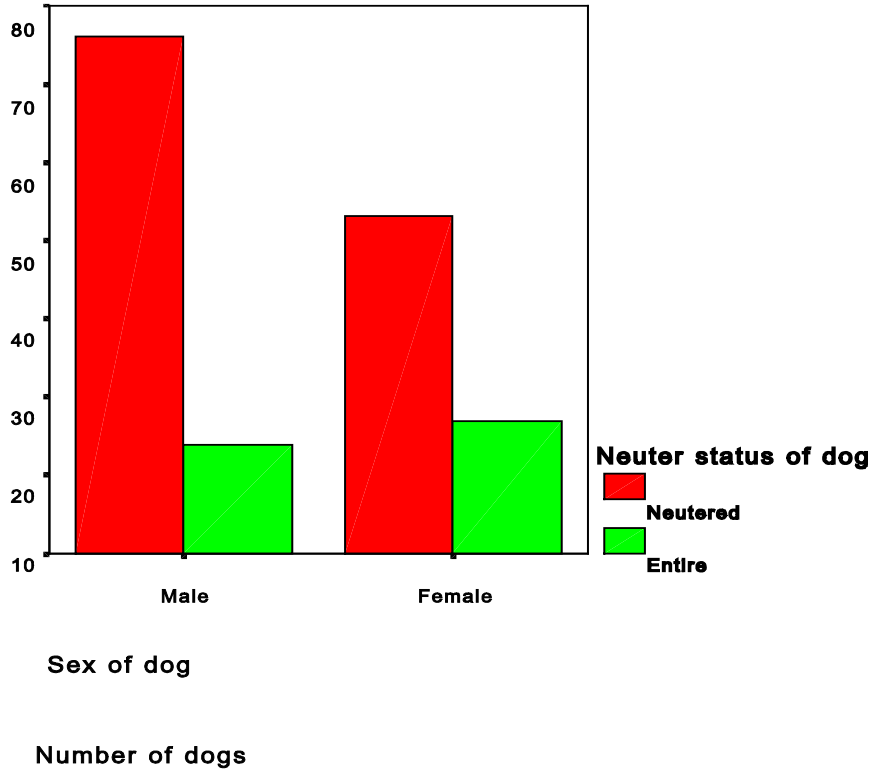

Fig 18: Sex and neuter status of dogs in Ashley Heath study combined with control cases from Cornwall study.

46% of the dogs were pure breeds and the sexes were equally represented (46% of males and 46% of females were pure breeds).

The ages of the dogs in the combined data set ranged from 4 weeks to 12 years, with a median age of 30 months.

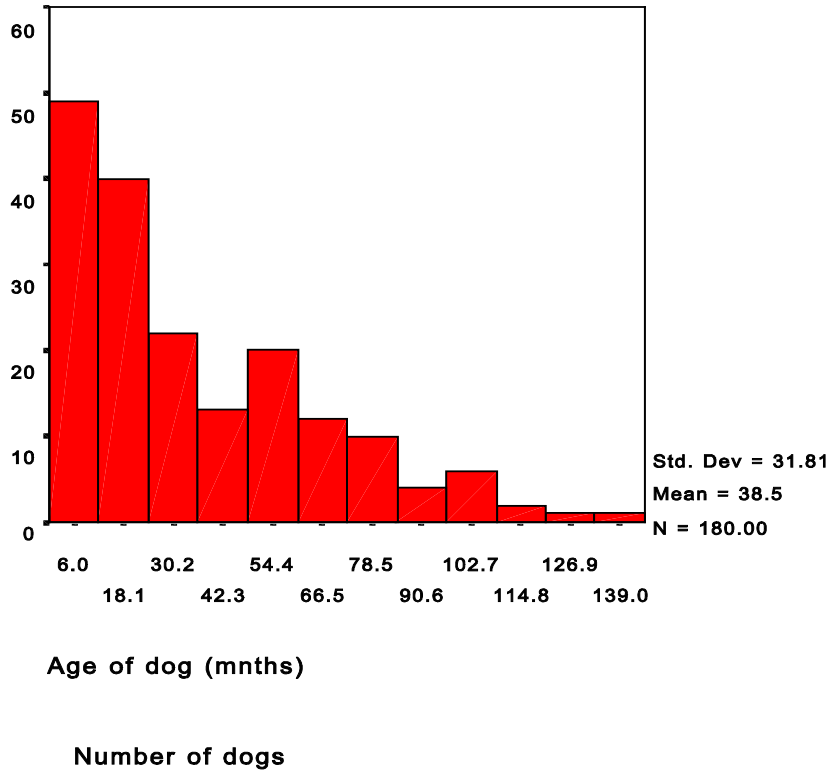

Fig 19: Ages of dogs in Ashley Heath study combined with control cases from Cornwall study.

Variables from the questionnaire were divided into those which may influence the development of separation-related behaviour in the new home ("causal variables"), those which may reflect the fact that the dog shows an adverse reaction to social isolation ("reflective variables") and those which may do both. The 7 variables which were appropriate in both categories were included in both analyses. This produced 22 causal variables and 21 reflective variables.

Variables showing less than 10% variation and those which were highly correlated to another similar variable were eliminated. The age of the dog was transformed, using square root, to normalise the data prior to further analysis.

Causal variables;

Data obtained from the questionnaires in the Cornwall study only (part two) was analysed to identify factors which may vary with the incidence of separation-related behaviour, for inclusion in the model examining the predictability of identifying separation-related behaviour in shelter dogs (part one).

Binary logistic regression was carried out, with separation-related behaviour as the dependent variable and treatment group, along with the 11 retained causal variables from the questionnaires, as co variates.

The only variable found to be significant in the model was the age of the dog (Wald = 6.81; df = 1; p = 0.009), with younger dogs more likely to develop separation-related behaviour following re-homing. The median age of dogs showing separation-related behaviour was 14½ months and the median age of dogs not showing separation-related behaviour was 36 months.

Although not statistically significant, slightly more crossbreed dogs (30%) showed SRB than pure breed dogs (26%) and more male dogs (31%) than females (27%) showed separation-related behaviour in the new home.

Significantly more entire dogs (46%) than neutered dogs (25%) showed separation-related behaviour ($\chi^2 = 5.271$; p = 0.022; df = 1).

Reflective variables;

Variables thought to reflect the fact that the dog reacted adversely to separation were examined in an attempt to identify any relationship between the way the dog behaved when the owner was present and whether the dog showed signs of separation-related behaviour when left alone. The combined data from Ashley Heath RSPCA centre and the control cases only from the Cornwall study was used in this analysis. Treatment cases from the Cornwall study were excluded as the dog's behaviour was likely to be influenced by the treatment advice given.

The reason why the dog was handed in to rescue was found to reflect whether the dog showed an adverse reaction to separation following adoption. The development of separation-related behaviour in the new home was found to be lower (9%) where the illness/death of the owner was cited as the reason for handing in the dog. Dogs that were handed in to rescue due to the owner "not wanting" them or being "unable to cope" were found to be significantly more likely to develop separation-related behaviour following re-homing (42%; $\chi^2 = 16.67$; p = 0.005; df = 5).

Dogs that showed signs of separation-related behaviour in the new home were more likely to react to being separated from their owner when the owner was in the house, i.e.the dog reacted to being shut in a different room by barking, whining or scratching the door. ($\chi^2 = 10.93$; p = 0.004; df = 2)

Owners of dogs that developed separation-related behaviour in their new homes were also more likely to describe their dogs as "frequently" seeking their attention than owners whose dogs did not show separation-related behaviour ($\chi^2 = 6.67$; p = 0.036; df = 2).

Dogs which showed separation-related behaviour in their new home were marginally more likely to show a change in their behaviour when the owner was preparing to leave, than those that were not reported to show separation-related behaviours ($\chi^2 = 3.11$; p = 0.078; df = 1). Dogs which showed separation-related behaviour were also slightly more likely to follow their

owners around the house ($\chi^2 = 8.83$; $p = 0.066$; $df = 4$), and less likely to eat their food straight away at mealtimes ($\chi^2 = 2.99$; $p = 0.083$; $df = 1$).

There was found to be no significant difference between dogs that did and did not show separation-related behaviour in the owners rating of how affectionate towards them their dog is and how attached to them their dog is ($\chi^2 = 2.71$; $p = 0.438$; $df = 3$; $\chi^2 = 1.13$; $p = 0.569$; $df = 2$ respectively). There was no significant difference between the two groups in how much attention the owner paid to the dog when saying goodbye ($\chi^2 = 0.863$; $p = 0.834$; $df = 3$), or whether the time for which the dog was left alone had increased ($\chi^2 = 0.009$; $p = 0.925$; $df = 1$). Dogs that showed separation-related behaviour in their new homes were also found to be no less likely to eat food or treats when left alone ($\chi^2 = 3.56$; $p = 0.313$; $df = 3$).

Dogs that developed separation-related behaviours following re-homing were not found to have more access to their owner during the day ($\chi^2 = 0.07$; $p = 0.791$; $df = 1$), or access to their owner's bedroom at night ($\chi^2 = 0.00$; $p = 1.00$; $df = 1$).

Discussion;

Comparison of two centres;

Whilst there was no difference in the sex or age of dogs between the two centres, there were found to be more pure breed dogs than cross breeds re-homed by the Ashley Heath centre. This may be as a result of a more selective intake policy, or as a result of differences in socio-economic status of the population within the catchment area of each shelter. There were also more entire dogs in the Ashley Heath study, which may also reflect intake policy, or differences in the local dog populations at each site.

Causal variables;

The median age of dogs developing separation-related behaviour was lower at both of the study sites than has been suggested by previous clinical research (Blackwell et al., 2003; Takeuchi et al., 2001). This may be due to a period of tolerance of separation-related behaviour, prior to the owner seeking professional advice in clinical cases.

The higher, although not significant, levels of separation-related behaviour in cross breed dogs than pedigree dogs is in agreement with previous studies (Takeuchi et al., 2001), as is the higher incidence of separation-related behaviour in males than females (Bradshaw et al., 2002a,b; Takeuchi et al., 2001; Voith and Borchelt, 1985, Podberscek et al., 1999).

Previous studies have indicated that neutered dogs are more likely to display separation-related behaviour than entire dogs, possibly as a result of neutering in an attempt to "cure" SRB (Bradshaw et al., 2002a). In this study significantly more entire dogs (upon entry to rescue) were found to display separation-related behaviour than neutered dogs, however the majority of dogs, other than very young puppies, were neutered by RSPCA prior to re-homing.

Reflective variables;

The higher incidence of separation-related behaviour in dogs handed in to rescue as the owner “could not cope” may indicate that a proportion of these dogs are relinquished because owners are unable to deal with problem behaviours, including separation-related behaviours. Dogs handed in due to the illness or death of their owner would be expected to show lower levels of separation-related behaviour, comparable to those shown in the general pet dog population (Bradshaw et al., 2002a).

It is consistent with clinical experience that dogs which react adversely to being left alone also react to physical separation when their owner is in the house. Some dogs seem to be dependent upon being able to get their owner’s attention at all times, whilst others may learn that vocalising or scratching at the door works to get their owner to return to them. The frequent attention seeking reported by owners of dogs showing separation-related behaviour may also be a result of this high level of dependence and need for constant attention from the owner.

A change in the dog’s behaviour when the owner is preparing to leave has been reported previously (Voith and Borchelt, 1985) and is thought to result from the dog predicting that the owner is about to depart. Following the owner around the house has also been suggested as a characteristic of dogs with separation-related behaviour (Voith and Borchelt, 1985) and may again be reflective of a general need to have access to the owner’s attention at all times. Some authors have proposed that some dogs which show separation-related behaviour are “generally anxious” (McPherson, 1998). Failing to eat food straight away may be an indication of this.

Owner ratings of their dogs attachment and affection were, perhaps surprisingly, no higher for dogs that showed separation-related behaviours. This may reflect the subjective feelings of people towards rescue dogs, and the types of people that home rescue dogs. A comparison with ratings of owners of dogs from other sources may be worthwhile.

In this study access to the owner during the day and at night did not appear to reflect whether or not the dog showed separation-related behaviour. In the past access to the owner, particularly at night, has been implicated in the development of separation-related behaviour (Merrill, 2000). However this may be as a consequence of the separation-related behaviour rather than a causal factor; dogs with SRB react badly if shut out of the room where the owner is and doors are therefore never closed. People taking on rescue dogs may also tend to allow more access than owners of dogs from other sources, although this requires further examination.

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APPENDIX 1

Interaction with dog prior to testing

Interactions to be carried out on 8th and 9th day following dog's arrival at RSPCA centre. Testing carried out on day 10.

5 minute walk

Dog is removed from kennel, taken for 5 minute walk on lead to allow it to toilet. Dog is then taken to test room.

15 minutes interaction

5 mins training dog;
Tester asks dog to do simple training exercises such as sit, down and walk to heel using food treats as rewards.

5 mins petting and talking to dog;
Tester sits on floor and gently strokes dog whilst quietly talking to it.

5 mins playing with dog;
Tester plays retrieve games with dog, using a selection of toys (several different sized balls, a squeaky toy, a soft toy a rubber Kong® toy and a rope toy).

(N.B. The playing element of the interaction takes place during the final 5 minutes of the 15 minute interaction period as it has been found that once play has been initiated, dogs may become preoccupied with the toys, to the detriment of subsequent social interaction (McPherson, 1998))

APPENDIX 2

Temperament Assessment Test

Date of test:

Dog's identification
Ref: RSPCA Ref:
Name:

Part 1: Kennel Test: Conducted in the kennel in which the dog is normally housed.

1. The tester approaches the kennel sideways on, squats alongside the kennel and makes casual eye contact with the dog for 30 seconds

Time taken for initial approach:	**Secs**
Was dog already at front of kennel upon approach:	1 / 0
Time interacting with tester:	**Secs**
Does dog jump up at tester:	**1**/ **0**
Does dog shiver:	**1** / **0**
Does dog cringe:	**1** / **0**
Does dog yawn:	**1** / **0**
Does dog lick lips:	**1** / **0**

Part 2: Room Test: Conducted in test room

1. The tester enters the kennel, attaches a lead to the dog's collar and takes the dog along a standardised route to the test room.

2.Upon arrival in the test room the dog's lead is removed and the dog is allowed to explore the room for 5 minutes. During this time the tester speaks quietly to the dog. The tester pets the dog if it approaches.

3. For the next 5 minutes the tester introduces the toys used in the interaction sessions on days 1-3 to the dog and encourages play interaction. The tester does not use any toy or level of activity that has caused the dog to show signs of anxiety during the interaction sessions on days 1-3.

Total time spent interacting with tester:	**Secs**

4. The tester slowly walks around the room for 1 minute.

Total time spent following tester:	**Secs**

5. The tester then gives several audio and visual cues that separation is about to occur. These include picking up a set of keys, putting on a coat and saying goodbye to the dog.

Whine:	**Freq:**	**Duration:**
Bark:	**Freq:**	**Duration:**
Howl:	**Freq:**	**Duration:**
Destructive behaviour:	**Freq:**	**Duration:**

Pacing:	**Duration:**

6. Immediately before leaving the room the tester places a number of treats on the floor. These consist of commercial dog treats that the dog has eaten when the tester was present during the interaction sessions on days 1-3. The tester then leaves the room for a period of 5 minutes. During this period the dog has no audio, visual or olfactory communication with the tester.

Whine:	**Freq:**	**Duration:**
Bark:	**Freq:**	**Duration:**
Howl:	**Freq:**	**Duration:**
Destructive behaviour:	**Freq:**	**Duration:**
Jumping on furniture:	**1** / **0**	
Urinate:	**Freq:**	
Defecate:	**Freq:**	
Repetitive behaviour:	**Freq:**	**Duration:**
Self directed behaviour:	**Freq:**	**Duration:**
Eat:	**1** / **0**	

7. The tester then re-enters the test room, quietly greets the dog verbally and pets it.

Approach:	**0** / **1** / **2** / **3**

APPENDIX 3

Advice given to treatment group

Introducing your dog to his new environment

When your dog first arrives, you and he will be getting to know each other and during this period he will be forming an impression of where he fits socially within your family group. It is therefore important that from the moment you collect your new dog you interact with him in a way that will teach him the basic social rules of living with you and your family. This involves teaching him basic "rules" so that he learns that it is you who is "in charge", but without the need for any force, shouting or aggression. To teach your dog that you are more important than he is in the family group, you need to control the things that are important to him ie: his food, his toys and most importantly your attention. This is how differences in status are maintained between dogs and by doing this you will develop a positive, consistent relationship between you and your dog.

Detailed below are 5 ways in which you can build a good relationship with your new dog and at the same time, avoid problems when you leave him home alone;

1. Establishing a good relationship with your new dog

Follow these rules make sure that your new dog doesn't become too dependent on you from the outset.

Of course we all have dogs to spend lots of time playing with them and cuddling them. You can spend as much time as you like interacting with your new dog (the more the merrier), however it is **essential** that you**;**

a) ***Start all interactions with him****.*

- **you** decide when you want to talk, cuddle or play with him.
- start interactions whenever you like, **except for when he is demanding attention from you.**
- do not talk, cuddle, play or even look at him if he demands attention from you.

b) ***finish all interactions with him***.

- **you** decide when you want to stop talking to him, cuddling him or playing with him.

- give your dog a signal that you wish to stop, by saying a word such as “finish” or “enough” to let your dog know that you have had enough, and then ignore him. Always use the same word, so he quickly learns what it means.

- when you come home only say hello if he is quiet. If he is excited or greets you over effusively, ignore him until he settles down, and then say hello.

These rules mean that you decide when to touch, speak to, or even look at your dog! This doesn’t mean ignoring him most of the time, but instead having positive interaction with him whenever <u>you</u> feel like it.

Teaching your dog these rules of interaction will build a good relationship with him and it will also prevent him from either becoming over dependent upon you, or demanding attention from you.

They help to ensure that your dog is confident enough to handle life on his own when you are not in the house, by ensuring that he is confident to cope on his own when you are there physically, but not 'available' to him in terms of your attention.

The rules will also help to prevent him from becoming reliant upon you for reassurance. If your dog is worried about something, comes to you and very obligingly, you give him attention, he may become anxious when he is alone as he is unable to come to you for reassurance.

c) Toys should be kept in a toy box out of his reach. You decide when your dog gets a toy and when you play with him. He can still have some toys all of the time but you give them to him and you take them away and give him alternatives from time to time.

d) Your dog should also learn that his food is under your control too. Ask him to perform a task, such as sit, or wait before you give him his food. Do not feed him on demand.

2. Teaching your dog that it is okay to be alone.

Because we do not know the previous history of most dogs in rescue kennels, it is possible that your dog may have shown behaviour problems when left alone in the past. In order to prevent such problems either recurring or developing, when you leave him alone, you need to teach your dog that being left alone at your house is a pleasant experience, during which time he can relax and has nice things to do. One of the most effective ways of preventing your dog from ever becoming anxious when he is left alone is to teach him right from the start that being alone is fun! To do this you need to **very**

gradually increase the time that you leave your dog alone so that it is **never** frightening and always associated with something pleasant!

The important aspects of this programme are;

i) That you build up the amount of time that you leave your dogs very gradually. The speed that you progress will depend upon your dog's reaction.

ii) That you never leave your dog long enough that he starts to become distressed.

N.B If you do have to go out and leave your dog for long periods of time as soon as you get him, then try to arrange for friends or family to help look after him for a short while.

iii) You reward your dog for being **relaxed** when left - rewards can be toys, treats, cuddles or praise. If he becomes anxious and does not remain quietly in his bed, do not reward him. Instead, simply go back a stage and try leaving him for a shorter period next time.

iv) repeat each of the following stages until you are **sure** your dog is happy before progressing. How quickly you progress depends on how well your dog responds;

1. Start by asking your dog to go to his bed and stay there with you present for a short while. Reward him for remaining quietly in his bed.

2. Next ask your dog to stay on his bed as you move away, then return and reward.

3. Move progressively further away and for longer. The distance/time that you increase by on each occasion will depend on your dog. If he reacts or moves, then don't reward but go back to the previous stage.

4. Start going out through the door before returning, then going out and shutting the door, then going out for longer periods of time. When you get to this point, start to vary the amount of time that you go out for.

5. Once you reach the stage where your dog is happy to be left for up to an hour, you should then have no problems leaving him for longer periods. Do remember to give him something to occupy himself whilst you are out to avoid boredom, which may lead to mischief!

3. Things that you can do to prevent your dog from becoming bored when he is alone.

There are a number of things that you can do to give your dog something to occupy himself whilst you are away.

- Leave a toy/bone with the dog when you go out. Make sure that this is a “special” toy by only making it available to the dog when you go out or when he is separated from you in the house (ie: in another room).

- Try to leave something that your dog really loves such as a ‘Kong’ stuffed with food (peanut butter or cheese mixed with dog biscuits are usually popular!), or a meat flavoured chew.

- Give your dog a treat ball or cube, that you can fill with dried treats, which make your dog work to get them out.

- Hide treats around the house or make “treat parcels” which require the dog to open the parcel to get at the treat.
- All of these things will give your dog mental stimulation and prevent him from becoming bored.

- Remember that when you return home, these “special” items should be put away again and only given to the dog when you go out, or when you are in a different room in the house.

4. Feeding and Exercise;

Your dog will be more inclined to relax when he is left alone if he has had an appropriate amount of exercise and been fed before being left alone.

a) Try to always exercise your dog before leaving him. Take your dog for a 30 minute walk before you leave him alone in the house. Return home from the walk half an hour before leaving your dog alone.

b) Feed your dog a small meal half an hour before he is left.

c) Always ensure that your dog goes to the toilet before he is left alone.

5. Avoid all punishment

If your dog does ever misbehave whilst you are out it is vital that you do not react badly upon returning home. One of the most common reasons why separation related behaviour problems get worse is where owners punish their dogs when they return home. Your dog can only link its actions with the punishment if the punishment occurs

within half a second of the behaviour. This means that punishment will be linked with your return, rather than the destruction, barking or toileting carried out some time previously. Your dog will then become anxious about what you will do when you return the next time he is left alone, and as a result of this increased anxiety the dog is more likely to chew or lose toilet control, making the problem even worse.

Many dogs who have been punished upon their owners return in the past will show submission in an attempt to appease their owners. They make themselves as small as possible, putting their ears back and their tail between their legs. Unfortunately, owners often think that the dog looks guilty and punish them because they “know they have done wrong”. Even if you take your dog to the scene of the crime, he will not be able to associate your anger with his behaviour hours earlier and will simply become more anxious the next time you go out.

Although it is not easy, if you do find a mess upon your return it is essential that you never physically punish or shout at your dog. Try to even avoid letting your dog see that you are annoyed - let him outside before cleaning up.

If you do experience problems with your dog when you leave him alone, please do not hesitate to contact me for further advice.