Effect of Providing New Owners of Rehomed Greyhounds with Written Information about Preventing Canine Separation Anxiety

A thesis

submitted in partial fulfilment

of the requirements for the degree

of

Master of Clinical Animal Behaviour

at

The University of Waikato

by

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THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

2018

Abstract

Separation anxiety or separation-related behaviour (SA/SRB) reflects a substantial welfare problem for dogs and causes concern for owners, which can lead to dogs being relinquished or returned to rehoming organisations. I aimed to determine whether providing new adopters of ex-racing greyhounds with information designed to reduce the risk of SA/SRB would reduce the occurrence of SA/SRB reported by owners at multiple time points; and to investigate factors associated with SA/SRB in newly rehomed greyhounds. Subjects were greyhounds rehomed through New Zealand Greyhounds as Pets during a 1-year period (n = 297). Owners were assigned, within 2 days of adoption, alternately to a control group, who received an email welcoming them to the greyhound community, or a treatment group, who received an email including a SA/SRB handout with preventative advice. Links to an online questionnaire regarding SA/SRB, and other factors suggested in the literature to be associated with SA/SRB, were sent to adopters 1-, 3-, and 6-months post-adoption. Emailing owners preventative information about SA/SRB had no significant impact on the proportion of greyhounds reported to exhibit SA/SRB in their new homes. There was no significant difference in the prevalence of owner-reported SA/SRB at 1, 3, or 6 months (20%, 18%, 17%). The prevalence of SA/SRB overall was less than usually reported for rehomed shelter dogs, and for pet dogs generally. SA/SRB was associated with an increased risk of the greyhound being returned to GAP. There was no significant difference between treatment and control groups regarding owner behaviour in relation to the advice, and generally more than half of all owners acted in a manner consistent with the recommendations. Owners were most likely to practice low-key greetings, and low-key departures, but only low-

key departures appeared to be protective against SA/SRB. Factors associated with the occurrence of SA/SRB changed substantially between the 1-month, and 3- and 6-month time points. Differences in the predictive models produced for the 1-, 3-, and 6-month data, and the lack of any effect of the preventative treatment, is likely associated with the multifactorial nature of SA/SRB. Further investigation of the particular aspects of advice that are protective for SA/SRB is warranted.

Keywords: Behaviour, Dog, Rehoming, Separation Anxiety

Acknowledgements

I would like to sincerely thank the Greyhound As Pets Trust and Kennel Managers for providing access to their records and adopters, and of course the greyhound owners who kindly responded to the questionnaires. I would also like to thank my Chief Supervisor Dr. Rebecca Sargisson for her guidance, responsiveness, and encouragement during this project; her feedback was invaluable. I am very grateful to my dear friend Sarah Papa for her persistent moral support, she helped with my stress no end. I am indebted to my family, Mum, Catherine and Rayne, who have fed me, made allowances for my absences, and believed I could do it. My father Adrian inspired my love of learning and curiosity about the world in which we live, he would have loved being part of this journey, I wish I could have shared it with him. My sincere gratitude to John, my pet astrophysicist, for his love, support, and understanding. And finally Milou, whose gentleness, soft fur, and constant companionship were great sources of comfort; she helped me keep the world in perspective.

I dedicate this thesis to Milou (22 April 2003 – 21 October 2017).

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Separation anxiety (SA) occurs when a dog displays signs of distress in the absence of their owner (Sherman & Mills, 2008). SA is a common and substantial behaviour problem in companion dogs (Ogata, 2016; Sargisson, 2014) and can have a negative impact on the well-being of dogs and owners (Overall, 2013; Shore, 2005; Tzivian, Frigera, & Kushnir, 2015). To put the problem of SA and my experiment using rehomed greyhounds into context, I will describe dog ownership in New Zealand, discuss the greyhound breed, and an organisation charged with re-homing ex-racing greyhounds as pets. I will outline the impact of behaviour problems on the dog and owner, and describe and quantify the signs and prevalence of SA. Further, I will describe the risk and protective factors associated with SA as reported in the literature, as well as recommendations for treatment, and present existing research on the effect of preventative treatments. Finally, I will outline my experiment in which I investigate factors associated with the occurrence of SA in rehomed greyhounds and the effect of providing new owners with written information about preventing SA.

Dog Ownership

In 2015, the New Zealand Companion Animal Council (NZCAC) commissioned its second comprehensive survey of companion animal ownership in New Zealand (NZCAC, 2016). A sample of 1,013 respondents (adults over 18 years of age) was selected, using quotas to ensure the respondents were distributed throughout New Zealand in proportion to population demographics. The total population of dogs in New Zealand was estimated to be 683000 with 28% of

households owning an average of 1.4 dogs. This number has decreased since 2011 where the domestic dog population was estimated at 700,000 with 29% of households owning an average of 1.5 dogs. The United Kingdom has a slightly lower rate of dog ownership, 24% of households (Pet Food Manufacturers Association, 2016), but both Australia and the United States have higher rates of dog ownership at 39% (Animal Medicines Australia, 2016) and 60% (American Pet Products Association, 2017). The NZCAC (2016) reports the predominant reason for acquiring a dog is for companionship, 77% of dog owners consider them a member of the family, 16% consider them a trusted companion, 2% own dogs as a hobby, 3% for security, and just 3% as a working animal. Dog owners are most likely to source their dog from a breeder (39%), friends and family (20%), shelter or rehoming organisation (12%), or pet shop (9%). A similar pattern was reported in a survey of pet dog ownership in Australia (n = 413 respondents; Bennett & Rohlf, 2007). Purebred dogs make up 66% of the survey population in Australia and 54% in New Zealand.

Greyhounds

Greyhounds have been valued historically for their hunting prowess and were selected for their ability to sight, chase and out manoeuvre fast moving prey such as deer, foxes and hares (Huggins, 2006). Greyhounds are a large breed weighing an average of 30.5 kg, they can reach speeds of up to 60 km per hour and are considered the fastest of all dog breeds (Fogle, 2000).

It is commonly reported that greyhound-like dogs depicted in ancient Egyptian tombs and temples in Turkey dating back to 6000 BC were the ancestors of the modern greyhound (Atkinson & Young, 2005; Birkinshaw, 2006; Fogle, 2000; Madden, 2010). However, modern genetics have recently differentiated the

greyhound from truly ancient middle-eastern sight hounds such as the Saluki and Afghan, and placed them in an “all other breeds” cluster, relating them more closely to modern herding breeds (Parker et al., 2004). Although greyhounds are morphologically similar to the ancient sight hounds, their genomes are not. Nonetheless, specific references to ‘greyhounds’ date back to the first century (Birkinshaw, 2006).

The role of greyhounds in human society has been variously represented as noble hunting hound, glamour pedigree sport dog, blue-collar icon, racing chattel, and more recently as pet companion (Huggins, 2006; Madden, 2010). The privileged position of greyhounds as prized hunting companions for more than 2000 years was transformed into sports commodity within just 150 years (Atkinson & Young, 2005; Huggins, 2006).

Chase-proneness is heritable, as are tendencies for aggression, playfulness, fear, and sociability (Arvelius, Eken Asp, Fikse, Strandberg, & Nilsson, 2014; Spady & Ostrander 2008). Greyhounds are reported to show relatively low levels of aggression when compared with other breeds (Duffy, Hsu, & Serpell, 2008).

In an investigation into genetic diversity and inbreeding in purebred dogs, greyhounds were the least inbred and showed the greatest genetic diversity within a representative group of 10 breeds registered with the United Kingdom Kennel Club (Calboli, Sampson, Fretwell, & Balding, 2008). The corresponding lack of popular sires (where a single stud dog might sire hundreds of offspring) means the adverse consequences of a loss of genetic variability are less likely for greyhounds, hence greyhounds are free from many common heritable diseases (e.g., hip-dysplasia) that plague other purebreds (Lord, Yaissle, Marin, & Couto, 2007). However, the disease

most commonly reported as the cause of death for greyhounds is cancer (58%), particularly osteosarcoma (25%; Lord et al., 2007).

The most common group of diseases or disorders for greyhounds is skeletal (33%; Lord et al., 2007) with many (e.g., arthritis, corns, toe dislocations) arguably associated with being bred and trained for racing. Twenty-four percent of ex-racing greyhounds entering a greyhound rehoming organisation were reported to have injury and health issues, and 43% of these had musculoskeletal conditions (Thomas, Adams, & Farnworth, 2017), many of which could require long-term medical care. Although greyhounds possess unique physiological and morphological features associated with artificial selection for speed, these also necessitate atypical interpretation of diagnostic procedures, in some circumstances, to ensure appropriate veterinary treatment (Zaldívar-López et al., 2011).

Dog owners have various motivations and preferences towards owning certain dog breeds, and these are affected by a number of factors, including fashion, culture, education, personality, and self-image, many of which can change over time (Coren, 2000). The popularity of ex-racing greyhounds as pets is growing (Lord et al., 2007; Zaldívar-López et al., 2011), despite decreasing support for the greyhound racing industry (Madden, 2010). This decline in support reflects a shift in public opinion about the appropriateness of using animals for sporting and entertainment purposes, as well as declines in revenue (Huggins, 2006; Madden, 2010; Walker & Jackson, 2011). Figures from the USA show there are more than twice as many greyhounds as pets than are racing (120000: 55000; Lord et al., 2007).

Given the likely emphasis on speed and the chase component of the predatory-action-sequence in the selection of greyhounds (Spady & Ostrander 2008;

Udell, Ewald, Dorey, & Wynne, 2014), it might seem surprising that they are touted as ideal companion animals (Bennett et al., 2015; GAP, 2017a). However, a recent survey of rehomed greyhounds in Australia and New Zealand found that greyhounds had a higher adoption success rate compared with rehomed shelter dogs, and that the vast majority of owners (91%) were 'very satisfied' with their greyhound as a pet (Elliott, Toribio, & Wigney, 2010). Greyhounds tend to live longer than many similar sized dogs, and have an average life expectancy of 10 to 12 years (Fogle, 2000). As the average racing career spans just 1.5 years, with an average age of 'retirement' of 3.4 years (Colgan, Neil, & Foy, 2013), rehomed greyhounds can potentially spend more than 7 years repurposed as a pet.

Questions continue to be raised about the varied rearing, socialisation, housing, and training methods of greyhounds, which are likely to impact on the ability of ex-racing greyhounds to successfully adapt to life as pets (Bennett et al., 2015; National Animal Welfare Advisory Committee, 2016). There is often an uneasy tension between rehoming and racing communities, but both groups are interested in increasing the number of greyhounds rehomed (Bennett et al., 2015; Madden, 2010).

Rehoming Greyhounds as Pets

Greyhound Racing New Zealand (GRNZ) established New Zealand Greyhounds as Pets (GAP) as an independent registered charitable trust in 2005 to facilitate the rehoming of greyhounds surplus to the racing industry (GAP, 2017b). There are more than 3000 greyhounds associated with the racing industry in New Zealand, made up of breeding stock, unregistered puppies, unraced dogs, and approximately1400 racing dogs (Colgan et al., 2013). Between 2009 and 2011 it was estimated more than 2200 dogs left the industry, with less than 16% (calculated from

Colgan et al., 2013) entered into GAP to be potentially rehomed. A further 32% were recorded as deceased, but this figure could be substantially higher due to the large number of raced and unraced greyhounds that were not traced (Colgan et al., 2013, National Animal Welfare Advisory Committee, 2016).

GAP have rehomed more than 1500 greyhounds as pets in New Zealand, and currently process more than 270 adoptions per year throughout New Zealand (GRNZ, 2016) via three rehoming kennel-bases located in Amberley, North Canterbury (established February 2016), Levin, Manawhatu-Wanganui (established April 2015), and Hampton Downs, North Waikato (established July 2014). Trainers and owners pay a fee to enter greyhounds into the rehoming programme. A small proportion (6%) of admissions are a result of welfare interventions, such as those via the GRNZ Racing Integrity Unit, or the New Zealand SPCA (Thomas et al., 2017). In addition, rehomed greyhounds may be returned to GAP following a change in their owner's circumstances or due to a failed adoption (Thomas et al., 2017).

Like many rehoming shelters (Mornement, Coleman, Toukhsati, & Bennett, 2010; Patronek & Bradley, 2016), all greyhounds rehomed through GAP must pass health and temperament screening processes and are de-sexed prior to adoption. Although researchers continue to question both the validity and reliability of temperament tests to accurately predict behaviour in a home environment, temperament tests are routinely used as screening tools when rehoming dogs (Mornement, Coleman, Toukhsati, & Bennett, 2015; Patronek & Bradley, 2016). Thomas et al. (2017) reported that 85.5% of greyhounds entering GAP are successfully rehomed, and of those that fail, 80% are a result of failing the initial temperament test. The GAP temperament test has not yet been scientifically

validated, and like many shelter based temperament tests (Blackwell, Casey, & Bradshaw, 2003; Mornement et al., 2010) does not include an assessment of SA.

In Australia, most ex-racing greyhounds are put into foster care for between 4 and 8 weeks before being rehomed, with the aim to "overcome socialisation deficits that have resulted from kennelling, to assess the dogs' suitability as pets and to match them to suitable permanent homes" (Elliott et al., 2010, p. 122). In New Zealand 36% of greyhounds that pass the temperament test are fostered before being rehomed (Thomas et al., 2017). There does not appear to be a standardised approach for foster care in New Zealand, but whether or not a dog is fostered has no significant effect on adoption success (Thomas et al., 2017).

Thomas et al. (2017) reported that the vast majority of the 835 greyhounds in their study that entered GAP New Zealand were retired racers, with only 18% recorded as never having raced. Whether or not a greyhound had raced had no significant effect on whether the dog was successfully rehomed. Early retirement due to injury or health accounts for between 14% and 24% of GAP admissions. The median age of greyhounds entering GAP is 44 months, which corresponds with the reported average age of 'retirement'; 50% are between 31 and 54 months old. Although young dogs (less than 2 years old) are more likely to pass the initial temperament test than older greyhounds, the re-homing success of dogs subsequently made available for adoption is not affected by age. Dogs that pass the temperament test with a score purportedly indicative of lower prey drive are more likely to be successfully rehomed, and female dogs are slightly more likely to be successfully rehomed than male dogs.

The success of rehomed greyhounds appears to compare favourably with dogs rehomed from shelters. For example, reports show 2.7% (Thomas et al., 2017) and 3.3% (Elliott et al., 2010) of rehomed greyhounds are returned within 1 month, compared with 6.5% (Wells & Hepper, 2000) and 12.9% (Marston, Bennett, & Coleman, 2005) of rehomed shelter dogs. Döring, Nick, Bauer, Küchenhoff, & Erhard (2017) reported that 6.2% of rehomed laboratory beagles were returned within 3 months of adoption, which compares to 7.5% of rehomed greyhounds within the same period (Thomas et al., 2017). By 6-months post-adoption, 11.7% of rehomed greyhounds have been returned (Thomas et al., 2017), compared with 14.7% of shelter dogs (Diesel, Pfeiffer, & Brodbelt, 2008).

Of 193 owners who responded to a questionnaire regarding rehomed greyhounds in Australia and New Zealand 1-month post-adoption, 71% reported they were concerned by at least one behaviour of their new pet (Elliott et al., 2010). Frequently displayed behaviours of concern (in descending order) included SA, digging, inappropriate toileting, anxiety and/or fearfulness, predatory behaviour, destructiveness, and aggression. There were only a small number of greyhounds returned within the 1-month survey period, but seven out of eight (87%) of these were due to behavioural problems (one was as a result of issues with a landlord). SA was the only behavioural issue significantly associated with a stated risk of return.

Problem Behaviour

It is estimated between 65% and 85% of pet dogs display some kind of problem behaviour (Chung, Park, Kwon, & Yeon, 2016; Elliott et al., 2010; Pirrone, Pierantoni, Mazzola, Vigo, & Albertini, 2015; Wells & Hepper, 2000). Owners of between 21% and 48% of dogs relinquished to shelters cite problem behaviour as the

main reason for handing their dog in (Blackwell et al., 2003; Kwan & Bain, 2013; Salman et al., 2000), and it is associated with up to 65% of relinquishments overall (Kwan & Bain, 2013). Further, between 60% and 89% of previously rehomed dogs are returned to shelters due to behaviour problems (Diesel et al., 2008; Elliott et al., 2010; Shore, 2005; Wells & Hepper, 2000). Behaviour problems are the predominant reason pet owners will have an otherwise healthy animal euthanized (Overall, 2013) and accounted for 67% (3941/5872) of euthanasia of dogs within Australian RSPCAs (RSPCA, 2016).

It is suspected that owners will often not disclose the main reason for relinquishment if they believe it will reduce the likelihood the dog will be rehomed, or reflect badly on them (Blackwell et al., 2003; Marston & Bennett, 2005, Shore, 2005), and shelters do not always fully investigate the reasons associated with relinquishment. However, the most commonly reported reasons for returning adopted dogs to a shelter include issues with other pets and children, toileting problems, escaping, destructiveness, and SA (Blackwell et al., 2003; Shore, 2005).

Problem behaviour is often described as such because it causes some concern or inconvenience for owners, but the behaviour might be ‘normal’ (in the sense of being functional or adaptive) for the dog. For example, predatory behaviour, if directed towards killing vermin or cooperative hunting with humans, is unlikely to be considered an undesirable behaviour, but if the same behaviour is directed towards pets or livestock, it can be a problem (Broom & Fraser, 2007).

In many cases, the behaviour of concern to owners will also either reflect or cause a direct or indirect welfare concern for dogs. Signs of fearfulness reflect negative valence (Blackwell, Bradshaw, & Casey, 2013), and dogs that display

chronic or frequent signs of fear or anxiety or both are likely to suffer from chronic stress, which in turn can cause disruption to immune, and other physiological functions, affecting physical and psychological well-being (Broom & Fraser, 2007; Mills, Braem Dube, & Zulch, 2013; Overall, 2013).

Dogs have been shown to improve the quality of life of owners (Matchock 2015; White, Mills, & Hall, 2017). However, if the animal does not meet the owner's expectations with regard to the desired relationship (e.g., due to problem behaviours), it can cause considerable stress for the owner and impinge on the well-being of both the owner and the dog (Broom & Fraser 2007; Overall 2013; Shore 2005).

Separation Anxiety and Separation-Related Behaviour (SA/SRB)

SA involves physiological and behavioural signs of distress, and is a significant behaviour problem in pet dogs (Ogata, 2016). SA results in compromised welfare as well as increased risk of relinquishment and euthanasia (Elliott et al., 2010; Sherman & Mills, 2008; Takeuchi, Houpt, & Scarlett, 2000). Emotions associated with SA include anxiety, fear, frustration, panic, and grief (Mills et al., 2013; Overall 2013; Palestrini, Minero, Cannas, Rossi, & Frank, 2010), all of which have negative valence (Mendl, Burman, & Paul, 2010). Signs of SA include a range of undesirable behaviours, referred to as separation-related behaviour (SRB) by many authors. These behaviours occur *only* when the dog is separated from, or denied access to, their owner or other attachment figure (Blackwell et al., 2003; Herron, Lord, & Husseini, 2014; Overall, 2013; Sherman & Mills, 2008). A differential diagnosis of SA requires ruling out other environmental or medical causes of the non-specific signs of anxiety, fear, or phobia, associated with the owner's absence. Many authors use the terms SA

and SRB interchangeably (Ogata, 2016), however for simplicity, I will use the acronym SA/SRB hereafter to refer to SA, the signs associated with it, or both.

Behavioural signs. The behaviours associated with SA/SRB typically include one or more of the following: vocalisation (e.g., whining, howling, or barking excessively), destructive behaviour (e.g., chewing, scratching, or digging, which can either be focussed on attempts to escape or less directed destruction), inappropriate toileting (e.g., urinating or defecating inside), repetitive behaviour (e.g., excessive self-licking or pacing), displacement or stress-related behaviours (e.g., salivating, lip-licking, yawning, or phantom chewing), or other signs of distress, panic, or fear (e.g., freezing or immobility, trembling or shaking, temporal transient anorexia, sporadic vomiting and/or diarrhoea) (Blackwell, Casey, & Bradshaw, 2006; Cannas et al., 2014; Mills et al., 2013; Overall, 2013; Palestrini et al., 2010).

Signs of SA/SRB can be confounded by a range of environmental, physiological, and behavioural factors, for example, incomplete toilet training or a urinary tract infection can cause inappropriate elimination, hypothyroidism can increase signs of anxiety (Overall, 2013), and repeated auditory or visual provocation can result in frequent vocalisation when left alone (Raglus, De Groef, & Marston, 2015). Canine Cognitive Dysfunction (CCD), considered the canine equivalent of Alzheimer's disease (Landsberg & Araujo, 2005), is associated with a variety of non-specific behavioural signs including separation-related behaviour, such as an increase in inappropriate elimination, vocalisation, and anxiety in situations in which the dog was previously content (Overall, 2013). The overlap between the behavioural signs of CCD and SA/SRB, might contribute to the increased likelihood of SA/SRB reported for older dogs (Chung et al., 2016; Landsberg, 1995).

Some animals will begin to show signs of SA/SRB with the impending departure of their owner, such as when an owner picks up keys or puts on a coat (Amat, Camps, Le Brech, & Manteca, 2014). In a video analysis of 23 dogs diagnosed with SA, separation-related behaviour generally occurred within 10 minutes of the owner's departure (Palestrini et al., 2010). Also, salivary cortisol measurements of dogs showing SA/SRB have been shown to peak 5 minutes after departure of owners (Shin & Shin, 2016).

Although most studies investigating SA/SRB rely on owner reports of their dog's behaviour (Ogata, 2016), several studies have quantified the prevalence and co-occurrence of different behavioural signs of SA/SRB via video recording of dogs left alone at home (Blackwell et al., 2006; Cannas et al., 2014; Lund & Jørgensen, 1999; Palestrini et al., 2010). In these recordings of dogs diagnosed with SA/SRB, vocalisation was the most commonly observed behaviour, occurring in 72.5% to 90% of cases, followed by destructiveness, which 65% to 83% of dogs displayed. Vocalisation and destructiveness occurred together for 55% to 75% of dogs. Toileting behaviour occurred in 5% to 13% of cases, and repetitive behaviours (including excessive self-licking) were displayed by 10% to 15% of dogs. In addition to the more obvious signs of SA/SRB, Palestrini et al. (2010) also recorded passive behaviours, such as trembling and immobility (but not resting), which occurred in 35% of cases. Cannas et al. (2014) reported that 48% of dogs displayed panting and salivation, and Lund and Jørgensen (1999) recorded displacement behaviours (e.g., yawning, and licking) in 85% of cases.

There are obvious challenges with detecting SA/SRB due to the fact that by definition, the behaviour only occurs when the owner is not present (Blackwell et al.,

2003). Some animals demonstrate clear and obvious signs of SA/SRB that are evident to owners upon their return (e.g., destructiveness, inappropriate elimination), whereas knowledge of excessive vocalisation might only occur if neighbours complain, and less apparent signs (e.g., soft non-disruptive vocalisation, panting, pacing, salivation, lip licking, yawning, freezing) might only be evident via video recordings of the animals when the owners are absent (Cannas et al., 2014; Lund & Jørgensen, 1999; Palestrini et al., 2010). SA/SRB is just as detrimental for dogs that display less noticeable signs as those that show more obvious signs (Lund & Jørgensen, 1999; Overall, 2013; Palestrini et al., 2010). As owners are less likely to seek help for behaviour they do not find problematic (Pirrone et al., 2015), SA/SRB may go undiagnosed or untreated if dogs show less obvious or problematic signs (Blackwell et al., 2003; Overall, 2013; Palestrini et al., 2010).

Prevalence. The prevalence of SA/SRB has been variously estimated to be between 17% and 34% for the general pet dog population (34%, Blackwell, Twells, Seawright, & Casey, 2008; 21%, Bradshaw, McPherson, Casey, & Larter, 2002; 28%, Chung et al., 2016; 30%, Howell, Mornement, & Bennett, 2016), and between 23% and 24% of all referrals to behaviour clinics (Storengen, Boge, Strøm, Løberg, & Lingaas, 2014; Takeuchi, Ogata, Houpt, & Scarlett, 2001). The prevalence for rehomed shelter dogs is between 17% and 38% (27%, Blackwell et al., 2003; 38%, Blackwell, Casey, & Bradshaw, 2016; 17%, Herron et al., 2014). Explaining the variation in reported prevalence is difficult due to substantial differences in sample composition, terminology, and methodology among studies (Ogata, 2016). Differences in the composition of samples include the mix of ages, breeds, sex, and neuter status of dogs, all of which have been variously shown to be associated with

the incidence of SA/SRB (Ogata, 2016; Sargisson, 2014). Other differences between studies include when and how SA/SRB is measured. Although most researchers rely on owner-reported SA/SRB (Ogata, 2016), some (Döring et al., 2017; Elliott et al., 2010; Tiira, Sulkama, & Lohi, 2016) ask owners to judge the presence of SA/SRB from one question (e.g., 'Does your dog exhibit separation anxiety when left alone?'), whilst others (Blackwell et al., 2003; Blackwell et al., 2008; Blackwell et al., 2013; Blackwell et al., 2016; Herron et al., 2014) ask owners to report the frequency or severity of non-specific signs, such as vocalisation, destructiveness, and inappropriate elimination, which are then discounted by the presence of these signs when the owner is present to give a differential diagnosis of SA/SRB. Some researchers use a convenience sample to measure owner-reported SA/SRB as a proportion of the general pet population (Blackwell et al., 2008; Chung et al., 2016), whilst others record owner-reported SA/SRB at a certain point in time post-adoption. For example, Blackwell et al. (2016) surveyed owners of rehomed shelter dogs at 1-month post-adoption and found 38% were reported to show SA/SRB, whereas Herron et al. (2014) surveyed owners 3-months post-adoption, and found 17% were reported to show SA/SRB. I was not able to find a study which explores whether SA/SRB is more likely to be reported at 1-month or 3-months post-adoption, however, Döring et al. (2017) investigated the behaviour of rehomed ex-laboratory beagles (n = 145), and although a general trend towards more desirable behaviour was reported between 1- and 12-weeks post-adoption, there was a significant increase in the proportion of beagles reported to show SA/SRB, from 14% 1-week post-adoption to 28% at 12-weeks.

It is possible that observed differences with regard to the prevalence of SA/SRB is affected by the country in which studies are conducted (Ogata, 2016). Genetic links have been found for SA/SRB (Arvelius et al., 2014; Zapata, Serpell, & Alvarez, 2016) and heritability of traits is likely to be affected by geographical constraints. Additionally, it is possible that differences in owner characteristics and preferences for certain breeds varies between countries, and that these factors also affect the incidence of SA/SRB (Konok et al., 2015). An internet survey of German (n = 1185) and Hungarian (n = 323) dog owners to investigate associations between owner and dog attachment styles found that all human personality, human attachment, and dog personality scores differed significantly between the Hungarian and German samples (Konok et al., 2015). The prevalence of SA/SRB in the German sample was 18.4%, compared with 33.1% in the Hungarian sample, supporting the suggestion that geographical, and perhaps cultural differences, will impact the prevalence of SA/SRB.

Aetiology, and Factors Associated with SA/SRB

Reviews of our current understanding of SA/SRB by Ogata (2016) and Sargisson (2014) show that although SA/SRB has been the subject of a substantial amount of research over the past few decades, the aetiology of SA/SRB remains largely unresolved. Associations have been reported between the likelihood of SA/SRB, and various dog characteristics such as sex, neuter status, age, and breed (Blackwell et al., 2003; Bradshaw et al., 2002; Eken Asp, Fikse, Nilsson, & Strandberg, 2015), as well as environmental, owner, and management factors (Blackwell et al., 2008; Blackwell et al., 2016; Chung et al., 2016; Herron et al., 2014; Palestrini et al., 2010). Although virtually all authors agree the aetiology of

SA/SRB is multifactorial (Sargisson, 2014), and not as a result of disobedience or boredom (Lund & Jørgensen, 1999), the vast number of possible combinations of contributing factors have led to equivocal results, and made predictive models problematic (Ogata, 2016).

The effects of sex, and age. The literature tends to suggest that SA/SRB is more frequently reported for male dogs than female dogs (Blackwell et al., 2016; Bradshaw et al., 2002; Herron et al., 2014; McGreevy & Masters; 2008; Takeuchi et al., 2000; Takeuchi et al., 2001), and more likely for neutered dogs than intact dogs (Blackwell et al., 2016; Flannigan & Dodman, 2001; González-Ramírez, Quezada-Berumen, & Landero-Hernández, 2017). Whilst younger dogs (less than 2 years old) have been reported to be more likely to show SA/SRB by some researchers (Blackwell et al., 2008; Blackwell et al., 2003; Döring et al., 2017; Takeuchi et al., 2001), others have suggested that older dogs were more likely to exhibit SA/SRB (Chung et al., 2016; Landsberg, 1995). However, these results might not be as contradictory as they appear, as it is possible a bimodal age pattern is associated with the risk of SA/SRB, with both younger dogs and older dogs being more susceptible to SA/SRB than middle aged dogs. Flannigan and Dodman (2001) reported 39% of dogs diagnosed with SA/SRB in a behaviour clinic developed the problem before 2 years of age, and dogs over the age of 6 years (23%) were more likely to be referred to the clinic for SA/SRB than other problems. In a study of 62 dogs over the age of nine, Landsberg (1995) reported that SA/SRB was the most commonly reported behavioural problem (29%), followed by aggression (27%), house soiling (23%) and excessive vocalisation (21%). All these behaviours are also associated with age dependent changes in the brain associated with Canine Cognitive Dysfunction

(Landsberg et al., 2005), and it could be that owner reports of SA/SRB in older dogs might also be associated with CCD (Overall, 2013).

The effect of breed. Although some researchers have suggested breed-specific tendencies in the prevalence of SA/SRB (Eken Asp et al., 2015; Flannigan & Dodman, 2001; Storengen et al., 2014), others have suggested mixed-breed dogs are more at risk than purebred dogs (Takeuchi et al., 2001), whilst others have found no difference between mixed and purebred dogs (Blackwell et al., 2003; Blackwell et al., 2008; Flannigan & Dodman, 2001; McGreevy & Masters, 2008). In an epidemiological analysis of dog behaviour problems presented to an Australian behaviour clinic (n = 7858 dogs), Col, Day, and Phillips (2016) reported seven breeds, including greyhounds, were over represented in the clinic database, compared to local dog registration information. Unfortunately, Col et al. analysed destructiveness, vocalisation, house soiling, escaping, and anxious behaviour separately, and there was no way to determine whether these behaviours were associated only with the owner's absence.

The effect of acquisition source. Most researchers appear to suggest that SA/SRB is prevalent for rehomed dogs (Blackwell et al., 2008; Cannas et al., 2014; Flannigan & Dodman, 2001; Riva, Bondiolotti, Michelazzi, Verga, & Carenzi, 2008), although Bradshaw et al. (2002) found no such association. Investigations involving behaviour clinic patients revealed a substantial proportion of dogs diagnosed with SA/SRB were sourced from shelters, e.g., 35% from studies conducted in Italy (Cannas et al., 2014; Riva et al., 2008), and 41% from an American study (Flannigan & Dodman, 2001), though it was unclear how the aforementioned percentages compared to the proportion of rehomed shelter dogs in the general pet population. In

New Zealand and Australia, 12% and 14% of pet dogs are sourced from shelters (Bennett & Rohlf, 2007; NZCAC, 2016), and in a survey of dog owners in the United Kingdom (*n* = 192), 20% had sourced their dogs from a shelter, and a higher proportion of these dogs showed SA/SRB than dogs from other sources (Blackwell et al., 2008).

It is possible that some dogs will have displayed SA/SRB in a previous home (and this might have been part of the reason for relinquishment), and this behaviour might then carry over into the dog's new home. Blackwell et al. (2003) reported that 29.6% of dogs rehomed from a shelter in the United Kingdom had shown SA/SRB in their previous home, and of these 45.8% went on to display SA/SRB in their new home. However, 50% of the rehomed dogs that displayed SA/SRB in their new home had not reportedly shown it before, suggesting the behaviour could have developed as a result of time spent at the shelter, or aspects of the dog's new home experience, or a combination of these factors.

Döring et al. (2017) reported that the behaviour of laboratory beagles during an isolation behaviour test, measured in the research facility 1 week prior to rehoming, did not correlate with increased SA/SRB reported by owners after 12 weeks in their new home. The authors suggested the beagles might have experienced isolation differently before and after adoption, and proposed that social bonding with the new owner likely led to the development of SA/SRB problems. However, 72% of the beagles did not develop SA/SRB, and presumably these dogs also went through a social bonding process with their new owners.

The effect of hyper-attachment. Hyper-attachment of the dog to their owner is often associated with the occurrence of SA/SRB (Appleby & Pluijmakers, 2004;

Flannigan & Dodman, 2001; Mills et al., 2013). Behaviours associated with hyper-attachment include excessive following from room to room, constant seeking and maintaining close proximity, frequent attention seeking such as nudging, pawing or vocalising for attention, and excessive greeting behaviour (Flannigan & Dodman, 2001). However, there is no evidence of a causal relationship between hyper-attachment behaviours and SA/SRB (Blackwell et al., 2016; Konok, Dóka, & Miklósi, 2011; Overall, 2013; Parthasarathy & Crowell-Davis, 2006; Sherman & Mills, 2008).

The effects of exercise, and training. Some researchers have shown that involvement in formal training activities is associated with decreased risk of SA/SRB (Jagoe & Serpell, 1996; Marston & Bennett, 2003), but others have found no protective effect (Blackwell et al., 2008; Zilocchi, Tagliavini, Cianni, & Gazzano, 2016). These contrasting results could be associated with the types of training methods used. For example, in a study of 364 pet-dog owners in the United Kingdom, owners using punishment, either alone or in combination with reinforcement methods, had the highest percentage of dogs exhibiting SA/SRB, compared to owners who only used reinforcement methods (Hiby, Rooney, & Bradshaw, 2004).

Tiira and Lohi (2015) investigated environmental factors associated with fear-related behaviours with a sample of 3262 purebred family dogs aged 6 months and over in Finland, and found dogs with owner-reported SA/SRB were exercised significantly less than dogs with no SA/SRB. The authors also noted that dogs with noise sensitivity, which is often comorbid with SA/SRB, were exercised significantly less compared with dogs with no noise sensitivity. Tiira and Lohi (2015) concluded that exercise probably acted as stress resilience. In contrast, other authors have

reported no significant association between the amount of exercise a dog receives, and the likelihood of SA/SRB (Blackwell et al. 2016; Herron et al. 2014). Chung et al. (2016) reported the duration of exercise had no association with the occurrence of SA/SRB, although less frequent walks was associated with excessive barking. Additionally, Elliott et al. (2010) reported the occurrence of SA/SRB for rehomed greyhounds was not associated with the frequency or duration of daily walks, or whether the dog was engaged in obedience training.

The effect of time spent alone. Some authors have found that the length of time a dog is left alone, or the amount of access to owners when home, is not associated with the occurrence of SA/SRB (Blackwell et al. 2016; Chung et al., 2016; Elliot et al., 2010; Herron et al. 2014). However, dogs that spend long periods alone, or spend long periods with the owner without being habituated to being left alone (followed by a period of isolation), are more likely to show SA/SRB, than dogs whose owners maintain routines of regular absences (Overall, 2013; Sherman & Mills, 2008). Further, dogs are affected by the duration of time alone and tend to show more intense greeting behaviour, and more stress-related behaviour, upon reunion with their owner after longer periods alone (Rehn & Keeling, 2011).

Several authors have suggested that a sudden or traumatic change to the household, or the dog's usual routine, can trigger SA/SRB. For instance, SA/SRB may begin after an owner's job change, an addition to the household, a period of kennel housing, being rehomed, or a single traumatic event while the dog is alone (Butler, Sargisson, & Elliffe, 2011; Fannigan & Dodman, 2001; McGreevy & Masters, 2008; Overall, 2013). However, Flannigan and Dodman (2001) reported that only 16% of owners could recall a change in the home when SA/SRB developed.

Being alone can act as a discriminative stimulus for traumatic events, where the dog associates being alone with the frightening event (e.g. thunder storm, or break-in) and develops a conditioned fear of isolation as a result (Mills et al., 2013; Overall, 2013).

Treatment of SA/SRB

Treatment protocols for SA/SRB typically include a variety of behaviour modification strategies, which may also be supported with psychopharmacology and/or pheromonatherapy (Mills et al., 2013; Overall, 2013; Sargisson, 2014; Takeuchi et al., 2000).

Behaviour modification therapy. Typical behavioural treatments generally include prohibiting owners from using punishment, for either catching the dog in the act of separation-related behaviour (e.g., barking, being destructive) or after the event; increasing exercise to reduce the dog's energy level and provide an opportunity for the dog to toilet; relaxation training, such as 'stay' training, to reduce anxiety; uncoupling departure cues to habituate the dog to departure routines; systematic desensitisation by gradually increasing the amount of time the dog is left alone without displaying signs of SA/SRB; counterconditioning by providing a special treat or food-filled toy to create a positive association with owner's departure; and practicing low-key departures and greetings to ensure anxious behaviours are not reinforced and to reduce arousal levels at departure and return (Takeuchi et al., 2000). Others have also suggested the importance of reducing the dog's dependency on their owner, including the provision of independent enrichment and time way from the owner at home, as well as ensuring all interactions with the dog are in response to calm and relaxed behaviour, as opposed to heightened arousal, anxiousness, or attention seeking (Blackwell et al., 2006; Mills et al., 2013; Overall, 2013).

Key components of behaviour therapy, such as counterconditioning and systematic desensitisation, have been widely tested and shown to reduce anxiety, fear and phobia (Butler et al., 2011; Overall, 2013; Sherman & Mills, 2008; Sargisson, 2014), however, many components of behaviour strategies for SA/SRB remain untested and some are controversial. For example, some treatment strategies include confining the dog in a cage or crate (Takeuchi et al., 2000), however, whilst crating might prevent the exhibition of some separation-related behaviours such as escaping, toileting, or destructiveness, Palestrini et al. (2010) suggested such confinement might actually increase the discomfort felt by the dog and mask other signs of SA/SRB, and revealed that crated dogs yawned and licked their lips more than dogs running free or confined in a room. Also, the common strategy of uncoupling departure cues as part of habituating dogs to their owner's departure has been challenged by research that suggests maintaining departure cues, rather than faking them, is more supportive for treating SA/SRB, because predictability has been shown to reduce the stress response (Amat et al., 2014).

Psychopharmacological and other supportive treatments. A variety of medications have been used in the treatment of SA/SRB including tricyclic antidepressants (TCA) such as clomipramine or amitriptyline; selective serotonin reuptake inhibitors (SSRIs) such as fluoxetine or sertraline; serotonin agonists, such as trazodone; and benzodiazepines such as diazepam or alprazolam (Cannas et al., 2014; Karagiannis, Burman, & Mills, 2015; Overall, 2013; Sümegi, Gácsi, & Topál, 2014). The judicious use of medication is recommended to decrease a dog's overall anxiety level to facilitate a more favourable response to behaviour therapy, however, there is a mixed response to medication and many owners oppose the use of

medication for financial or other reasons (Ciribassi, 2015; Cottam, Dodman, Moon-Fanelli, & Patronek, 2008; Mills et al., 2013; Overall, 2013). Takeuchi et al. (2000) reported that 52% of dogs treated with medication (amitriptyline) in addition to behaviour therapy improved, compared with 68% of dogs treated with behaviour therapy alone. However, only 41% of owners whose dogs were treated with medication felt the medication had been effective. Cottam et al. (2008) reported that 83% of owners who administered medication as part of their dog's treatment plan felt their dog's SA/SRB had improved, compared with 100% of owners who did not use medication.

Stress induced by an owner's departure can be reduced physiologically by providing the dog with something containing the owner's scent, or by allowing the dog to listen to a recording of owner's voice (Shin & Shin, 2016). Another promising treatment includes the use of intranasal oxytocin (Thielke & Udell, 2017). Other supportive treatments include special anxiolytic diets, neutraceuticals (e.g., Calmex®), supplements (e.g. anti-oxidants and omega-3 fatty acids), aromatherapy, and pheromonatherapy (Mills et al., 2013; Overall, 2013).

Dog-appeasing pheromone (DAP) has been shown to reduce SA/SRB for hospitalised (Kim et al., 2010) and shelter dogs (Tod, Brander, & Waran, 2005) and is recommended as a supportive treatment for behavioural modification in SA/SRB cases, especially those involving destructiveness and excessive vocalisation (Mills et al., 2013). In a between-subjects experiment, the efficacy of DAP was compared with clomipramine (tricyclic antidepressant) as supportive treatments for behavioural therapy for SA/SRB (Gaultier, Bonnafous, Bougrat, Lafont, & Pageat, 2005). Following treatment, researchers found fewer undesirable signs of SA/SRB in the

DAP group compared with the clomipramine group, although owner reports indicated there was no significant difference between the treatment groups.

Success of treatments and compliance with recommendations. Owner reports, 6 to 64 months after clinical treatment for SA/SRB at a university behaviour clinic in the United States, revealed that 12% of dogs had been euthanized, 8% had been rehomed, 6% were worse, 13% showed no change, 46% had improved, and 15% were 'cured' (Takeuchi et al., 2000). Other researchers have shown that between 56% and 68% of owners report improvements in their dog's SA/SRB after 2 to 3 months engagement with behavioural treatment programmes (Blackwell et al., 2006; Takeuchi et al., 2001).

The time and money involved in clinical behaviour consultations is substantial, and is likely to contribute to the number of owners who seek professional help for SA/SRB, and in delays in getting treatment (Blackwell et al., 2006; Cottam et al., 2008). Cottam et al. (2008) found no significant difference in effectiveness (measured via a SA score based on owner-reported behaviours) of traditional in-person clinical treatment (39% improved) compared with a fax-based service (41% improved). However, 78% of owners involved in the fax-based trial felt their dog's behaviour had improved, compared with 92% of the clinic clients. Similarly, Blackwell et al. (2006) found no difference in reported improvement between owners engaged in a standardised (treatment) behaviour modification programme (56% improved) compared with a clinical group where owners received a customised clinical treatment programme for SA/SRB (58% improved). However, none of the clinical cases were reported to show any worsening of behaviour, compared to 19% of the treatment cases where behaviour deteriorated over 12 weeks.

Differences in the reported success of treatment for SA/SRB are likely contributed to by variations in treatment plans, as well as a number of dog and owner factors (Takeuchi et al., 2000). Mixed-breeds, and dogs from shelters, are significantly less likely to respond to treatment (48% and 43% improved) compared with purebred dogs, and dogs from sources other than shelters (76% and 77% improved; Takeuchi et al., 2000). Delays of more than a year between onset of SA/SRB and treatment have been shown to decrease the likelihood of improvements (Takeuchi et al., 2001), as has the age of onset, with younger dogs being more likely to improve than older dogs (Takeuchi et al., 2000). Takeuchi et al. (2000) reported owners were more likely to comply for 1 month or more with not using punishment (79% complied), increasing exercise (78%), and providing a special toy (69%), compared with desensitisation and uncoupling cues (43% and 35%), suggesting owners appeared more likely to comply with instructions that were easier to implement. Of owners who complied with the advice given, 73.5% believed that low-key departures had a positive effect on reducing SA/SRB, and 46% reported that a 'stay' training protocol had a significant effect, however these perceived effects were not tested. The success of treatment plans were significantly associated with the number of instructions given to the client, where five or fewer instructions resulted in significantly better improvements in SA/SRB (80% improved), compared with when clients were given more than five instructions (42% improved). However, the SA/SRB outcome was not associated with either the level of compliance or with which particular aspects of the treatment plan owners complied (Takeuchi et al., 2000). Simply raising awareness of the emotional state and motivations behind

SA/SRB may help owners accept and respond more beneficially to SA/SRB (Overall, 2016).

Not all SA/SRB is due to anxiety, and some authors have suggested that SA/SRB is compatible with one or more underlying emotional and motivational states, contributing to the variation in effectiveness of different treatment and prevention strategies (Mills et al., 2013; Overall, 2013; Palestrini et al., 2010). For example, panic-grief induced SA/SRB is often associated with hyper-attachment to the owner, and behavioural treatment would typically include reducing the dog's dependence on their owner and encouraging autonomy (Mills et al., 2013; Overall, 2013). However, a dog suffering from fear induced SA/SRB, associated with a conditioned fear of isolation in which the onset is likely linked to an unpleasant event when the animal was alone, would not necessarily benefit from exercises designed to increase autonomy (Mills et al., 2013).

Due to the multifactorial aetiology of SA/SRB, often there is more than one underlying motivation or emotion for SA/SRB, and it is likely that the effectiveness of various treatment approaches will also depend on the dog's motivation to perform SA/SRB (Mills et al., 2013). For example, Mills et al. (2013) report some dogs appear to be motivated to retain access to a primary attachment figure, with signs of panic and grief associated with separation from a specific person, irrespective of another person being present. Others might not show signs when separated from a specific person, but inconsistently show SA/SRB when left on their own. Still others show SA/SRB in conjunction with generalised fearfulness, anxiety or specific phobias (e.g., noise phobia, fear of fireworks or storms; Mills et al., 2013; Overall, 2013).

Given that treatment programmes appear to be difficult for owners to comply with, and only improve between 40% and 68% of cases of SA/SRB, it is important to investigate ways to prevent the development of SA/SRB.

Prevention of SA/SRB

Providing advice to dog owners about dog behaviour and training, and how to prevent problem behaviour, has been shown to be effective in a number of situations such as improving toilet training (Herron, Lord, Hill, & Reisner, 2007), and decreasing undesirable behaviours of puppies. For example, at the first veterinary visit soon after adoption, Gazzano et al. (2008) provided a group of new puppy owners (n = 46) with evidence-based information on canine behaviour and basic training (e.g., the importance of positive socialisation experiences, the appropriate use of reinforcers, controlling resources via a 'leadership without force' programme, how to avoid inadvertent reinforcement of attention-seeking behaviour), and included advice regarding habituation and desensitisation to being alone. The authors then interviewed the owners of this group and a control group at the 1-year booster vaccination visit. Owners of the puppies who received the information reported decreased prevalence of undesirable behaviours, such as incomplete toilet training, aggression towards unknown people and dogs, persistent attention seeking, and mouthing or mounting humans, compared to the control group that did not receive the advice. However, the provision of advice did not make a significant difference to the proportion of puppies that were reported to show SA/SRB, and although compliance with some aspects of the advice was reported to be higher in the experimental group compared with the control group, compliance with the 'learning to be alone' advice was not reported. Regardless, Gazzano et al. (2008) suggested that appropriate owner

education can mitigate a lack of knowledge of the biological and socio-psychological needs of the animal to ensure owners have realistic expectations of their pet, and encourage appropriate interactive behaviour with their dog that reduces the likelihood of behavioural problems.

Blackwell et al. (2016) and Herron et al. (2014) recently investigated the effect of providing advice about how to prevent SA/SRB to new owners of rehomed shelter dogs. Blackwell et al. (2016) used a convenience sample of 306 dogs rehomed through a RSPCA in the United Kingdom to test the effect of providing new owners with a leaflet about preventing SA/SRB on the occurrence of SA/SRB 3 months after adoption. A summary of advice contained in the leaflet is shown in Table 1. Over a 13-month period, adopters were allocated alternately to a treatment or control group. The treatment group received the SA/SRB leaflet and the control group received general advice about vaccinations and worming. Questionnaires, sent 3 months after adoption, were received from 57.5% of adopters. In total, 30% of the dogs were reported to show one or more SA/SRB, and significantly more of the control group showed SA/SRB (38%) than the treatment group (22%), suggesting that the provision of written advice was effective in reducing the likelihood of SA/SRB. Whether or not owner behaviour was consistent with the advice provided was evaluated using a compliance score, which revealed that owners in the treatment group were more likely to act in a manner consistent with the advice provided than those in the control group. However, compliance overall was generally poor and varied between different aspects of the treatment advice.

Table 1

Summary of Advice about Preventing Separation-Related Behaviour Provided to New Owners of Rehomed Shelter Dogs in Two Separate Experimental Studies

Study 1: Written advice[a] (Blackwell et al., 2016)	Study 2: Verbal advice[b] (Herron et al., 2014)
	[c]Provide a safe home alone area (e.g., crate training, for which separate instructions were provided) to prevent the dog having access to dangerous items.
[c]Control all social interactions with dog, and only initiate interaction when dog displays relaxed behaviour, and cease interactions if dog displays anxious, attention seeking, or other undesirable behaviour, including during departures and greetings.	Encourage independence in the dog by preventing constant following and allowing the dog to spend time in an area separate to the owner when the owner is home.
	Keep departures and arrivals low key so as not to increase arousal levels at these times.
[c]Do not punish dog in response to evidence of undesirable behaviour while the owner was absent (such as destructiveness or inappropriate elimination).	Avoid the use of punishment in response to evidence of undesirable behaviour while the owner was absent (such as destructiveness or inappropriate elimination).
Exercise the dog before leaving the dog alone.	[c]Provide the dog with 20 minutes of exercise before leaving the dog alone.
[c]Provide enrichment in the form of interactive or food-filled toys or treats when leaving the dog alone.	[c]"Most importantly" provide a food-filled toy when leaving the dog alone (the experimenters provided dog owners with a KONG® toy for this purpose).
[c]Apply a systematic desensitisation and counter-conditioning program involving: leaving the dog for only a moment to begin with, and rewarding the dog for relaxed behaviour, and then gradually increasing the distance and time owner and dog were parted; leaving the dog with a long lasting food treat (counterconditioning) during desensitisation periods. Owners were told not to leave their dogs alone for any longer that the time achieved at any particular stage during the desensitisation process.	

Note.

Items of advice are aligned in rows according to similarities.

[a]Adapted from "Efficacy of written behavioural advice for separation-related behavior problems in dogs newly adopted from a rehoming center," by E. J. Blackwell, R. A. Casey, J. W. S. Bradshaw, 2016, *Journal of Veterinary Behavior: Clinical Applications and Research, 12*, p. 13-19.

[b]Adapted from "Effects of preadoption counseling on the prevention of separation anxiety in newly adopted shelter dogs," by M. E. Herron, L. K. Lord, and S. E. Husseini, 2014, *Journal of Veterinary Behavior: Clinical Applications and Research, 9*(1), p. 13-21.

[c]Compliance with these aspects of the advice was evaluated by the authors.

Herron et al. (2014) evaluated the effects of providing a 5-minute pre-adoption counselling session regarding the prevention of SA/SRB, to every alternate adopter of dogs rehomed from a large shelter in the United States. The authors excluded puppies younger than 6 months because incomplete toilet training and destructive-chewing play-behaviours are common in young puppies, and could potentially confound the diagnosis of SA/SRB. A summary of the advice provided to the treatment group is shown in Table 1. In case owners elected to use a crate as the safe home-alone area, crate-training instructions were also provided to reduce the likelihood of confinement-induced panic being a confounding factor when identifying signs associated with SA/SRB. An accompanying handout in support of the verbal counselling session was also provided to owners. The authors conducted interviews with 116 adopters 1-month post-adoption and reported no significant difference between the group that received the counselling and the group that did not receive counselling, on the occurrence of SA/SRB reported by owners (18.2 vs. 15.5%).

Blackwell et al. (2016) and Herron et al. (2014) provided similar advice (Table 1), with the exceptions that Blackwell et al. (2016) included a process of systematic desensitisation and counterconditioning for time spent alone, and Herron et al. (2014) advised the use of a safe home-alone area or crate. The use of a crate or contained area has been shown to have little protective effect for SA/SRB (Palestrini et al., 2010), whereas implementing a programme of desensitisation and/or counterconditioning has been shown to be effective in the treatment of SA/SRB (Blackwell et al., 2006; Butler et al., 2011; Takeuchi et al., 2000). Unfortunately, compliance with the advice provided was reported differently between the two studies. Herron et al. (2014) only reported compliance for three of six aspects of the

advice (as shown in Table 1), but did report on the impact of these aspects on the occurrence of SA/SRB, suggesting the recommended behaviour had no significant effect on the development of SA/SRB. Blackwell et al. (2016) presented analyses for compliance with four of five aspects of the advice provided in the leaflet (compliance with providing exercise before leaving the dog alone was not reported), and reported that compliance was generally poor overall. However, Blackwell et al. did not report whether acting in accordance with individual aspects of the advice given had any effect on the occurrence of SA/SRB.

Aim and Rationale

The two key studies by Herron et al. (2014) and Blackwell et al. (2016) measured the prevalence of SA/SRB at different time points (1 vs. 3 months) post-adoption. Additionally, there were differences in the composition of their samples in terms of age, sex, and breed of dogs, all of which have been variously associated with the occurrence of SA/SRB (Ogata, 2016; Sargisson 2014). It is possible that the different rates of SA/SRB (17% cf. 30%) were related to the length of adoption (1 cf. 3 months), or to the different treatments of the two studies, or to other factors. Similarly, it is possible that the different results (no effect of treatment, Herron et al., 2014; cf. effective treatment, Blackwell et al., 2016) are associated with the aforementioned differences in sample composition and methodology. Further, both these studies used rehomed shelter dogs, a proportion of which are likely to have shown SA/SRB in a previous home increasing the risk they will exhibit SA/SRB after rehoming (Blackwell et al., 2003).

The vast majority of rehomed greyhounds have not been pets before (86%, Thomas et al., 2017), which potentially reduces the confounding effect of subjects

with a history of SA/SRB. Further, the opportunity to explore owner and management factors associated with separation-related behaviour problems in a single breed, bred and raised specifically for racing, removes another common confound found in similar studies where a variety of purebred and mixed-breeds are involved (Blackwell et al., 2016; Herron et al., 2014; Ogata, 2016).

Elliott et al. (2010) reported a relatively high prevalence of owner-reported SA/SRB (43%) in rehomed greyhounds 1-month post-adoption, and that SA/SRB was associated with an increased risk of the dog being returned. However, the presence of SA/SRB was determined by owners' responses to one question ("Does your dog show separation anxiety when left alone or about to be left alone?"), which was not discounted by owners' responses to questions regarding similar behaviour when the owners were also present. Further, the presence of the non-specific signs of 'noisiness', 'inappropriate toileting', and 'destructiveness', which were reported to occur when the owners were present, was positively correlated with owner-reports of SA/SRB. This could suggest an artificially elevated level of prevalence of SA/SRB in rehomed greyhounds, as SA/SRB is characterised by behaviour that *only* occurs in the absence of the owner (Mills et al., 2013; Overall, 2013). Elliott et al. (2010) suggested that a longitudinal examination of SA/SRB (and other behaviour problems) for rehomed greyhounds would be useful to investigate the prevalence of SA/SRB, and the reported association with an increased risk of return, further.

Nearly 70% of greyhounds returned from adoption are returned within 6 months (Thomas et al., 2017). As only 18% of greyhound adoptions fail (and 82% of these greyhounds are successfully re-adopted), including a 6-month post-adoption follow-up period allows for investigation of any association between SA/SRB and

risk of return. Understanding factors that might increase the likelihood that SA/SRB will occur, and investigating practices that can potentially reduce the risk of problem behaviours developing, can improve the success of dog adoptions (Blackwell et al., 2003; Cannas et al., 2018; Diesel et al., 2008; Elliott et al., 2010).

My primary aim was to determine whether providing new owners with specific information about the prevention of SA/SRB at the time of adoption had an effect on the occurrence of SA/SRB for rehomed ex-racing greyhounds. I provided every other new owner adopting a greyhound through GAP with written information about how to prevent SA/SRB and then asked all new owners for information relating to management and behaviour of their greyhound at intervals of 1-, 3-, and 6-months post-adoption via questionnaires. The responses enabled investigation of the effect of providing preventative advice, compliance with the advice, prevalence of SA/SRB shown only in the absence of the owner, as well as comorbidity with other behaviour problems in the sample population, and possible associations with owner and management factors. Using multiple time points for questionnaire responses, I hoped to describe any patterns of SA/SRB over time from the point of adoption. My hypothesis was that providing new owners with written information regarding SA/SRB at the time of adoption would reduce the occurrence of SA/SRB for rehomed greyhounds, compared with greyhounds whose owners did not receive the information.

Method

Subjects

My population was all greyhounds adopted (n = 297) between 1 June 2016 and 31 May 2017 (study period) through GAP's three New Zealand kennel bases: Hampton Downs (Location 1: 136 adoptions), Levin (Location 2: 104 adoptions), and Amberley (Location 3: 57 adoptions). The 297 adoptions involved 287 adopters (10 adopters adopted two dogs within the study period), and 276 dogs (21 dogs were returned and readopted within the study period). Median age of dogs at entry to the GAP programme was 3.7 years (range 0.9 to 9.7 years, 25^{th} – 75^{th} percentile: 2.9 – 4.3 years). Slightly more male than female dogs were adopted (156 males cf. 141 females). All dogs were de-sexed before rehoming.

Access to greyhound adoption records for the purpose of this research was provided with permission from the New Zealand GAP Programme Director, subject to a confidentiality agreement.

Description of sample. Median age of dogs was 3.7 years (range 0.9 to 9.7 years, 25^{th} – 75^{th} percentile: 2.9 – 4.3 years) and 47.8% (118/247) were female dogs. A total of 51.0% (126/247) of responses were from the treatment group, and of these 49.2% (62/126) related to female dogs. The control group (n = 121) included 56 (46.3%) female dogs. There was no significant difference in dogs' sex between the treatment group and control group, χ^2 (1) = 0.212, p = .65. There was also no significant difference in dogs' ages between the treatment group, M = 3.77 years, 95% CI [3.51, 4.03], and control group M = 3.55 years, 95% CI [3.35, 3.75], t(245) = 1.30, p = .20.

Materials

A 1-page SA/SRB hand-out (SAHO) containing evidence-based information on how to prevent SA/SRB in newly rehomed dogs (Appendix A) was prepared with a focus on four key messages, based on recommendations by Sargisson (2014):

- Gradually increase the amount of time your greyhound is left alone each day (desensitisation), and provide a food-filled toy when leaving (counterconditioning).
- Maintain stable routines and absences from your greyhound: Do not leave your greyhound for long periods alone, or go for long periods without leaving your greyhound alone.
- Avoid all punishment.
- Discourage your greyhound from forming an excessive attachment to one person: Prevent constant following and ensure low-key departures and greetings.

These points were supported with some “Do’s” and “Don’ts” including stressing the importance of regular exercise and mental stimulation, the problem with punishment, dramatic departures and greetings, and ideas to reduce anxiety and create a calm but enriched environment when the dog was alone (e.g., play classical music, use of aromatherapy and pheromonatherapy, provision of food-filled toys).

I developed an online questionnaire (Appendix B) using Qualtrics® to obtain information from new owners regarding the occurrence of SA/SRB and compliance with advice in the SAHO. In addition, I sought information regarding factors suggested in the literature to be associated with SA/SRB, such as household composition, previous dog ownership, management practices associated with the

housing, feeding, exercise and training of the greyhound, the amount of time the dog is left alone, and behaviour of the greyhound including hyper-attachment, and fearful behaviours (Blackwell et al., 2016; Cannas et al., 2014; Chung et al., 2016; Flannigan & Dodman, 2001; Herron et al., 2014; McGreevy & Masters, 2008; Palestrini et al., 2010; Storengen et al., 2014; Takeuchi et al., 2001). The questionnaire devised by Elliott et al. (2010) was used as the basis for my online questionnaire. In addition, relevant elements were incorporated from other authors' questionnaires for evaluating SA/SRB, management factors and household composition (Blackwell et al., 2008; Herron et al., 2014; McGreevy & Masters, 2008; Storengen et al., 2014; Takeuchi et al., 2001), the type and frequency of exercise (Tiira & Lohi, 2015), hyper-attachment behaviours (Chung et al., 2016), and the use of crates (Herron et al., 2014). Advice was sought about the questionnaire composition and format from my supervisors Drs. Rebecca Sargisson and Tim Edwards.

In the online questionnaire, owners noted the frequency, and level of concern or severity of reported behaviours using a Likert scale. The level of severity was gauged for signs of aggression and fear, where it was feasible to include a description of applicable behaviours. The level of concern was gauged where the severity of the behaviour was irrelevant, such as for SA/SRB, where mild signs are considered to be as potentially harmful for the dog as more severe signs (Blackwell et al., 2003; Overall, 2013; Palestrini et al., 2010). Information was sought about owner behaviour in relation to practices recommended in the SAHO, which facilitated exploration of owner's compliance with the advice provided.

A question specifically relating to the frequency and severity of a range of fearful and anxious behaviours (other than SA/SRB) was added to the online questionnaire on 19 February 2017 (Question 62, Appendix B).

Procedure

The University of Waikato School of Psychology Research and Ethics Committee granted approval for human research (#16:19). An application for animal ethical approval was submitted to the University of Waikato Animal Ethics Committee who determined that animal ethics approval was not required.

After the GAP Programme Director had formally consented to take part in the study, the three GAP kennel managers were informed of the research project, via telephone, and were advised to continue to conduct adoptions as usual. Although the adoption process described by each of the kennel managers varied, it generally involved adopters being given detailed verbal information about matters associated with the greyhound's transition from racing kennels to pet home, including safety (e.g., leads and muzzles), introductions to other pets, physical well-being (e.g., shelter, coats, bedding, feeding, exercise, and health), and training (e.g., toilet training, crate training, and daily routines). No specific information was highlighted regarding SA/SRB in the usual adoption practice. Adopters were invited to contact kennel managers at any time for support and advice, but there was no structured follow-up with new adopters. Kennel managers reported adoptions taking between half an hour and 2 hours to complete at the time the greyhound was collected. Prior to new owners collecting their greyhound, kennel managers sent adopters a comprehensive adoption guide and links to the GAP website for training and behaviour information relating to rehomed greyhounds. Once the adoption was

completed, kennel-base personnel entered details of the transaction into GAP's online database.

All new owners of greyhounds rehomed through GAP between 1 June 2016 and 31 May 2017 received one of two introductory emails (treatment-group email or control-group email) advising them of the research project in general terms and providing the option to opt out if they did not wish to participate in follow-up questionnaires. The control-group email (Appendix C) directed new adopters to the GAP website for general behaviour and training tips. The treatment-group email (Appendix C) additionally included the SAHO. New owners from each kennel base were allocated alternately to either the treatment or control group and emails were generally sent within 2 days of the adoption (collection of the greyhound).

A link to the online questionnaire was emailed to greyhound owners using email templates (Appendix C). All new owners received a questionnaire link within 5 days of their 1-, 3-, and 6-month post-adoption anniversaries (i.e., between 1 July 2016 and 30 November 2017). A follow-up email was sent to all non-respondents 7 days after the initial emails.

Where adopters adopted more than one greyhound within the study period (n = 10), email links for the questionnaire were customised to specify which greyhound the questionnaire was to relate to. If the adopter was allocated to the control condition for their first adoption, they were randomly allocated to either the control or treatment condition for their second adoption. Where the adopter was allocated to the treatment condition for their first adoption, they were always allocated to the treatment condition for their second adoption, as the adopter would already have been aware of the SAHO.

The questionnaire link was also emailed to owners who adopted within the treatment period (i.e., 1 June 2016 to 31 May 2017), and who subsequently returned greyhounds to GAP between 1 June 2016 and 30 November 2017 due to a failed adoption, or a change in circumstances. Emails to people who returned greyhounds were sent approximately 1 month after the return date, unless they had completed a questionnaire within the previous month. A follow-up email was sent to non-respondents 1 to 2 weeks after the initial email.

Data Recording and Management

A Microsoft Excel® spreadsheet was used to track which email (control group email or treatment group email) was sent to adopters, and questionnaire response dates, which were logged against adoption records exported from the online GAP database. GAP records included the date of adoption (or failed adoption return date), adopter's contact details (name and email address), dog's sex, age, name, and the adopting kennel base. It was also noted whether the adopter had adopted a greyhound before, any reason given for failed adoptions, and whether the greyhound had been previously fostered or adopted.

Greyhounds were sometimes recorded as being 'fostered to adopt' (n = 40). These transactions effectively provide a 'try-before-you-buy' situation for GAP volunteers considering an adoption. The date of the 'foster-to-adopt' transaction was treated as the adoption date for the purposes of this research unless the potential adopter subsequently returned the greyhound (and the dog was then rehomed with a different person). In this situation, the 'foster-to-adopt' transaction was recorded as a normal foster placement rather than a failed adoption (n = 2).

Returned greyhounds that were readopted were recorded as a second adoption, but otherwise treated as usual.

Adopters were excluded from the study where the adopter opted out (n = 1), or where no valid email address was recorded (n = 8).

Data Analyses

Questionnaire responses were downloaded from Qualtrics® into Microsoft Excel® where answers were aligned with the corresponding GAP database record and coded for further analyses.

A separation anxiety score (SA score) was calculated by adding together the Likert responses (every time = 3; most times = 2; sometimes = 1; never or not applicable = 0) for each potential separation-related behaviour (i.e., excessive vocalisation, destructiveness, inappropriate toileting, escaping, self-injurious behaviour) reported by adopters, and then excluding those responses where the owner had also reported their greyhound displayed the behaviour when the owner was at home. The maximum possible score was 18. In addition, an alternative binary dependent (outcome) variable was created where the total SA score was greater than zero (SA/SRB shown = 1; SA/SRB not shown = 0). Counting SA/SRB when one sign or more is shown *only* in the absence of the owner is consistent with other studies (Blackwell et al., 2016; Herron et al., 2014; Palestrini et al., 2010; Shin & Shin, 2016).

An attachment score was calculated by adding together the Likert responses (always = 3; most of the time = 2; some of the time = 1; never = 0) for owner-reported attachment behaviours shown by the dog (e.g., constant following, proximity seeking, and persistent attention seeking). The maximum possible score was 9.

Owners' response options for reporting fearful behaviour problems included descriptions of, and a Likert scale for, severity. Therefore, scores for fearful behaviours were calculated by multiplying the Likert responses for severity (severe = 3; moderate to severe = 2; moderate = 1; never or not applicable = 0) with frequency (every time or most times = 3; sometimes = 2; rarely = 1; never or not applicable = 0), for situations in which fearful behaviours were shown (from those described in the questionnaire as per Question 62 in Appendix B). The fear calculation resulted in a maximum possible score for each item of 9, and a total maximum possible score of 63. In addition, an alternative binary variable was created where any individual fear-score was greater than one (shown = 1, or not shown = 0), which excluded 'moderate' signs shown 'rarely'.

A score for 'other' potential problem behaviours when the owner is present (e.g., destructiveness, inappropriate toileting, excessive energy, mouthing or biting, high predatory behaviour, pulling on-leash, poor manners or obedience, vocalisation, excessive self-licking) was calculated by multiplying the level of concern (very concerned = 4; moderately concerned = 3; a little concerned = 2; not concerned = 1; not applicable = 0) with the frequency of the behaviour (rarely = 3; sometimes = 4; always or often = 5; not applicable = 0). This resulted in a maximum possible score for each item of 20, and a total maximum possible score of 200. An alternative binary variable was also created for problem behaviours where any problem behaviour score was greater than five (shown = 1, or not shown = 0), which excluded behaviours that were of no concern to owners.

The degree to which adopters acted in a manner consistent with the advice outlined in the SAHO was evaluated by their responses to questions that asked them

to select an answer that reflected their usual behaviour, practices, and routines with regard to leaving their greyhound alone, and when reuniting with their greyhound after an absence (see Questions 64, 65, and 66 respectively in Appendix B). I also calculated a compliance score by adding all the compliant responses (where the adopter indicated they performed a behaviour that was recommended in the SAHO) and subtracting all the non-complaint responses (where the adopter indicated they performed a behaviour that was contrary to that recommended in the SAHO). This resulted in a maximum possible compliance score of 7, and a minimum of -7.

The type, duration, and frequency of exercise were evaluated (see Question 33 in Appendix B) by calculating the average amount of time spent, per day or per week, on different activities (i.e., playing or training on the owners property; on-leash exercise off the property; off-leash exercise off the property; training activities or classes off the property). Sub totals were calculated for on-leash, and off-leash exercise off the owner's property, and a total for off-property exercise was also calculated.

Scores for positive reinforcement (R+), and positive punishment (P+) were calculated by allocating the selected method or tool (from Question 63 in Appendix B) to one of four categories: positive punishment (i.e., verbal reprimand, physical correction, spray bottle, electric-shock or other correction collar, non-verbal sound), negative punishment (i.e., withdrawal of attention, 'time-out'), positive reinforcement (i.e., verbal praise, clicker, food reward, petting or play), and negative reinforcement (i.e., physical restraint, pushing into position). The Likert responses for how frequently the selected tool or method was used (rarely = 1; sometimes = 2; always or

often = 3; not applicable = 0) were then added together to get the final R+ (maximum possible = 12), or P+ (maximum possible = 21) score.

Some descriptive statistics were calculated using Microsoft Excel®, and descriptive and statistical analyses were conducted using IBM SPSS® Version 24.

In Step 1 of my analyses, I used analysis of variance (ANOVA) to explore the effect of group (treatment vs. control), and time (1-, 3-, and 6-month questionnaires) on SA score outcome. In Step 2, I used multiple regression analyses using SA score as the outcome variable for each of the 1-month, 3-month, and 6-month data, to test for effects of multiple factors, including treatment group, compliance score, and other factors suggested in the literature to be associated with the occurrence of SA/SRB. In Step 3, I used multiple regression to investigate the effect of individual components of advice in the SAHO on SA score outcome, using the 1-month, and 3-month questionnaire data. To enable comparison of owner compliance with other key studies (Blackwell et al., 2016; Herron et al., 2014), chi-square analyses were also used where data were at categorical levels of measurement.

Results

Questionnaire Responses

Questionnaire responses were received for 247 of the 297 adoptions that occurred within the study period (83.2% participation rate), involving 241 out of 287 (83.9%) adopters, and 227 out of 276 (82.2%) dogs. Six adopters who had adopted two greyhounds within the study period returned questionnaires for more than one dog.

Of the dogs adopted within the study period, 84.6% (192/227) were being adopted for the first time, and 15.4% (35/227) were being adopted for the second (or in one case, third) time, including 22 dogs that had originally been adopted for the first time before the start of the study period. A total of 13 dogs were adopted, returned, and readopted within the study period. Twenty-six dogs (11.5%) had been in foster care before being adopted, and 54 out of 227 dogs (23.8%) had prior foster and/or adoption experience. Of the 297 dogs adopted within the study period, 34 had been returned by 30 November 2017. Of these, questionnaires were received for 70.6% (24/34), including 75% (21/28) of dogs that were returned and re-adopted, and 50% (3/6) of returned dogs that were subsequently euthanized.

The response rate to questionnaire invitations was 62% overall. Of the 844 questionnaire invitations sent, 522 usable responses were received, (at least) 24 were undelivered, and 46 incomplete responses were deleted. A total of 75.4% (224/297) of the 1-month post-adoption questionnaires (1MthQ) were returned, 56.5% (160/283) 3-month questionnaires (3MthQ), and 52.3% (138/264) 6-month questionnaires (6MthQ). Of the 247 adoptions represented, 69 (27.9%) returned just one

questionnaire, 81 (32.8%) returned two, and 97 (39.3%) returned all three questionnaires as shown in Table 2.

Table 2

Owner Responses to Questionnaires sent at 1-, 3-, and 6-Months Post-Adoption, as a Percentage of All Respondents (n = 247)

Adopter response:	*n*	
Month 1 only	55	22.3%
Month 3 only	8	3.2%
Month 6 only	6	2.4%
Months 1 and 3 only	46	18.6%
Months 1 and 6 only	26	10.5%
Months 3 and 6 only	9	3.6%
Months 1, 3 and 6	97	39.3%

Prevalence of SA/SRB

Table 3 shows the number of potential separation-related behaviours reported before and after discounting cases where the owner also reported the behaviour occurring while the owner was present. Of the 34 owners (at the 1MthQ) who reported their greyhounds had toileting issues when left alone, 88.2% (n = 30) also reported their dogs had toileting issues when their owners were present, and 74.5% (35/47) of dogs reported to be destructive when their owners were absent were also destructive when their owners were home. The incidence of separation-related behaviours that only occur in the absence of the owner is used for all further analyses.

A total of 20.1% (45/224) of dogs showed any SA/SRB (SA score > 0) at the 1MthQ, 18.1% (29/160) at the 3MthQ, and 17.4% (24/138) at the 6MthQ.

Table 3

The Occurrence of Potential Separation-Related Behaviours (SRB) of Rehomed Greyhounds, Reported by Owners in 1-, 3-, and 6-Month Post-Adoption Questionaires, and the Percentage of Dogs also Reported to Show these Behaviours when the Owner was Present

SRB	Behaviour shown when owner absent	% of cases behaviour also shown when owner present
1-Month (*n* = 224)		
Vocalising	76	59.2%
Destructiveness	47	74.5%
Toileting	34	88.2%
Self-injury	6	100.0%
Escaping[a]	5	unknown
3-Month (*n* = 160)		
Vocalising	47	66.0%
Destructiveness	30	73.3%
Toileting	29	72.4%
Self-injury	8	87.5%
Escaping[a]	0	unknown
6-Month (*n* = 138)		
Vocalising	35	62.9%
Destructiveness	23	78.3%
Toileting	25	84.0%
Self-injury	6	83.3%
Escaping[a]	4	unknown

Note. [a]Owners were not asked whether their dogs also escaped while the owners were home.

The percentage of dogs showing individual separation-related behaviours is shown in Figure 1. The most commonly reported separation-related behaviour was vocalising when left alone, followed by destructiveness and inappropriate toileting behaviour. Fewer greyhounds were reported to vocalise or be destructive over time, but reports of inappropriate toileting showed an increasing trend. Of the owners reporting SA/SRB 86.7%, 86.2%, and 87.5% were ‘a little concerned’ with their dog’s SA/SRB at the 1MthQ, 3MthQ, and 6MthQ respectively; and 13.3%, 13.8%,

and 12.5% were 'moderately' or 'very concerned'. A small minority of owners (*n* = 5) reported any separation-related behaviour occurring more than 'sometimes' (i.e., 'often' or 'always') at 1-, 3-, or 6-months post-adoption.

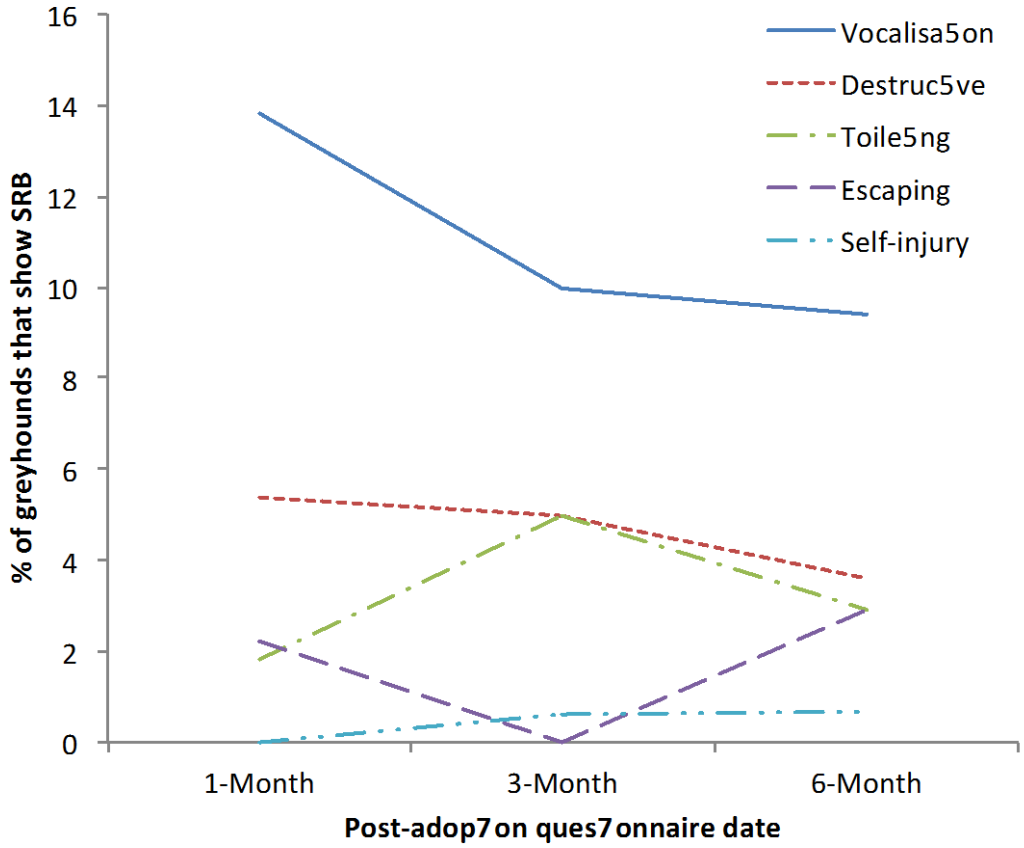

Figure 1. **Percentage of rehomed greyhounds showing different types of separation-related behaviour (SRB), as reported by owners in 1-, 3-, and 6-month post-adoption questionnaires.**

The occurrence, and co-occurrence, of different separation-related behaviours is shown in Table 4 as a percentage of greyhounds that display SA/SRB (as opposed to Figure 1, which displays SRB as a percentage of all rehomed greyhounds). Of the dogs that showed SA/SRB at the 1MthQ, 84.4% (38/45) of dogs displayed one behaviour, and 15.6% (7/45) displayed two behaviours. Similar proportions were reported at the 3MthQ and 6MthQs.

Table 4

Occurrence of Different Separation-Related Behaviours (SRB) Shown by Rehomed Greyhounds, as a Percenatge of Greyhounds Reported to Exhibit SRB in 1-, 3-, and 6-Month Post-Adoption Questionnaires by Owners

SRB	1-Month	3-Month	6-Month
V only	53.3%	48.3%	41.7%
D only	15.6%	17.2%	20.8%
T only	6.7%	17.2%	12.5%
S only	0.0%	3.4%	4.2%
E only	8.9%	0.0%	8.3%
V + D	11.1%	3.4%	0.0%
V + T	2.2%	3.4%	4.2%
V + E	2.2%	0.0%	8.3%
D + T	0.0%	6.9%	0.0%
Any SRB	$n = 45$	$n = 29$	$n = 24$

Note. V = vocalisation; D = destructiveness; T = inappropriate toileting; S = self-injurious behaviour; E = escaping.

The characteristics (dogs' sex, age, and adopting kennel location), and group allocation (treatment or control), of the dogs reported to show SA/SRB in the 1-, 3-, and 6-month responses are shown in Table 5. Chi-square analyses showed no significant associations, $p > .05$, with regard to dogs' sex, age, or group allocation, in terms of whether or not owners reported SA/SRB at the 1-, 3-, or 6-month post-adoption responses.

Step 1: Effect of Treatment on the Occurrence of SA/SRB

I ran a mixed ANOVA with time (1-, 3-, and 6-month questionnaires) as a repeated-measures independent variable, treatment group (treatment vs. control) as a between-subjects independent variable, and SA score (excluding behaviours also exhibited in the owner's presence) as the dependent variable.

Table 5

Questionnaire Responses According to Dogs' Sex, Age, and Treatment Group, and Whether Owners Reported Separation-Related Behaviour (SRB), as a Percentage of All Respondents in 1-, 3-, and 6-Months Post-Adoption Questionnaires

Characteristic	Category	1-Month respondents n = 224		3-Month respondents n = 160		6-Month respondents n = 138	
		All	Owner-reported SRB	All	Owner-reported SRB	All	Owner-reported SRB
Sex	Female	48.7%	42.2%	50.6%	58.6%	47.8%	33.3%
	Male	51.3%	57.8%	49.4%	41.4%	52.2%	66.7%
Age group[a]	Young	9.8%	13.3%	11.9%	20.7%	8.0%	4.2%
	Adult	83.9%	80.0%	81.3%	75.9%	84.1%	95.8%
	Senior	6.3%	6.7%	6.9%	3.4%	8.0%	0.0%
Treatment group[b]	Control	49.1%	37.8%	48.8%	55.2%	42.0%	29.2%
	Treatment	50.9%	62.2%	51.3%	44.8%	58.0%	70.8%
Total	Owner-reported SRB	20.1%	100.0%	18.1%	100.0%	17.4%	100.0%

Note. Questionnaires returned by owners of ex-racing greyhounds rehomed though New Zealand Greyhounds As Pets (GAP) between 1 June 2016 and 30 May 2017, n = 247 adoptions represented in total.

[a]Age group: Young = 0.9 – 2.0 years; Adult = 2.1 – 5.5 years; Senior = 5.6 – 9.7 years.

[b]Both groups received an email within 2 days of adoption to welcome them to the GAP community. The treatment group email contained additional advice regarding the prevention of separation anxiety/separation-related behavior.

The Huynh-Feldt correction was used for the within-subjects effects as recommended by Field (2013) as the data violated the assumption of sphericity.

The ANOVA showed no significant effect of either treatment group, $F(1, 95) = 0$, $p = 1$, $r = 0$, or of time, $F(1.90, 180.79) = .17$, $p = .84$, $r = .04$ on SA score.

There was, however, a significant interaction between time and treatment group, $F(1.90, 180.79) = 3.38$, $p = .04$, $r = .18$, as illustrated in Figure 2, indicating that dogs in the treatment group were less likely to exhibit signs of separation anxiety than control-group dogs at the 3-month questionnaire, but were more likely to at the other two times. If a Bonferroni correction is applied, due to the fact that I conducted

a total of three separate inferential tests on the same dependent data, giving a critical alpha level of .017, this interaction would no longer be significant.

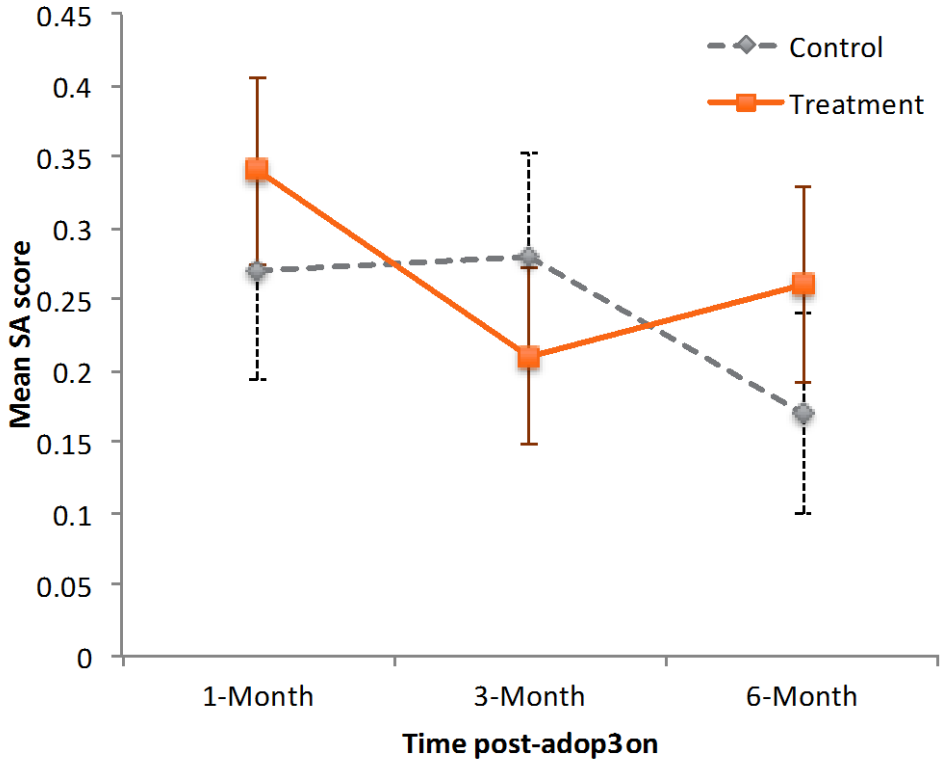

Figure 2. Mean separation-anxiety score (SA score) for rehomed greyhounds, calculated from owner reports in 1-, 3-, and 6-month post-adoption questionnaires. Error bars represent standard errors of the means.

Step 2: The Effects of Possible Risk Factors on the Occurrence of SA/SRB

1-Month data. I ran a multiple regression using the backwards stepwise method of entering predictors in SPSS. I entered the following 19 predictors into the model initially:

- Experimental group (treatment vs. control).
- Presence of other dogs in the house (y/n).
- Gender of attachment figure (M/F).
- Previous dog experience as an adult (y/n).
- Presence of other anxious behaviour e.g., panting, pacing, excessive salivation, shaking, or trembling (y/n).
- Whether or not the dog is crated when left alone (y/n).

- Frequency of on-leash exercise (number of days per week).
- Involvement in training activities (y/n).
- Number of adults in the house.
- Total attachment score.
- Whether food is available between meals (y/n).
- Overall compliance score.
- Age at adoption.
- Number of days per week the dog spends more than 4 hours alone.
- Number of children in the house.
- Sex of the dog.
- Positive reinforcement score.
- Positive punishment score.
- Noise fear score.

The outcome variable was SA score (excluding behaviours also performed in the presence of the owners).

The initial model with all 19 predictors included was significant, $F(19, 22) = 2.88$, $p = .009$. SPSS sequentially removed predictors from the model that accounted for the lowest amount of variance in separation anxiety score. The final model included nine predictor variables, and this model was also significant, $F(9, 32) = 7.00$, $p < .001$. The R^2 value for the final model was .66 (adj. $R^2 = .57$), compared to the original model R^2 of .71 (adj. $R^2 = .47$), with none of the changes in R^2 in each sequential model being significant, $p > .05$. Therefore, the most parsimonious model with nine predictors is described here.

Predictors in the final model, in the order of importance, are displayed in Table 6 with their corresponding *b*, β, *t*, and *p* values. Applying a Bonferroni correction, as before, produced a critical value of .017 for alpha, meaning that only the first five predictors in the model were significant predictors of SA score. However, the four non-significant predictors add net explanatory power to the model (i.e., reduces enough error to justify their addition as a factor) even if the individual

predictor is non-significant (Field, 2013). There is low collinearity among the predictors; therefore most of the variance each predictor shares with the criterion will be a unique contribution to the multivariate model (Field, 2013).

Table 6

Unstandardized (b) and Standardized (β) Slopes, Lower and Upper Bounds of the 95% Confidence Intervals for the Unstandardized Slope, t and p Values, for Each Predictor and for the Intercept in the Final Regression Model for the 1-Month Data

			95% Confidence Interval for *b*			
	b	β	Lower	Upper	*t*	*p*
Intercept	-1.52		-2.48	-.56	-3.22	.003
Predictor						
Number of children in the household	.70	.54	.393	1.00	4.66	<.001[a]
Frequency of on-leash exercise	.20	.46	.10	.30	3.93	<.001[a]
Number of days dog spends more than 4 hours alone	-.23	-.43	-.38	-.09	-3.34	.002[a]
Previous dog owning experience as adult	1.01	.41	.39	1.63	3.33	.002[a]
Overall compliance with separation anxiety advice	-.22	-.33	-.36	-.07	-3.02	.005[a]
Sex of the dog	.77	.31	.18	1.38	2.64	.01[a]
Whether food is available between meals	-.85	-.31	-1.49	-.20	-2.68	.01[a]
Total attachment score	.18	.26	.02	.36	2.35	.03
Whether dog is crated	.71	.23	.03	1.38	2.12	.04

Note. [a] Significant after applying a Bonferroni correction, which produced a critical alpha value of .017.

Significant predictors. The strongest predictor was the number of children in the home with a greater number of children predicting higher SA scores. The second strongest predictor of SA score was the frequency of on-leash exercise with dogs who were exercised more often having higher predicted SA scores. Dogs who spent a greater number of days per week alone for more than 4 hours were predicted to have lower SA scores. Owners who had had previous experience with dog ownership as an adult were more likely to have dogs with higher SA scores. Owners whose behaviour

complied more with advice for the prevention of SA/SRB were predicted to have dogs with lower SA scores.

Non-significant predictors. Male dogs had higher predicted SA scores than female dogs. If food was available between meals, the dog was predicted to have lower SA scores. The more attached the dog was judged to be to its owner, the higher the predicted SA score. Dogs that were crated were predicted to have higher SA scores than those that were not crated.

The final model met the assumption of an absence of multicollinearity (all VIF values were between 0.2 and 10, mean VIF value = 1.29). The assumption of independent residuals was met (Durbin-Watson statistic = 1.54). The plots of standardized residuals against standardized predicted values, and partial plots, showed that the assumptions of homoscedasticity and linearity were met. The residuals approximated a normal distribution.

3-Month data. I repeated the multiple regression analysis described above for the 3-month data. The initial model with all predictors included was not significant, $F(19, 12) = 2.37$, $p = .06$. The final model included four predictor variables, and this model was significant, $F(4, 27) = 11.89$, $p < .001$. The R^2 value for the final model was .64 (adj. $R^2 = .58$), compared to the original model R^2 of .79 (adj. $R^2 = .46$), with none of the changes in R^2 in each sequential model being significant, $p > .05$. Therefore, the most parsimonious model with four predictors is described here.

Predictors in the final model, in the order of importance in terms of β value, are displayed in Table 7 with their corresponding *b*, β, *t*, and *p* values. The strongest, and significant, predictor of SA score was the fear-of-noise score, where higher fear of noises predicted higher SA scores. The only other significant predictor was

compliance score. Owners whose reported behaviour complied more with the advice in the SAHO were predicted to have dogs with lower SA scores. The presence of anxious panting and pacing behaviour predicted high SA scores, and the presence of other dogs in the house predicted lower SA scores; both these predictors were non-significant after applying the Bonferroni correction.

Table 7

Unstandardized (b) and Standardized (β) Slopes, Lower and Upper Bounds of the 95% Confidence Intervals for the Unstandardized Slope, t and p Values, for Each Predictor and for the Intercept in the Final Regression Model for the 3-Month Data

			95% Confidence Interval for *b*			
	b	β	Lower	Upper	*t*	*p*
Intercept	-.009		-.24	.22	-.07	.94
Predictor						
Noise fear score	.16	.53	.08	.23	4.13	<.001[a]
Anxious panting, pacing, salivating, shaking, or trembling	.46	.34	.09	.82	2.56	.02
Overall compliance with separation anxiety advice	-.10	-.33	-.18	-.03	-2.76	.01[a]
Presence of other dogs in the house	-.38	-.23	-.80	.04	-1.86	.08

Note. [a] Significant after applying a Bonferroni correction, which produced a critical alpha value of .017.

The final model met the assumption of an absence of multicollinearity (all VIF values were between 0.2 and 10, mean VIF value = 1.18). The assumption of independent residuals was met (Durbin-Watson statistic = 1.87). The plots of standardized residuals against standardized predicted values, and partial plots, showed that the assumptions of homoscedasticity and linearity were met. The residuals approximated a normal distribution.

6-Month data. I repeated the multiple regression analysis described above for the 6-month data. The initial model with all predictors included, and with the Bonferroni correction applied, was not significant, $F(20, 18) = 2.26$, $p = .04$. The final

model included two predictor variables, and this model was significant, $F(2, 36) = 25.27$, $p < .001$. The R^2 value for the final model was .58 (adj. $R^2 = .56$), compared to the original model R^2 of .72 (adj. $R^2 = .40$), with none of the changes in R^2 in each sequential model being significant, $p > .05$. Therefore, the most parsimonious model with two predictors is described here.

Predictors in the final model, in the order of importance, are displayed in Table 8 with their corresponding *b*, β, *t*, and *p* values.

Table 8

Unstandardized (b) and Standardized (β) Slopes, Lower and Upper Bounds of the 95% Confidence Intervals for the Unstandardized Slope, t and p Values, for Each Predictor and for the Intercept in the Final Regression Model for the 6-Month Data

			95% Confidence Interval for *b*			
	b	β	Lower	Upper	*t*	*p*
Intercept	-.24		-.45	-.03	-2.37	.02
Predictor						
Anxious panting, pacing, salivating, shaking, or trembling	.91	.50	.50	1.32	4.47	<.001[a]
Noise fear score	.15	.45	.07	.22	4.04	<.001[a]

Note. [a] Significant after applying a Bonferroni correction, which produced a critical alpha value of .017.

The strongest predictor of SA score was the presence of other anxious behaviour such as panting and pacing, where the presence of this behaviour predicted high SA scores. Noise fear was also a significant predictor of SA score, with higher noise fear predicting higher SA score.

The final model met the assumption of an absence of multicollinearity (average VIF value = 1.10). The assumption of independent residuals was met (Durbin-Watson statistic = 2.32). The plots of standardized residuals against

standardized predicted values, and partial plots, largely met the assumptions of homoscedasticity and linearity.

Step 3: Owner Behaviour with Regard to Advice (compliance)

Owner behaviour was relatively consistent over time (between the 1MthQ, 3MthQ, and 6MthQs) as shown in Table 9. The majority of owners (at all time points) usually left their dog with a food-filled toy or treat when leaving them home alone (> 56%), and practiced low-key departures (>72%), and low-key greetings (>59%). Most owners (59.5%) gradually increased the amount of time their greyhound was left alone each day, over the first week or so, but 19.4% left their dog alone for more than 7 hours during the first week. Only one owner at the 1MthQ, and one at the 3MthQ, reported they punished their greyhound if they returned to any damage or toileting 'accidents'. The most frequently reported behaviour contrary to the recommendations in the SAHO, was 'greet your excited greyhound and pet or interact with him/her', which was reported by more than 46% of respondents.

Respondents in the treatment group tended to have higher compliance scores than control group respondents as shown in Table 9. The difference was significant at the 1MthQ, $t(204.88) = 2.72$, $p = .007$, but not at the 3MthQ or 6MthQ, $p > .05$. There were no significant differences in mean overall compliance scores at the 1MthQ, 3MthQ, or 6MthQ time points, $p > .05$. There was no significant difference in mean compliance scores between respondents who reported their dogs displayed SA/SRB compared with respondents whose dogs did not display SA/SRB, at the 1MthQ, 3MthQ, or 6MthQ, $p > .05$.

Table 9

Owner-Reported Behaviour when Leaving, or Reuniting with their Greyhound, as a Percentage of All Respondents to 1-, 3-, and 6-Months Post-Adoption Questionnaires

All respondents	1-Month *n* = 222	3-Month *n* = 159	6-Month *n* = 138
Recommended supportive owner behaviours			
Low-key departures	72.5%	78.0%	80.4%
Leave dog with chew or food toy	59.0%	57.2%	56.5%
Classical music or audio book playing	9.0%	6.9%	8.7%
Use of pheromonatherapy or aromatherapy	0.9%	1.3%	0.0%
Low-key greetings	63.1%	59.1%	61.6%
Maintain routine absences	34.2%	47.8%	40.6%
Desensitise to isolation gradually	59.5%	55.3%	55.1%
Unsupportive, or neutral[†] owner behaviours			
Cuddle, pet and fond goodbye	19.4%	18.2%	16.7%
Leave 'other' music or TV playing[†]	16.7%	22.0%	18.8%
Punish dog for damage or accidents while owner was absent	0.5%	0.6%	0.0%
Greet and interact with excited dog	47.3%	52.2%	46.4%
Go more than a week without leaving dog alone	6.8%	8.2%	4.3%
No routine absences (unpredictable)	34.7%	36.5%	38.4%
Left dog alone for more than 7 hours at a time during first week	19.4%	11.9%	18.1%
Mean compliance score[a]	1.54	1.56	1.60
Control group	1.19	1.37	1.26
Treatment Group	1.86	1.74	1.85
Dogs **not** reported to SA/SRB[b]	1.53	1.65	1.60
Dogs reported to show SA/SRB[b]	1.55	1.14	1.63

Note. Groups of supportive, and unsupportive behaviours, with regards to their suggested effect on reducing the occurrence of separation-related behaviour problems.
[a]Sum(supportive owner behaviours) – Sum(unsupportive or neutral owner behaviours)
[b]Separation anxiety/separation-related behaviour

As the compliance score was found to be predictive of SA/SRB in the 1- and 3-month regression models in Step 2, I ran additional multiple regression analyses to investigate these data further. This also helped me compare my compliance results with the results reported by Herron et al. (2014) and Blackwell et al. (2016) for 1- and 3-months post-adoption.

1-Month data. I ran a backwards stepwise multiple regression using individual measures of compliance, and non-compliance (acting contrary) with the advice in the SAHO (as shown in Table 9), as predictors of SA score excluding behaviours also performed in the owner's presence. The initial model with all 14 predictors was not significant, $F(14, 207) = 1.12$, $p = .34$, and neither was any subsequent model produced by the backwards deletion process used by SPSS.

3-Month data. I then ran the same analysis as above, for the 3-month data. The initial model with all 14 predictors was not significant, $F(14, 144) = 1.53$, $p = .11$. However, the final model, with three predictors was significant, $F(3, 155) = 4.65$, $p = .004$.

The R^2 value for the final model was .08 (adj. $R^2 = .07$), showing 8% of the variance in SA score was accounted for by the three compliance predictors. The R^2 for the original model was .13 (adj. $R^2 = .05$). None of the changes in R^2 in each sequential model was significant, $p > .05$. Therefore, I describe the most parsimonious model with three predictors here.

Predictors in the final model are displayed in Table 10 with their corresponding *b*, β, *t*, and *p* values.

None of the predictors of SA score were significant after applying the Bonferroni correction, which produced a critical alpha value of .017. The three non-significant predictors included owners who maintained stable and regular absences from their greyhound (recommended in SAHO), and owners who maintained considerable variety and unpredictability in terms of absences from their greyhound (contrary to the advice provided), which paradoxically both predicted lower SA

scores. Owners who cuddled or petted their greyhound before leaving (contrary to the advice provided) predicted higher SA scores.

Table 10

Unstandardized (b) and Standardized (β) Slopes, Lower and Upper Bounds of the 95% Confidence Intervals for the Unstandardized Slope, t and p Values, for Each Predictor and for the Intercept in the Final Regression Model for the 3-Month Data for Compliance with Separation Anxiety Advice

			95% Confidence Interval for *b*			
	b	β	Lower	Upper	*t*	*p*
Intercept	.34		.20	.53	4.42	<.001
Predictor						
Maintain stable and regular absences	-.20	-.17	-.39	-.02	-2.16	.03
Cuddle or pet greyhound and say a fond good-bye	.26	.17	.02	.50	2.17	.03
Maintain considerable variety and unpredictability in terms of absences	-.21	-.17	-.40	-.01	-2.10	.04

Note. Shaded predictors are behaviour contrary to advice provided in a separation anxiety handout. None of the predictors were significant after applying a Bonferroni correction, which produced a critical alpha value of .017.

Additional Descriptive Statistics

Hyper-attachment. Hyper-attachment behaviours (attachment behaviour shown 'always' or 'most of the time') are shown in Table 11.

Table 11

Rehomed Greyhounds Reported to Show Hyper-Attachment Behaviours, as a Percentage of All Respondents to 1-, 3-, and 6-Month Post-Adoption Questionnaires

Hyper-attachment behaviours[a]	All respondents	1-Month *n* = 224	3-Month *n* = 160	6-Month *n* = 138
Follows owner from room to room		43.3%	41.9%	33.3%
Proximity seeking (sit close or in contact with owner)		26.3%	26.9%	18.8%
Attention seeking (nudge, nuzzle or paw for attention)		11.2%	11.9%	10.1%
Any hyper-attachment behaviour shown		48.2%	49.4%	43.5%

Note. Most owners reported more than one hyper-attachment behaviour.
[a]Attachment behaviour shown 'most of the time' or 'always'

In total, 48.2% (108/224) of greyhounds showed some form of hyper-attachment behaviour at the 1MthQ. 'Following the owner from room to room' was the most commonly reported attachment behaviour, shown 'always' or 'most of the time', for 43.3% of dogs at the 1MthQ, and for 33.3% at the 6MthQ.

Overall the attachment score did not change substantially between the 1-, 3-, and 6-month data. The mean attachment score, with 95% CI in brackets, was 3.37 [3.14, 3.60] at the 1MthQ, 3.51 [3.25, 3.77] at the 3MthQ, and 3.17 [2.93, 3.41] at the 6MthQ.

The mean attachment score at the 1MthQ was higher for dogs reported to display SA/SRB, M = 3.27 3.78, 95% CI [3.21, 4.35], compared with dogs that did not display SA/SRB, M = 3.27, 95% CI [3.02, 3.52], but the difference was not significant, $t(222) = 1.72$, $p = .09$. There was very little difference in mean attachment scores for dogs reported to show SA/SRB and those that did not display SA/SRB at the 3MthQ, $t(34.20) = 0.163$, $p = .87$, and 6MthQ, $t(136) = 0.028$, $p = .98$.

Households with children (1MthQ). The majority of adoptions (57.6%, 129/224) were to homes with no children, including 4.9% (11/224) to single adults (one man and 10 women). Of homes with children, 57.9% (55/95) had more than one child, median = 2 children, range 1 to 4 children, 25^{th} - 75^{th} percentile = 1 – 2 children (M = 1.78 children).

Dog-owning experience of adopters. Of the 241 adopters who completed questionnaires, 224 (93%) were novice greyhound owners, and 17 (7%) had adopted a greyhound before. At the 1MthQ, 55.4% (124/224) of respondents reported they had had previous dog-owning experience as an adult, including 33.9% (76/224) who had owned more than one dog before adopting their greyhound. A further 26.3%

(59/224) of respondents reported only having previous dog experience as a child, and 18.3% (41/224) had no prior dog-owning experience.

Time spent alone. The number of days greyhounds spent fewer than 4 hours alone, or more than 7 hours alone, did not change substantially between 1-, 3-, and 6-month time points. Fewer than 50% of greyhounds were alone for more than 4 hours per day, 3 days per week or more, and nearly 40% spent fewer than 4 hours alone every day.

The mean number of days per week, at the 1MthQ, that dogs reported to show SA/SRB (SA score > 0) spent more than 4 hours alone, was slightly lower, $M = 2.09$, 95% CI [1.42, 2.76] than for dogs not reported to display SA/SRB, $M = 2.53$ days, 95% CI [2.20, 2.86], but this difference was not significant $t(222) = 1.15$, $p = .25$. Similarly the differences were not significant at the 3MthQ, $t(158) = 0.358$, $p = .72$, or the 6MthQ, $t(136) = 0.512$, $p = .61$.

Housing of greyhounds. When owners were out, greyhounds were most commonly either left unrestricted inside, or unrestricted outside, as shown in Table 12. A total of 12.9% of owners reported using a crate to contain their greyhound when leaving them alone at the 1MthQ, dropping to 6.9% at the 3MthQ, and to 4.3% at the 6MthQ.

The sleeping arrangements of rehomed greyhounds at 1-, 3-, and 6-months post-adoption is shown in Table 12. The percentage of greyhounds that slept in a crate, at the 1MthQ, 3MthQ, and 6MthQ, was 27.7, 16.3, and 12.3% respectively. The most common sleeping place was in the owner's bedroom. Fewer than 10 dogs slept on the owner's bed and only two dogs were reported to sleep outside.

Table 12

Housing of Greyhounds When Left Alone, and at Night, as Reported by Owners in 1-, 3-, and 6-Month Post-Adoption Questionnaires, as a Percenatge of All Respondents

All respondents	1-Month *n* = 224	3-Month *n* = 160	6-Month *n* = 138
Where kept when left alone			
Unrestricted inside	29.0%	33.8%	37.0%
Restricted inside (in a room or pen)	12.1%	11.3%	9.4%
Restricted inside in a crate	12.9%	6.9%	4.3%
Unrestricted outside on property	25.0%	28.1%	24.7%
Restricted outside e.g. fenced run	6.3%	5.0%	8.7%
Able to move between inside and outside	14.7%	15.0%	15.9%
Sleeping arrangements			
Unrestricted inside	13.4%	12.5%	22.5%
In owners bedroom	32.1%	41.9%	39.1%
Restricted inside (in another room or pen)	25.4%	26.9%	21.7%
Restricted inside in a crate	27.7%	16.3%	12.3%
Outside in a kennel or garage	1.3%	2.5%	4.3%

Duration and frequency of exercise. The proportion of owners providing on-leash exercise for their greyhounds did not change substantially between the 1-, 3-, and 6-month time points (84.8%, 85.0%, and 87.5%). At the 1MthQ, 63.2% (141/223) of owners walked their dog 7 days per week, and 13.9% (31/223) walked 5 to 6 days a week. The median on-leash exercise per day was 45 minutes (25^{th} - 75^{th} percentile = 38.6 – 90 minutes per day). There was no substantial change in frequency or duration of on-leash exercise reported over time.

There was an apparent trend for more owners to provide off-leash exercise for their greyhounds over time. Off-leash exercise (off the owners property) was provided to 52.9% (118/223) of greyhounds at the 1MthQ, 66.9% (107/160) at the 3MthQ, and 77.4% (106/137) at the 6MthQ. The median off-leash exercise per week was 10.5 minutes (25^{th} - 75^{th} percentile = 0 – 90 minutes per week) at the 1MthQ,

40.0 minutes (25^{th} - 75^{th} percentile = 0 – 138.75 minutes per week) at the 3MthQ, and 41.6 minutes (25^{th} - 75^{th} percentile = 9.2 – 120.0 minutes per week) at the 6MthQ.

Fear behaviours. The occurrence and severity of fearful behaviour shown by greyhounds in different situations is shown in Table 13. In total, between 89.0% and 91.8% of owners reported their dogs showed some signs of fear post-adoption. Overall, moderate and infrequent signs of fear shown 'rarely' decreased between the 1MthQ (15.5%) and 6MthQ (9.3%), whereas moderate to severe signs shown 'sometimes' or 'every time' increased (1MthQ = 76.3% cf. 6MthQ = 80.4%). The most commonly reported situations in which moderate to severe signs of fear were shown more than rarely were in response to sudden or loud noises or during interactions with unfamiliar dogs. Dogs that reacted fearfully to unfamiliar dogs, or to sudden or loud noises, more frequently showed more severe signs of fear than dogs reacting to other fearful stimuli. The reported frequency and severity of fearful reactions did not change substantially over time.

Other anxious behaviour. A total of 21.9% (49/224) of owners reported at the 1MthQ that their dogs displayed other anxious behaviour such as pacing, excessive salivation, shaking or trembling when the owner was about to leave, and/or at other times. This reduced to 11.9% (19/160) at the 3MthQ, and 10.1% (14/138) at the 6MthQ. No more than three owners reported their greyhound displayed this behaviour more than 'sometimes'.

Table 13

Situations in which Signs of Fear are Shown by Rehomed Greyhounds, as Reported by Owners in 1-, 3-, and 6-Month Post-Adoption Questionnaires (Qdate), as Percentage of All Respondents[a]

Situation in which fear is shown	Qdate	'Moderate' signs of fear shown 'rarely'	'Moderate to severe' signs of fear shown 'sometimes' to 'every time'	Any signs of fear shown
Unfamiliar adult[b]	1-Mth	7.2%	30.9%	38.1%
	3-Mth	7.7%	31.9%	39.6%
	6-Mth	12.1%	31.8%	43.9%
Unfamiliar child[c]	1-Mth	4.1%	24.7%	28.9%
	3-Mth	4.4%	26.4%	30.8%
	6-Mth	8.4%	27.1%	35.5%
Familiar person[d]	1-Mth	1.0%	32.0%	33.0%
	3-Mth	4.4%	18.7%	23.1%
	6-Mth	1.9%	26.2%	28.0%
Sudden or loud noises[e]	1-Mth	24.7%	52.6%	77.3%
	3-Mth	20.9%	52.7%	73.6%
	6-Mth	18.7%	60.7%	79.4%
Unfamiliar objects or situations[f]	1-Mth	19.6%	41.2%	60.8%
	3-Mth	13.2%	41.8%	54.9%
	6-Mth	14.0%	38.3%	52.3%
Familiar dog[g]	1-Mth	9.3%	28.9%	38.1%
	3-Mth	9.9%	23.1%	33.0%
	6-Mth	5.6%	30.8%	36.4%
Unfamiliar dog[h]	1-Mth	5.2%	54.6%	59.8%
	3-Mth	14.3%	46.2%	60.4%
	6-Mth	8.4%	56.1%	64.5%
Any signs of fear	1-Mth	15.5%	76.3%	91.8%
	3-Mth	15.4%	73.6%	89.0%
	6-Mth	9.3%	80.4%	89.7%

Note. Owners often reported more than one situation in which signs of fear were shown.
[a]All respondents at 1-month = 97, 3-months = 91, and 6-months = 107.
[b]When being approached or touched by an unfamiliar adult. [c]When being approached or touched by an unfamiliar child. [d]When being approached or touched by a familiar person. [e]In response to sudden or loud noises, including fireworks or storms. [f]In response to unfamiliar objects or situations. [g]When meeting or being approached by a familiar dog. [h]When meeting or being approached by an unfamiliar dog.

How well greyhounds adjust to their new home generally. At the 1MthQ 41.9% (90/215) of owners reported their greyhound was generally adjusting to their

new home ‘extremely well’, this increased to 57.0% (90/158) at the 3MthQ, and 68.1% (94/138) at the 6MthQ. A total of 49.8%, 34.8%, and 29.0% reported their greyhounds were adjusting ‘very well’ at the 1MthQ, 3MthQ, and 6MthQ respectively. The poorest level of ‘adjustment’ reported by owners was ‘moderately well’ reported by 8.4% at the 1MthQ, 8.2% at the 3MthQ, and 2.2% at the 6MthQ.

Risk of return. Of the 24 respondents’ dogs that were adopted within the study period and returned by 30 November 2017, 50% had been reported by owners to be at risk of being returned. Also, 50% of the 24 dogs reported to be at risk of return, were returned.

At the 1MthQ, 8.0% (18/224) of owners reported that their greyhound was at risk of being returned and of these, nine were subsequently returned. Chi-square analysis showed that dogs reported to be at risk of return were significantly more likely to show SA/SRB than dogs not reported to be at risk of return (44.4% vs. 18.0%), χ^2 (1) = 7.232, p = .007. Also, dogs that were returned were significantly more likely to display SA/SRB than dogs that were not returned (36.4% cf. 18.3%), χ^2 (1) = 4.025, p = .045. The proportion of returned greyhounds, and greyhounds reported to be at risk of return, that were reported to show other behaviour problems are shown in Table 14. With the exception of fearfulness, high predatory behaviour, and poor obedience, all other owner-reported behaviour problems had a substantially lower prevalence than SA/SRB.

Table 14

The Percentage of Rehomed Greyhounds that Show Problem Behaviours, as Reported by Owners in 1-Month Post-Adoption Questionnaires, Compared to Greyhounds that are Returned, or at Risk of Being Returned to the Rehoming Organisation

Problem behaviours	All respondents *n* = 224	Dogs at risk of return *n* = 18	Returned dogs *n* = 22
Separation-related behaviours[a]			
Barking, whining	13.8%	27.8%	22.7%
Destructiveness	5.4%	11.1%	9.1%
Inappropriate toileting	1.8%	5.6%	4.5%
Self-injury e.g., excessive self-licking	0.0%	0.0%	0.0%
Escaping	2.2%	5.6%	4.5%
Any separation-related behaviour	20.1%	44.4%	36.4%
Other anxious behaviour e.g. panting, pacing, excessive salivation, shaking, or trembling[b]	21.9%	44.4%	40.9%
Other behaviour problems of concern to owners			
Destructiveness	16.7%	27.8%	18.2%
Inappropriate toileting	8.6%	27.8%	22.7%
Excessive or high energy	9.0%	5.6%	9.1%
Mouthing, biting	9.9%	11.1%	18.2%
High predatory behaviour	29.7%	55.6%	50.0%
Pulls on leash	14.4%	22.2%	27.3%
Poor manners e.g. jumping-up, steeling food	18.0%	11.1%	13.6%
Poor obedience e.g. recall	42.3%	44.4%	40.9%
Barking, whining	13.1%	11.1%	4.5%
Self-injury e.g., excessive self-licking	5.4%	5.6%	0.0%
Any 'other behaviour problem'	73.4%	88.9%	90.9%
Aggression (at least moderate signs shown more than rarely)			
Dog-to-human	15.6%	11.1%	13.6%
Dog-to-dog	13.4%	5.6%	9.1%
Any signs of aggression	21.4%	16.7%	18.2%
Fearfulness (at least moderate signs shown more than rarely)	All respondents *n* = 97		
Any signs of fearful behaviour	76.3%	50.0%	59.1%

Note. Owners often reported more than one problem behaviour.
[a]Behaviours shown *only* when owners are absent.
[b]Shown when owners are about to leave, and/or at other times.

Discussion

Prevalence of SA/SRB for Rehomed Greyhounds

The reported prevalence of SA/SRB for rehomed greyhounds in my study (20% at the 1MthQ, 18% at the 3MthQ, and 17% at the 6MthQ) was lower than estimates from surveys of pet dog owners (22%, Bradshaw et al., 2002; 30%, Chung et al., 2016), behaviour clinic populations (23%, Storengen et al., 2014; 24%, Takeuchi et al., 2001), and, with the exception of one study (17%, Herron et al., 2014), lower than reported for rehomed shelter dogs (e.g., 27% to 38%, Blackwell et al., 2003; Blackwell et al., 2016). However, there are a number of differences between these studies and mine including sample composition, different time points, and the difference in the way some authors measured SA/SRB.

Differences in sample composition between the studies of Blackwell et al. (2016), Herron et al. (2014), and myself include the proportion of male dogs (62%, 42%, and 52%), the mean age of dogs (3.2 years, 2.2 years, and 3.7 years), the proportion of mixed-breeds (63%, 46%, and 0% mixed-breeds), and the geographical location (United Kingdom, United States, and New Zealand). However, it is difficult to determine the effect the combination of these factors has on the occurrence of SA/SRB. For example, Blackwell et al. (2016) had a greater proportion of male dogs, and mixed-breeds, which are both associated with a higher prevalence of SA/SRB (Takeuchi et al., 2001), whereas Herron et al. (2014) had younger dogs, which have also been associated with a higher occurrence of SA/SRB (Blackwell et al., 2008), and yet Herron et al. (2014) reported a lower occurrence of SA/SRB than I did.

To assess the prevalence of SA/SRB, and the potential risk factors associated with it, I discounted reported separation-related behaviours (Question 21 in Appendix

B) where the behaviour was also reported to occur when the owner is present (Question 50 in Appendix B), consistent with other studies specifically investigating SA/SRB (Blackwell et al., 2016; Herron et al., 2014). This was to ensure that the reported non-specific signs of SA/SRB (e.g., vocalisation, destructiveness, inappropriate toileting, self-injurious behaviour) were *only* in response to being separated from the owner, and not as a result of other factors, such as incomplete toilet training, skin irritations, playfulness, boredom, or vocal responses to external stimuli. Although a differential diagnosis of SA/SRB requires ruling out other reasons for non-specific signs (Overall, 2013; Sherman & Mills, 2008), it is not uncommon for researchers to assess SA/SRB without taking into account whether the behaviour also occurs when the owner is present (Chung et al., 2016; Döring et al., 2017; Elliott et al., 2010; Palestrini et al., 2010; Parthasarathy & Crowell-Davis, 2006; Shin & Shin, 2016), which could result in higher reported prevalence rates. For example, although Elliott et al. (2010) reported a substantially higher prevalence of SA/SRB for rehomed greyhounds (43%) than I found (20%), these authors did not discount owner-reported SA/SRB (defined as vocalisation, destructiveness, and inappropriate toileting when left alone, as well as restlessness, agitation, or pacing) by owners' reports of the same behaviours when the owners were present. Although the authors also asked whether excessive vocalisation, destructiveness, inappropriate toileting, or escaping behaviours occurred when the owners were present, these responses were not subtracted from the evaluation of SA/SRB, even though Elliott et al. found these behaviours were positively associated with reported SA/SRB. Had I included in my assessment of SA/SRB those cases where owners reported anxious panting and pacing behaviours, or excessive vocalisation, destructiveness, and

inappropriate toileting also in the presence of the owner, my reported prevalence of SA/SRB would have been more than 30% at the 1MthQ. Blackwell et al. (2016) did discount behaviour that also occurred in the presence of the owner, but also reported a higher than expected prevalence of SA/SRB for rehomed shelter dogs (38% in their control group). Blackwell et al. suggested that their result supported the prevalence reported by Elliott et al. (2010), but this might not be a comparable assessment given that Elliott et al. did not discount potential signs of SA/SRB shown also in the presence of the owner.

Elliott et al. (2010) reported SA/SRB was the only behaviour problem significantly associated with an increased risk of return for rehomed greyhounds at 1-month post-adoption. In a post hoc chi-square analysis (for the purpose of enabling a comparison between my data and Elliott et al.), I also found dogs reported to be at risk of return were more likely to show SA/SRB than dogs not reported to be at risk of return. Further, dogs that were returned were more likely to display SA/SRB, than dogs that were not returned. These results support the findings by Elliott et al. (2010) despite the difference in the way we measured SA/SRB. However, greyhound owners reported a range of 'other' behaviour problems that could also be associated with risk of return, which have not been considered here. For example, high predatory behaviour, poor obedience, and fearful behaviour, were all relatively prevalent among returned dogs and those reported to be at risk of return (Table 14). Analysis of other factors associated with risk of return and the actual return of rehomed greyhounds is outside of the scope of this thesis, but would be an interesting and potentially valuable line of enquiry to pursue with the data I have collected.

Prevalence of individual signs of SA/SRB. In agreement with other studies (Blackwell et al., 2006; Cannas et al., 2014; Lund & Jørgensen, 1999; Palestrini et al., 2010), I found that vocalisation was the most frequently reported SRB, followed by destructiveness, and inappropriate toileting. Of the dogs reported to display SA/SRB 1-month post-adoption, more greyhounds in my study vocalised when left (69%), compared with reports of this behaviour for rehomed shelter dogs (56%, Herron et al., 2014). However, at 3-months post-adoption the proportion of greyhounds reported to vocalise (55%) was similar to the proportion reported for rehomed shelter dogs (53%, Blackwell et al., 2016). By 6-months post-adoption 54% of dogs in my sample were reported to vocalise when left. It is possible that the relatively high proportion of greyhounds reported to vocalise at the 1MthQ could be associated with the dramatic transition from kennel housing and a racing environment to pet life, which is suggested to be particularly stressful, contributing to increased anxiety generally (Bennett et al., 2015; Dawson, 2016).

Of the dogs reported to show SA/SRB, I found a considerably smaller proportion of greyhounds were reported to be destructive at the 1MthQ (27%), 3MthQ (28%), and 6MthQ (21%) than reported by Herron et al. (2014; 42%, 1-month post-adoption) and Blackwell et al. (2016; 58%, 3-months post-adoption) for rehomed shelter dogs. This could be associated with the small proportion of rehomed greyhounds that are under the age of 2 years (10%), as Blackwell et al. (2016) found dogs reported to be destructive were significantly younger (M < 10 months) than dogs without SA/SRB or those reported only to vocalise. Consistent with this suggestion, post hoc chi-square analysis for the purpose of a comparison with Blackwell et al. (2016) revealed a significant association between age group and destructive

behaviour for greyhounds reported to show SA/SRB at the 3MthQ, χ^2 (1) = 10.54, p = .001. Of the greyhounds under the age of 2 years, 21% were reported to show destructive behaviour, compared with 3% of dogs over the age of 2 years. A similar trend was seen in the 1-month data but the difference between age groups was not significant ($p > .05$).

I found the proportion of greyhounds with SA/SRB reported to have toileting issues when left alone (and not at other times) was substantially less at the 1MthQ (9%) than reported by Herron et al. (2014; 30%), but was similar at the 3MthQ (28%) to Blackwell et al. (2016; 26%). At the 6MthQ, 17% of greyhounds were reported to have toileting issues when left alone. Although I discounted reports of inappropriate toileting while owners were absent when owners also reported inappropriate elimination when the owners were present, it is possible that the fluctuating reports of toileting associated with SA/SRB could still be related to incomplete toilet training. It would be usual for owners to achieve greater toilet-training success when they are present, before achieving the same reliability when they are absent. Also, the proportion of greyhounds reported to be restricted inside in a crate, room, or pen when their owners left them alone decreased between 1- and 6-months post-adoption, potentially providing more opportunity for dogs to toilet inappropriately. The proportion of dogs reported to exhibit inappropriate elimination in studies involving the video recording of dogs with SA/SRB when home alone (5%, Lund & Jørgensen, 1999; 13%, Palestrini et al., 2010) is generally less than my inappropriate-toileting results, lending weight to my suggestion that this SRB could be associated with incomplete toilet training for greyhounds. Further, in video recordings of 80 dogs

with SA/SRB, only 2.5% exhibited toileting behaviour without also showing another SRB (Blackwell et al., 2006), whereas between 7% and 17% of greyhounds in my study were reported to exhibit this behaviour without displaying any other SRB.

The proportion of greyhounds in my study reported by owners to vocalise or be destructive when left alone is substantially less than reports from studies where dogs with SA/SRB were videoed when home alone (Blackwell et al., 2006; Cannas et al., 2014; Lund & Jørgensen, 1999; Palestrini et al., 2010). Other researchers have suggested that SA/SRB is likely underreported, as by definition the behaviours occur while the owner is absent and more subtle signs might also go unnoticed (Blackwell et al., 2003; Overall, 2013; Palestrini et al., 2010). It is possible that SA/SRB is also underreported for greyhounds in my study. Validation of owner reports using video recordings of dogs when left alone could be a valuable addition to future investigations, although previous studies have shown that owner reports of SA/SRB correlated well with video footage of their dog's behaviour when alone (Konok et al., 2011; van Rooy et al., 2018).

Effect of Time

Most investigations into owner-reported SA/SRB use one survey time point (e.g., Blackwell et al., 2003; Blackwell et al., 2016 = 3-months post-adoption; Elliott et al., 2010; Herron et al., 2014 = 1-month post-adoption), but I wanted to explore whether there was any change in the reported prevalence of SA/SRB for rehomed greyhounds over time since adoption.

I found no significant effect of either time or of treatment group on SA/SRB outcome, and no significant interaction between time and treatment group (after applying the Bonferroni correction). Owner behaviour (measured using mean

compliance scores) in relation to the advice provided in the SAHO also did not change substantially over time.

In contrast with Döring et al. (2017) my data did not show an increase in reported SA/SRB between 1- and 3-months post-adoption. Döring et al. (2017) investigated the success of rehoming ex-laboratory beagles and found a significant increase in owner-reported SA/SRB from 14% 1-week post-adoption, to 28% at 12 weeks. However, Döring et al. (2017) did not discount the prevalence of SA/SRB if the behaviour also occurred when the owner was home, which could have contributed to inflated reports of SA/SRB at 12 weeks as other problem behaviours, such as destructiveness, also increased during this time.

Blackwell et al. (2016) compared their higher-than-expected occurrence of SA/SRB (38% for rehomed shelter dogs 3-months post-adoption) with a survey of pet owners who had owned their dogs for longer than 3 months (Bradshaw et al., 2002; 21%) and suggested reports of SA/SRB might decrease over time as a result of longer-term owners not wanting to admit to problem behaviour they felt they had some responsibility to resolve. However, I found no significant decrease in reported SA/SRB at 6-months post-adoption compared to 1- or 3-months post-adoption.

Effect of Providing Greyhound Owners with Advice

Providing new owners of rehomed greyhounds with written advice about preventing canine separation anxiety had no significant effect on the reported occurrence of SA/SRB 1-, 3-, or 6-months post-adoption. My result is consistent with Herron et al.'s (2014) who found no significant effect of a 5-minute pre-adoption counselling session (followed by a written summary of the advice provided) on the occurrence of SA/SRB 1-month post-adoption for shelter dogs. Conversely, my result

contrasts with those of Blackwell et al. (2016) who also provided written advice about preventing SA/SRB to new owners of shelter dogs and reported a reduced occurrence of SA/SRB 3 months after adoption for these dogs compared with rehomed dogs whose owners did not receive the advice. However, the preventative treatment of Blackwell et al. (2016) only explained between 11% and 16% of the variance in SA/SRB occurrence, compliance with the preventative advice in their study was poor, and the occurrence of SA/SRB in their treatment group (22%) was still higher than for greyhounds in my study.

Although the difference between my treatment and control groups did not reach significance with regard to the occurrence of SA/SRB, the pattern displayed in Figure 2 can be cautiously compared with the contrasting results found by Herron et al. (2014) and Blackwell et al. (2016). At 3-months post-adoption, more greyhounds in my control group (55%) were reported to display SA/SRB compared with the treatment group (45%), which corresponds with Blackwell et al.'s (2016) study where they reported that 38% of their control group, compared with 22% of their treatment group reported SA/SRB at 3-months post-adoption. In contrast, although Herron et al. (2014) found no significant effect of their treatment on the occurrence of SA/SRB reported 1-month post-adoption, the authors revealed that 18% of their treatment group displayed SA/SRB, compared to 15% of their control group. Similarly, more greyhounds in my treatment group (62%), than those in the control group (38%), were reported to show SA/SRB at 1-month post-adoption, but the difference also did not reach significance. Although it is possible that the impact of providing preventative advice might change over time, my study did not confirm this.

A number of factors could potentially explain why my written advice did not have a significant effect on reducing the occurrence of SA/SRB when Blackwell et al.'s (2016) did, and these are discussed in relation to 'compliance' below.

Owner Behaviour With Regard to Advice (compliance)

In Step 2 of my analyses, owner's overall compliance score (indicating the degree to which owners acted in a manner consistent with the advice contained in the SAHO, and did not act contrary to that advice) was included in the multivariate regression analysis and found to be a significant predictor of SA/SRB in the 1- and 3-month data. Owners with higher compliance scores were more likely to have low SA scores compared with owners with lower compliance scores, suggesting that compliance with the advice in the SAHO reduced the occurrence of SA/SRB. However, although mean compliance scores were higher for the treatment group than the control group at 1-, 3-, and 6-months post-adoption, the regression analysis showed no significant effect of group (treatment vs. control) on SA/SRB outcome. These results appear contradictory. One explanation could be that the treatment was ineffective in meaningfully changing owner behaviour; the difference in mean compliance scores between treatment and control was only significantly different at the 1MthQ. Another explanation could be that my calculation of compliance score is not a meaningful measure of compliance. The calculation assumed an equal value for each of the 14 compliance variables (Table 9). So for example, the score assumed that leaving a dog with a food-filled toy (a plus-one in the compliance calculation) is of equal value to owners not punishing their dog upon return for any undesirable behaviour while the owner was away. Although I calculated my compliance score in a similar way to that described by Blackwell et al. (2016), there is no evidence to

support the assumption that the different elements of advice have an equivalent impact on preventing SA/SRB, or whether the individual aspects of advice are in fact beneficial. For example, providing a food-filled toy has been shown to have no significant protective effect on the occurrence of SA/SRB (Herron et al., 2014), whereas stopping all punishment upon reunion with owners for behaviour that occurred while owners are absent is suggested to have a significant protective effect (Blackwell et al., 2016). Further, Takeuchi et al. (2000) reported that the success of clinical treatment plans for SA/SRB was not associated with either the level of compliance or the particular aspects of the treatment plan owners complied with. Assuming individual aspects of the advice are not of equal value, the effect of compliance score on SA/SRB outcome could be statistically noisy and should be interpreted with caution.

In Step 3 of my analyses, to further investigate the effect of compliance on SA/SRB outcome that was suggested in Step 2, I ran multivariate regression using all 14 compliance items (Table 9) as independent variables, and SA score as the dependent variable for the 1MthQ and 3MthQ data. The 1MthQ data did not produce a significant predictive model, suggesting that compliance with any particular aspect(s) of the advice did not account for a significant amount of the variance in SA/SRB outcome. Although a significant regression model was produced for the 3MthQ data, with three predictors (non-significant after applying the Bonferroni correction) of SA/SRB, the model only explained 8% of the variance in SA score, and two of the predictors were conflicting. Whereby ‘maintaining stable and regular absences from your greyhound’ would decrease the likelihood of high SA scores (which was consistent with the advice provided in the SAHO), and the opposite,

'maintaining considerable variety and unpredictability in terms of absences' (which was supposedly acting contrary to the advice provided in the SAHO) also predicted lower SA scores. It is difficult to explain this illogical result except in terms of contradictory owner responses to the compliance questions. For example, of the owners who reported they maintained considerable variety and unpredictability in terms of absences, 36% (21/58) also reported they maintained stable and regular absences from their greyhound. These apparently contradictory results might suggest the wording of at least some of my compliance questions were ambiguous, at least to some respondents, and/or that the categories for 'supportive owner behaviours' and 'unsupportive or neutral owner behaviours' were not sufficiently exclusive to preclude conflicting answers. Consistent with these hypotheses, a substantial proportion of owners (38%; 11/29) who reported they acted in accordance with the third predictor, 'cuddling or petting your greyhound before leaving them alone' (which predicted higher SA scores consistent with the allocation of this compliance item to the unsupportive category) also reported they practiced the opposite recommended behaviour, i.e., low key-departures by 'leaving without doing or saying anything special to their greyhound' or 'just saying a casual goodbye'. These confounding results highlight the importance of testing the questionnaire design to ensure questions provide answers that are reliable and valid reflections of the factors being investigated (Hsu & Serpell, 2003). A limitation of my study is that the thesis timeframe did not allow for a pilot of the questionnaire.

The advice provided in the SAHO was similar to the advice described by Blackwell et al. (2016) and Herron et al. (2014) (with the exception of crate training, which was emphasised by Herron et al., 2014), but delivered via email rather than in-

person at the time of adoption. Blackwell et al. (2016) reported a beneficial effect of their preventative treatment on the occurrence of SA/SRB, but they did not include their compliance score in the regression analysis and instead evaluated compliance with the advice they provided using chi-square analyses. Although Blackwell et al. (2016) investigated differences between their treatment and control groups with regard to some aspects of compliance, they did not investigate associations between the occurrence of SA/SRB and compliance with particular aspects of the advice. Herron et al. (2014) did not find any significant effect of their preventative treatment on the occurrence of SA/SRB, but also used chi-square analyses to investigate compliance with key aspects of their advice in terms of differences between their treatment and control groups. These authors did evaluate the effect of compliance with particular recommended owner behaviours (e.g. use of a crate and leaving a food-filled toy) on SA/SRB outcome, and I will discuss this later.

Evaluating the effects of, and compliance with, individual elements of the preventative advice using chi-square analyses ignores possible interactions between recommended owner behaviours, making it difficult to draw meaningful conclusions. For example, if petting and cuddling your greyhound before leaving is an unsupportive behaviour in terms of preventing SA/SRB, but the owner also practices calm greetings, which is a supportive behaviour, what is the net effect? Regardless, to enable a comparison between the compliance results reported by Blackwell et al. (2016) and Herron et al. (2014), and my study, I conducted post hoc chi-square analyses on corresponding compliance items.

Although Herron et al. (2014) reported significantly more owners in their treatment group left their dogs with a food-filled toy (73%) compared with owners in

their control group (24%), compliance with this aspect of the advice had no significant effect on the occurrence of SA/SRB. Similarly, I found no significant association ($p > .05$) between the occurrence of SA/SRB and leaving greyhounds with a food-filled toy or chew treat (at any time point). However, in contrast with Herron et al. (2014), although I found more of my treatment group (between 61% and 63%) compared with my control group (between 50% and 55%) left a food-filled toy or chew treat with their greyhound at the 1-, 3-, and 6-month time points, the difference between my treatment and control groups with regard to this behaviour was not significant ($p > .05$). Blackwell et al. (2016) also reported no difference between treatment and control groups with regard to leaving dogs with a food-filled toy, and a relatively high proportion of owners (64% of treatment group), complied with this advice. These results appear to suggest that leaving a dog with a food-filled toy has little protective effect on the occurrence of SA/SRB.

Blackwell et al. (2016) reported a low level of compliance with the systematic desensitisation and counterconditioning aspect of their advice, and no significant difference between their control (36% complied) and treatment groups (46% complied). A higher proportion of greyhound owners in my study acted in accordance with this aspect of advice, but similarly, there was no significant difference between my control group (55% complied) and treatment group (56% complied) with regard to this behaviour ($p > .05$). There was also no significant association with the occurrence of SA/SRB and reported compliance with systematic desensitisation in my study.

Although Blackwell et al. (2016) emphasised the importance of avoiding punishment for behaviour (such as eliminating and/or destruction) in their

preventative advice, they reported a high level of punishment (77%) although only 1% reported physically punishing their dogs. Only one owner in my study reported punishing their greyhound for finding evidence of inappropriate behaviour while the owner was absent.

More owners in my treatment group (68%) than in Blackwell et al.'s (2016; 43%) reported they practiced low-key greetings (not interacting with an excited dog when the owner returned home) in accordance with the advice provided. Owners in my control group were significantly less likely to practice low-key greetings than owners in my treatment group (50% cf. 68%), χ^2 (1) = 5.269, p = .022. However neither this behaviour, nor the opposite behaviour (greeting and interacting with an excited dog), were significantly associated with the occurrence of SA/SRB (p > .05) in my study.

Blackwell et al. (2016) reported 26% of their treatment group cuddled or petted their dog before leaving, contrary to the advice provided, which is more than the owners in my treatment group (16%) and control group (21%). Blackwell et al. (2016) did not report whether owners in their control group acted differently to owners in their treatment group with regard to this behaviour, or whether this owner behaviour was associated with the occurrence of SA/SRB. Although there was no significant difference between my treatment and control groups with regard to this behaviour (p > .05), I found that dogs that were cuddled or petted before their owners left them were significantly more likely to be reported to show SA/SRB (38%) than dogs whose owners did not cuddle or pet them before leaving (13%), χ^2 (1) = 10.095, p = .001. Also, Blackwell et al. (2016) reported significantly more owners in their

treatment group (70%) did not interact with their dogs before leaving them, or just said a casual goodbye, than owners in their control group (percentage not reported), and, as this was one of only two behaviours reported to be significantly different between their treatment and control groups, Blackwell et al. (2016) suggested this behaviour was likely to have contributed to the significant effect of their treatment on the reduced occurrence of SA/SRB. I found 78% of owners in both my treatment group and control group (at the 3MthQ) reported they did not interact with their greyhounds before leaving them, or just said a casual goodbye, and this behaviour was significantly associated with reduced occurrence of SA/SRB, χ^2 (1) = 5.907, p = .015. A total of 14% (17/124) of owners who reported they acted in accordance with this advice also reported their dogs displayed SA/SRB, compared with 31% (11/35) of owners who did not act in accordance with this recommendation. If practicing low-key departures is a significant factor in reducing the likelihood of SA/SRB, the fact that more greyhound owners acted in a manner consistent with this recommendation, regardless of their group allocation, could help explain why I had a lower overall reported prevalence of SA/SRB at the 3MthQ (18%) than Blackwell et al. (2016; 30%) and also why my treatment did not have any significant effect on SA/SRB whereas the treatment by Blackwell et al. (2016) had a beneficial effect.

Overall, the owners in my study acted in a manner consistent with the recommended advice more than the owners in the study by Blackwell et al. (2016), and in a similar proportion to those in the study by Herron et al. (2014). Further, the behaviour of owners in my treatment group was not significantly different to the behaviour of owners in my control group with regard to the 14 compliance items

(Table 9) with one exception at the 3MthQ ('low-key greetings'), and two at the 1MthQ ('cuddle or pet your greyhound before leaving' and 'low-key departures'). Owners in my study appear to act in a manner consistent with the recommended advice regardless of their group allocation, and this might have contributed to my finding of no significant effect of treatment on the occurrence of SA/SRB. However, as only one aspect of the recommended advice in the SAHO was suggested to be protective against SA/SRB (i.e., practice low-key departures and do not cuddle or pet your dog before leaving) further investigation into the effects of advice given to owners on the occurrence of SA/SRB is warranted.

Factors Associated with SA/SRB Occurrence

The mixed ANOVA in Step 1 of my analyses revealed there was no effect of either my treatment group, or time post-adoption, on the occurrence of SA/SRB, and, after the Bonferroni correction, there was no significant interaction between time and treatment group. However, the multivariate regression in Step 2 of my analyses suggested that other factors did have an effect, and that these differed at 1-, 3-, and 6-months post-adoption.

A large range of factors, including dog characteristics, owner, and management factors, have been variously associated with the occurrence of SA/SRB (Ogata, 2016; Sargisson, 2014). I conducted multiple regression analyses to explore these, and to compare the effect of factors associated with SA/SRB for greyhounds with other relevant studies (Blackwell et al., 2016; Herron et al., 2014).

Analysis of my 1-month data indicated that the number of children in a household was the strongest predictor of SA/SRB (more children = higher SA score), which is in contrast with other studies (Blackwell et al., 2008; Cannas et al., 2014).

Blackwell et al. (2008) reported SA/SRB was more likely in households with fewer children, and suggested that dogs in households with more children might be less likely to be left alone, and/or less dependent on their owner's attention, which is probably prioritised towards children rather than dogs. The subject dogs in the study by Blackwell et al. (2008) were a convenience sample of pet dog owners, and only 20% of owners had obtained their dogs from a rehoming centre. It is therefore likely that the vast majority of these dogs had lifelong experience with children, whereas few greyhounds have any socialisation experience with children prior to rehoming (Bennett et al., 2015). More than half of greyhound adoptions were to homes with children, and 58% of these had more than one child. Nearly 30% of owners reported their greyhound showed fearful behaviour towards children in the 1MthQ, and fearfulness has been shown to be comorbid with SA/SRB (Mills et al., 2013; Storengen & Lingaas, 2015). It is possible that sudden exposure to multiple children could increase greyhounds' stress during the initial transition to pet life, and thus increase the occurrence of anxiety disorders (Dawson, 2016). Other authors have suggested that a sudden or traumatic change in a dog's usual routine can trigger SA/SRB (Butler et al., 2011; Fannigan & Dodman, 2001; McGreevy & Masters, 2008; Overall, 2013). The number of children in the household was not a significant predictor of SA/SRB for greyhounds at either the 3-month or 6-month time point, lending support to the hypothesis that the greyhounds experienced children as stressful initially but may have become accustomed to them over time. Döring et al. (2017) found no indication of adaptation problems for rehomed laboratory beagles related to the presence of children, and suggested this was because the dogs were used to, and tolerant of, handling and manipulation by humans.

The second strongest predictor of SA/SRB in the 1-month data was the frequency of on-leash exercise (more exercise = higher SA score), which is in contrast with Tiira and Lohi (2015) who found that daily exercise was the most significant environmental factor associated with reduced risk of SA/SRB for pet dogs. Increasing regular exercise is considered an effective component of treating SA/SRB, as exercise acts as stress resilience, reduces energy levels, and thus enhances relaxed behaviour (Blackwell et al., 2006; Mills et al., 2013; Overall, 2013; Takeuchi et al., 2000; Tiira & Lohi, 2015). However, most greyhounds lack appropriate early socialisation for life as a pet (Bennett et al., 2015), which is associated with increased fearfulness especially in relation to novel situations, people, and animals (McMillan, Duffy, & Serpell, 2011). Therefore, it is possible that sudden exposure to the vast array of novel stimuli in a simple on-leash walk could contribute to increased levels of anxiety (Dawson, 2016) rather than acting as stress resilience as suggested for pet dogs (Tiira & Lohi, 2015). At 1-month post-adoption, more than 60% of greyhounds were reported to show signs of fear in response to unfamiliar objects or situations, 38% were fearful when confronted with an unfamiliar person, and 60% were frightened of unfamiliar dogs. As mentioned, a sudden or traumatic change in a dog's usual routine has been associated with the onset of SA/SRB (Butler et al., 2011; Fannigan & Dodman, 2001; McGreevy & Masters, 2008; Overall, 2013). Elliott et al. (2010) found the amount and frequency of exercise had no impact on the occurrence of SA/SRB for rehomed greyhounds, however, as stated prior, these authors measured SA/SRB differently than I did, making a comparison between our results difficult. Other studies have found no protective effect of providing exercise immediately

before leaving a dog alone on the occurrence of SA/SRB for rehomed shelter dogs (Blackwell et al., 2016; Herron et al., 2014).

More than 40% of greyhounds spent fewer than 4 hours alone every day. The greater the number of days greyhounds spent more than 4 hours alone, the less likely they were to exhibit SA/SRB. In contrast, other authors have found no association between the amount of time a dog is left alone, and the occurrence of SA/SRB (Blackwell et al. 2016; Chung et al., 2016; Herron et al. 2014). Sherman and Mills (2008) reported that dogs were predisposed to SA/SRB if they had spent long periods left alone, but also if they had spent long periods with the owner without being habituated to being left alone (followed by a period of isolation), and also following periods of kennel housing. Most pet dogs are not habituated to long-term kennelling and the associated isolation from humans (Rooney, Gaines, & Bradshaw, 2007), but greyhounds are routinely housed in kennels prior to rehoming and are likely to have spent long periods every day without human company. It is possible that greyhounds initially find increased exposure to humans in an unfamiliar setting stressful, and the ability to spend more time alone reduces this stress and therefore the risk of SA/SRB. For most rehomed shelter dogs, it is likely that the stay in rehoming kennels represents a substantial reduction in human contact and change in environment (Rooney et al., 2007), which could contribute to the increased occurrence of SA/SRB reported for shelter dogs (Blackwell et al., 2008; Cannas et al., 2014; Flannigan and Dodman, 2001; Riva et al., 2008). Whether increased, or reduced, human contact is stressful for a dog is likely to depend on the dog's previous experience. Prior habituation to social isolation might also contribute to the lower than usual prevalence of SA/SRB in greyhounds. It has been suggested that SA/SRB may be

more about social isolation than a more general characteristic of hyper-attachment to owners (Blackwell et al., 2016). Greyhounds bred and kept for racing are generally housed individually in kennels and have limited human contact each day (Bennett et al., 2015). Although this practice is associated with increased fear and anxiety in rehomed greyhounds generally (Bennett et al., 2015), it could be that regular periods of social isolation are protective for SA/SRB in some greyhounds.

Greyhounds with owners who had previous dog-owning experience were predicted to have higher SA scores than dogs from novice owners. This is in contrast with Jagoe and Serpell (1996) who reported that dogs from first-time dog owners were more likely to develop SA/SRB than dogs with experienced owners. Just over half of all greyhound adoptions were to owners with previous dog-owning experience as an adult, and a third had owned more than one dog before adopting their greyhound. Blackwell et al. (2008) found no association between previous dog-owning experience and the occurrence of SA/SRB, or any other behaviour problem, although only 15% (n = 29) of owners in their sample were first-time dog owners. It is unclear why previous dog-owning experience would be associated with higher SA/SRB for greyhounds, and this was not a factor at 3- or 6-months post-adoption.

In agreement with several other studies (Bradshaw et al., 2002; Herron et al., 2014; McGreevy & Masters; 2008; Overall et al., 2001; Takeuchi et al., 2000; Takeuchi et al., 2001), I found that male dogs were more likely to show SA/SRB than female dogs (58% cf. 42%), but this was only a significant predictor in the 1MthQ regression model. Male greyhounds are generally substantially larger than female dogs (Fogle, 2000), and Herron et al. (2014) suggested that larger male dogs may display more obvious signs of SA/SRB, for example due to louder vocalisations, or

potentially greater destructiveness, than smaller female dogs, and hence are more likely to be reported to show SA/SRB by their owners. Male dogs are more likely (between 58% and 60%) to be treated in veterinary behaviour clinics for SA/SRB than female dogs (Flannigan & Dodman, 2001; Storengen et al., 2014), but there are also significantly more males dogs (between 60% and 63%) in behaviour clinic populations (Flannigan & Dodman, 2001; Storengen et al., 2014), compared to the proportion of male dogs (42% to 50%) in general hospital populations or health surveys (Storengen et al., 2014; Takeuchi et al., 2001). This suggests that male dogs might be more likely than female dogs to display behaviour problem of concern to owners generally, and not just SA/SRB.

Making food available between meals was predictive (at the 1MthQ) of lower SA scores than when owners did not leave food down. In contrast, Riva et al. (2008) found that 35% of anxious dogs (including dogs with SA/SRB) had food continuously at their disposal, compared with 0% of a control group with no problem behaviours, and suggested that the regularity of feeding at discrete meal times, as opposed to food being available continuously, might reinforce a clear hierarchy between a dog and their owner, and therefore reduce underlying levels of anxiety. Although the sample in their study was relatively small (n = 33 dogs), seven dogs (21%) had food continuously available, which is similar to the proportion of greyhounds (23%, 52/224) that were reported to have food available between meals at the 1MthQ. However, greyhounds in my study reported to show SA/SRB were less likely to have food available between meals than dogs that did not exhibit SA/SRB (20% cf. 24%). Although this factor was not significant at either the 3- or 6-month time points, the trend was in the opposite direction with food being available between

meals for 38% of greyhounds (at the 3MthQ, and 6MthQ) that were reported to show SA/SRB, compared with 28% (3MthQ) and 25% (6MthQ) of greyhounds not reported to show any SA/SRB. It is not clear why having food available between meals might be associated with decreased SA/SRB at the 1-month time point.

Although total attachment score was included in the significant regression model for the 1MthQ data, the predictor itself was non-significant, and there was little difference between mean attachment scores for dogs reported to show SA/SRB and dogs not reported to show SA/SRB. The trend was for higher attachment scores, indicative of greyhound's hyper-attachment to their owners (e.g., constant following; proximity, or attention seeking), to be associated with higher SA scores, which is in agreement with other studies that suggest hyper-attachment is associated with increased likelihood of SA/SRB (Appleby & Pluijmakers, 2004; Flannigan & Dodman, 2001; Mills et al., 2013). For example, Flannigan and Dodman (2001) reported dogs with SA/SRB were 3 times more likely to follow their owners excessively, and almost 4 times more likely to greet them excitedly for more than 2 to 3 minutes, when compared to dogs with 'other' behaviour problems. However, 'following', 'proximity seeking', and 'separation distress', are also considered necessary components of any attachment bond (Payne et al., 2016), and not all dogs that show hyper-attachment behaviours display SA/SRB, just as not all dogs that display SA/SRB also demonstrate hyper-attachment behaviours (Blackwell et al., 2016; Elliott et al., 2010; Flannigan & Dodman, 2001; Herron et al., 2014; Parthasarathy & Crowell-Davis, 2006). For example, of the greyhounds that showed SA/SRB in my study, 67% showed more than one attachment behaviour 'most of the time' or 'always', suggestive of hyper-attachment behaviour, but 44% of dogs that did

not exhibit SA/SRB also showed hyper-attachment behaviour. Elliott et al. (2010) also found that although shadowing behaviour (constant following) was positively associated with SA/SRB for rehomed greyhounds, 53% reported to display this behaviour were not reported to have SA/SRB. Similarly, Herron et al. (2014) found that owners who reported their dog as 'very', or 'moderately' needy were more likely to report that their dog had SA/SRB compared with less needy dogs, but 77% of dogs with no signs of SA/SRB were also very or moderately needy. Parthasarathy and Crowell-Davis (2006) suggested that SA/SRB is not a result of 'hyper-attachment', but likely due to an attachment pattern that is inappropriate. Kis, Turcsán, Miklósi, and Gácsi (2012) demonstrated that aspects of owners' personality were linked to dogs' behaviour, and it seems logical that the attachment style of the owner must also be considered when assessing the attachment behaviour of the dog. There is growing support for the assertion that hyper-attachment associated with SA/SRB is a non-essential sign of the disorder rather than a causal factor (Blackwell et al., 2016; Herron et al., 2014; Parthasarathy & Crowell-Davis, 2006). The owner's attachment style, and interaction with the dog's attachment behaviour, however, are likely to be contributing factors (Konok et al., 2015; Parthasarathy & Crowell-Davis, 2006; Rehn, Lindholm, Keeling, & Forkman, 2014). Separation anxiety in children has long been associated with the attachment styles of both the child and primary caregiver (Bowlby, 1979). It seems logical that investigations including both owner, and dog personality and attachment styles, might help explain why some dogs displaying hyper-attachment behaviour develop SA/SRB, and others do not (Konok et al., 2015). Konok et al. (2011) reported dogs with SA/SRB do not use the owner as a secure base. The authors suggested that dogs with SA/SRB have an insecure attachment

style, equivalent to humans who show insecure attachment. Konok et al. (2015) investigated the influence of owner attachment style and personality on their dogs SA/SRB in an internet survey of German (n = 1185) and Hungarian (n = 323) dog owners, and reported that higher attachment avoidance scores for owners (using the Adult Attachment Scale) were correlated with higher occurrence of SA/SRB for dogs. Avoidant owners were assumed to be less responsive to the dog's needs and to not provide a secure base for the dog when needed. As a result dogs form an insecure attachment and may develop SA/SRB.

Crating greyhounds when they are left alone was suggested to increase the likelihood of SA/SRB at the 1-month time point, which could indicate greyhounds might not have been adequately or appropriately crate trained before being confined in this way when left alone (Overall, 2003). Crating can induce panic behaviour for dogs that do not see them as the safe haven intended and increases the discomfort response, making SA/SRB worse rather than better (Overall, 2013; Palestrini et al., 2010). Crating was not found to have any effect at 3 or 6 months, which is not surprising given the proportion of dogs crated when left alone reduced substantially from 1-month (13%), to 3- (7%), and 6-months (4%) post-adoption. Herron et al. (2014) emphasised crating in their preventative advice (and provided specific crate-training instructions), suggesting that this would have a protective effect. They reported 66% (n = 77) of rehomed dogs were crated during their first month, however, in agreement with our results, the authors found no effect of crating on the likelihood of SA/SRB.

Potential predictors that were dropped from the regression model for the 1-month data, indicating that they had no influence on the occurrence of SA/SRB for

rehomed greyhounds, were experimental group, presence of other dogs in the house, gender of human attachment figure, other anxious behaviour, involvement in training activities, the number of human adults in the house, dog's age at adoption, training methods (R+, cf. P+), and fear of noises.

The absence of any age effect could be associated with the age range of rehomed greyhounds. I hypothesised earlier that conflicting reports of an age effect could reflect a bi-modal age pattern of association with SA/SRB occurrence, whereby younger dogs (less than 2 years old), and older dogs (more than 6 years old), are more likely to be associated with SA/SRB (Blackwell et al., 2008; Blackwell et al., 2003; Chung et al., 2016; Döring et al., 2017; Landsberg, 1995; Takeuchi et al., 2001). The vast majority (84%) of rehomed greyhounds were between 2 and 5.5 years of age, therefore, my results may not be suitable for exploring age effects on SA/SRB.

The presence of another dog in the house was included in the significant regression model for the 3-month data, suggesting that the presence of other dogs predicted lower SA scores. In contrast, neither Blackwell et al. (2016) nor Herron et al. (2014) found the presence of another dog in the house to be protective against SA/SRB, consistent with other studies (van Rooy, Arnott, Thomson, McGreevy, & Wade, 2018). However, Sherman and Mills (2008) reported the loss of a companion dog in the household could predispose the remaining dog to develop SA/SRB. Although the relationship between housemates is likely different to kennel neighbours, as most greyhounds have spent a substantial proportion of their pre-pet life in training kennels, with visual (and other sensory) access to other greyhounds, it seems plausible the loss of familiar conspecifics could predispose them to SA/SRB.

Fear of noises was a significant predictor of SA score at both the 3- and 6-month time points, with higher noise fear scores predicting higher SA scores. The comorbidity of noise fear with SA/SRB for greyhounds is in agreement with a number of studies (Flannigan & Dodman, 2001; Overall et al., 2001; Riva et al., 2008, Storengen et al., 2014; Storengen & Lingaas, 2015; Tiira & Lohi, 2015; Tiira et al., 2016). In my sample, 22% of noise-sensitive dogs displayed SA/SRB, which is comparable to the 23% reported by Tiira et al. (2016). However, at the 3- and 6-month time points, 71% (1MthQ = 15/21, 6MthQ = 12/17) of greyhounds reported to show SA/SRB also displayed some fear of noises, which is substantially higher than other reports (48.5%, Flannigan & Dodman, 2001; 43.7%, Storengen et al., 2014; 49.5%, Tiira et al., 2016). The reported comorbidity of noise sensitivity and SA/SRB might indicate a partially overlapping aetiology for different forms of anxiety (Storengen et al., 2014), and could suggest that some dogs have a predisposition to show anxiety-associated behaviour (Overall et al., 2001). Other authors have suggested that inadequate socialisation during early sensitive periods can predispose dogs to fearfulness (Bennett et al., 2015; McMillan et al., 2011). Blackwell et al. (2013) suggested that fear responses to noises that are less intense or salient to dogs, might reflect an underlying pre-disposition to fearfulness, whereas fear responses to extraordinary noises, such as fireworks or gunshots, might be expected to incite fear in all but the most resilient dogs. Herron et al. (2014) found no association between fear of thunder and SA/SRB, and, although Blackwell et al. (2013) reported a very low concordance between fear of noises and SA/SRB, the authors reported a stronger relationship between SA/SRB and dogs that were fearful of less salient noises, such as traffic noise, and loud noises on television, compared with thunder, fireworks, and

gunshots. Further, in a web-based survey of 17 dog breeds in Norway (n = 5257), the odds of a dog showing SA/SRB was 3 times higher for dogs that also showed noise sensitivities compared to dogs that were not fearful of noises, but SA/SRB was 7.7 times more likely for dogs fearful of loud traffic (cf. dogs not fearful of loud traffic), and only 2.2 times more likely for those frightened of fireworks (Storengen & Lingaas, 2015). Unfortunately in my study, only 56% of respondents who reported their greyhounds were fearful of noises specified the type of noise their dogs reacted to, but of those that were specified, 65% (42/65) were related to everyday noises such as traffic, vacuum cleaners, or lawn mowers, whereas 35% reacted to thunder, gunshots, or fireworks. The comorbidity of noise sensitivity and SA/SRB for greyhounds might be explained by the fact that nearly two thirds of greyhounds reported to be fearful of noises were fearful of everyday noises (as opposed to thunder and fireworks).

It is also relevant to note that a reduced number of respondents answered the question on fear (43% of the 1MthQ respondents, 57%, and 78% of the 3MthQ, and 6MthQ respectively), as this question was added to my questionnaire later in the study period. This might explain why fear of noises was not included in the significant regression model for the 1MthQ data when the trend was the same, with 63% (15/24) of greyhounds reported to show SA/SRB also exhibiting a fear of noises.

At the 6MthQ, the presence of other anxious behaviour when the owner was about to leave (e.g., panting, pacing, excessive salivation, shaking, or trembling) was a significant predictor of higher SA scores. Of the greyhounds reported to show other anxious behaviour, 64% (9/14) were reported to also show SA/SRB, compared with 12% (15/124) of dogs that did not show other anxious behaviour. Although other

anxious behaviour was not included in the predictive model at the 1MthQ, and was non-significant after applying the Bonferroni correction at the 3MthQ, the trend was the same as shown at the 6MthQ, i.e., a greater proportion of greyhounds reported to show other anxious behaviour were also reported to exhibit SA/SRB, compared with dogs that did not show other anxious behaviour (1MthQ: 35% cf. 16%; 3MthQ: 26% cf. 17%). Herron et al. (2014) also found a correlation between 'nervous' or 'panicked' behaviour as the owner prepared to leave the house and increased likelihood of SA/SRB for rehomed shelter dogs 1-month post-adoption. Similarly, Blackwell et al. (2016) reported that putative signs of anxiety as owners were leaving (including pacing, trembling, and panting) were associated with the occurrence of SA/SRB 3-months post-adoption. It seems logical that dogs that are anxious when isolated would learn the predictive cues that their owner is about to leave, resulting in anxious behaviour when those cues are evident (Amat et al., 2014; Blackwell et al., 2006; Blackwell et al., 2016; Pongrácz, Lenkei, Marx, & Faragó, 2017). Learning about owner-departure cues over time might explain why anxious behaviour was a significant predictor of SA/SRB in the 6-month model, a non-significant predictor in the 3-month model, and absent from the model for my 1-month data, despite the prevalence of this behaviour having an opposite trend, with fewer greyhounds displaying anxious panting, and pacing behaviour at the 6MthQ (10%) compared with the 1MthQ (22%), and 3MthQ (12%). It may be that whilst most greyhounds habituate to their owner's departure cues, those with SA/SRB become sensitised to them instead.

It is relevant to note that I asked respondents to indicate whether their greyhound exhibited panting, pacing, excessive salivation, shaking, or trembling

when they were left alone or about to be left alone. Although it is likely this behaviour occurred prior to the owner leaving, because it would be difficult to observe otherwise, I cannot be sure that owner's responses only referred to behaviour prior to their departure. However, the reported prevalence of this behaviour for greyhounds (12% at the 3MthQ) is lower than the 26% reported by Blackwell et al. (2016) for pre-departure behaviour, and substantially lower than the 48% reported by Cannas et al. (2014) from direct observations of dogs with SA/SRB when home alone.

Questionnaire Response Rate

Overall, adopter participation in my study (83%) was more than reported by Blackwell et al. (2016; 68%) and Elliott et al. (2010; 79%), and slightly less than reported by Herron et al. (2014; 87%). Nearly 40% of adopters completed questionnaires for all three time-points, and a third of adopters completed two questionnaires. Considering the questionnaire response rates at each time point, the response rate in my study (75%) at 1-month post-adoption was lower than reported by Herron et al. (2014) and Elliott et al. (2010), but higher than reported by Wells and Hepper (2000; 37%). At the 3-month time point, the response rate in my study (57%) was substantially lower than reported by Blackwell et al. (2016), and reduced further at the 6-month time point (52%). The relatively high participation in the study by Herron et al. (2014) likely reflects the method of engagement, which was via telephone interview, and also possibly the relatively short questionnaire, which contained 14 questions, compared to 48 questions in my questionnaire. Blackwell et al. (2016), and Elliott et al. (2010) sent their questionnaires (of 47 and 45 questions respectively) via normal post, whereas my questionnaires were sent via email.

Whether the difference in delivery method had an effect on the response rate is unknown. An improvement for future research with multiple time points might be to have a shorter version of the questionnaire for subsequent time points, or a more concise questionnaire.

Limitations

The validity and reliability of the questionnaire used in this study have not been scientifically tested to ensure the questions and responses actually reflect the occurrence of SA/SRB for rehomed greyhounds, or whether it measures SA/SRB consistently among adopters. Further, the prevalence of SA/SRB relied upon owner reports of behaviour occurring whilst the greyhound was left alone and, although other researchers have shown that video footage of dog's behaviour when left alone correlate well with owner reports of SA/SRB (Konok et al., 2011; van Rooy et al., 2018), this was not tested in my study.

It is possible the reduced questionnaire response rate from 75% at 1-month to 52% at 6-months post-adoption reflects a responder bias, and therefore my results might not be representative of all greyhound adoptions, especially at the 3- and 6-month time points. For instance, overall, greyhound owners reported their greyhounds' adjustment to their new home improved steadily from 1- to 3- to 6-months post-adoption. At the 6MthQ, 97% reported their greyhound was adjusting very well, or extremely well to their new home. This could indicate either that owners were becoming more satisfied or that more satisfied owners were more likely to return subsequent questionnaires.

Future Research

The recent welfare report to the New Zealand Racing Board on welfare issues affecting greyhound racing (Hansen, 2017) reinforces the need for a greater proportion of surplus and retired racing greyhounds to be rehomed (National Animal Welfare Advisory Committee, 2016), and places pressure on GRNZ to increase the rate of greyhound adoptions. Hansen (2017) identifies the large number of puppies that are whelped but never raced for whom rehoming does not appear to have been considered. Approximately 30% of the 800 to 1000 greyhound puppies whelped every year since 2010 were never raced, and 88% of these have no deregistration information (i.e., there is no record of what happened to the puppies). During the same period, just 13% (n = 108) of the greyhounds entered into GAP for rehoming were under the age of 2 years old (Thomas et al., 2017). If a greater number of younger greyhounds were rehomed in the future, it would be interesting to test my hypothesis of a bimodal age pattern for the prevalence of SA/SRB with a survey of all pet greyhound owners, which would also allow for the inclusion of older dogs.

In my questionnaire to owners, in addition to gathering information relevant to SA/SRB, I sought reports of fearfulness, aggression, and other behaviour problems for rehomed greyhounds. Investigation of these data could help elucidate the challenges faced by new owners, evaluate the prevalence of behavioural problems for rehomed greyhounds compared with the wider pet-dog population, and identify other factors associated with increased risk of returned adoptions.

Conclusion

Emailing owners information about SA/SRB shortly following their adoption of an ex-racing greyhound does not lower the risk of the dog showing SA/SRB in their new home. Although there was no significant difference between my treatment and control groups regarding owner behaviour in relation to advice in the SAHO, generally more than half of all owners acted in a manner consistent with the recommendations. Factors associated with the occurrence of SA/SRB changed substantially across measurement times, likely reflecting the multifactorial nature of most cases of SA/SRB (Blackwell et al., 2006; Herron et al., 2014).

The indication that more days with time alone, fewer children in the household, and less frequent walks, were protective for SA/SRB 1-month post-adoption, might support assertions that the transition from racing- to pet-life is particularly challenging for greyhounds, and could be associated with deficiencies in early socialisation (Bennett et al., 2015; Dawson 2016).

The prevalence of SA/SRB for rehomed greyhounds is slightly less than usually reported for rehomed shelter dogs (Blackwell et al., 2003), clinic populations (Storengen et al., 2014; Takeuchi et al., 2001), or pet dogs generally (Bradshaw et al., 2002; Chung et al., 2016). This could be a result of underreporting by owners who may not notice more subtle signs of SA/SRB in their greyhounds, or that new greyhound owners tend to act in a manner that is protective for SA/SRB, or that newly rehomed greyhounds are less susceptible to SA/SRB than other dogs. A reduced susceptibility could be due to breed, age, or particular aspects of greyhound's pre-pet lives. Consistent with my hypothesis that SA/SRB is associated with a bimodal age pattern whereby younger and older dogs appear to be more susceptible to

SA/SRB, the ‘middle-aged’ profile of most newly rehomed greyhounds might have influenced the lower than usual reported prevalence of SA/SRB as few greyhounds under the age of 2 years or over the age of 5.5 years were rehomed. Prior habituation to social isolation might also contribute to the lower than usual prevalence of SA/SRB reported for greyhounds.

SA/SRB is associated with an increased risk of greyhounds being returned to GAP. Further investigation into other factors associated with an increased risk of return is warranted.

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Appendix A: Separation Anxiety Handout

Preventing Separation Anxiety

The following steps can reduce the likelihood your greyhound will develop separation anxiety, and help your greyhound transition to a new way of life.

1 ***Gradually increase the amount of time your greyhound is left alone each day*** *e.g. from a few minutes at a time initially, up to an hour or more at a time, over the the first week. Only increase time alone if your greyhound remains calm and relaxed during your absence.*

2 ***Maintain stable routines and absences from your greyhound*** *e.g. don't leave your greyhound alone for too long at a time, and don't go for long periods without leaving your greyhound alone.*

3 ***Avoid all punishment*** *- especially for any undesirable behaviour while you are away e.g. barking, destructiveness, toileting inside. It is vital that you do not react negatively when you come home.*

4 ***Discourage your greyhound from forming an excessive attachment*** *to you or another person in the household e.g. Avoid dramatic departures and greetings and do not allow your greyhound to always follow you from room to room.*

Do (these things reduce anxiety)

- **Provide regular exercise and stimulation…** Greyhound has an outlet for mental and physical energy– *leaving him/her more calm and content.*
- **Leave home calmly and confidently**, only say a brief up-beat goodbye or nothing at all... *Message to greyhound – all is well, all is normal.*
- When you return home, only touch, pet, talk to, or otherwise **acknowledge your greyhound, when he/she is calm and relaxed…** Greyhound learns – *this is how to get the human's attention, just the same as other times.*

Don't (these things increase anxiety)

- **Punish**, shout, slap, 'show' your greyhound the object of your disapproval e.g. "look what you did"... Greyhound learns – *when the human returns, bad things happen .*

When you leave your greyhound…

Do (these things reduce anxiety)

- **Leave him/her with a safe food-filled toy**, such as a Kong®, or a long lasting chew... Greyhound associates you leaving with – *yummy treats!.*
- **Provide sensory enrichment**: play light classical music or audio books; use pheromonatherapy - spray or diffuse Adaptil®; use aromatherapy - spray or diffuse Lavender scent…
  Greyhound response – *increased calm, quiet behaviour, more resting and positive emotions.*

If you have any questions or concerns regarding your greyhound's behaviour, please contact
http://greyhoundsaspets.org.nz/

Appendix B: Post-Adoption Questionnaire

The question format of this questionnaire relates to the Qualtrics® online platform. Question numbers are not consecutive and were not displayed.

Q1 When did you adopt your greyhound?

Month

Year

Q2 What sex is your greyhound?

- ❍ Male
- ❍ Female

Q3 How old is your greyhound?

Months

Years

Q4 Generally, how well do you feel your greyhound is adjusting to your home?

- ❍ Extremely well
- ❍ Very well
- ❍ Moderately well
- ❍ Slightly well
- ❍ Not well at all
- ❍ I no longer have the dog

Display This Question:

If Generally, how well do you feel your greyhound is adjusting to your home? I no longer have the dog Is Selected

Q5 What is the main reason you no longer have the greyhound?

- ❍ Allergic to the dog
- ❍ Dog was lost or stolen
- ❍ Didn't get along with other pet(s)
- ❍ Not a good match for my family / lifestyle
- ❍ I am moving and unable to take the dog with me
- ❍ Unable to keep or care for / change in circumstances
- ❍ Health problems
- ❍ Had an accident
- ❍ Aggressive towards people
- ❍ Aggressive towards other animals
- ❍ Separation Anxiety e.g. destructive, barking, toileting problems when left alone
- ❍ Other (please specify) _____

Display This Question:
If Generally, how well do you feel your greyhound is adjusting to your home? I no longer have the dog Is Selected

Q6 What happened to the greyhound, or where is it now?

- ❍ Returned to Greyhounds as Pets
- ❍ Relinquished to another rehoming shelter
- ❍ Rehomed with a friend or relative
- ❍ Rehomed with an unrelated person
- ❍ Unknown e.g. lost, escaped or stolen
- ❍ Died or euthanised
- ❍ Other _____

Display This Question:
If Generally, how well do you feel your greyhound is adjusting to your home? I no longer have the dog Is Selected

Q7 When did the greyhound leave your home?

Month
Year

Display This Question:
If Generally, how well do you feel your greyhound is adjusting to your home? I no longer have the dog Is Selected

Q8 Although you no longer have the greyhound, we would appreciate it if you would still complete this questionnaire based on your experience during the time he/she was present in your home.

Q45 Have you owned a dog(s) before?

- ❑ Yes, as an adult (please specify how many) _____
- ❑ Yes, as a child (please specify how many) _____
- ❑ No

Q9 Please indicate the makeup of your human household

	Number of males	Number of females	Number of transgender
Adults (18 years old and over)			
Children 11 to 17 years old			
Children 4 to 10 years old			
Children 0 to 3 years old			

Q10 Do you have another dog(s) in the household?

- ❍ Yes, another greyhound(s)
- ❍ Yes, another dog(s) of a different breed
- ❍ Yes, another greyhound(s) and another dog(s) of a different breed
- ❍ No

Display This Question:
If Do you have another dog(s) in the household? Yes, another greyhound(s) Is Selected
Or Do you have another dog(s) in the household? Yes, another greyhound(s) and another dog(s) of a different breed Is Selected

Q52 How does your new greyhound generally get on with your other greyhound(s)?

- ❍ Gets on well (e.g. approaches / plays well) with other greyhound(s)
- ❍ Not that interested in the other greyhound(s)
- ❍ Afraid of the other greyhound(s)
- ❍ Barks, lunges or fights with other greyhound(s)
- ❍ Other (please specify) _____

Display This Question:
If Do you have another dog(s) in the household? Yes, another dog(s) of a different breed (please specify breed(s)) Is Selected
Or Do you have another dog(s) in the household? Yes, another greyhound(s) and another dog(s) of a different breed (please specify other breed(s)) Is Selected

Q12 How does your new greyhound generally get on with your other dog(s)?

- ❍ Gets on well (e.g. approaches / plays well) with other dog(s)
- ❍ Not that interested in the other dog(s)
- ❍ Afraid of the other dog(s)
- ❍ Barks, lunges or fights with other dog(s)
- ❍ Other (please specify) _____

Display This Question:
If Do you have another dog(s) in the household? Yes, another dog(s) of a different breed Is Selected
Or Do you have another dog(s) in the household? Yes, another greyhound(s) and another dog(s) of a different breed Is Selected

Q17 How concerned are you about your new greyhound's behaviour in relation to your other dog(s)?

- ❍ Not concerned at all
- ❍ A little concerned
- ❍ Moderately / quite concerned
- ❍ Very concerned

Display This Question:
If Do you have another dog(s) in the household? Yes, another greyhound(s) Is Selected
Or Do you have another dog(s) in the household? Yes, another greyhound(s) and another dog(s) of a different breed Is Selected

Q54 How concerned are you about your new greyhound's behaviour in relation to your other greyhound(s)?

- ❍ Not concerned at all
- ❍ A little concerned (2)
- ❍ Moderately / quite concerned
- ❍ Very concerned

Q15 Do you have a cat(s) in the household?

- ❍ Yes
- ❍ No

Display This Question:
If Do you have a cat(s) in the household? Yes Is Selected

Q16 How does your new greyhound generally get on with your cat(s)?

- ❍ Gets on well with the cat(s)
- ❍ Not that interested in the cat(s)
- ❍ Afraid of the cat(s)
- ❍ Wants to chase / attack the cat(s)
- ❍ Has not met the cat
- ❍ Other (please specify) _____

Display This Question:
If Do you have a cat(s) in the household? Yes Is Selected

Q14 How concerned are you about your greyhounds behaviour in relation to your cat(s)?

- ❍ Not concerned at all
- ❍ A little concerned
- ❍ Moderately / quite concerned
- ❍ Very concerned

Q18 Do you have other pets?

- ❍ Yes
- ❍ No

Display This Question:
If Do you have other pets? Yes Is Selected

Q19 What type of other pets do you have?

Display This Question:
If Do you have other pets? Yes Is Selected

Q20 How concerned are you about your greyhound's behaviour in relation to your other pet(s)?

- ❍ Not concerned at all
- ❍ A little concerned
- ❍ Moderately / quite concerned
- ❍ Very concerned

Q33 What kind of exercise does your greyhound generally get? And how often? Please select from the drop down menus below and enter 'none' or 'N/A' where not applicable

	How long do you spend on this activity at a time on average?	How many times per day?	How many times per week or per month?
Playing or training with you on your property			
Walking on a leash (off your property)			
Off leash exercise (off your property)			
Training activities off your property e.g. obedience, agility, tracking			
Other (please specify) e.g. dog exercises itself on the property; comes to work with me most days; visit friends, cafes etc.			

Q63 Please indicate below the types of training methods or tools you have used with your greyhound. Tick all that apply. Please note: the tools or methods listed here are not a recommendation for their use

	How often do you use this method/tool?			
	Always or Often	Sometimes	Rarely	Never
Verbal praise e.g. good dog!	❍	❍	❍	❍
Verbal telling off e.g. No!, Arghh!, Ah-ah!, Bad dog!	❍	❍	❍	❍
Positive reinforcement	❍	❍	❍	❍

using food treats				
Positive reinforcement using 'other' rewards e.g. stroking, petting, play	❍	❍	❍	❍
Leash corrections	❍	❍	❍	❍
Clicker training	❍	❍	❍	❍
Electric-shock collar	❍	❍	❍	❍
Citronella or sonic collar	❍	❍	❍	❍
Physical correction e.g. scruff, shake, pinch, or smack	❍	❍	❍	❍
Spray bottle or water pistol	❍	❍	❍	❍
Non-verbal sound 'distraction' e.g. shake can	❍	❍	❍	❍
Withdrawal of attention e.g. "time out"	❍	❍	❍	❍
Physical restraint e.g. holding still or pushing into position	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍

Q34 How much time does your dog generally spend alone per day each week?Total should add up to seven days a week

_____ Not left alone
_____ Less than one hour alone
_____ 1 to 4 hours alone
_____ 4 to 7 hours alone
_____ 7 to 10 hours alone
_____ More than 10 hours alone

Q35 During the day, when you are NOT home, is your dog generally (mainly)....

- ❍ Indoors loose
- ❍ Indoors in a crate
- ❍ Indoors contained e.g. garage, playpen, one room
- ❍ Outdoors loose on the property
- ❍ Outdoors tied up
- ❍ Outdoors contained e.g. in a fenced run
- ❍ Able to move between indoors and outdoors
- ❍ Other (please specify) _____

Q36 During the day, when you ARE AT HOME, is your dog generally (mainly).....

- ❍ Indoors loose
- ❍ Indoors in a crate
- ❍ Indoors contained e.g. garage, playpen, one room
- ❍ Outdoors loose on the property
- ❍ Outdoors tied up
- ❍ Outdoors contained e.g. in a fenced run
- ❍ Able to move between indoors and outdoors
- ❍ Other (please specify) _____

Q37 Where does your greyhound generally sleep during the night?

- ❍ In a bedroom
- ❍ Unrestricted in the house
- ❍ Restricted in the house e.g. contained in one or two rooms
- ❍ In the garage
- ❍ Outside
- ❍ Other (please specify) _____

Q38 What does your greyhound generally sleep on or in at night?

- ❍ On your (or another family member's) bed
- ❍ On the floor or a dog bed inside
- ❍ On the furniture e.g. sofa
- ❍ In a crate (inside)
- ❍ In a kennel (outside)
- ❍ Other (please specify) _____

Q24 What do you generally feed your dog at meal times? (tick all that apply)

	All or most meals	Some meals	Rarely	Never
Dry biscuits e.g. commercially prepared complete diets	❑	❑	❑	❑
Wet processed dog food e.g. dog roll, jellymeat	❑	❑	❑	❑
Raw meat e.g. raw chicken, mince, tripe, offal	❑	❑	❑	❑
Raw bones e.g. lamb brisket, chicken carcass	❑	❑	❑	❑
Home prepared dog diets e.g. cooked or mixed food	❑	❑	❑	❑
Human food e.g. leftovers, vegetables, rice, cooked meat	❑	❑	❑	❑
Other (please specify)	❑	❑	❑	❑

Q25 How often do you feed your dog?

- ❍ Once a day
- ❍ Twice a day
- ❍ Three times a day
- ❍ On demand
- ❍ Other (please specify) _____

Q26 Is food available between meal times?

- ❍ Yes
- ❍ No

Q21 Some dogs show signs of anxiety when left alone (or separated from their owners), even for short periods of time. How often does your greyhound show any of the following behaviours when he/she is left alone, or about to be left alone?

	Every time	Most times	Sometimes	Never	Don't know / not applicable
Barking, whining or howling for more than a few minutes	❍	❍	❍	❍	❍
Destructiveness - chewing or scratching at doors, gates, floors, fences, windows, curtains etc.	❍	❍	❍	❍	❍
Toileting inside (urination or defecation)	❍	❍	❍	❍	❍
Self injurious behaviour e.g. licking or nibbling him/herself excessively	❍	❍	❍	❍	❍
Escaping the property	❍	❍	❍	❍	❍
Panting, pacing, excessive salivation, shaking or trembling	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍

Q22 If you identified any separation related behaviours in the previous question, how concerned are you about those behaviours?

❍ No behaviours of concern
❍ A little concerned
❍ Moderately / quite concerned
❍ Very concerned

Q23 Some dogs show an intense attachment to their owners, and some demand a great deal of attention from them. How frequently does your greyhound show any of the following behaviours?

	Always	Most of the time	Some of the time	Never	Not applicable / don't know
Tends to follow you (or other members of the household) from room to room	❍	❍	❍	❍	❍
Tends to sit close to, or in contact with, you or other household members when you are sitting down	❍	❍	❍	❍	❍
Tends to nudge, nuzzle or paw you (or others) for attention when you are sitting down	❍	❍	❍	❍	❍

Q40 How attached do you feel to your greyhound?

❍ Strongly attached
❍ Moderately / quite attached
❍ Mildly attached
❍ Not attached at all

Q57 Do you think your new greyhound is particularly attached to one specific member of the household (you or someone else)?

❍ Yes
❍ No

Display This Question:
If Do you think your new greyhound is particularly attached to a specific member of the household (you or someone else)? Yes Is Selected

Q58 Who is the greyhound particularly attached to?

Gender	❍ Male	❍ Female	❍ Transgender		
Age	❍ Adult 18 to 38 years old	❍ Adult 39 to 59 years old	❍ Adult 60 years and over	❍ Child 11 to 17 years old	❍ Child 4 to 10 years old

Q61 Some dogs show aggressive behaviour in certain situations, such as being approached on their bed, or when they are eating. Signs of aggression can range from moderate signs, such as grumbling and growling or barking, to more severe signs such as snapping, lunging and biting.In the recent past, has your greyhound shown any signs of aggression?

❍ Yes
❍ Maybe
❍ No

Display This Question:
If Some dogs show aggressive behaviour in certain situations, such as being approached on their bed, or when they are eating. Signs of aggression can range from moderate signs, such as grumblin... Yes Is Selected
Or Some dogs show aggressive behaviour in certain situations, such as being approached on their bed, or when they are eating. Signs of aggression can range from moderate signs, such as grumblin... Maybe Is Selected

Q60 Please indicate your greyhound's recent tendency to display aggressive behaviour in each of the following situations, or choose 'not applicable' in the drop down menus:

	How severe are the signs of aggression? Moderate signs: may include growling, grumbling and/or barking, baring teeth Moderate to severe signs: may include previous signs and/or snarling, lunging, snapping, biting (without causing bruises or broken skin) Severe signs: may include previous signs and/or bites causing bruising or broken skin	How frequently is the behaviour displayed?
When being approached or touched by an unfamiliar adult		
When being approached or touched by an unfamiliar child		
When a familiar person attempts to touch, handle or pet the dog		

When approached on a favourite resting/sleeping place by a familiar person		
When a familiar person attempts to take a toy or prized object away from the dog		
When a familiar person directly approaches, or tries to remove food from the dog, while the dog is eating		
When meeting or being approached by a familiar dog		
When meeting or being approached by an unfamiliar dog. Please specify size - small/medium/large dogs, or any size		
Other (please specify)		

Q62 Some dogs show fearful or anxious behaviour in certain situations or when exposed to particular things. This can range from mild signs such as turning or walking away, lip-licking, lowered or tucked tail, through to more severe signs such as cowering, urinating or defecating, attempts to escape/retreat, hiding, trembling and even displays of aggressive behaviour. Please indicate your greyhound's recent tendency to display fearful behaviour in each of the following situations or choose 'not applicable' in the drop down menus:

	How severe are the signs of aggression? Moderate signs: may include growling, grumbling and/or barking, baring teeth Moderate to severe signs: may include previous signs and/or snarling, lunging, snapping, biting (without causing bruises or broken skin) Severe signs: may include previous signs and/or bites causing bruising or broken skin	How frequently is the behaviour displayed?
When being approached or touched by an unfamiliar adult		
When being approached or touched by an unfamiliar child		
When a familiar person attempts to touch, handle or pet the dog		
When approached on a favourite resting/sleeping place by a familiar person		
When a familiar person attempts to take a toy or prized object away from the dog		
When a familiar person directly approaches, or tries to remove food from the dog, while the dog is eating		
When meeting or being approached by a familiar dog		

When meeting or being approached by an unfamiliar dog. Please specify size - small/medium/large dogs, or any size		
Other (please specify)		

Q64 When you are about to leave your greyhound alone, do you usually.... (tick all that apply)

- ❑ Leave without doing or saying anything special to your greyhound
- ❑ Cuddle or pet your greyhound and say a fond 'good-bye'
- ❑ Just say a casual good-bye
- ❑ Leave your greyhound with a treat or chew treat
- ❑ Leave your greyhound with classical music or audio books playing
- ❑ Leave your greyhound with other music playing
- ❑ Use Adaptil pheromonatherapy
- ❑ Use lavender or chamomile aromatherapy
- ❑ Leave your greyhound with a puzzle or food filled toy
- ❑ Other (please specify) _____

Q65 When you come home to your greyhound, do you usually.....(tick all that apply)

- ❑ Ignore the greyhound
- ❑ Tell him/her off if you come home to a mess e.g. 'look what you did' , 'bad dog!'
- ❑ Greet your excited greyhound and pet or interact with him/her
- ❑ Calmly say hello and wait until your greyhound is calm before you interact
- ❑ Other (please specify) _____

Q66 From the time you first brought your greyhound home, did you....(tick all that apply)

- ❑ Maintain regular and stable absences from your greyhound
- ❑ Over the first week or so, gradually increase the amount of time your greyhound was left alone each day
- ❑ Maintain considerable variety and unpredictability in terms of absences from your greyhound
- ❑ Go for long periods (more then a week) without leaving your greyhound alone

Within the first week, leave your greyhound alone (without human company) for 7 hours or more at a time

Q50 During the recent past, how frequently has your greyhound shown any of the following 'other' behaviour problems? Please the appropriate level of concern from the drop down menus or select 'N/A' if not applicable

	How concerned are you about this behaviour?	How frequently is the behaviour demonstrated?
Chewing, digging or damaging objects he/she shouldn't (while someone is home)		

Inappropriate toileting e.g. house soiling (while someone is home)		
Excessive or high energy		
Mouthing and/or nipping		
High predatory behaviour e.g. highly reactive to moving things or animals		
Pulls too much on the leash		
Poor 'manners' e.g. jumps up, steals food		
Poor obedience e.g. does not come when called		
Noisy e.g. barking, whining (when someone is home)		
Licks him/herself excessively (when someone is home)		
Other (please specify)		

Q47 Have you tried anything to correct the behaviours that are of concern to you?

- ❍ Yes
- ❍ No
- ❍ N/A

Display This Question:
If Have you tried anything to correct the behaviours that are of concern to you? Yes Is Selected

Q48 What have you tried, and how successful has it been?

	Very successful	Moderately successful	Helped a little bit	Didn't help at all	N/A
Telephone advice from GAP staff	❍	❍	❍	❍	❍
Used advice on GAP website	❍	❍	❍	❍	❍
Consulted a veterinarian	❍	❍	❍	❍	❍
Consulted a dog trainer or attended a training class	❍	❍	❍	❍	❍
Consulted a behaviourist	❍	❍	❍	❍	❍
Tried	❍	❍	❍	❍	❍

suggestions researched on the internet					
Talking to other people	❍	❍	❍	❍	❍
Other (please specify)	❍	❍	❍	❍	❍

Display This Question:
If Have you tried anything to correct the behaviours that are of concern to you? Yes Is Selected
Or Have you tried anything to correct the behaviours that are of concern to you? No Is Selected

Q49 If your greyhound's behaviour does not improve, would you consider returning him/her to GAP?
❍ Yes
❍ Maybe
❍ No
❍ N/A

Q27 Would you like someone from GAP to contact you regarding any behaviours of concern you have identified in this questionnaire?
❍ Yes
❍ No thanks
❍ Not applicable

Display This Question:
If Would you like someone to contact you regarding any behaviours of concern you have identified in this questionnaire? Yes Is Selected

Q28 Please enter your name and contact number, and an appropriate GAP professional will contact you.

Q29 Thank you very much for taking the time to complete this survey, please do not hesitate to contact your nearest GAP kennel base if you have any questions or concerns regarding this questionnaire or the behaviour of your greyhound.

Appendix C: Email Templates

Control Group Email

Dear (name)

Congratulations on adopting your new greyhound as a pet!

We understand that this is an exciting but also potentially challenging time for your greyhound and their new family. Our aim is to help you successfully integrate your new greyhound into your home as smoothly as possible. You will already have been given the GAP Guide and remember there is loads of information on the GAP website regarding training and behaviour tips.

If you would like more information, or have any concerns regarding your greyhound's behaviour, please do not hesitate to contact your local GAP kennel manager (contact details are on our website www.greyhoundsaspets.org.nz).

We are currently conducting some research regarding new adoptions, and would love to get your feedback about how things are going over the next few months, via a couple of online questionnaires that we will email to you. If you do not wish to participate, please reply with 'unsubscribe' at any time

Kind regards

Julia Thomas

E: research@gap.co.nz

www.greyhoundsaspets.org.nz

Treatment Group Email

Dear (name)

Congratulations on adopting your new greyhound as a pet!

We understand that this is an exciting but also potentially challenging time for your greyhound and their new family. Our aim is to help you successfully integrate your new greyhound into your home as smoothly as possible. You will already have been given the GAP Guide and remember there is loads of information on the GAP website regarding training and behaviour tips.

In addition to this, please find attached a brief handout about separation anxiety.

Most greyhounds will have spent their entire lives in greyhound kennels. They will always have had the company of other greyhounds and will never really have been alone.

It can be quite a shock for some greyhounds to suddenly find themselves alone, in an unfamiliar environment, with an unfamiliar routine, and without the comfort of other greyhounds....or humans.

When you leave the house, your greyhound does not know you are only leaving temporarily, and this can lead to separation anxiety, where the dog shows signs of distress when left alone. Separation related behaviours include destructiveness, whining, barking, pacing, salivating, escape attempts, and toileting problems when left alone. These behaviours can be a result of acute stress and anxiety.

You can help protect against Separation Anxiety, by following the few straightforward steps outlined in the attached one page handout □

The recommendations presented here have been shown to reduce signs of anxiety in dogs. Most dogs will adjust well to their new environment, but if you have any concerns please do not hesitate to contact your local GAP kennel manager (their contact details are on our website).

Kind regards

Julia Thomas

E: research@gap.co.nz

www.greyhoundsaspets.org.nz

P.S.

We are currently conducting some research regarding new adoptions, and would love to get your feedback via a couple of online questionnaires we will email you over the next few months. If you do not wish to participate, please reply with 'unsubscribe' at any time.

1-Month Post-Adoption Questionnaire Invitation

Hello

We are conducting research into recent greyhound adoptions, to understand how people incorporate their new greyhound into their lives, and to find out the type and frequency of problems or challenges faced by new owners.

Our aim is to gain valuable insights that will help us improve the information and support we provide to adopters, and ultimately the success of the GAP programme. We hope you can help us!

The questionnaire will take approximately 15 minutes. You can exit the survey at any stage, and return to it later by clicking on the link again.

Follow this link to the Survey:

${l://SurveyLink?d=Take the survey}

Or copy and paste the URL below into your internet browser:

${l://SurveyURL}

All responses will be treated as strictly confidential. If you would like a summary of the results when this study is concluded, or have any questions or concerns about this questionnaire, please do not hesitate to contact me.

Thank you very much for your time.

Kind regards

Julia Thomas

Email: research@gap.co.nz

Web: www.greyhoundsaspets.org.nz

PS If you do not wish to participate in this research, please follow the link to opt out of future emails:

${l://OptOutLink?d=Click here to unsubscribe}

3-Month Post-Adoption Questionnaire Invitation

Hello

Thank you if you completed an earlier questionnaire about new greyhound adoptions. The second phase of our research is to investigate how or if behaviour and management of pet greyhounds change over time.

So, at the risk of really pushing our luck, we are hoping you will complete a second survey for us!

Ultimately, our aim is to gain valuable insights that will help us improve the information and support we provide to adopters, and ultimately the success of the GAP programme. We hope you can help us...again:)

The questionnaire will take approximately 15 minutes. You can exit the survey at any stage, and return to it later by clicking on the link again.

Follow this link to the Survey:

${l://SurveyLink?d=Take the survey}

Or copy and paste the URL below into your internet browser:

${l://SurveyURL}

All responses will be treated as strictly confidential. If you would like a summary of the results when this study is concluded, or have any questions or concerns about this questionnaire, please do not hesitate to contact me.

Thank you very much for your time.

Kind regards

Julia Thomas

Email: research@gap.co.nz

Web: www.greyhoundsaspets.org.nz

PS If you do not wish to participate in this research, please follow the link to opt out of future emails:

${l://OptOutLink?d=Click here to unsubscribe}

6-Month Post-Adoption Questionnaire Invitation

Hello

Thank you for completing an earlier questionnaire about new greyhound adoptions. The final phase of our research is to investigate how or if behaviour and management of pet greyhounds change, six months after adoption.

So, at the risk of really ...really pushing our luck, we are hoping you will complete one last survey for us!

Ultimately, our aim is to gain valuable insights that will help us improve the information and support we provide to adopters, and ultimately the success of the GAP programme. We hope you can help us...again:)

The questionnaire will take approximately 15 minutes. You can exit the survey at any stage, and return to it later by clicking on the link again.

Follow this link to the Survey:

${l://SurveyLink?d=Take the survey}

Or copy and paste the URL below into your internet browser:

${l://SurveyURL}

All responses will be treated as strictly confidential. If you would like a summary of the results when this study is concluded, or have any questions or concerns about this questionnaire, please do not hesitate to contact me.

Thank you very much for your time.

Kind regards

Julia Thomas

Email: research@gap.co.nz

Web: www.greyhoundsaspets.org.nz

PS If you do not wish to participate in this research, please follow the link to opt out of future emails:

${l://OptOutLink?d=Click here to unsubscribe}

Questionnaire Invitation to Owners of Returned Greyhounds

Hello

We are conducting research into greyhound adoptions, to find out the type and frequency of problems or challenges faced by new owners. We want to know what works for new adopters and what doesn't, so that we can improve the re-homing process in future.

We are sincerely sorry that you had to return your greyhound, and we appreciate that this is often an extremely difficult decision. Not all greyhounds are successfully rehomed and circumstances change, but we would really really value your feedback to help us improve the success of the GAP programme.

All responses will be strictly confidential, and no individual responses will be shared with GAP staff or anyone else. If you would like a summary of the results when this study is concluded, or have any questions or concerns about this questionnaire, or your adoption experience, please do not hesitate to contact me.

The questionnaire will take approximately 15 minutes. You can exit the survey at any stage, and return to it later by clicking on the link again.

Follow this link to the Survey:

${l://SurveyLink?d=Take the survey}

Or copy and paste the URL below into your internet browser:

${l://SurveyURL}

Thank you very much for your time.

Kind regards

Julia Thomas

Email: research@gap.co.nz

Mobile: 021 369947

Web: www.greyhoundsaspets.org.nz

PS If you do not wish to participate in this research, please follow the link to opt out of future emails:

${l://OptOutLink?d=Click here to unsubscribe}

Questionnaire Follow-Up Email

Hi there

We hope you don't mind us following up, but we would really, really appreciate it if you would complete this online questionnaire for Greyhounds As Pets :)

Your response will be treated completely confidentially, and even if you no longer live with the greyhound you adopted, your feedback is invaluable.

The survey will take approximately 15 minutes and you can return to the survey at any time by clicking on the link below.

Follow this link to the Survey:

${l://SurveyLink?d=Take the survey}

Or copy and paste the URL below into your internet browser:

${l://SurveyURL}

Thank you!

If you have any questions or concerns, please do not hesitate to contact me.

Kind regards

Julia Thomas

research@gap.co.nz

M: 021 369947

www.greyhoundsaspets.org.nz

Follow the link to opt out of future emails:

${l://OptOutLink?d=Click here to unsubscribe}