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Managing *the risk of* aggressive dog behaviour: Investigating the influence of owner threat and efficacy perceptions

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ABSTRACT

Aggressive behaviour in pet dogs is a serious problem for dog owners across the globe, with bite injuries representing a serious risk to both people and other dogs. The effective management of aggressive behaviour in dogs represents a challenging and controversial issue. Although positive reinforcement training methods are now considered to be the most effective and humane technique to manage the risk of aggression, punishment-based methods continue to be used. Unfortunately, there has been little scientific study into the various factors influencing whether dog owners choose to use positive reinforcement techniques to manage aggression in their dogs. As such, current understanding of how best to encourage and support dog owners to use these methods remains extremely limited. This paper uses a survey methodology based on Protection Motivation Theory to investigate the factors that influence owner use of positive reinforcement methods to manage aggressive behaviour, in an attempt to understand potential barriers and drivers of use. In addition, the paper provides an initial exploration of the potential role of wider psychological factors, including owner emotional state, social influence, and cognitive bias. Findings show that the perceived efficacy of positive reinforcement methods and the perceived ability of owners to effectively implement the technique, are both key factors predicting future intentions and current reported use. Future interventions should focus on enhancing owner confidence in the effective use of positive reinforcement techniques across multiple scenarios, as well as helping owners manage their own emotional responses when they encounter challenging situations and set-backs.

Social Media 200-character Summary: This paper uses Protection Motivation Theory as a basis to explore the various factors that influence whether dog owners choose to use positive reinforcement to manage aggression in their dogs.

KEYWORDS: Risk management; human-animal interaction; dog aggression; positive reinforcement

1. INTRODUCTION

Dogs are the most popular pet in the UK, with 31% of households owning one or more dogs (Murray, Browne, Roberts, Whitmarsh, & Gruffydd-Jones, 2010) and the Pet Food Manufacturers Association (PFMA) estimating that there were around 9 million pet dogs in the UK in 2018. However, in spite of this popularity, the majority of dog owners find some aspect of their pet's behaviour problematic (Clark & Boyer, 1993; Vacalopoulos & Anderson, 1993; Wells & Hepper, 2000) and behavioural disorders are often cited as the main reason for relinquishment to rehoming organisations (Blackwell, Casey & Bradshaw, 2016; Salman et al., 2000).

Aggression is perceived as a serious problem by dog owners (Pirrone, Pierantoni, Mazzola, Vigo, & Albertini, 2015) and is often the reason for euthanasia of otherwise healthy animals (Blackshaw, 1991). Aggressive behaviour is commonly reported by dog owners, with UK-based surveys finding aggression towards people reported by 10% of owners (Casey, Loftus, Bolster, Richards, & Blackwell, 2013) and aggression towards unfamiliar dogs when out on a walk reported by 47% of owners (Blackwell, Twells, Seawright & Casey, 2008), suggesting that bite injuries represent a significant risk, both to the public and other dogs (Mora, Fonseca, Navarro, Castaño, & Lucena, 2018; Mouro, Vilela & Niza, 2010). It is therefore not surprising that it is the most frequent reason for owners to seek specialist behavioural advice, making up between 29% (Lund, Agger & Vestergaard, 1996) and 52% (Fatjo, Amat, Mariotti, De La Torre, & Manteca, 2007) of clinical cases.

The physical, psychological and financial implications of dog bites make them a serious public health concern (Calkins, Bensard, Partrick & Karrer, 2001; Griego, Rose, Orengo & Wolf, 1995; Ordog, 1986; Peters, Sottiaux, Appelboom & Kahn, 2004). Many injuries go unreported, however between March 2005 and February 2015, in England, the number of hospital admissions due to dog bites increased by 76% from 4,110 to 7,227 (RSPCA, 2016).

'Reactive behaviour' is a colloquialism commonly used by dog trainers and owners to describe a dog that reacts to certain stimuli. The 'reaction' is usually to bark, lunge, growl or bite/snap at other dogs or people and represents one of the most challenging behavioural responses to manage. Many owners feel guilty or responsible for their pets' behaviour (O'Farrell, 1997) and these experiences, which may be repeated daily, can have serious implications for the quality of life of both the animals and their owners.

A wide range of training methods is used to modify the behaviour of dogs, and these can be broadly described with respect to definitions of reinforcement and punishment, as defined in Blackwell, Bolster, Richards, Loftus, and Casey (2012). Historically dog training relied heavily upon aversive based techniques, involving negative reinforcement or positive punishment. In more recent years, as attitudes towards animal cognition have advanced, increasing emphasis has been placed upon the use of positive reinforcement to modify problematic behavioural responses. Evidence suggests that training using aversive methods is no more effective than positive reinforcement-based training techniques (Cooper, Cracknell, Hardiman, Wright, & Mills, 2014) and some studies suggest that they are less effective (Blackwell et al., 2012). Positive training techniques, such as systematic desensitization and counter-conditioning, have been shown to be effective in cases of aggression towards other dogs and people (Orihel & Fraser, 2008; Sherman, Reisner, Taliaferro & Houpt, 1996), yet many owners continue to use both negative reinforcement and positive punishment in these situations, even though their use is controversial (Blackwell et al., 2012; Todd, 2018).

The behaviour of owners has a significant influence on dog behaviour, particularly where owners resort to punitive methods. Owners who utilize positive punishment-based training techniques in an attempt to change aggressive behaviour are likely to place themselves at increased risk of injury (Blackwell et al., 2008; Herron,

Shofer & Reisner, 2009) and risk harming their relationship with their pet (Todd, 2018). Despite considerable evidence to suggest that the use of punishment-based dog training techniques have negative effects on animal welfare (Blackwell et al., 2012; Deldalle & Gaunet, 2014; Hiby, Rooney & Bradshaw, 2004; Schilder & van der Borg, 2004; Todd, 2018; Ziv, 2017), as many as 72% of dog owners have previously reported using some form of positive punishment to modify their pet's behaviour (Blackwell et al., 2008).

In light of evidence for the increased risk of harm to both the owner and their pet, associated with punishing aggressive dogs, it's not clear why people continue to use these techniques or what prevents them from adopting positive reinforcement-based methods. Barriers to the use of more humane training methods may include a lack of knowledge about the potential welfare implications associated with punishment-based methods, perceptions of their efficacy, previous experiences and poor regulation of dog trainers and behaviourists (Todd, 2018). However, there has been little scientific study into the various factors determining the choices made by dog owners. A better understanding of how owners choose to manage the risk of aggressive behaviour in their dogs, and the different factors that may influence this, is therefore needed.

Successfully encouraging owners to adopt positive techniques could potentially reduce the number of dogs relinquished, euthanasia of otherwise healthy dogs, and the prevalence of aggressive behaviour in dogs overall, thereby reducing the risk to public health.

The reported study uses a survey-based approach to explore these issues and investigate the different factors that may influence how owners choose to manage aggressive behaviour in their dogs. Protection Motivation Theory (Rogers, 1975) provides the primary theoretical foundation for the research, focusing on how owner perceptions of threat related to the *likelihood* and *severity* of aggressive behaviour, and perceptions of efficacy related to the *effectiveness* and *personal use* of positive reinforcement as a risk management strategy, influence both future intentions and

current use of such training techniques. In addition, the potential role of wider psychological factors, such as social influence (Cialdini, 2007), current emotional state (Angie, Connelly, Waples, & Kligyte, 2011; Finucane, Alhakami, Slovic, & Johnson, 2000), and cognitive resource (Kahneman, 2011), is explored. Section 2 of the paper considers relevant literature related to these psychological approaches, focusing first on Protection Motivation Theory (Section 2.1.) before moving on to the role of other psychological factors related to decision-making (Section 2.2.). Section 3 reports the design and methodological approach of the work and section 4 presents the quantitative and qualitative results of the survey. Finally, section 5 discusses the theoretical and practical implications of the findings.

2. THEORETICAL BACKGROUND

2.1. Protection Motivation Theory

Protection Motivation Theory (Rogers, 1975) was developed in the 1970s to assist in the design of effective, targeted interventions regarding risk-related behaviours, primarily in the health domain. Specifically, the theory focuses on two main aspects: (i) threat appraisal processes, which comprise of individual perceptions of the likely *severity* of a particular threat, and their perceived *vulnerability* to that threat, and (ii) efficacy appraisal processes, which comprise of individual perceptions of the likely effectiveness of a particular protective action to reduce the threat (termed *response-efficacy*) and whether the individual feels able to effectively enact this protective action (termed *self-efficacy*). Higher perceived threat has been associated with greater information seeking about an issue (Mead et al., 2012; Neuwirth, Dunwoody & Griffin, 2000; Rimal & Real, 2003). However, when high perceived threat is combined with low perceived efficacy, it can lead to the use of maladaptive coping strategies, such as avoidance of the issue or denial of the claims of educational messaging (Witte, Cameron, McKeon & Berkowitz, 1996).

Research has suggested that both threat and efficacy appraisal are important factors influencing risk-based decisions across a range of domains, including health behaviour, online security behaviour, pro-environmental behaviour, and responses to natural hazards (e.g., Bui, Mullan & McCaffery, 2013; Floyd, Prentice-Dunn & Rogers, 2000; Poussin, Botzen & Aerts, 2014; Rainear & Christensen, 2017; Tsai et al., 2016; Westcott, Ronan, Bambrick & Taylor, 2017). Although some inconsistencies in findings have been shown across studies (e.g., van Bavel, Rodriguez-Priego, Vila & Briggs, 2019), greater perceived likelihood and severity of a potential threat, and greater perceived response efficacy and self-efficacy in relation to protective actions, is generally considered to increase protective behaviour (Floyd et al., 2000; Witte et al., 1996). However, despite the wide application of Protection Motivation Theory across multiple domains, the approach has yet to be applied to the field of human-animal interaction. In particular, to understand how owners appraise and manage behavioural risks in their pets.

The majority of research regarding aggressive behaviour in dogs has typically focused on the behaviour of the dog itself, rather than exploring the perceptions and decisions of owners who are attempting to manage such situations (Casey, Loftus, Bolster, Richards, & Blackwell, 2014; Casey et al., 2013; Lord, Loftus, Blackwell & Casey, 2016). This is despite the fact that such decisions are likely to have a fundamental impact on the dog's resulting behaviour (Blackwell et al., 2008; Casey, Twells & Blackwell, 2007). For instance, do owners consider positive reinforcement techniques sufficiently effective to reduce the risk of aggressive behaviour? And do they feel capable of using these techniques effectively? Addressing these questions is the primary aim of the reported study.

2.2. Heuristics and Biases

When considering how people make decisions in contexts that are inherently risky or uncertain, previous conceptualisations of decision making based on rational calculations

of anticipated costs and benefits (e.g., Expected Utility Theory, Friedman & Savage, 1952) have proven problematic. Instead, individual decision-making is considered to be influenced by a range of cognitive biases and heuristics related to the wider environment and individuals' previous experiences and beliefs (Gigerenzer & Gaissmaier, 2011; Kahneman, 2011; Tversky & Kahneman, 1992). For instance, people have been found to base decisions on the particular emotions that they experience in a given scenario, choosing to avoid situations where a negative outcome is considered likely and pursue those with more positive outcomes. This outcome evaluation is subjective and can differ across individuals based on their previous experiences (Damasio, 1994; Tversky & Kahneman, 1973) and the emotional responses associated with them (Finucane et al., 2000).

The mood that people are in when making a decision, even if this emotional state has no relation to the particular decision scenario itself (termed *incidental emotion*), has also been suggested to influence judgements, particularly in complex and unanticipated scenarios. In particular, positive mood states have been associated with more optimistic judgements, whereas negative mood states have been associated with more pessimistic judgements (for a review, see Lerner, Li, Valdesolo & Kassam, 2015). The experience of negative affect (specifically, fear) has also been linked with enhanced perceptions of risk (Keller, Siegrist & Gutscher, 2006).

In addition to factors specific to the individual decision maker, the beliefs, attitudes and behaviours of others can also influence behaviour. For instance people are likely to feel pressure to conform to the behaviour and views of those around them when deciding how to behave, and to comply with advice and guidance from perceived experts and authority figures (Cialdini, 2007). Engaging in more in-depth mental consideration of potential options is considered to reduce the reliance on such heuristics and biases (Kahneman, 2011). However, this requires people to have sufficient mental resource and motivation to engage in more effortful mental processing

(Williams, Morgan & Joinson, 2017). If people are distracted by other tasks or not giving a scenario their full attention, then they are more likely to base decisions on these more automatic, heuristic forms of processing.

How people manage aggressive behaviour in their dogs at a particular point in time, therefore, may be influenced by a range of additional factors specific to the situation itself, including the owner's current emotional state, the presence and views of other individuals, and the available mental resource when considering response options. To our knowledge, the relative role of such factors has yet to be explored. However, understanding these aspects is vital if interventions are to address the potential challenges that owners face in using positive reinforcement techniques. A secondary aim of this paper is to explore this issue.

2.3. The Current Study

To address these aims, a survey-based methodology is used, combining both exploratory questions and established questionnaire measures based upon Protection Motivation Theory (e.g., Milne, Orbell & Sheeran, 2002; Milne, Sheeran & Orbell, 2000; Tsai et al., 2016; Witte et al., 1996), that were adapted to the specific context. Specifically, we address the following hypotheses and research questions.

Hypothesis 1a: If owner perceptions of the efficacy of positive reinforcement approaches to manage their dogs aggressive behaviour influences resultant use, then greater perceived efficacy (specifically, perceived response efficacy and perceived self-efficacy) will be related to (i) greater self-reported current use of positive reinforcement strategies and (ii) greater intentions to use these strategies in the future.

Hypothesis 1b: If owner perceptions of the threat of aggressive behaviour in their dog influences their use of positive reinforcement approaches, likely due to increased information seeking regarding the efficacy of various training approaches, then greater perceived threat (specifically, threat likelihood and threat severity) will be related to (i)

greater self-reported current use of positive reinforcement strategies and (ii) greater intentions to use these strategies in the future.

Research Question: Do wider psychological aspects, such as perceived social appraisal, emotional state, previous experience, and available mental resource, influence owner confidence and decisions regarding how to manage their dog's aggressive behaviour?

3. METHOD

3.1. Participants

Participants were recruited to an online survey investigating how people manage reactive behaviour in their dogs using the Qualtrics online survey platform (qualtrics.com). For the purposes of this survey, reactive behaviour was defined as showing one or more of the following behavioural signs: stiff posture with hackles raised and intense staring, barking, growling, snarling (curling lip), lunging, snapping, nipping, biting. Recruitment was via circulation of the survey details on social media and via specialist mailing lists (e.g., the Dog Science Group: <https://www.dogsciencegroup.org/>). In total, 1,069 people participated in the survey, however only 630 participants completed the entire questionnaire and were used in the final data analysis. This consisted of 42 males (6.7% of respondents) and 582 females (92.2% of respondents). Seven people did not report a specific gender. Respondents had a mean age of 46.3 years (*Range* = 19-78 years; *SD* = 13.28). Overall, 93.2% of participants had heard the term 'positive reinforcement' before and 61.6% had previous experience of reactive dogs. In addition, 67.0% of participants rated themselves as either moderately or extremely knowledgeable about dog behaviour (*Mean* = 3.76; *Range* = 1-5; *SD* = .95) and 45.6% rated themselves as either moderately or extremely experienced at dog training (*Mean* = 3.25; *Range* = 1-5; *SD* = 1.09). Finally, 82.4% of participants chose a want response to the question 'When my dog first showed reactive behaviour, my first instinct was to [want / not want] to think about it', and 95.1% chose

a want response to the question 'When my dog first showed reactive behaviour, my first instinct was to [want / not want] to do something to manage my dog's reactivity'.

Overall, 328 dogs were reported as male (52.1%) and 296 as female (46.9%), with 549 dogs being neutered (87.0%). Rehoming organisations represented the most common source for dogs (261 dogs; 41.5%), followed by breeders (189 dogs; 30.0%). Reactivity to other dogs was the most common reported scenario (561; 88.9% of respondents), followed by reactivity to strangers (328; 52.0% of respondents) and familiar people (125; 19.8% of respondents). Across these scenarios, barking, lunging and growling were the most commonly reported reactive behaviours, followed by snapping, snarling, nipping and biting, with the mean perceived severity of reactive behaviour at its worst reported as 3.32 out of 5 (*Range* = 1-5; *SD* = 1.19).

3.2. Materials and Procedure

Seventeen questionnaire items were adapted based on previous survey research using Protection Motivation Theory (e.g., Milne et al., 2002; Milne et al., 2000; Tsai et al., 2016; Witte et al., 1996) to create a survey measure related to the management of aggressive behaviour in dogs. All of these were based on items taken from previous scales, with only minor adjustments to wording and using identical response scales. For example, 'I believe that [health threat] is serious' from Witte et al. (1996) became 'I believe that [my dog behaving reactively] is serious', with participants rating their response on a Likert scale of 1-5 (1 = strongly disagree and 5 = strongly agree). All 17 items, including internal consistency for each construct within the reported study data (Cronbach's Alpha), are shown in Table I. In line with PMT constructs, items related to:

1. The perceived severity of a dog's reactive behaviour
2. The perceived likelihood of a dog behaving reactively
3. The extent to which people believed that positive reinforcement was an effective way to reduce a dog's reactivity

4. The extent to which people believed that they were able to successfully use positive reinforcement
5. Intention to use positive reinforcement training techniques in the future

Table I. Protection Motivation Theory Questions and Associated Constructs

<i>Question</i>	<i>Construct</i>	<i>α</i>
If my dog were to behave reactively, the consequences could be severe I believe that my dog behaving reactively is serious My dog behaving reactively would be unlikely to lead to serious problems for ME (R) My dog behaving reactively would be unlikely to lead to serious problems for MY DOG (R) Overall, my dog behaving reactively would be a serious problem	Perceived Severity	.775
My dog is unlikely to behave reactively in any situation (R) It is possible that my dog will behave reactively It is likely that my dog will behave reactively	Perceived Likelihood	.729
I feel confident in my ability to effectively use TYPE A techniques I am discouraged from trying to use TYPE A techniques because I feel unable to do so (R) I am able to use TYPE A techniques to prevent my dog from behaving reactively	Perceived Self-Efficacy	.635
Using TYPE A techniques will help prevent my dog from behaving reactively Using TYPE A techniques is effective in preventing my dog from behaving reactively Using TYPE A techniques is a good way of reducing the risk of my dog behaving reactively	Perceived Response Efficacy	.887
I intend to use TYPE A techniques every time my dog may behave reactively I am unlikely to use TYPE A techniques in the next 3 months (R) I expect to use TYPE A techniques over the long term	Future Intentions	.639

Note: Responses to all questions on a scale of 1-5 (1 = strongly disagree, 5 = strongly agree); (R) = item reverse scored.

Definitions of training techniques provided to participants are shown in Fig. 1.

Participants also completed a number of exploratory questions regarding the different factors that may influence how people choose to manage their dog’s behaviour. A full list of questions is shown in Appendix A and included:

1. The extent to which 10 different factors, such as the advice of veterinary professionals and previous experience of particular techniques, influenced

participant decisions on how to manage their dog's behaviour (1 = not at all; 5 = extremely).

2. The extent to which 9 different factors, including visible disapproval from people around you and being distracted by other things, influenced (a) participant confidence, and (b) participant effectiveness, in managing their dog's behaviour (1 = much less [confident/effective]; 5 = much more [confident/effective]).
3. Agreement with two questions regarding whether they 'sometimes' and 'always' used each of the four different training approaches to manage their dog's behaviour (1 = strongly disagree; 5 = strongly agree).
4. Two questions related to avoidance behaviour adapted from Witte et al. (1996) (i.e., When my dog first showed reactive behaviour, my first instinct was to [want / not want] to think about it; When my dog first showed reactive behaviour, my first instinct was to [want / not want] to do something to manage my dog's reactivity).
5. Five questions related to characteristics of the owner (e.g., age, gender, knowledge of dog behaviour, experience of dog training (1= not at all [knowledgeable/experienced]; 5 = extremely [knowledgeable/experienced])).
6. Eight questions related to characteristics of the dog and its reactive behaviour (e.g., age, sex, breed, behaviour displayed in different scenarios).
7. Three open-ended questions exploring participants feelings when they encountered aggressive behaviour scenarios (i.e., When I encounter a situation where my dog is likely to display reactive behaviour, I feel... : When I feel that I have successfully managed my dog's reactive behaviour, I feel... ; When I feel that I have *not* successfully managed my dog's reactive behaviour, I feel...).

The survey took approximately 15-20 minutes to complete. All questions required a response, except those related to respondent characteristics (e.g., age, gender), some

aspects of dog characteristics (e.g., age, source of dog) and the open-ended questions. In total, 25 participant responses contained missing data across some of these non-forced response questions. SPSS was used for data analysis, which included a combination of linear regressions, paired sample t-tests and bivariate correlations.

TECHNIQUE	DEFINITION	EXAMPLES
TYPE A	Giving the dog something nice (rewarding) to increase a behaviour	Giving the dog a treat/toy if it ignores another dog passing by. Praising the dog for not barking
TYPE B	Removing something unpleasant to increase a behaviour	Putting pressure on the dog's collar until it comes away from the other dog/stops lunging on the lead
TYPE C	Doing something that the dog finds unpleasant to decrease a behaviour	Telling the dog off when it growls Smacking the dog or pinning it down when it shows aggression
TYPE D	Withholding something that the dog likes in order to decrease a behaviour	Withholding a treat if the dog barks at another dog passing by

Fig. 1. Definitions of training types provided to participants.

4. Results

4.1. H1: Do Owner Perceptions of (a) Efficacy and (b) Threat Predict the Use of Positive Reinforcement Management Strategies?

To examine whether threat and efficacy appraisal predicted future intentions to use positive reinforcement training techniques, a linear regression was computed with perceived severity, likelihood, response efficacy and self-efficacy as predictor variables and mean intention to use positive reinforcement in the future (mean score for the 3-item intention subscale shown in Table I) as the dependent variable (model 1). The regression model was found to be statistically significant, $F(4,625) = 69.09, p < .001$, explaining 31% ($R^2 = .31$) of the variance in intentions. Greater perceived likelihood ($B = .09, SE = .03, t = 2.72, p = .007$), self-efficacy ($B = .15, SE = .04, t = 3.52, p < .001$) and response efficacy ($B = .40, SE = .04, t = 10.80, p < .001$) were found to predict greater

intentions to use positive reinforcement. Interestingly, perceived severity was not found to be a significant predictor ($B = .03, SE = .03, t = 1.10, p = .270$). When owner age, gender, self-reported knowledge of dog behaviour, and self-reported training experience were added as predictors, these relationships remained significant, suggesting that they independently influenced intentions. In addition, greater self-reported knowledge of dog behaviour was predictive of greater intentions to use positive reinforcement techniques ($B = .12, SE = .04, t = 2.97, p = .003$). Table II displays results for both regression models.

Table II. Results of Regression Analyses for Future Intentions

	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>	<i>R</i> ²
Overall Model 1						69.09	4,625	<.001	.31
Severity	.03	.03	.04	1.10	.270				
Likelihood	.09	.03	.10	2.72	.007**				
Response Efficacy	.40	.04	.45	10.80	<.001**				
Self-Efficacy	.15	.04	.15	3.52	<.001**				
Overall Model 2						36.30	8,609	<.001	.32
Severity	.03	.03	.04	1.11	.268				
Likelihood	.09	.03	.09	2.61	.009**				
Response Efficacy	.40	.04	.44	10.69	<.001**				
Self-Efficacy	.14	.04	.14	3.11	.002**				
Owner Age	<.01	<.01	.01	.37	.711				
Owner Gender	.08	.10	.03	.78	.434				
Owner Knowledge	.12	.04	.14	2.97	.003**				
Owner Training Experience	-.06	.03	-.09	-1.83	.068				

Note: β = standardised coefficient; *B* = unstandardized coefficient; *SE* = standard error for unstandardized coefficient. The dependent variable for both regressions was mean intention to use positive reinforcement.

To examine whether threat and efficacy appraisal also predicted current reported use of positive reinforcement techniques, a linear regression was computed with perceived severity, likelihood, response efficacy and self-efficacy, and self-reported knowledge, as predictor variables and total current reported use of positive reinforcement as the dependent variable. This variable comprised of the sum of participant responses to ‘always’ and ‘sometimes’ using these techniques. Bivariate correlations between the two questions showed responses to be positively correlated ($r = .32, p < .001$). Since owner age, gender and self-reported training experience were not found to have any significant effects in the previous analysis, they were not included in this model. The regression model was again found to be statistically significant, $F(5,621) = 33.92, p < .001$, explaining 21% ($R^2 = .21$) of the variance in current use of positive reinforcement techniques. Greater perceived threat severity ($B = .15, SE = .07, t = 2.17, p = .03$), self-efficacy ($B = .30, SE = .10, t = 3.03, p < .001$) and response efficacy ($B = .71, SE = .09, t = 8.20, p < .001$) were found to predict greater use. Interestingly, perceived likelihood ($B < .01, SE = .048, t = .06, p = .952$) and self-reported knowledge ($B < .01, SE = .07, t = -.089, p = .93$) were not found to be significant predictors for current usage. Table III displays results for the regression model.

Table III. Results of Regression Analyses for Total Current Use

	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>	<i>F</i>	<i>df</i>	<i>p</i>	<i>R</i> ²
Overall Model						33.92	5,621	<.001	.21
Severity	.15	.07	.08	2.17	.030*				
Likelihood	.005	.05	.002	.06	.952				
Response Efficacy	.71	.09	.36	8.20	<.001**				
Self-Efficacy	.30	.10	.14	3.03	<.001**				
Owner Knowledge	-.006	.07	-.003	-.09	.930				

Note: β = standardised coefficient; *B* = unstandardized coefficient; *SE* = standard error

for unstandardized coefficient. The dependent variable for the regressions was total current reported use of positive reinforcement.

Overall, hypothesis 1a was supported, and hypothesis 1b was partially supported, for both future intentions and current use of positive reinforcement. Table IV shows mean threat and efficacy responses and self-reported use of all training techniques.

Table IV. Mean Perceived Efficacy, Threat and Use of Training Techniques

	<i>M</i>	<i>SD</i>
Perceived Severity	3.54	.97
Perceived Likelihood	4.04	.82
Self-Efficacy	4.23	.77
Response Efficacy	4.25	.87
Future Intention to Use Type A techniques	4.46	.78
Sometimes use Type A techniques	4.53	1.01
Always use Type A techniques	4.22	1.07
Total Current Use of Type A techniques	8.75	1.69
Sometimes use Type B techniques	2.70	1.50
Always use Type B techniques	1.82	1.14
Total Current Use of Type B techniques	4.52	2.41
Sometimes use Type C techniques	1.70	1.23
Always use Type C techniques	1.30	0.81
Total Current Use of Type C techniques	3.01	1.84
Sometimes use Type D techniques	2.15	1.46
Always use Type D techniques	1.76	1.23
Total Current Use of Type D techniques	3.91	2.52

Note: Total current use of techniques represented the sum of ‘always’ and ‘sometimes’ response scores for each participant.

4.2. RQ: What Factors Influence Owner Perceptions of Confidence and Effectiveness in Managing Aggressive Dog Behaviour?

Experiencing negative emotions, being distracted, having previous negative experience with a technique, and the potential severity of the consequences if the technique didn’t work, were all highlighted as reducing owner *confidence* in effectively managing their dog’s behaviour. A similar pattern was also shown for factors influencing owner perceptions of their *effectiveness* in managing their dog’s aggressive behaviour, with negative emotions, being distracted, and previous negative experience all highlighted as reducing effective management. Interestingly, whilst perceived severity of the reactive behavior was highlighted as making people less confident, it also made them consider it more likely that they would manage the behaviour effectively, potentially due to an increased focus arising from the greater perceived ramifications if they were not successful. However, the extent to which perceptions of severity may change the

particular management techniques used is uncertain. Table V shows mean responses to all factors.

Table V. Mean Perceived Influence of Factors on Handler Confidence and Perceived Effectiveness in Managing Dog Behaviour

		<i>M</i>	<i>SD</i>
Influence on handler confidence	Visible disapproval from people around you	2.38	.87
	Feeling negative emotions at the time (e.g., upset, angry)	2.09	.79
	Feeling positive emotions at the time (e.g., happy, calm)	4.28	.76
	Being distracted by other things	2.48	.75
	Being completely focused on my dog	4.43	.77
	Previous positive experience using a technique	4.60	.66
	Previous negative experience using a technique	2.25	.99
	Feeling that, if it doesn't work, the consequences could be severe	2.62	1.08
	Feeling that, if it doesn't work, the consequences would not be severe	3.06	.94
Influence on perceived handler effectiveness	Visible disapproval from people around you	2.95	.97
	Feeling negative emotions at the time (e.g., upset, angry)	2.23	.96
	Feeling positive emotions at the time (e.g., happy, calm)	4.33	.82
	Being distracted by other things	2.25	.88
	Being completely focused on my dog	4.66	.70
	Previous positive experience using a technique	4.68	.62
	Previous negative experience using a technique	2.52	1.20
	Feeling that, if it doesn't work, the consequences could be severe	3.36	1.20

Note: Mean >3 indicates relative positive influence of factor, <3 indicates relative negative influence of factor.

4.3. What Factors Influence Owner Decisions of How to Manage Reactive Behaviour?

Mean perceived confidence in using a technique when in the home and when in public were reported as the two most influential factors for how owners choose to manage their dog's reactive behaviour, followed closely by the perceived severity of the behaviour. Paired-sample t-tests were conducted, with Bonferroni corrections applied for multiple comparisons, to determine whether these three factors rated as most influential significantly differed from lower rated factors. Overall, confidence in using techniques at home was rated significantly more influential than all of the other factors (all $t(629)$'s > 3.38, all p 's < .035). This was followed by confidence in using techniques in public, which was rated as significantly more influential than all of the remaining

factors (all $t(629)$'s > 3.62 , all p 's $< .001$), except advice from a dog trainer $t(629) = 1.87$, $p > .1$, and the severity of the behaviour ($t(629) = .56$, $p > .1$). The third most influential factor, severity of the dog's behaviour, was rated as significantly more influential than all of the remaining factors (all $t(629)$'s > 3.42 , all p 's $< .030$), except advice from a dog trainer ($t(629) = 1.42$, $p > .1$). Table VI shows mean responses to the listed factors.

Table VI. Mean Perceived Influence of Various Factors on Decisions of How to Manage Reactive Behaviour in Order of Rated Importance

	<i>M</i>	<i>SD</i>
When I am at home, how confident I feel in being able to successfully use a technique	3.81	1.23
When I am in public, how confident I feel in being able to successfully use a technique	3.64	1.19
How severe the behaviour is that I am trying to manage	3.61	1.21
Advice provided to me by dog trainers	3.51	1.43
Advice provided to me by Certificated Clinical Animal Behaviourists (CCAB)	3.35	1.69
Previous experience of particular techniques	3.20	1.45
What I read in books	3.05	1.32
Advice from vets	2.82	1.45
What I see on TV / read online	2.65	1.25
Opinions of those around me (e.g., friends / family)	2.14	1.09

To examine whether greater perceived threat was associated with greater use of information and advice from 'external' sources, responses to the six factors related to external information were considered (i.e., advice from dog trainers, advice from CCAB, advice from vets, opinions of others, advice from books, advice from TV/online). First, bivariate correlations were conducted between these six factors, which showed that participant responses for all factors were significantly positively correlated (all r 's $> .08$, all p 's $< .04$). These scores were then combined to create a single mean score ('external information') and bivariate correlations were conducted between this total score and

perceived severity and likelihood of aggressive behaviour. Greater perceived severity and greater perceived likelihood were both associated with greater influence of external information sources (severity: $r = .21, p < .001$; likelihood: $r = .15, p < .001$).

Finally, to examine whether the use of external information was also associated with greater use of positive reinforcement, bivariate correlations were conducted between this score and both future intentions to engage in positive reinforcement training and current reported use of training techniques. Greater use of external information was found to be positively associated with both greater intentions ($r = .20, p < .001$) and greater reported use of positive reinforcement ($r = .17, p < .001$), and negatively associated with reported use of Type C punishment-based techniques ($r = -.14, p < .001$).

4.4. Qualitative Data

Participant responses to open-ended questions provided qualitative data regarding how people felt (a) when they encountered reactive scenarios, (b) when they were successful in managing these scenarios, and (c) when they were not. This provided data regarding emotional responses to reactive situations, as well as the potential influence of both negative and positive behaviour management experiences on owners.

4.4.1. When I Encounter a Situation Where my Dog is Likely to Display Reactive Behaviour, I Feel...

When first encountering scenarios, participants varied in the extent to which they felt confident and prepared in their ability to manage the situation. For example, participant 46, a 65 year-old female who strongly agreed with always using Type A techniques and strongly disagreed with using Type B or Type C techniques, stated that she felt “confident I can manage it”, whereas, participant 193, a 67-year old female who somewhat agreed with always using Type A techniques, but also somewhat agreed to always using Type B techniques, stated that she felt “worried that I won’t manage it”. Some participants viewed the scenario as a “training opportunity” to practice and

develop their skills (e.g., participant 138, a 32-year old female who strongly agreed with always using Type A techniques and strongly disagreed with using Type B or Type C techniques), whilst others highlighted trying to “avoid the situation”, feeling “stressed”, “nervous”, “on-edge” or “anxious” and less confident of a positive outcome (e.g., “resigned to the inevitable”, participant 235, a 54-year old female who strongly agreed with always using Type A techniques and strongly disagreed with using Type B or Type C techniques).

4.4.2. When I Have Not Successfully Managed my Dog's Reactive Behaviour, I Feel...

When people did not feel that they had effectively managed their dog's behaviour, they reported feeling a number of negative emotions, including being “disappointed”, “frustrated” and “sad”. Responses ranged in the severity of negative feeling, from feeling “a bit down” to feeling “heartbroken”, “dejected and useless” and “hopeless”. A large number of participants blamed themselves for any negative outcomes, considering they had failed (e.g., “like a failure”, “incompetent and judged...”, “like I'm failing us both”) and to have “let my dog down” (e.g., participant 168, a 38 year-old female who somewhat agreed with always using Type A techniques, strongly agreed with always using Type B techniques, and strongly disagreed with always using Type C techniques). A smaller proportion of people viewed it as a learning opportunity, providing a chance to reflect on their strategies and further develop their techniques (e.g., “I have to re-run in my mind what went wrong and learn from the experience”; participant 87, a 69 year-old male who strongly agreed with always using Type A techniques and strongly disagreed with using Type B or Type C techniques).

4.4.3. When I Have Successfully Managed my Dog's Reactive Behaviour, I Feel...

Similar to the negative experiences and feelings discussed above, the reported positive emotions that people experienced when they felt that they had successfully managed their dog's behaviour ranged from feeling “pleased”, “positive” and “good”, to feeling “euphoric”, “ecstatic”, “triumphant” and “empowered”. There were also feelings of

“relief” and hope for the future (e.g., “optimistic”, “hopeful... there’s light at the end of the tunnel”). Some respondents also reported feeling “validated” in their techniques, with successful interactions increasing their confidence (e.g., “motivated I can achieve anything”, “increases my confidence in managing her behaviour”; participant 28, a 32 year-old female who somewhat agreed with always using Type A techniques and somewhat disagreed with always using Type B techniques), although others were more cautious or unsure whether the success would be repeated (e.g., “relieved - but that’s tempered by the knowledge that we’ll be doing it again very, very shortly”, “like it was a fluke”; participant 572, a 56 year-old female who strongly agreed with sometimes using Type A techniques, strongly agreed with sometimes using Type B techniques, and somewhat agreed with sometimes using Type C techniques). Interestingly, whereas the negative emotions in the previous question focused predominantly on self-blame, positive scenarios were often viewed as an achievement to be proud of for both the dog and owner, with the predominant focus being on the dog itself (e.g., “so proud of her for being able to cope, and I see how far we have both come”). A greater emphasis was also shown on the role of the relationship between the dog and the owner, being part of a team facing a challenge (e.g., “I feel proud of my dog and our partnership to successfully handle the situation”; participant 145, a 51 year-old female who somewhat agreed with always using Type A techniques and strongly disagreed with using Type B and Type C techniques).

5. GENERAL DISCUSSION

The reported study explored the factors that influence how owners manage aggressive behaviour in their dogs. Specifically, the extent to which perceptions of the efficacy of positive reinforcement methods to reduce the risk of aggression (i.e., response efficacy and self-efficacy) and perceptions of the likely threat from aggressive behaviour (i.e., threat likelihood and threat severity) influence both current, and future, self-reported use of positive reinforcement techniques. The perceived efficacy of positive

reinforcement methods (response efficacy) and the perceived ability of owners to effectively implement the technique (self-efficacy), were both found to be key factors predicting future intentions and current reported use of positive reinforcement, supporting hypothesis 1a. The influence of threat perceptions was found to be less consistent, although greater perceived severity and likelihood were associated with greater self-reported influence of external information sources on owner decisions, which in turn was associated with greater intentions to use, and current use of, positive reinforcement. Therefore, hypothesis 1b was partially supported.

Finally, the role of wider factors, including emotional state, distraction and previous experience of techniques, on overall owner confidence and decisions in managing aggressive behaviour in their dogs, was also explored. These findings are discussed in more detail below.

5.1. Primary Theoretical Implications

There has been little scientific study into the various factors that influence how dog owners manage aggressive behaviour in their dogs, particularly their choice of training techniques, despite the fact that such decisions can have implications for the dog's behaviour and resultant risk of aggression (Blackwell et al., 2008; Herron et al., 2009). To our knowledge, Protection Motivation Theory (Rogers, 1975) has also yet to be applied to the domain of human-animal interactions. As such, this study provides a significant contribution to the current literature by exploring the relative influence of theoretically based psychological concepts on owner decisions.

With regards to the use of positive reinforcement techniques, the findings of the current study suggest that the perceived efficacy of positive reinforcement is a key aspect influencing owner decisions, with individual perceptions of both the effectiveness of positive reinforcement techniques to reduce the risk of aggression, and their own ability to effectively apply these techniques, predicting both current and future use. This reflects findings in other risk domains that highlight the importance of

understanding and addressing efficacy appraisals when designing interventions to encourage protective behaviour (Bui et al., 2013; Floyd et al., 2000; Witte et al., 1996).

Since self-efficacy represents a significant factor influencing intentions to use positive reinforcement techniques, it is important to understand the various factors that influence owner perceptions of their ability to effectively use positive reinforcement to manage their dog's aggressive behaviour. Within the qualitative data, respondents commonly reported feeling negative emotional responses, such as stress and anxiety, when potential reactive scenarios were encountered. Experiencing negative emotions was also considered to reduce confidence in the ability to effectively manage aggressive behaviour. This may be due to negative emotions leading to increased pessimism regarding individual abilities (e.g., Lerner et al., 2015) or to greater perceptions of risk due to increased fear responses (Keller et al., 2006). Such emotional responses are also likely to be impacted by previous negative experiences of reactive scenarios influencing evaluations of likely outcomes (Damasio, 1994; Finucane et al., 2000; Tversky & Kahneman, 1973). This reduced confidence may in turn reduce the likelihood that positive reinforcement techniques will be used. Although challenging, the ability of participants to 're-frame' potentially negative scenarios as training opportunities may help to encourage a more positive mind-set that is likely to be less damaging to self-efficacy.

In contrast to the support found for the role of efficacy appraisal, the influence of threat appraisal was found to differ substantially in its predictive value for future intentions to use positive reinforcement techniques compared to current reported use of such techniques. Whilst only perceived likelihood of aggression significantly predicted future intentions, only perceived severity of aggression predicted a high degree of current use. It may be that greater threat severity increases information seeking in dog owners regarding effective management and training techniques, which in turn increases the likelihood that they will use such techniques to manage current

issues, hence its predictive value for high current use of positive reinforcement. However, it is unclear why this would not also apply to future intentions to use such techniques. One possibility is that owners primarily envisage using such techniques to manage current issues, hoping that their dog's reactivity may reduce as a result, and thus do not anticipate a need for future use. Considering that one's dog is more likely to react aggressively, and thus that you are more vulnerable to the threat of aggressive behaviour, may also result in greater future intentions to use such techniques in order to reduce this perceived vulnerability. However, again, it is unclear why this would not also apply to current reported use of such techniques. Previous research has highlighted inconsistencies in relation to the influence of threat appraisal in other domains (e.g., Bui et al., 2013), so further investigation is required to replicate and clarify these findings.

Interestingly, within the current study, efficacy and threat appraisal concepts were found to account for a greater proportion of the variance in relation to future intentions to use positive reinforcement techniques (31%) than in their current reported use (21%). Similarly, reporting a higher level of knowledge about dog behaviour was only found to significantly influence future intentions rather than current use. This suggests that whilst such factors may be key in developing future intentions, aspects of the particular context, such as the presence of barriers to the actual use of such techniques (e.g., disapproval from others, panicking or being distracted when faced with a potentially aggressive scenario) may reduce their relative contribution to actual behaviour (e.g., Fisher, 2008). Since positive reinforcement techniques generally rely on the ability to control exposure to the stimulus, which can be extremely difficult for a large number of owners (e.g., walking in remote locations or at anti-social times), even if owners are knowledgeable about behaviour, confident that the techniques work and intend to use them, such aspects may lead to practical difficulties in implementing them. As a result, future exploration should focus on further investigating the relative

influence of contextual factors on risk perceptions and decisions, as well as potential individual differences related to these.

5.2. Practical Implications

The findings of this research suggest a number of practical implications applicable to practitioners working with the owners of dogs who display aggressive behaviour.

Firstly, it is encouraging to note that even though trainers and some TV celebrities still expound the virtues of punishment-based training methods, this was highlighted as less important in the list of potential influences. However, the role of self-efficacy in owner choices suggests that within clinical practice settings it is not enough to simply tell owners what techniques to use and how to use them. Successfully applying positive reinforcement techniques in the field presents a substantial challenge for owners, who are likely to already be dealing with issues related to managing their own emotional and cognitive responses to scenarios. Ensuring that owners feel sufficiently confident in effectively applying these techniques in uncertain and risky contexts, whilst also maintaining trust in the efficacy of the technique itself when faced with potential setbacks, is vital. Thus, both self-efficacy and response efficacy regarding positive reinforcement must be maintained. Providing owners both the space and time to practice techniques in supported and diverse environments is likely to assist with the development of self-efficacy, whilst providing examples of cases with successful outcomes using such techniques, including the challenges experienced by owners along the way, may increase response efficacy.

Secondly, the findings of the reported work also suggest that greater knowledge regarding dog behaviour may increase intentions to use positive reinforcement techniques. Although no significant effect of knowledge was found on reported current use, it is still likely to be beneficial to further educate dog owners regarding dog behaviour to increase the likelihood that owners will at least intend to use positive

reinforcement techniques, even if they do not always do so. Further work can then address potential barriers for converting such intentions into actual behaviour.

Finally, the results suggest that increased perceptions of the potential severity of aggressive behaviour in dogs may increase the likelihood that individuals will use positive reinforcement methods. It may be that greater awareness of negative consequences, such as potential legal ramifications, may increase the likelihood that people will investigate, and use, the most effective training techniques to manage aggressive behaviour. However, this finding is highly tentative, being found only in relation to current use of positive reinforcement and not future intentions to use such techniques. In line with previous research regarding the potential negative consequences of fear appeals and other threat-based interventions (Eppright, Hunt, Tanner & Franke, 2003; Witte et al., 1996), it is also vital to ensure that dog owners are sufficiently supported to successfully enact any protective behaviours proposed, in order to avoid maladaptive coping strategies.

5.3. Limitations and Future Work

This study represents the first application of Protection Motivation Theory to the management of aggressive behaviour in dogs. It is also the first time that qualitative data has been collected regarding the emotional impact of dealing with this type of behaviour on owners. However, this research has several limitations that should be considered. Firstly, survey participants were recruited via advertisement of the study on social media and via dog groups. As a result, there is likely to be sample bias within respondents, with those who are more knowledgeable or interested in dog behaviour being more likely to participate. This may have resulted in more respondents who have more positive views regarding positive reinforcement training and more negative views regarding punishment-based methods. Further work is required to examine the extent to which these findings apply to other dog owners.

Secondly, this research was based entirely on self-report data. Although we did not use the term positive reinforcement or 'punishment' within the technique descriptions (using instead 'type A, type B' etc.), it is possible that respondents may have considered that reporting that they used certain techniques may be viewed negatively. It would be useful, therefore, to conduct further work focused on direct observations in the field to investigate the extent to which people actually use these methods when managing aggressive behaviour.

Thirdly, as the current study focused specifically on the use of positive reinforcement techniques, we did not ask participants about their future intentions to use other training types. As a result, it is not possible to compare intended usage of positive reinforcement with other training approaches. This limits the conclusions that can be drawn with regard to the mechanisms that may influence intentions to use training techniques in general. For instance, it is possible that perceived severity of behaviour may not have been found to predict intentions to use positive reinforcement because owners may not feel that they are likely to need these techniques in the future due to a hoped-for reduction in reactivity. Further data on intentions to use other forms of training techniques would allow further consideration of this issue, in particular whether owners do not intend to use any particular training techniques in the long-term, instead responding only to current requirements and issues.

Finally, it is acknowledged that the regression models presented did not predict more than 32% of variance in responses. Although this is a common result for models attempting to predict human behaviour, further work would be beneficial to consider additional factors that may influence responses. The findings within the current study provide an initial foundation from which to systematically explore these aspects. Since the qualitative data highlight the potential for extreme negative emotional responses in owners when a situation is not managed well, it is also essential that the impact of such

responses on owner decisions (including the potential to revert to more risky, punishment-based methods) and wider owner wellbeing be further investigated.

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APPENDIX A

A full list of questions used in the survey is presented below:

1. How old is your dog?
2. What breed is your dog?
3. What sex is your dog? (Male / Female)
4. Is your dog neutered (i.e., castrated / spayed)? (Yes / Don't know / No)
5. How long have you had your dog?
6. For approximately how long have you owned dogs in general?
7. Where did you get your dog? (Breeder / Rehoming organisation / Bred myself / From friend or family / Private purchase / Other)
8. Does your dog ever display reactive behaviour? (Yes / No)
Within this research, reactive behaviours are considered to be one or more of the following: Stiff posture with hackles raised and intense staring, Barking, Growling, Snarling (curling lip), Lunging, Snapping, Nipping, Biting.
9. Please indicate when your dog shows reactive behaviour.
If your behaviour is not covered, you can add specific information in the 'other' box. If you wish, you can also provide further detail in the open text box in the following question.

	Yes	No
Reactivity towards strangers	<input type="radio"/>	<input type="radio"/>
Reactivity towards dogs	<input type="radio"/>	<input type="radio"/>
Reactivity towards familiar people (i.e., people they have met before)	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>

10. For approximately how long has your dog shown reactive behaviour?

11. Have you had previous experience of reactive dogs prior to this? (Yes /No)

12. Thinking about particular contexts, please tick if your dog ever shows any of the following behaviours for each context. If your behaviour is not covered or you wish to provide additional information, you can provide further detail in the 'other' text box provided in the following question.

	Barking	Growling	Snarling	Lunging	Snapping	Nipping	Biting
When encountering strangers in the home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When encountering strangers outside of the home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When encountering other dogs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When encountering particular dogs only	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When encountering familiar people in the home	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When encountering familiar people	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

outside of the home							
When being fed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
When food is around, but your dog is not being fed his/her meal	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If you would like to provide more detail on your dog's reactivity, or their behaviour is not covered in the box above, please enter more detail below.

13. If your dog ever displays reactive behaviour, please rate how severe you *feel* this behaviour is **at its worst** (Scale of 1-5, 1 = not at all severe, 5 = extremely severe)

14. When your dog displays reactive behaviour, if unrestrained, what do you feel the likelihood would be of a dog or person being injured? (Scale of 1-5, 1 = not at all likely, 5 = extremely likely)

15. Please rate whether any of the following have influenced your decisions regarding how you manage your dog's behaviour .

	Not at all	Slightly	Somewhat	Moderately	Extremely
What I see on TV / read online	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
What I read in books	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Opinions of those around me (e.g., friends / family)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice provided to me by veterinary professionals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice provided to me by Clinical Animal Behaviourists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Advice provided to me by dog trainers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Previous experience of particular techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
How severe the behaviour is that I am trying to manage	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I am at home, how confident I feel in being able to successfully use a technique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
When I am in public, how confident I feel in being able to successfully use a technique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. Please rate the following statements according to the extent that you agree or disagree with them. Some of the questions are very similar, but please answer them all. This is so that we can choose the best questions to include in future questionnaires.

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
If my dog were to behave reactively, the consequences could be severe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I believe that my dog behaving reactively is serious	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

My dog behaving reactively would be unlikely to lead to serious problems for ME (R)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My dog behaving reactively would be unlikely to lead to serious problems for MY DOG (R)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Overall, my dog behaving reactively would be a serious problem	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My dog is unlikely to behave reactively in any situation (R)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is possible that my dog will behave reactively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It is likely that my dog will behave reactively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(R) = indicates reverse-coding

17. If your dog were to ever bite another person, what do you think the most severe potential consequences would be?

18. If your dog were to ever bite another dog, what do you think the most severe potential consequences would be?

19. If your dog were to ever bite you, what do you think the most severe potential consequences would be?

20. **Thinking of your current actions**, indicate the degree to which you agree or disagree with the following statements in relation to these techniques

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I sometimes use TYPE A techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I always use TYPE A techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I sometimes use TYPE B techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I always use TYPE B techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I sometimes use TYPE C techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I always use TYPE C techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I sometimes use TYPE D techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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I always use TYPE D techniques to manage my dog's behaviour	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
Using TYPE A techniques will help prevent my dog from behaving reactively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using TYPE A techniques is effective in preventing my dog from behaving reactively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Using TYPE A techniques is a good way of reducing the risk of my dog behaving reactively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel confident in my ability to effectively use TYPE A techniques	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am discouraged from trying to use TYPE A techniques because I feel unable to do so (R)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to use TYPE A techniques to	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

prevent my
dog from
behaving
reactively

(R) = indicates reverse-coding

21. Now, thinking of your future actions, indicate the degree to which you agree or disagree with the following statements regarding **your likelihood of using TYPE A techniques in the future** to manage reactive behaviour in your dog

	Strongly disagree	Somewhat disagree	Neither agree nor disagree	Somewhat agree	Strongly agree
I intend to use TYPE A techniques every time my dog may behave reactively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am unlikely to use TYPE A techniques in the next 3 months (R)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I expect to use TYPE A techniques over the long term	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

(R) = indicates reverse-coding

22. We are also interested in the factors that you think **affect your ability to effectively manage your dog's behaviour at a specific point in time**. Please rate each statement according to the extent that it **influences how you manage** your dog at a particular point in time

	Makes me much less likely to manage my dog effectively	Makes me slightly less likely to manage my dog effectively	Does not influence how I manage my dog	Makes me slightly more likely to manage my dog effectively	Makes me much more likely to manage my dog effectively
Visible disapproval from people around you	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Feeling negative emotions at the time (e.g., upset, angry, low, anxious, stressed)

Feeling positive emotions at the time (e.g., happy, calm, content)

Being distracted by other things

Being completely focused on my dog

Previous positive experience using a technique

Previous negative experience using a technique

Feeling that, if it doesn't work, the consequences could be severe

Feeling that, if it doesn't work, the consequences would not be severe

23. Please rate each statement according to the extent that it **influences how confident you feel** managing your dog at a particular point in time

	Makes me feel much less confident	Makes me feel slightly less confident	Does not influence my confidence	Makes me feel slightly more confident	Makes me feel much more confident
Visible disapproval from people around you	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling negative emotions at the time (e.g., upset, angry, low, anxious, stressed)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling positive emotions at the time (e.g., happy, calm, content)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being distracted by other things	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Being completely focused on my dog	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Previous positive experience using a technique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Previous negative experience using a technique	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Feeling that, if it doesn't work, the consequences could be severe	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Feeling that, if
it doesn't
work, the
consequences
would not be
severe



24. Overall, how successful do you think that you are in managing reactive behaviour in your dog? (Scale 1-5, 1 = not at all successful, 5 = extremely successful)

25. Finally, please complete the following sentences:

When I encounter a situation where my dog is likely to display reactive behaviour, I feel...

When I feel that I have successfully managed my dog's reactive behaviour, I feel...

When I feel that I have **not** successfully managed my dog's reactive behaviour, I feel...

26. When my dog first showed reactive behaviour, my first instinct was to **[want / not want]** to think about it

27. When my dog first showed reactive behaviour, my first instinct was to **[want / not want]** to do something to manage my dog's reactivity

28. Your age

29. Your gender (Male / Female / Other / Prefer not to say)

30. Have you ever heard the term 'Positive Reinforcement Training' before? (Yes / No)

31. How would you rate your knowledge of dog behaviour in general? (Scale of 1-5, 1 = not at all knowledgeable, 5 = extremely knowledgeable)

32. How would you rate your degree of experience of dog training? (Scale of 1-5, 1 = not at all experienced, 5 = extremely experienced)

33. Is there anything else that you would like to add in relation to this survey?

REFERENCES

Angie, A.D., Connelly, S., Waples, E.P., & Kligyte, V. (2011). The influence of discrete emotions on judgement and decision-making: A meta-analytic review. *Cognition & Emotion, 25*(8), 1393-1422.

Blackshaw J.K. (1991). An overview of types of aggressive behaviour in dogs and methods of treatment. *Applied Animal Behaviour Science, 30*, 351-354.

Blackwell, E. J., Bolster, C., Richards, G. J., Loftus, B. & Casey, R. (2012). The use of electronic collars for training domestic dogs: estimated prevalence, reasons and

risk factors for use, and owner perceived success as compared to other training methods. *BMC Veterinary Research*, 8, 93.

Blackwell, E.J., Casey, R.A. & Bradshaw, J.W.S. (2016). Efficacy of written behavioral advice for separation-related behavior problems in dogs newly adopted from a rehoming center. *Journal of Veterinary Behaviour*, 12(c), 13-19.

Blackwell, E.J., Twells, C., Seawright, A., & Casey, R.A. (2008). The relationship between training methods and the occurrence of behaviour problems, as reported by owners, in a population of domestic dogs. *Journal of Veterinary Behavior: Clinical Applications and Research*, 3, 207-217.

Bui, L., Mullan, B., & McKaffery, K. (2013). Protection Motivation Theory and physical activity in the general population. *Psychology, Health & Medicine*, 18(5):522-542.

Calkins, C.M., Bensard, D.D., Partrick, D.A., Karrer, F.M. (2001). Life-threatening dog attacks: A devastating combination of penetrating and blunt injuries. *Journal of Pediatric Surgery*, 36(8), 1115-1117.

Casey, R.A., Loftus, B.A., Bolster, C., Richards, G.J. & Blackwell, E. (2014). Human directed aggression in domestic dogs (*Canis familiaris*): occurrence in different contexts and risk factors. *Applied Animal Behaviour Science*, 152, 52-63.

Casey, R.A., Loftus, B., Bolster, C., Richards, G., & Blackwell, E.J. (2013). Inter-dog aggression in a UK owner survey: prevalence, co-occurrence in different contexts and risk factors. *Veterinary Record*, 172(5), 127.

Casey, R.A., Twells, C. & Blackwell, E.J. (2007). An investigation of the relationship between measures of consistency in owners and the occurrence of 'behavior problems' in the domestic dog. *Journal of Veterinary Behavior: Clinical Applications and Research*, 2, 83-84.

Cialdini, R. (2007). *Influence: The psychology of persuasion*. New York: HarperCollins.

- Cooper, J.J., Cracknell, N., Hardiman, J., Wright, H., & Mills, D. (2014). The welfare consequences and efficacy of training pet dogs with remote electronic training collars in comparison to reward based training. *PLoS ONE*, 9, e102722.
- Damasio, A.R. (1994). *Descartes' error: emotion, reason, and the human brain*. New York: Grosset/Putnam.
- Deldalle, S., & Gaunet, F. (2014). Effects of 2 training methods on stress-related behaviors of the dog (*Canis familiaris*) and on the dog-owner relationship. *Journal of Veterinary Behavior: Clinical Applications and Research*, 9, 58-65.
- Eppright, D.R., Hunt, J.B., Tanner Jr., J.F., & Franke, G.R. (2003). Fear, coping, and information: A pilot study on motivating a healthy response. *Health Marketing Quarterly*, 20(1), 51-73.
- Fatjo, J., Amat, M., Mariotti, V.M., De La Torre, J.L.R. & Manteca, X. (2007). Analysis of 1040 cases of canine aggression in a referral practice in Spain. *Journal of Veterinary Behavior: Clinical Applications and Research*, 2, 158-165.
- Finucane, M.L., Alhakami, A., Slovic, P., & Johnson, S.M. (2000). The affect heuristic in judgment of risks and benefits. *Journal of Behavioural Decision Making*, 13(1), 1-17.
- Fisher, E.B. (2008). The importance of context in understanding behavior and promoting health. *Annals of Behavioral Medicine*, 35(1), 3-18.
- Floyd, D.L., Prentice-Dunn, S., & Rogers, R.W. (2000). A meta-analysis of research on Protection Motivation Theory. *Journal of Applied Social Psychology*, 30(2), 407-429.
- Friedman, M., & Savage, L.J. (1952). The expected utility hypothesis and the measurability of utility. *Journal of Political Economy*, 60, 463-474.
- Gigerenzer, G., & Gaissmaier, W. (2011). Heuristic decision making. *Annual Review of Psychology*, 62, 452-482.
- Griego, R.D., Rose, T., Orengo, I.E & Wolf, J.E. (1995). Dog, cat, and human bites, a review. *Journal of the American Academy of Dermatology*, 33(6), 1019-1029.

- Herron, M.E., Shofer, F.S., & Reisner I.R. (2009). Survey of the use and outcome of confrontational and non-confrontational training methods in client-owned dogs showing undesired behaviors. *Applied Animal Behaviour Science*, *117*, 47-54.
- Hiby, E.F., Rooney, N.J., & Bradshaw, J.W.S. (2004). Dog training methods: their use, effectiveness and interaction with behaviour and welfare. *Animal Welfare*, *13*, 63-69.
- Kahneman, D. (2011). *Thinking, fast and slow*. London, UK: Penguin.
- Keller, C., Siegrist, M., & Gutscher, H. (2006). The role of the affect and availability heuristics in risk communication. *Risk Analysis*, *26*(3), 631-639.
- Lerner, J.S., Li, Y., Valdesolo, P., & Kassam, K.S. (2015). Emotion and decision making. *Annual Review of Psychology*, *66*, 799-823.
- Lord, M., Loftus, B.A., Blackwell, E., & Casey, R.A. (2016). 40%, Risk factors for human-directed aggression in a referral level clinical population. *Vet Record*, *181*, 44-49.
- Lund, J.D., Agger, J.F., & Vestergaard, K.S. (1996). Reported behaviour problems in pet dogs in Denmark: age distribution and influence of breed and gender. *Preventive Veterinary Medicine*, *28*, 33-48.
- Mead, E., Roser-Renouf, C., Rimal, R.N., Flora, J.A., Maibach, E.W., & Leiserowitz, A. (2012). Information seeking about global climate change among adolescents: The role of risk perceptions, efficacy beliefs and parental influences. *Atlantic Journal of Communication*, *20*, 31-52.
- Milne, S., Orbell, S., & Sheeran, P. (2002). Combining motivational and volitional interventions to promote exercise participation: Protection Motivation Theory and implementation intentions. *British Journal of Health Psychology*, *7*, 163-184.
- Milne, S., Sheeran, P., & Orbell, S. (2000). Prediction and intervention in health-related behavior: A meta-analytic of Protection Motivation Theory. *Journal of Applied Social Psychology*, *30*, 106-143.

- Mora, E., Fonseca, G.M., Navarro, P., Castaño, A., & Lucena, J. (2018). Fatal dog attacks in Spain under a breed-specific legislation: A ten-year retrospective study. *Journal of Veterinary Behavior*, *25*, 76-84.
- Mouro, S., Vilela, C.L. & Niza, M.M.R.E. (2010). Clinical and bacteriological assessment of dog-to-dog bite wounds. *Veterinary Microbiology*, *144*(1-2), 127-132.
- Murray, J.K., Browne, W.J., Roberts, M.A., Whitmarsh, A., & Gruffydd-Jones, T.J. (2010). Number and ownership profiles of cats and dogs in the UK. *Veterinary Record*, *166*, 163-168.
- Neuwirth, K., Dunwoody, S., & Griffin, R.J. (2000). Protection motivation and risk communication. *Risk Analysis*, *20*(5), 721-734.
- O'Farrell, V. (1997). Owner attitudes and dog behaviour problems. *Applied Animal Behaviour Science*, *52*(3-4), 205-213.
- Ordog, G. (1986). The bacteriology of dog bite wounds on initial presentation. *Annals of Emergency Medicine*, *15*, 1324-1329.
- Orihel, J.S., & Fraser, D. (2008). A note on the effectiveness of behavioural rehabilitation for reducing inter-dog aggression in shelter dog. *Applied Animal Behaviour Science*, *112*, 400-405.
- Peters, V., Sottiaux, M., Appelboom, J., & Kahn, A. (2004). Posttraumatic stress disorder after dog bites in children. *Journal of Pediatrics*. *144*, 121-122.
- PFMA (2018). Dog Population 2018. Cited from <https://www.pfma.org.uk/dog-population-2018>. Accessed 19th September 2018.
- Pirrone, F., Pierantoni, L., Mazzola, S.M., Vigo, D., & Albertini, M. (2015). Owner and animal factors predict the incidence of, and owner reaction toward, problematic behaviors in companion dogs. *Journal of Veterinary Behavior: Clinical Applications and Research*, *10*, 295-301.

- Poussin, J.K., Wouter Botzen, W.J., & Aerts, J.C.J.H. (2014). Factors of influence on flood damage mitigation behaviour by households. *Environmental Science and Policy*, 40, 69-77.
- Rainear, A.M., & Christensen, J.L. (2017). Protection Motivation Theory as an explanatory framework for proenvironmental behavioural intentions. *Communication Research Reports*, 34(3), 239-248.
- Rimal, R.N., & Real, K. (2003). Perceived risk and efficacy beliefs as motivators of change. *Health Communication Research*, 29, 370-399.
- Rogers, R.W. (1975). A protection motivation theory of fear appeals and attitude change. *Journal of Psychology*. 91, 93-114.
- RSPCA (2016). Breed not deed – A dog’s dinner. Cited from https://www.rspca.org.uk/webContent/staticImages/Downloads/BSL_Report.pdf. Accessed 23rd September 2018.
- Salman, M.D., Hutchison, J., Ruch-Gallie, R., Kogan, L., New, J.C., Kass, P.H., & Scarlett, J.M. (2000). Behavioral reasons for relinquishment of dogs and cats to 12 Shelters. *Journal of Applied Animal Welfare Science*, 3(2), 93-106.
- Schilder, M.B.H., & van der Borg, J.A.M. (2004). Training dogs with help of the shock collar: Short and long term behavioural effects. *Applied Animal Behaviour Science*, 85, 319-334.
- Sherman, C.K., Reisner, I.R., Taliaferro, L.A., & Houpt K.A. (1996). Characteristics, treatment, and outcome of 99 cases of aggression between dogs. *Applied Animal Behaviour Science*, 47, 91-108.
- Todd, Z. (2018). Barriers to the adoption of humane dog training methods. *Journal of Veterinary Behavior: Clinical Applications and Research*, 25, 28-34.
- Tsai, H.S., Jiang, M., Alhabash, S., LaRose, R., Rifon, N.J., & Cotten, S.R. (2016). Understanding online safety behaviors: A protection motivation theory perspective. *Computers & Security*, 59, 138-150.

- Tversky, A., & Kahneman, D. (1992). Advances in prospect theory: Cumulative representation of uncertainty. *Journal of Risk and Uncertainty*, 5(4), 297-323.
- Tversky, A., & Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. *Cognitive Psychology*, 5(2), 207-232.
- Vacalopoulos, A., & Anderson, R.K. (1993). Canine behaviour problems reported by clients in a study of veterinary hospitals. *Applied Animal Behaviour Science*, 37, 84.
- van Bavel, R., Rodriguez-Priego, N., Vila, J., & Briggs, P. (2019). Using protection motivation theory in the design of nudges to improve online security behavior. *International Journal of Human-Computer Studies*, 123, 29-39.
- Wells, D.L. & Hepper, P.G. (2000). Prevalence of behaviour problems reported by owners of dogs purchased from an animal rescue shelter. *Applied Animal Behaviour Science*, 69(1), 55-65.
- Westcott, R., Ronan, K., Bambrick, H., & Taylor, M. (2017). Expanding Protection Motivation Theory: Investigating an application to animal owners and emergency responders in bushfire emergencies. *BMC Psychology*, 5, 13.
- Williams, E.J., Morgan, P., & Joinson, A. (2017). Press accept to update now: Individual differences in susceptibility to malevolent interruptions. *Decision Support Systems*, 96, 119-129.
- Witte, K, Cameron, K.A., McKeon, J.K., & Berkowitz, J.M. (1996). Predicting risk behaviors: Development and validation of a diagnostic scale. *Journal of Health Communication*, 1, 317-341.
- Ziv, G. (2017). The effects of using aversive training methods in dogs: A review. *Journal of Veterinary Behavior: Clinical Applications and Research*, 19, 50-60.