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# Understanding Canine 'Reactivity': Species-Specific Behaviour or Human Inconvenience?

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**Abstract:** Dogs are often referred to as "human's best friend," with many households in the United Kingdom and worldwide including a dog. Yet, whilst research highlights the myriad of human health benefits associated with canine companionship, many dogs are relinquished, or euthanized, for purported behavioral problems. A key behavior often cited in these situations is Reactivity, despite a lack of consensus in the literature (or in the population) as to exactly what is encompassed within this term. Resultantly, this paper reports on an online survey to investigate how the term Reactivity is understood by humans. Following the completion of a thematic analysis, six sub-themes were developed forming three over-arching theme clusters, namely; Canine Characteristics, The Importance of Human Perception and Human Capability. In sum, this research highlights the complex, nuanced and sometimes, contradictory nature of understanding about the label of Reactivity, encompassing both canine and human factors. As such, conclusions include the proposal of a preliminary Perceived Reactivity Framework to conceptualize this seemingly multi-facted concept.

**Keywords:** Human-dog bond; canine reactivity; canine behavior; welfare; shelter

The UK is often referred to as a nation of dog lovers, with around 12.5 million canine companions living in the UK in 2021 (Statista Research Department, 2022). There is typically a strong symbiotic relationship between human and dog, with many physical and psychological benefits for both parties. For humans, dog guardianship is linked to increased physical activity levels (Christian et al., 2018; Peel, Douglas, Parry, & Lawton, 2010), as well as a variety of physiological benefits such as lower blood pressure, heart rate and lower cortisol levels (Hughes, Verreynne, Harpur, & Pachana, 2020; Morales-Jinez et al., 2018). Dogs also provide companionship (Hoffman, Creevy, Franks, O'Neill, & Promislow, 2018; Powell et al., 2018), decreasing feelings of loneliness (Oliva et al., 2021) and isolation (Liu et al., 2019), and can act as a protective factor for human mental health (Liu et al., 2019). As such, it is unsurprising that dog guardianship is often considered a key approach in improving social connections, particularly within older populations (Knight & Edwards, 2008).

Nonetheless, approximately 130,000 dogs enter UK rehoming charities each year (Battersea, 2020), with approximately 12 stray/unwanted canines being euthanized daily (Carter & Martin, 2020). The human-canine bond has been reported as integral to successful long-term companionship (Rault, Waiblinger, Boivin, & Hemsworth, 2020), with its compromise linked to relinquishment or euthanasia (Diesel, Pfeiffer, & Brodbelt, 2008; Kwan & Bain, 2013; Lambert, Coe, Niel, Dewey, & Sargeant, 2015; O'Connor, Coe, Niel, & Jones-Bitton, 2017; Salman et al., 2000; Wells & Hepper, 2000; Weng, Kass, Hart, & Chomel, 2006). Albeit limited, some

research has demonstrated how dogs presenting with complex behaviors can impact the formation and development of this bond (Salman et al., 2000; Wells & Hepper, 2000). Furthermore, research has highlighted how behaviors such as house soiling (Diesel, Brodbelt, & Pfeiffer, 2010; New et al., 2000), aggression (toward people and other animals; Diesel et al., 2008; Friend & Bench, 2020), and destructive behaviors (Diesel et al., 2010) are often cited as reasons for canine relinquishment. Thus the interaction between canine behavior and the human-canine bond needs further consideration.

An important factor in the maintenance of a strong human-canine bond is the ability to cohabit harmoniously, including the requirement for dogs to behave in accordance with societal expectations (Olson, 2018). For example, dogs are often expected to remain attentive, whilst also inhibiting “inappropriate” behaviors and demonstrating environmental adaptability (Olsen, 2018). Whilst dogs have an array of skills supporting social behavior, the dynamic nature of many human environments can provoke behaviors that are problematic for humans (Lindsay, 2001). These, often distance-increasing behaviors (barking, lunging etc.), can occur as a result of arousal related to increased levels of adrenaline and cortisol due to exposure to uncomfortable or overly excitable stimuli (Belpedio et al., 2010; Bradshaw, 2011; Carrier, Cyre, Anderson, & Walsh, 2013). That is, a dog is reacting to something within the environment due to a neurobiological response (Lindsay, 2001). However, such reactivity is often cited as the reason for canine surrender/euthanasia (Yu, Wilson, Masters, van Rooy, & McGreevy, 2021).

The development of so-called reactive behaviors has been attributed to environmental factors (e.g., poor socialization and guardian personality; Puurunen et al., 2020; Sundman et al., 2019), biological causes (e.g., hormones, genetics, or breed; Clarke, Mills, & Cooper, 2016; MacLean, Snyder-Mackler, VonHoldt, & Serpell, 2019; Peremans et al., 2003), and training (Fernandes, Olsson, & de Castro, 2017). Increasingly, the label Reactivity is being seen more prominently across the lay and professional contexts when referring to dogs deemed as presenting with problematic behaviors. However, the term has been contested in terms of both its usefulness and the extent to which it should be used. Thus, further understanding around this concept is essential, particularly given that failed adoptions are often attributed to problematic or reactive dog behavior (Diesel et al., 2008; Kwan & Bain, 2013; O’Connor et al., 2017; Salman et al., 2000; Wells & Hepper, 2000; Weng et al., 2006), with such behaviors predicted to increase given the recent SARS-CoV-2 virus (COVID-19) pandemic. For example, emerging evidence has demonstrated an increase in adolescent behavioral problems, including reactivity, in lockdown-bought puppies as well as an increased likelihood of separation anxiety amongst existing family dogs (Christely et al., 2021; Hargrave, 2020; Holland et al., 2021).

Resultantly, it is more important than ever to gain insight into what humans understand by the term Reactivity, and the perceived impact such behaviors have on the human-canine relationship. For example, it may be that walking with a dog perceived as exhibiting reactive behaviors may not provide the same benefits to human wellbeing (Campbell et al., 2016; Westgarth et al., 2017). Subsequently, this could explain recent findings where no benefits between dog guardianship and human wellbeing were found (Barcelos et al., 2021; Cui et al., 2021). As such, this paper reports results from a preliminary study addressing the question; what do humans understand by the term Reactivity in relation to dog behavior?

## **Methodology: Design and materials**

Drawing from a realist lens (Wiltshire & Ronkainen, 2021), a qualitative survey was developed in consultation with a research steering group (consisting of guardians, canine researchers, training, and behavior professionals as well as canine rescue organizations). The survey was designed to explore current knowledge and understanding of dog behavior in anyone over 18

**Table 1.** The questions around participant understanding of Reactivity.

Have you ever heard the term reactivity used with reference to dogs? Please explain your answer:  
What do you understand by the term reactivity with reference to dogs?  
What behaviors would you expect to see from a reactive dog? (Please be specific).  
How would you expect a reactive dog to behave in the home? (Please be specific).  
How would you expect a reactive dog to behave outside the home? (Please be specific)  
What might you expect dogs to be reactive to? (Please be specific).  
What are your thoughts on the term reactivity with reference to dog behavior?  
Is the term reactive useful in classifying a dog's behavior? Please explain your answer:  
Would you adopt a dog that had been classed as having reactive behaviors? Please explain your answer:  
Would breed affect your decision to adopt a dog considered to be reactive? Please explain your answer:  
Why do you think some dogs display inappropriate or undesirable behaviors? (Please select all that apply. If other was selected then participants were asked to specify their response). The options here were: Breeding practice, Genetics, Breed-specific, Owner-led, Environmental-led, and Previous experience  
Can you explain why you chose the above?  
To what extent do you think breeding practices can impact dog behavior? How and Why?  
To what extent do you think dog breed influences behavior? (Please try to be as specific as you can).  
How do you think this is displayed? (Please try to be as specific as you can).  
How do you think specific breed characteristics can appear in dog behavior? (For example Collies are more likely to herd. Please try to be as specific as you can).

(including current guardians, canine professionals and non-guardians). Split across several sections, the survey collected demographic information, human perceptions on what behaviors they considered appropriate and inappropriate for a dog, their understanding of the term Reactivity, and their experiences of seeking support with problematic dog behaviors.

Given the aim of this phase of the wider research program, this means of data enabled insight into the varied expectations of humans when assessing canine behavior (Braun et al., 2020). Within this paper, we consider the specific aspects of the survey that relate to human understandings of the term Reactivity. Questions are outlined in Table 1.

## Recruitment and participants

Following ethical clearance from the (Anonymized), the online survey was distributed using the JISC Survey Platform via professional groups and social media (including a stakeholder group developed to inform the design and implementation within the (anonymized) research group). Participants were recruited via a convenience sample aiming for a minimum of 150 respondents to attain data saturation (Tran, Porcher, Falissard, & Ravaud, 2016).

A convenience sample of 175 adults (163 female, 10 male, 1 non-binary, 1 prefer not to say, Mean age = 43.2 years, SD = 13.4) aged 18 and above completed the survey. Within the sample, the majority of participants were current dog guardians (n = 159) with 28% indicating that they had worked with dogs professionally (though only 14% reported holding canine qualifications). Whilst the majority (n = 114) were from the UK, data was collected from participants from 21 countries worldwide. Whilst 4% did not provide their level of formal education, 5% had primary education (up to G.C.S.E or equivalent), 13% had secondary education (up to AS/A Level or equivalent), 12% had a foundation degree or higher diploma, 34% had an undergraduate degree, 26% had a postgraduate degree, and 6% had a doctoral degree.

## Data analysis

A reflexive thematic analysis was completed on data pertaining to the Reactivity questions. Following Braun and Clarke's (2021) six steps, the data corpus was initially coded descriptively (by both DSL & NT), and reviewed for commonalities prior to moving onto the second stage. Succinct labels (e.g., "barking at dogs," "responding to noises," "responding to something") were created based on a statement of knowledge surrounding the term Reactivity. Subsequently, the data and descriptive codes were then reviewed in terms of creating more

interpretative labels (by DSL). Here, coding attempted to capture the meaning attributed to the concepts discussed within the data. For example, initial descriptive codes (as presented above) were reviewed for similarity in meaning, resulting in a more theoretically driven label (e.g., “response to environmental trigger”). Interpretative codes were then, subsequently, clustered in relation to the underpinning meaning being captured. Clusters were reviewed, assessing whether the meaning attributed overlapped with one another (e.g., “reaction to environmental trigger,” “positive or negative reaction,” “functional behaviour” became clustered under “a literal behavioural response”). Clustering continued until it resulted in an initial thematic structure being developed and reviewed by the entire research team, alongside a sub-set of the data. Conceptualizations were reviewed based on the codes applied and the original dataset.

## Analysis

The vast majority of participants had previously heard of the term Reactivity in relation to dogs (n = 129), with the majority viewing the term as useful (n = 57) or sometimes useful (n = 73), for classifying dog behavior. Many of these participants would consider adopting a dog who was classed as having reactive behaviors (n = 134), albeit dependent on breed (n = 75). Most participants attributed the cause of reactive behaviors in dogs to the guardian (n = 166), the dog’s previous experiences (n = 156) and their environment (n = 140). Other causes suggested included breeding practices (n = 119), genetics (n = 112) and breed-specific characteristics (n = 87).

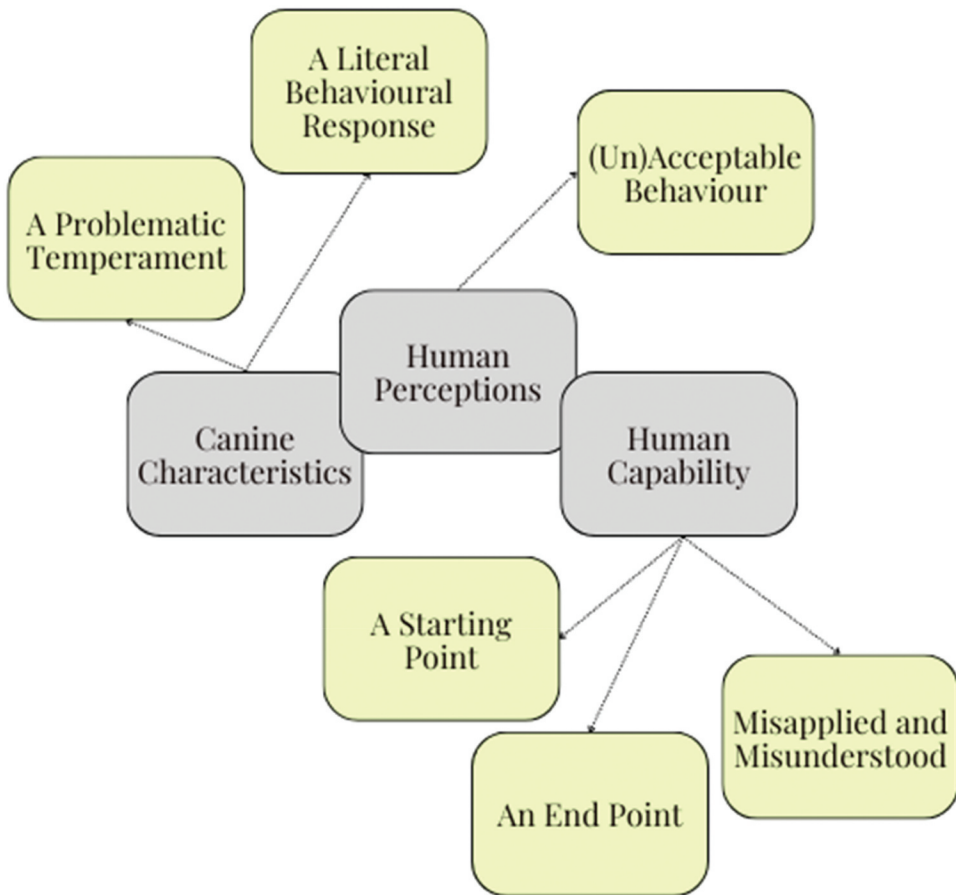
As illustrated in Figure 1, six sub-themes were conceptualized in relation to what was understood by the term Reactivity. Table 2 reports on the overarching and sub-themes, number of participants included within each sub-theme and some illustrative coding. On further scrutiny, these themes were then clustered in creating over-arching themes due to overlapping concepts. Two sub-themes (**A literal Behavioral Response; A Problematic Temperament**) were clustered to form the over-arching theme of **Canine Characteristics. (Un)Acceptable Behavior** captured an element of natural canine behavior but highlighted the constructed nature of these when seen through the lens of human perception. As such, it was determined that this sub-theme should be separated from the over-arching theme of **Canine Characteristics** and inform a further over-arching theme of the **Importance of Human Perceptions**. Finally, three sub-themes (**A Starting Point; The End Point; Misapplied and Misunderstood**), were deemed sufficiently overlapping in capturing the perceived ability of canine guardians, resulting in the third overarching theme of **Human Capability**. Together, these themes highlighted the complex, nuanced and, sometimes, contradictory nature of understanding around the label of Reactivity.

### A literal behavioral response

When considering Reactivity, a consistent pattern derived from the data related to the encapsulation of the literal behaviors of a dog in response to something in their environment. Within this, the theme captured behaviors as well as the various underpinning causes, (including emotions, cognitions or the genetic predispositions), usually in response to a stimulus. As part of this, there were a number of recognizable behaviors attributed to Reactivity:

Growling at other dogs or people, suddenly lunging or barking, barks at cars, easily frightened by loud noises. This depends on the stimuli/situation, but I'd expect to see some reactions depending on stress. Might include body language indicators or distress, growling, barking, snapping, lunging.

Specifically, these “reactions” (note: quotations marks are used for phrasing specifically taken from the illustrative quotes) included an array of specific behaviors including “barking, snapping,



**Figure 1.** A thematic map of overall theme structure.

lunging,” or other “body language” indicators. Furthermore, such behaviors were considered to be deemed to be behavior in response to some underlying emotional assessment. Subsequently, many considered Reactivity as perfectly normal behavior:

Reactivity is a naturally occurring behaviour.

Sometimes dogs will just bark because they are dogs and not because they are ‘reactive’

Within the above, Reactivity is considered “*naturally occurring behaviour*.” Nonetheless, such normal behaviors were attributed to potential “*negative*” experiences resulting in a dog becoming “*scared*”:

It’s a huge spectrum and is generally rooted in a general lack of confidence or some kind of negative experience.

Most reactive dogs are scared and need a level of understanding and reassurance most people cannot give them

As such, the conceptualization of Reactivity becomes more complex, suggesting that reactive behaviors are typical of sentient beings responding to emotional states. That is, dogs who display reactive behaviors, are usually displaying these as a response to normal emotional responses to perceived negative experiences.

In addition to negative affect in response to negative experiences, some respondents discussed how Reactivity captures both aggressive and excitable displays of behavior:

I think it should be used equally across ‘aggressive’ and ‘excitable’ dogs and it’s a better phrase than naughty or badly behaved, but still doesn’t quite sit right for me.

**Table 2.** Table of themes alongside number of participants and illustrative coding.

Overarching Theme	Sub-Theme	Total Participants	Example Codes
<i>Canine Characteristics</i>	A Literal	132	"literal"/"response to environment"/"Response to stimuli"/"natural responses"/"positive and negative"/"just behaviour"/"normal"/"reaction to trigger"/"functional behaviour"/"negative response"/"fight or flight"/
	Behavioral Response		"Difficult Start"/"Unhappy dog"/"out of control"/"more than behaviour"/
<i>Importance of Human Perceptions</i>	A Problematic Temperament	52	"nervous disposition"/"born anxious"/"uneducated dog"/"personality"/
			"caused by genetics"/"fearful"/"bad"/"dangerous"/"abnormal"/
	(Un)acceptable behavior	108	"trauma"/"Impulsive"/"over-excitables"/"bred into"/"illness"/
			"Normal behaviour"/"Developmental phase"/"human connotations"/
			"social desirability"/"based in bad experiences"/"desirable reactions"/
			"listening"/"human-centred"/"perceived as problem"/"science vs pop-culture"/"unwanted behaviour"/"responsive"
<i>Human Capability</i>	A starting point	88	"Better guardian"/"Avoids mislabelling"/"Not aggression"/"avoids stigma"/
			"helpful for lay"/"more than aggression"/"provides education"/"all-encompassing"/"starting point"/"safe"/"can enable education"/"offers explanation"
	An end point	45	"Dogs get unfair reputation"/"Owner fault"/"Used as excuse"/"Owner's responsibility"/"Owner Failure"/"negative connotation"/"lack of training"/"people ill-equipped"/"human-created"/"normalising aggression"/"removes responsibility"/"blames dog' /
	Misapplied and misunderstood	72	"Too vague"/"reductionist"/"more complex"/ "broad"/"needs context"/
			mis-used"/over-applied"/"lack of understanding"/"no specificity"/"over-used"/"too literal"/"no clear definition"/"spectrum"/"multi-layered"/
			"more than behaviour"/

When a dog reacts to stimulus in a hyperaroused state & rapidly getting overexcited

As such, Reactivity is not just limited to behavioral responses to negative affect, but also for those dogs who may get *"overexcited."* As such, it is considered an overarching term for behavior expressed by a dog, either in response to positive or negative affect, that is perceived as *"naughty."* Additionally, the role of genetics was also thought to contribute to these behavior expressions, with some referring to breed-specific behaviors:

It depends on the breed and how they were bred. A well-bred terrier will likely go for fight and keep going until they or the "prey" is dead vs a collie will be more inclined to dart in and out and nip at ankles.

A dog that has ancestors that been selectively bred for their fighting abilities over hundred of years is not going to unlearn the genetic predisposition.

The above captures examples of stereotypical breed-specific behaviors associated with two different breeds and how the behaviors they typically exhibit is inherently linked to the jobs they were bred to do. A "well-bred" terrier, for example, will "fight" to the death. Here, the behavior attributed to fighting is positioned as normal and sought after due to good breeding. As such, the Reactive behavior is deemed suitable, and possibly even desired, for this breed. Resultantly, this theme establishes Reactivity as something normal; typical dog behavioral expressions resulting from either emotional, neurochemical (in the form of a stress-response), experiential or genetic causal factors.

## A problematic temperament

A further theme considered Reactivity to be more encompassing than the behavior itself. Rather, this theme considered Reactivity as referring to the underpinning disposition of a dog; their temperament. As such, dogs with Reactivity were considered to be anxious, fearful or aggressive. Across all of these, it was deemed that such dispositions could arise from genetics, disruptions to ontogenetic influences, medical illness or traumatic experiences resulting in an impact on

the dog's overall development and psychological health. For example, the below respondent discusses the importance of maternal well-being:

The temperament of the parents is very important. Research has shown that the offspring of anxious, nervous or aggressive mothers are more likely to be nervous or aggressive themselves.

Above, the respondent describes how the temperament of a dog's parents is ultimately important for the "*offspring*" themselves. Within this, they note how "*anxious, nervous or aggressive mothers*" are more likely to pass on such temperaments to their puppies. As such, Reactivity becomes far more than a behavior itself, it includes predispositions derived before the dog is even born. This was highlighted as being more important than possible breed characteristics:

I believe aggression in dogs has a genetic component and was very careful about meeting both the parents of my dog so I could see their temperament. I know a few dogs (a st bernard and a golden retriever) who both have aggression issues even though they are breeds associated with gentle natures.

If you breed an aggressive dog, surely somewhere along the line the pup will pick up on these identities and it will be part of them

Some dogs are predisposed to certain genetic traits. Eg nervousness. That in turn can mean the dog is more likely to become reactive

The "*temperament*" of the parents is detailed as more important than the breed in terms of future behavioral expressions. Above, data highlights how despite the "*gentle*" nature associated with certain breed characteristics, breed alone does not protect dogs from displaying "*aggression issues*." Rather, some dogs are "*predisposed*" to certain behavioral states more conducive to reactive behavior. Thus, Reactivity is deemed more complex and all-encompassing than mere behavioral expression. A further aspect of this temperament disposition was attributed to medical concerns. The below highlights the risk with "*genetic diseases*" and how these can contribute to Reactivity:

It has been proven that certain mental illness can be passed on genetically in humans, why would that not be the case for dogs? Pain is a factor in reactivity and genetic diseases such as hip dysplasia cause pain which can contribute to reactivity.

Pain was considered a key factor to consider in relation to problematic behaviors, with many recognizing the impact such experiences can have on the overall disposition of a dog. In addition to medical concerns, traumatic concerns were highlighted as a key "*cause*" for dogs "*issues*":

All of our dogs have been rescues, and their issues have all been caused by the way they were mistreated

We have a rescue dog who has obviously been mistreated in the past and displays fear and aggression in equal measures.

### **(Un)acceptable dog behavior**

This theme highlighted the human lens which is often applied to canine behavior. For example, within this theme, Reactivity was considered a human constructed "*label*" for behaviors deemed "*inappropriate*":

In all honesty, I think we, as humans, have labelled normal dog behaviour with a word which describes a behaviour which we think is inappropriate.

Subsequently, what is or is not considered Reactivity, is dependent on the social acceptability of a dog's behavior. Within this, Reactivity encapsulated behaviors that dogs were naturally bred for, but that are no longer regarded as appropriate for modern human society:

If a dog kills another pet, it's not their fault, it's yours for not taking adequate care to prevent the traits bred into your dog over years from killing another pet. Dogs have been bred for many different roles. The Dalmatian as a carriage dog to stop people stealing the carriage. Rotties as powerful, muscular dogs with a powerful bite



used in security settings though our rotti was as soft as a brush. The German shepherds that will get between an officer and a criminal risking his own life. Gun dogs breed to retrieve game. Labradors as guide dogs because of their fantastic temperament. There is a breed suitable for everyone, research and care will help you re-home a dog that is a bonus for your family and not a disaster where the dog always pays the price of human stupidity and carelessness often with his life. Not fair really is it?

Above, the respondent captures the crossover between how behavior can be considered normal for dogs, but unacceptable for humans. The respondent considers how many breeds have been specifically bred with the purpose of displaying behaviors now considered problematic through *“human stupidity.”* Reactivity, as such, is positioned as normal behavior that is no longer viewed as acceptable by humans. Furthermore, what is considered acceptable or unacceptable is *“family”* specific, with simple *“research”* ensuring a dog, and their associated predilections, are considered *“a suitable breed for everyone.”*

Finally, an unexpected interpretation of the term had a more positive undertone. Rather than being viewed as a problematic behavior due to negative situations or concerns, for some participants Reactivity was considered a dog who behaved promptly when asked:

I think another way of perceiving ‘reactivity’ in a positive context would be how attentive a dog is. E.g., if one were to stand up and put on one’s coat and boots, ready to go outside, a dog might react by leaping up and running to the door, expecting to go on a walk. In a positive context, this dog is just very attentive and has positive connotations to its owner putting on their boots.

Unlike negative responses, here a dog’s reactive behavior is deemed appropriate and *“positive”* in that it demonstrates how *“attentive”* the dog is. Subsequently, the conceptualization of Reactivity is human constructed, varying depending on guardian and dog characteristics, as well as historical and cultural timepoints.

### **“The starting point”**

In contrast to the dog-centric focus of the above themes, the following themes encapsulated more on what Reactivity can mean for human guardians. For example, across the data, Reactivity was often conceptualized as providing canine guardians with a *“Starting Point.”* That is, it provided guardians with an anchor to work from in understanding their dog’s behavior, as well as learning how best to respond to such behavior:

It is a useful term- dog behaviour doesn’t just come out of nowhere, they have feelings and experiences that impact on future reactions.

It has its merits as it prepares you for the fact that the dog needs special handling if you are to develop a healthy relationship with it.

As well as providing insight into a dog’s behavior, Reactivity is seen as *“preparing”* guardians for the type of relationship they may have with the dog and the *“special”* handling they may require. Subsequently, it equips guardians with the knowledge that dog behavior is contextual and stems from things beyond their control, such as *“feelings”* or *“past experiences.”* Such insight can act as a catalyst for accessing relevant support that enables guardians to *“do”* more for their dog:

Because you can start to understand what the dog is reacting to and why and then by exposing them to it and training them the correct behavioural response. The more you know the more you can do.

Contrary to the *“branding”* of *“aggressive,”* which seemingly led to a more definitive ending for working with a dog, Reactivity provided an avenue for providing more in-depth and progressive explanations for a dog’s behavior:

By having the term reactive dog you’re not branding them as aggressive. It means your able to provide a more in depth understanding of the dog and not see it as a negative rather you understand your dog is fearful.

Resultantly, a more positive perspective enables dog behavior to be seen objectively, re-focusing emphasis on the causal factors and explanations for behavior. As such, this provides a more solution- focused perspective:

For me, my dog isn't aggressive. He just wants other dogs to give him space. So, calling him aggressive isn't suitable and brings all sorts of connotations because of his breed that I don't want put on him. Reactive in his case describes the behaviour and that it's not aggressive, so it's suitable while we're working on it.

Thus, rather than encapsulating the temperament or personality of a dog as a distinct or fixed variable, Reactivity becomes conceptualized as something more productive. Removing "*connota-tions*" from the dog, the term offers a description of behavior, from which guardians can learn to understand, manage and respond to their dog's needs:

It avoids a dog being labelled as aggressive, which then leads to stigma. A reactive dog can be managed if you understand the triggers.

## The end point

However, Reactivity was also imbued with negative connotations attributed to the human side of the human-dog relationship. Specifically, this theme highlighted a pattern on how the term was used as a way of removing blame from the guardian:

Reactivity is labelling the dog & it's not their fault, it's the owners fault 100%!

This theme captured the notion of Reactivity as being misapplied in removing responsibility from the "*owner*" through placing the dog at "*fault*." However, there was a level of authenticity surrounding the notion of what guardians were deemed deserving of the use of the term. For example, below, a respondent details how they believe that when used by those unwilling to support their dogs, it diminishes the meaning of the word, leading to stigmatization due to people putting others at risk:

People who's dogs are truly aggressive and/or aren't working to eliminate those behaviours I don't believe should be using this term as it doesn't accurately describe what's happening and your commitment to the dog. Even though the people not working on it have reactive dogs, I don't like the idea that just because a dogs displaying those behaviours that it's ok and totally acceptable when it puts others safety at risk.

Above, the participant suggests that to be applied appropriately, the guardian should be seen as having "*commitment to the dog*." In this way, the term becomes far more laden by moral notions of appropriate human behavior in supporting their dog. As such, Reactivity is not just the behavior of the dog, but the way that guardians respond to it. If actively engaging and supporting their dog, the label becomes "*acceptable*," while those guardians who are dismissive of their dog's behavior become viewed as a "*risk*."

Contrary to earlier themes, Reactivity here, removes emphasis from the dog's behavior, placing emphasis on the "*owner*" as being a causal factor:

Bad behaviour is from bad owner, not breed

Within this conceptualization of Reactivity, guardians are not only positioned as at fault for their dog's "*bad behaviour*," but also as attributing the label as an "*excuse*":

It's an overused term and often becomes an excuse rather than something that needs to be fixed

Such overuse or mis-attribution, essentially results in further "*issues*," as once something has a name, it can be viewed as "*being*" and without need of "*addressing*":

However by labelling their issues, you are almost providing a further issue instead of just addressing and sorting what you can. I find with people when you label their problems they almost give up as it is an excuse to.

Ultimately, Reactivity was conceptualized here as something that was caused by, and the responsibility of, humans. Whilst the behavior may be performed by the dog, this theme demonstrated how the guardian interpretation and response to those behaviors were key in their development;

I personally believe a lot of pets these days know no boundaries and are treated like babies, then problems can begin

### **Misinterpreted and misunderstood**

Irrelevant of whether the focus was dog-centric or human-centric, a key pattern across the data raised concerns around the ambiguous and too-readily applied use of the term Reactivity. Specifically, there was a consensus that the term captured an array of behaviors without clarification of the type, severity or underlying causal factors for those behaviors:

Reactive is a catch all and could be mild or severe. Also, the dog could be reactive to stimuli that you rarely encounter, so wouldn't affect either of your lives too much.

As a result of this “*catch-all*,” the true impact of reactive behaviors and what they mean for the human-dog bond, cannot be explored without more consideration and unpicking.

### **Discussion and recommendations**

The present study intended to address the question “what do humans understand by the term Reactivity in relation to dog behaviour”?

The findings highlight the heterogeneity of understanding around the label of Reactivity, in addition to the multiple meanings associated with what the label encompasses. Whilst reactive behaviors are, in simple terms, behavioral responses to stimuli, these findings illustrate how the term Reactivity is conceptualized as somewhat more nuanced, capturing both canine and human factors.

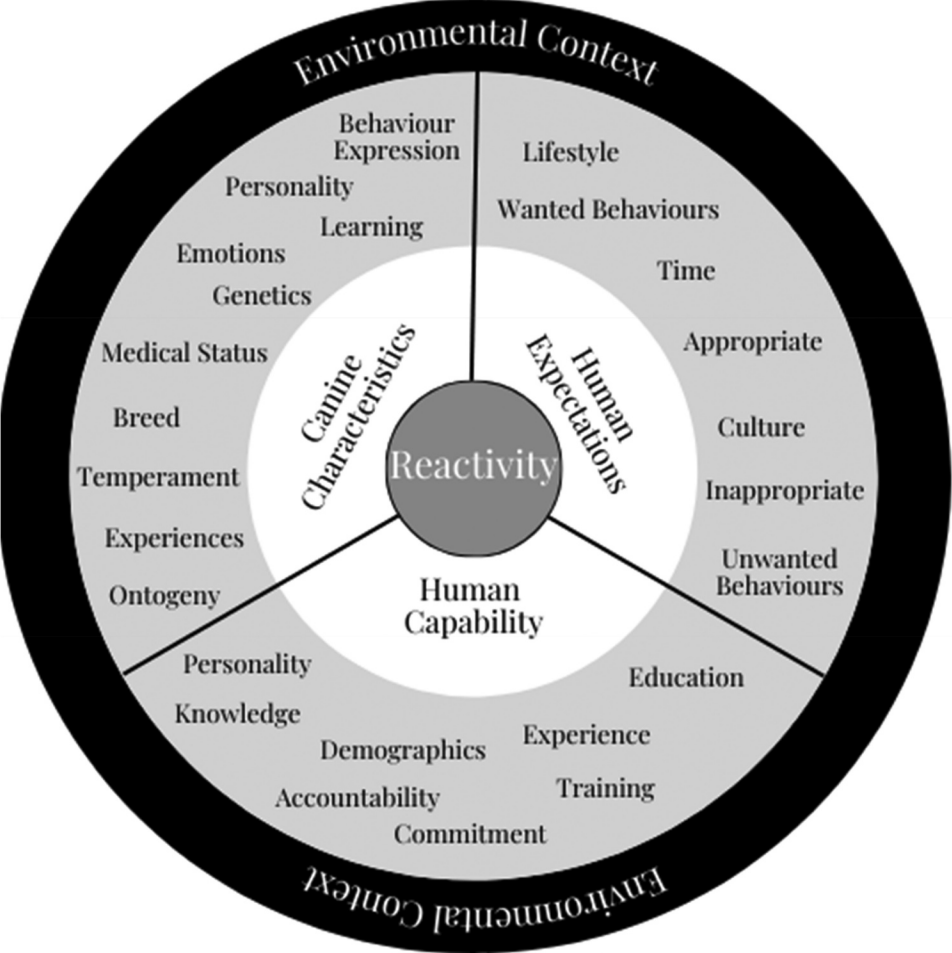
Unsurprisingly, a key theme captured the array of *Canine Characteristics* attributed to the term Reactivity. There is an array of literature considering the influence of canine genetics (Handegard et al., 2021; Overall, Dunham, & Juarbe-Diaz, 2016; Sulkama et al., 2021), neurobiology (Belpedio et al., 2010; Bradshaw, 2011; Carrier et al., 2013; Lindsay, 2001), ontogeny (Puurunen et al., 2020; Tiira & Lohi, 2015; Tiira et al., 2016), as well as early traumatic experiences (Hydbring-Sandberg et al., 2004; Lindsay, 2001) on canine behavior. Additionally, it is well-established that a number of natural canine behaviors expressed by dogs are underpinned by intrinsic predatory patterns (Coppinger & Coppinger, 2001; Lindsay, 2001). However, the present study highlights the application of the term, Reactivity, to encompass both natural (though unwanted) and more problematic behavioral concerns. Subsequently, this makes behavior classification, including their underpinning mechanisms, difficult. Academically, there is a differentiation between what may be called unwanted behaviors and those considered to be behavioral disorders (Lindsay, 2001). However, the use of Reactivity as reflected in this paper, can work in problematizing natural dog behaviors, whilst seemingly overshadowing more serious behavioral disorders. This is of particular concern given that it is typically these more serious behavioral disorders that pose a risk of harm, not only for the dog themselves, but for society too (Lindsay, 2001). This raises questions as to whether, Reactivity as a label, is inclusive of behavioral disorder, or simply unwanted behavior.

Furthermore, the over-arching themes of *The Importance of Human Perceptions* and *Human Capability* highlight the human-centric lens applied when considering dog behavior. These themes captured the fundamental role humans play in the conceptualization of dog behavior, as well as its suitability for everyday modern life. Essentially, while many behaviors are considered adaptive for canine companions (Coppinger & Coppinger, 2001; Lindsay, 2001), these behaviors are subject to human and societal ideals. This makes behavioral assessment

problematic, particularly in light of evidence that suggests that canine guardians often fail to interpret dog behavior and communication accurately (Grigg et al., 2021; Mariti et al., 2012). As such, a clearer conceptualization of canine behavior as it applies to the term Reactivity is warranted, particularly incorporating the human element of the human-canine relationship. In particular, it is imperative that the role guardians have in the categorization of canine behavior and what is perceived as Reactivity is accounted for.

**Implications: A preliminary conceptual framework for reactivity**

Based on the above, a more nuanced conceptualization of what is meant by the term Reactivity is needed. Given that dog behaviors exist within a modern human society, and are often interpreted through a human lens, such a conceptualization needs to capture both sides of the human-dog relationship. Thus, we propose the following Perceived Canine Reactivity Framework (Figure 2.). Drawing from the over-arching theme clusters, the framework encapsulates three distinct but overlapping elements found to be relevant in the conceptualization of Reactivity among canine companions:



**Figure 2.** The proposed, perceived canine reactivity framework.

- 1 - Canine Characteristics:** Capturing aspects relating to canine behavior, emotion and learning as well as epigenetics that influence behavioral expression as well as possible behavioral disorders.
- 2 - Human Expectations:** Capturing the human perception of what is considered appropriate or inappropriate canine behavior.
- 3 - Human Capability:** In terms of guardians' education, perceived capability and motivation toward training and behavior change.

Importantly, these three elements are dependent upon the environmental context in which the human-canine relationship exists. This framework aims to capture the multifaceted conceptualization of Reactivity, incorporating both sides of the human-canine relationship. Subsequently, Reactivity can be defined as canine behavioral displays (based on multiple developmental, cognitive and physiological factors), which are contrary to human expectations, and, often, outside of human capability to manage effectively. As such, we believe that this preliminary framework cannot only set the scene for a more formal conceptualization of Reactivity, but can also provide a basis for more accurate assessment of canine behavior, human expectations and capability. Formulation and subsequent assessment of each of these elements can then enable the tailoring of interventions to include education, targeted training or behavior modification targeting either the dog, guardian or both.

## Recommendations

Two key recommendations are proposed from this research. Firstly, further consideration is essential around the conceptualization of canine reactivity, and, particularly, for human perceptions around appropriate and inappropriate dog behaviors. Whilst this research has established a basis for consideration, more insight is imperative in developing more depth around a complex, and somewhat multifaceted concept. Given the complex interplay in the human-canine relationship, there is a real need for further research specifically examining human expectations around appropriate and inappropriate canine behavior. Additionally, future research should aim to gain insight into how human characteristics (including education, training-philosophy beliefs and support-seeking practice) mediate their perception of canine behavior and perceived Reactivity. Secondly, this research emphasized the importance of human expectations associated with the interpretation canine behavior in relation to the term Reactivity. Such a finding is particularly important when considering rehoming centers and attempts at matching human-canine adoptions. As such, we propose further development of the Perceived Canine Reactivity Framework in the form of an instrument specifically tailored to capturing canine behavior, human expectations and capabilities. The creation of such an instrument would allow for more appropriate assessment of canine behavior (in terms of whether they are unwanted or disordered), insight into guardian expectations for canine behavior as well as whether guardians are equipped with the resources for understanding and managing canine behavior. Not only would such an instrument be pivotal in supporting better human-canine matching during adoptions, it could also provide objective data for assessing individual cases (leading to tailored behavior modification plans targeting both canine behavior, and human education and/or skills). Subsequently, such an instrument could prove advantageous for all canine-related professionals and organizations.

## Declaration of interest

None to declare

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