Dog behaviours in veterinary consultations: Part 1. Effect of the owner's presence or absence

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Original Article

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Abstract

Veterinary practices can be stressful places for dogs. Decreasing stress during veterinary consultations is therefore a major concern, since animal welfare matters both for owners and veterinarians. Stress can be expressed through behaviour modifications; monitoring canine behaviour is thus one way to assess stress levels. We also know that the owner can affect dog behaviour in different ways. The aim of this study was therefore to assess the effect of the presence of owners on the behaviour of their dogs in veterinary consultations. We studied 25 dog-owner dyads at two standardised veterinary consultations, conducted at intervals of 5-7 weeks; the owner was present for the first consultation and absent for the second (O/NoO group, n=12), or vice versa (NoO/O group, n=13). A consultation consisted in three phases: exploration, examination, greeting. Dog behaviours were compared between the two conditions using a video recording.

Despite some limitations (e.g. no male owners, the exclusion of aggressive dogs, a limited sample size, minimally invasive veterinary examinations, restricted owner-dog interactions), our results showed that the presence or absence of the owner had no significant effect on the stress-related behaviour of the dog or the veterinarian's ability to handle the animal during the examination phase ($P > 0.05$). Nevertheless, the behaviour of the dogs towards people was affected before, during, and after the veterinary examination. In the presence of their owner, dogs were more willing to enter the consultation room ($P < 0.05$), and they appeared more relaxed during the exploration phase ($P < 0.01$). During the examination, dogs looked in direction of their owner in both situations (owner present and behind the door, respectively; $P < 0.001$). These results suggest that allowing the owner to stay in the room during veterinary consultations is a better option for canine welfare.

48 *Keywords:* Dog behaviour; Owner presence; Owner absence; Stress; Veterinary consultation

Introduction

Improving animal welfare during veterinary consultations is a key concern of veterinarians, researchers and owners alike. Dogs frequently experience stress in these situations (Lind, 2017; Edwards, 2019) which can be assessed by monitoring behaviour (Beerda et al., 1997; Maximino et al., 2010; Koolhaas et al., 2011), e.g., when entering the veterinary practice (Stanford, 1981; Mariti et al., 2017), during time spent in the waiting room (Mariti et al., 2015; Csoltova et al., 2017; Mariti et al., 2017), and during the examination itself (Döring et al., 2009; Mariti et al., 2017). In a study by Döring et al. (2009), 80% of dogs showed stress-related behaviours on the examination table; 56.3% panted, 61.5% shivered, and 71.9% displayed avoidance behaviour. Glardon et al. (2010) reported that approximately 25% of dogs could not be handled during the examination. Published studies have also reported physiological signs of stress, such as increased plasma cortisol levels, pulse rates, and blood pressure (Kallet et al., 1997; Vonderen et al., 1998).

Chronic stress can cause impaired welfare which can have negative effects on health, potentially leading to reduced immune performance (Herbert and Cohen, 1993; Stowell et al., 2001; Gimsa et al., 2018), increased rates of neoplasia (Riley, 1975; Dai et al., 2020), and premature aging (Epel et al., 2004). Acute stress, as expected in veterinary consultations, can lead to dysregulation of the autonomic response if the stress is extremely intense or recurrent (Chrapusta et al., 1997; De Kloet et al., 2005; Vaessen et al., 2015). Stress also modifies the behaviour of dogs and may increase aggression. When faced with a threatening situation, dogs tend to react in three different ways: freeze; fight; and/or flight (Bracha, 2004). Canine aggression is also dangerous for veterinarians and owners. In Australia, 48% of veterinarians reported that they had been bitten by a dog at work between one and five times in the previous 12 months (Fritschi et al., 2006).

The ways in which dogs tend to react depends on their temperament (Goodloe and Borchelt, 1998; Serpell and Hsu, 2001; Svartberg, 2002; Bray et al., 2017); coping style (Koolhaas et al., 1999; Horváth et al., 2007; Diverio et al., 2017); genetics (Wilsson and Sundgren, 1997; Saetre et al., 2006; Meyer et al., 2012; Arvelius et al., 2014; Persson et al., 2015); and previous experiences (Seligman et al., 1979; Döring et al., 2009; Douglas et al., 2012). According to Döring et al. (2009), even one past aversive experience increases stress-related behaviour in dogs, thus modifying their behaviour at future visits to the veterinarian.

Many factors can be stressful for dogs in a veterinary practice (Edwards, 2019), such as transportation between home and the practice (Beerda et al., 1997), the novel location (Beerda et al., 1997), the 'white coat effect' (Kallet et al., 1997; Belew et al., 1999), the presence of new people and animals (Scotney, 2010), and unusual sounds and activities (Beerda et al., 1997; Wells et al., 2002). Even smells such as those released by stressed people and animals can be stressful for dogs (Graham et al., 2005; Siniscalchi et al., 2011; Siniscalchi et al., 2016). In addition, dogs can be fearful when entering a veterinary practice due to previous experiences (Döring et al., 2009; Ziv, 2017). Veterinarians may also use gestures or postures that are stressful for dogs (Mariti et al., 2017; Edwards, 2019), such as bending over them (Vas et al., 2005; Győri et al., 2010; McGreevy et al., 2012), touching them (Payne et al., 2015), placing them on the examination table (Döring et al*.,* 2009). restraining them by force (Beerda et al*.*, 1997), holding their collar or closing their mouth (Kuhne et al., 2014), looking at them directly in the eyes (Győri et al*.,* 2010), or bringing their face close to the dog's head (Rezac et al., 2015). As a result, veterinary practices may be fearful places for dogs.

Other stressful factors can originate from the owner (Lind, 2017). Studies focused on dog-owner attachment have shown that dogs can behave differently depending on whether their owner is present or absent (Topál et al., 1998). In particular, when dogs are left in a novel place without a familiar caregiver, they show higher activity (Tuber et al., 1996), higher circulating glucocorticoid concentrations (Tuber et al., 1996; Palestrini et al., 2005), higher heart rates (Palestrini et al., 2005), and higher anxiety (Prato-Previde et al., 2003; Palestrini et al., 2005; Parthasrathy and Crowell-Davis, 2006), even if an unknown person is present (Parthasrathy and Crowell-Davis, 2006). Miklosi et al. (2003) showed that dogs looked at their owner when facing an unsolvable task, and Kerepesi et al. (2015) demonstrated that dogs moved closer to their owner but not towards other individuals, even familiar ones, in situations provoking anxiety or fear. Other studies have shown that dogs react in the same way as their owner when confronted with a strange object (Merola et al., 2012) or an unknown person (Duranton et al., 2016).

Owners can thus potentially modify the behaviour of their dog in a veterinary consultation. This hypothesis has been observed anecdotally by veterinarians in the field. Some believe that the very presence of owners can calm down their dog, whereas others maintain that dogs are easier to handle in the absence of their owner. A study by Stellato et al. (2020) investigated this question and reported positive effects of owner presence on behavioural and physiological measures of fear in dogs during veterinary consultations.

In Part 1 of our study, we examined the effect of owner presence or absence on the behaviours of dogs during a veterinary consultation, regardless of the owners' actions. Based on the abovementioned literature, we expected the owner's presence to decrease stress-related behaviours of dogs during the veterinary examination and hence facilitate their handling by

123 the veterinarian. In Part 2 of the study (Helsly et al., 2022), using the raw data from
124 consultations with the owner present, we explored whether owners' actions affected dog
125 behaviours by observing dog-owner dyads.
126
127 **Materials and methods**
128 *Participants*
129 All participants were volunteers and were recruited via social media. The owners (all
130 women) and dogs meeting the following criteria were selected: adult dogs between 12 months
131 and 10 years old and unfamiliar with the researchers, measuring less than 70 cm at the withers
132 in order to be easily lifted and examined on the table, in good general health, and
133 nonaggressive towards humans to avoid the use of a muzzle that could modify their
134 behaviour; owners not working as a veterinarian, assistant, or veterinary student. A total of 32
135 dog-owner dyads were recruited, but four dogs were excluded due to the owner's withdrawal
136 between the two appointments, another one due to aggressive behaviour and two due to
137 protocol deviation. Thus, the study finally included 25 owner-dog dyads. Participant
138 demographics are shown in Table 1.
139
140 *Experimental procedure*
141 The study protocol was approved by the Ethical Committee SSA (Science et Santé
142 Animale) Number115 (SSA_2018_008) on 18 July 2018. The experiment took place in an
143 examination room at the National Veterinary School of Toulouse (ENVT), France (Fig. 1).
144 All dogs underwent two videotaped veterinary consultations at an interval of 5-7 weeks
145 (Table 1), one in the presence of their owner and the other in their absence. Prior to each
146 consultation, all owners were told how to behave with their dogs. The veterinary consultations
147 were all carried out by the same two researchers: two female veterinary students, one in the

role of the veterinarian (C. G.) and the other in the role of the assistant (M. H.). During the consultations, the researchers conducted the veterinary examination using as neutral a disposition as possible: the researchers stayed still and did not talk to the dogs, pet them, make eye contact with them, or punish them. The veterinary consultation was divided into three main phases: phase 1: exploration; phase 2: examination; and phase 3: greeting. We consider a 'consultation' to include all events between the times when the dog entered and exited the examination room, whereas an 'examination' includes only the phase where the dog was examined (see 'Standardised protocol for the veterinary consultations' below). Dogs were randomly distributed into two groups using AB/BA crossover design: in the O/NoO group (n = 12), the owner was present for the first veterinary consultation and absent for the second, and vice versa in the NoO/O group (n = 13). Consultations were arranged by appointment according to the availability of owners.

Raw data collected for this study was also used in Part 2 (Helsly et al., 2022). Part 2 focuses on data collected during consultations with the owner present. Four additional dogs were included in Part 2 but not in Part 1 because these dyads did not attend the second consultation with the owner absent.

Data collection and analysis

Consultations were videotaped from when the dog entered the consultation room until the end of the greeting phase. We used two cameras (a Canon Legria HF S21 and a Panasonic HC-WX970 with a Panasonic vW-W4907H wide-viewing angle) situated in two corners of the room and facing the examination table. The recorded videos from the two cameras were synchronised and assembled into a single video (Fig. 1).

The variables we studied, described below, differed depending on the phase of the consultation. A summary of all studied variables and their availability for the three phases is described in Supplementary Table S1 (see Appendix A: Supplementary material). Dog behaviour was analysed using the Solomon Coder beta 17.03.22 program[1] and the behavioural repertoire adapted from the literature (Beerda et al., 1998; Mills et al. 2006; Deldalle and Gaunet, 2014; Csoltova et al., 2017, Table 2). Stress-related behaviours among these behaviours are highlighted in Table 2. As the phase durations were variable, the durations of behaviours were converted into a time percentage (behaviour duration/phase duration) for all behaviours. Behavioural indices were further computed as detailed in Table 3. The Emotional State of the dog is a subjective rate assessing stress, scored by using a three-point scale defined as follows: relaxed, aroused, anxious, see definitions in Table 4. The dog's apparent comfort when entering the room and the greeting intensity of the dogs towards their owner and of owners towards dogs were evaluated using a five-point scale defined in Table 5. The level of physical restraint was scored using a three-point scale defined as follows: low, medium, high. All definitions are given in Table 6. The success and difficulty of the manipulations were evaluated using a scale defined in Table 7.

Standardised protocol for the veterinary consultations

Owner: present condition

Exploration phase (phase 1): The owner entered the room with her dog on a leash and sat on a chair (Fig. 2). The leash was dropped, and the dog explored the room freely for 2 min 30 s. Neither the owner or the researcher spontaneously interacted with the dog; the owner could nevertheless respond to the dog's behaviour (physical, verbal and visual interactions

[1] See : Solomon Coder, András Péter, https://solomoncoder.com (Accessed 11 November, 2021).

were allowed). The researchers asked questions similar to those asked in a standard veterinary consultation.

Examination phase (phase 2): The dog was put on the examination table by the researchers; the owner stood one metre away from the table in a designated spot, facing the dog. The veterinarian began a standardised veterinary examination following this predefined sequence: examination of eyes, ears, teeth, gums, palpation of lymph nodes, examination of scapular skin fold, abdominal palpation, heart and lung auscultation, measurement of rectal temperature, and paw palpation. The assistant held the dog using a standardised restraint (Fig. 3): one hand on the chest and another on the base of the tail, using the minimal necessary strength to keep the dog sitting or standing on the table. If a particular manipulation failed because the dog was not cooperative for 5 s (for example, the dog struggled, resisted, or tried to escape), the veterinarian did not repeat the manipulation and continued with the next one. During the examination phase, the owner was only allowed to talk to or look at her dog (verbal and visual interactions were allowed). If the dog showed any sign of aggression toward the researchers or behaviour endangering them (for example, growling, showing teeth, or trying to bite), the procedure was terminated, and the dog was excluded from the study.

Greeting phase (phase 3): This phase started when the dog was on the floor and the owner in the room and lasted exactly 20 s. The dog was indeed taken down from the table by the researchers, and the leash was given back to the owner. The researchers then stepped aside and filled in forms in order to allow the owner and the dog to interact freely (physical, verbal and visual interactions were allowed).

Owner: absent condition

The procedure was the same as with 'Owner: present condition', except that the owner waited outside the room during the exploration and examination phases and only entered the room for the greeting phase. During the exploration phase, the owner accompanied the dog to the open door, gave the leash to the assistant and was free to interact with the dog in order to encourage the dog to enter the room. The dog explored the room freely for 2 min 30 s while still on the leash. During this phase, the researchers did not interact with the dog and spoke in a neutral tone. The procedure of the examination phase was the same as described in 'Owner: present condition'. During the greeting phase, the dog was taken down from the table by the researchers. Then, the assistant went outside to fetch the owner, and the leash was given back to the owner when she came back in the room without specific instructions. The end of this phase was the same as described in 'Owner: present condition' after having given the leash back to the owner.

Interobserver agreement

Three assessors participated in the video analysis. The two researchers coded all the behaviours in all the videos: half of the behaviours were coded by one researcher and the other half by the second researcher. To assess the reproducibility of the behavioural analysis, a third assessor who was unaware of the study hypotheses and aims coded 30% of the behaviours in a random subset of 30% of the videos. Considering that a concordance, and not only a correlation, was needed to assess the interobserver reproducibility, Lin's concordance correlation test was used (Lawrence et al., 1989; Barnhart et al., 2002; Barnhart et al., 2007). Interobserver agreement between the two assessors was determined by calculating ρC values and rated according to Landis and Koch (1977) (ρC = 0 - 0.2: slight agreement, ρC = 0.21 - 0.4: fair agreement, ρC =0.41 - 0.60: moderate agreement, ρC = 0.61 - 0.8: substantial agreement, ρC > 0.81: excellent agreement). Lin's concordance correlation coefficients were

excellent ($\rho C > 0.98$) for whining, tail between the legs, and moving and gazing at the owner, and substantial for contact with the assistant ($\rho C = 0.71$) and sniffing ($\rho C = 0.69$). Physical restraint was evaluated by the assistant, the success and difficulty of the manipulations were assessed by the veterinarian, and the other scores were rated by the three assessors.

Statistical analysis

The exploration, examination, and greeting phases were analysed separately. Comparisons were carried out for each behaviour or behavioural index between the owner absent and present conditions by paired Student's *t* test using R software[2].

Results

On average, the exploration phase lasted 155.43 ± 9.54 s and the examination phase 142.53 ± 16.4 s. The greeting phase, standardised in the study, lasted 20 s.

Exploration phase (phase 1)

Entering the room

Dogs appeared to enter the room more readily when the owner was present rather than absent, and the difference was significant ($P < 0.05$, Table 8 and Video 1).

Emotional state

Dogs had a significantly lower score for emotional state during the exploration phase when the owner was present rather than absent ($P < 0.05$, Table 8 and Video 2).

Examination phase (phase 2)

[2] See: The R Project for Statistical Computing. http://www.r-project.org./h (Accessed11 November 2021)

Stress-related behaviour

No differences were observed regarding the stress-related behaviours or Total Stress (defined in Table 3) during the examination phase in the presence or absence of the owners ($P > 0.05$).

Behaviour towards the veterinarian and assistant

The dog contact with the veterinarian and/or assistant lasted significantly longer during the examination phase if the owner was present rather than absent ($P < 0.001$, Table 9).

Behaviour towards the owner and/or door

During the examination phase, dogs looked straight ahead toward the assigned place of the owner significantly more if the owner was present rather than absent. ($P < 0.001$, Table 9 and Video 3). Furthermore, dogs looked at the door significantly less when their owner was present rather than absent ($P < 0.001$, Table 9 and Video 3).

Dog handling

No difference was observed regarding the restraint and the success and difficulty scores of manipulations in the presence or absence of the owners ($P > 0.05$).

Greeting phase (phase 3)

Intensity of greeting

When the dog and owner were reunited after the examination phase, dogs greeted their owners for a significantly shorter period of time ($P < 0.01$) and showed a lower reunion score ($P < 0.0005$) if the owner was present rather than absent during the examination phase (Table

295 10 and Video 4). Nevertheless, the scores of owner behaviour towards their dog were similar
296 regardless of whether the owner was present or not in the previous phase ($P > 0.05$).
297
298 Door-directed gaze
299 There was not a statistically significant difference between whether owners were
300 present or absent regarding dogs gazing at the door ($P = 0.08$; Table 10 and Video 5).
301
302 **Discussion**
303 This experiment aimed to investigate whether the presence or absence of the dog owner
304 influenced canine behaviours in veterinary consultations. Our findings suggest that allowing
305 the owner to stay in the room during a veterinary consultations is a better option for the dog's
306 welfare. During the exploration phase, in the presence of their owner, dogs were more willing
307 to enter the consultation room and appeared more relaxed. During the examination phase,
308 dogs looked in direction of their owner when their owner was present (standing in front of the
309 dog); dogs looked straight ahead more often and at the door less often than when the owner
310 was absent. When the owner was absent during the examination phase (she had left the room
311 through the door), the dogs looked at the door more often and looked straight ahead less often
312 than when the owner was present. Physical contacts engaged by dogs with the researchers
313 lasted longer when their owners were present. Our results also indicated that the presence or
314 absence of the owner had no significant effect on the stress-related behaviour of the dog or the
315 veterinarian's ability to handle the animal during the examination phase. Finally, during the
316 greeting phase, our results showed that if the owner had never left the room, the dogs
317 exhibited less greeting behaviour than if the owner had been absent.
318

A study by Stellato et al. (2020) focused on the effect of the presence or absence of the owner on dog behaviour in veterinary practices, comparing two standardised veterinary consultations with owner present or absent. Dogs had a lower rate of vocalisation, higher rate of yawning and lower mean axillary temperature in the presence of the owner. Thus, they encouraged owners to remain with their dog during routine veterinary examinations. Note that we did not find similar differences for vocalisation and yawning, but we did find significant differences for other parameters. A study by Csoltova et al. (2017) focused on the active or passive support of the owner during veterinary examinations. The authors compared behavioural and physiological measures of dogs during a veterinary examination under two conditions: the active presence of the owner (talking and petting), and the passive presence of the owner (sitting quietly next to the examination table). They found heart rate and internal temperature variations showing a beneficial effect of dog-owner interaction on the dogs' well-being, but no significant behavioural changes. As mentioned in the Introduction, dog owners can affect the behaviour of their dog. Studies have shown that dogs adjust their behaviour to their owner's overall emotional body posture (Vas et al., 2005; Custance and Meyer 2012), to the owner's behaviours (Millot, 1994; Merola et al., 2012; Horn et al., 2012; Duranton and Gaunet, 2015); and to the owner's facial expressions (Deputte and Doll, 2011). Other studies detailed in Part 2 of this study reported that physical contact did not have the same effect on dog behaviour as talking (Helsly et al., 2022). The effect of the presence of the owner is thus difficult to accurately predict, as it can depend on the owner's behaviour and mood.

In the present study, several factors could explain the absence of any significant differences in stress-related behaviours during the examination phase. Firstly, physical contact between the owners and dogs was not allowed during the examination phase, to control parameters not being studied. Csoltova et al. (2017) showed a beneficial effect of contact

during veterinary examinations, although Part 2 of our study reported that talking and physical contact did not have the same effect (Helsly et al., 2022). Our study also subjectively evaluated stress (emotional state). This evaluation showed higher levels of stress during the exploration phase (phase 1) when the owner was absent than when the owner was present. In contrast, during the examination phase (phase 2), no difference was found in the subjective evaluation by the judges (emotional state) or the video analyses (stress-related behaviours). Firnkes et al. (2017) demonstrated that some stress-related behaviours ('licking of lips' and 'looking away') decrease even when the intensity of the stressor increases. We thus postulate that the dogs reached a high threshold of stress in the 'Owner: absent condition' that prevented them from displaying additional stress-related behaviours. Potentially, too many stressors may mask the display of stress-related behaviour at some point. Alternatively, the absence of any difference may show that dogs are not actually more stressed when the owner is absent during a veterinary examination. In the examination phase, dogs engaged in more physical contact with the researchers when their owner was present than when their owner was absent. This engagement with researchers suggests that in an interventionist situation, if we had imposed physical contact on the dogs to keep them on the table, the presence of the owner would act as a social reference for the dog towards the veterinarian and assistant. That is, the presence of the owner could help dogs to handle this difficulty. Even if no significant differences were shown in terms of stress-related behaviours during examination phase, other results suggest that the owner does play a role. For instance, dogs looked in the direction of their owner whether they were present or absent. This also emphasizes the importance of the owner's presence to help dogs cope with the situation (e.g. social referencing in Merola et al., 2012; Duranton et al., 2016; Salamon et al., 2020; and also Part 2 of this review (Helsly et al., 2022). Furthermore, greeting behaviours during the two reunion conditions differed. Once dogs were placed back on the floor and the leash was given back to the owner, dogs showed

more greetings when the owner returned than if the owner had never left the room. This is in accordance with studies reporting that greeting behaviour is more marked when dogs spend a stressful time without their owner (Konok et al., 2011; Rehn and Keeling, 2011). In our study, there was no significant difference in gazing at the door during the greeting phase when the owner had come back compared to when the owner had never left. Dogs are known to look at a desirable object (Gaunet, 2008; Gaunet, 2010; Gaunet and Deputte, 2011), and thus they may have been more motivated to leave the room when their owner was absent, since the time they spent in the room was more stressful, in accordance with the emotional state evaluation during the exploration phase. Finally, the presence of the owner had no detrimental effect and some beneficial effects on the dogs in our study. Dogs were neither more stressed or more difficult to handle during examination phase and appeared less stressed during the exploration phase. To summarise, the presence of owners appeared to be more beneficial than their absence during veterinary examinations.

There were several limitations in this study. Our sample size was small, the veterinary examination was minimally invasive; puppies, old dogs and dogs > 70cm high were not included, and aggressive dogs were excluded from our study for safety reasons. Glardon et al. (2010) estimated that 16% of dogs displayed aggressive behaviour during veterinary examinations. If these dogs had been included in the study, the results may have been different, since aggressive dogs can be less tolerant of manipulations. Additionally, the manipulations used in this study were standard but minimally invasive. The dogs' tolerance of manipulation could have changed if we had employed more invasive or painful procedures (Holton et al., 2001; Hansen, 2003), and the presence or absence of the owner could have had a different effect in these cases. Owner and researcher behaviour could also have differed from a real-life scenario, as owners were not allowed to touch their dogs during the

examination phase, and researchers kept a neutral disposition and did not initiate interaction toward dogs or respond to their requests for attention. The dogs in our study were healthy and did not need any invasive manipulation. Owners may be more stressed in a real veterinary examination and therefore have a different effect on dog behaviour than in the controlled experimental conditions. While it has been shown that dogs react differently to men and women (Hennessy et al., 1998; Wells and Hepper, 1999; Deputte and Doll, 2011), we were not able to study the gender effects of owners and researchers on the behaviours of the dogs, as both the owners and researchers were all women. In the present study, we focused on canine behaviour, although physiological measures such as plasma or salivary cortisol, heart rate, and infrared thermography can also be used. These measures could provide additional information about the stress experienced by dogs during veterinary consultations and help highlight the differences that cannot be observed by behaviour analysis alone, such as behaviours with high interindividual variation (Firnkes et al*.,* 2017). We thus encourage further studies to focus on neurochemical and physiological differences in conjunction with behavioural differences, to use a larger sample of dogs and to study the effect of owner gender.

Conclusions

In summary, despite some limitations (e.g. no male owners, no dog > 70cm high, no old dogs or puppies, no aggressive dogs, 25 dogs/dyad, minimally invasive examinations, restricted owner-dog interactions), the current study shows that the presence of the owner in veterinary consultations (constituted by exploration, examination and greeting phases) may help to reduce the stress-related behaviours of dogs before veterinary examinations. During examination phase, dogs looked at their owners and appear to seek social information from owner, whereas when their owners were absent, they looked for them. Behaviours such as

greeting their owners and door-related behaviours suggest that even if no significant differences were shown for stress-related behaviours in terms of the absence or presence of owners, dogs were less stressed during examination phase when their owner was present. Given these results, it seems more appropriate to allow owners to attend veterinary examinations with their dog, as only positive effects were observed in terms of the dogs' behaviour and well-being, in spite of the previously mentioned limitations.

Conflict of interest statement

None of the authors has any financial or personal relationships that could inappropriately influence or bias the content of the paper.

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Supplementary material

Supplementary data associated with this article can be found, in the online version, at doi: …

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760 **Table 1**

761 Characteristics of owners and dogs.

Dogs	Experimental group	Interval between visits (weeks)	Dog age (years)	Sex of dogs	Dog breed	Age of owners
1	NoO/O	5	3	FN	Mixed shepherd	25-40
2	NoO/O	5	1	MN	Mixed Retriever	25-40
3	NoO/O	6	4	FN	Cavalier King Charles	41-60
4	O/NoO	5	2.5	FN	Beauceron	25-40
5	O/NoO	7	3	FN	Schapendoes	<25
6	O/NoO	5	5	FE	Mixed terrier	25-40
7	O/NoO	6	5	FN	Mixed terrier	>60[a]
8	O/NoO	6	5	ME	Mixed terrier	>60[a]
9	O/NoO	6	7.5	MN	Labrador	41-60
10	O/NoO	6	2.5	ME	Boxer	25-40
11	NoO/O	5	5	MN	Mixed terrier	25-40 [a]
12	O/NoO	5	6	MN	Mini Australian shepherd	25-40 [a]
13	NoO/O	7	2.5	MN	Whippet	25-40
14	O/NoO	5	2	ME	Boxer	41-60
15	NoO/O	6	2	MN	French bulldog	41-60
16	O/NoO	5	1.5	ME	German shepherd	41-60
17	O/NoO	7	7	FN	Spitz	25-40
18	O/NoO	6	2	FE	Boxer	41-60
19	NoO/O	7	4	MN	Whippet	>60
20	NoO/O	6	3.5	FN	Cotton Tulear	25-40
21	NoO/O	5	3.5	MN	White Swiss shepherd	25-40
22	NoO/O	7	9	FN	Australian shepherd	41-60 [a]
23	O/NoO	7	3	FN	Australian shepherd	41-60 [a]
24	NoO/O	6	4	FE	Groenendael	25-40
25	NoO/O	7	5	ME	Malinois	41-60

762 NoO/O, Owner was absent for the first veterinary consultation and present for the second;
763 O/NoO, Owner was present for the first veterinary consultation and absent for the second; F,
764 Female; M, Male; N, Neutered; E, Entire.
765 [a] Owners participating with more than one dog.

766 **Table 2**

767 Recorded dog behaviours during the examination and greeting phases and their definitions.

768

Observed behaviour	Definition
Non-exclusive stress-related behaviours	
Scratching [a] / Sniffing[a] / Shivering [a] / Shaking [a]	The dog scratched itself / The dog sniffed the ground or straight ahead / The dog trembled / The dog shook
Low postures[a]	The dog's tail was lowered, its ears faced backwards, or its legs were bent; at least two of these postures were exhibited
Mouth (exclusive behaviours)	
Yawning [a] / Panting [a] / Licking [a]	The dog yawned / The dog panted / The dog licked its mouth
Vocalisations (exclusive behaviours)	
Whining [a] / Barking [a]	The dog whined / The dog barked
Gaze (exclusive behaviours)	
Gaze at a person	The dog gazed with its head oriented towards the owner (Gaze O), the veterinarian (Gaze V), the assistant (Gaze A), or the veterinarian and the assistant (Gaze VA)
Gaze at an object or thing	The dog gazed with its head oriented towards the door (Gaze D) or straight ahead when on the table (Gaze Ad)
Avoidance (exclusive behaviours)	
Avoidance	The dog stepped backwards away from the veterinarian or the assistant following one of their actions
Situation (exclusive behaviours)	
Situation / somebody	Half of the dog's body (head and chest) was situated less than 50 cm from the owner (Situation O) or from the veterinarian and the assistant (Situation VA)
Situation / something	Half of the dog's body (head and chest) was situated less than 1 m from the door (Situation D), or the dog was not in one of the previous locations (Situation E)
Movement (exclusive behaviours)	
Move	The dog moved its four limbs with less than 1 s between the movement of each limb
Contact (exclusive behaviours)	
Contact	The dog intentionally touched the owner (Contact O), the veterinarian (Contact V), or the assistant (Contact A)

Tail (exclusive behaviours)	
Tail wagging	Tail wagged below the spine but was not between the legs
Tail between legs [a]	Tail was between the rear limbs
Tail low	Tail was below the spine but was not wagging or between legs
Tail high	Tail was above the spine, whether wagging or not

769 [a] Stress-related behaviours

Table 3

Behavioural indices calculated using several behaviours shown in Table 2.

Index (Unit)	Definition	Formula
Total Stress (%)	Sum of percentages of time spent yawning, panting, scratching, adopting low posture, shivering, sniffing, whining, barking and licking	Total Stress (%) = Yawning (%) + Panting (%) + Shivering (%) + Low postures (%) + Shaking (%) + Sniffing (%) + Whining (%) + Barking (%) + Licking (%)
Contact V+A (%)	Sum of percentages of time spent in contact with veterinarian (V) and/or assistant (A)	Contact V+A (%) = Contact V (%) + Contact A (%)
Gaze V+A (%)	Sum of percentages of time spent gazing at veterinarian (V) and/or assistant (A)	Gaze V+A (%) = Gaze V (%) + Gaze A (%) + Gaze VA (%)
Gaze O+Ad (%)	Sum of percentages of time spent gazing at owner (O) when present or straight ahead (Ad) when absent	Gaze O+Ad (%) = Gaze O (%) + Gaze Ad (%)
Behav. Tow. Owner (%) (dog behaviours towards owner)	Sum of percentages of time spent gazing at, having contact with, and seeking proximity to the owner	Behav. Tow. Owner (%) = Gaze O (%) + Contact O (%) + Situation O (%)

%, Time percentage (behaviour duration/phase duration); Yawning, The dog yawned; Panting, The dog panted; Scratching, The dog scratched itself; Low posture, The dog's tail was lowered, its ears faced backwards, or its legs were bent, at least two of these postures were exhibited; Shaking, The dog shook; Sniffing, The dog sniffed the ground or straight ahead; Whining, The dog whined; Barking, The dog barked; Licking, The dog licked its mouth; Contact V, The dog intentionally touched the veterinarian; Contact A, The dog intentionally touched the assistant; Gaze V, The dog gazed with its head oriented towards the veterinarian; Gaze A, The dog gazed with its head oriented towards the assistant; Gaze VA, The dog gazed with its head oriented towards the veterinarian and the assistant; Gaze O, The dog gazed with its head oriented towards the owner; Gaze Ad, The dog gazed with its head oriented straight ahead when on the table; Contact O, The dog intentionally touched the owner; Situation O, Half of the dog's body (head and chest) was situated less than 50 cm from the owner.

Table 4

Rated emotional states of dogs during exploration, examination, and greeting phases, their definition, and their score.

Emotional state	Definition	Score
Relaxed	No or low frequency of movement, with no visual evidence of tension in the body	1
Aroused	Tense, with high frequency of movement, but no visual evidence of anxious behaviours	2
Anxious	Tense, with licking, yawning, crying, agitation or observable fearful posture	3

790 **Table 5**

791 Rated scores of dogs when entering the examination room (exploration phase) and reuniting
792 with the owner after the veterinary examination (greeting phase), along with the name of the
793 factor and the signification of the score.

794

Factor	Name of factor	Score (from 1 to 5)
Apparent comfort in entering the room	Entering Room	1, Has to be drawn to enter 5, Enters voluntarily, pulls on leash
Greeting intensity by dog towards owner	Reunion / Dog	1, Indifferent, 5, Very happy, jumps on the owner, requests contact
Greeting intensity by owner towards dog	Reunion / Owner	1, Indifferent 5, Talks to the dog, pets the dog a lot

795 **Table 6**

796 Rated levels of dog restraint performed by the assistant during the examination phase, along

797 with their definition and score.

798

Restraint	Definition	Score
Low	The assistant did not need to use force to keep the dog in the right position. The dog was voluntarily almost immobile.	1
Medium	The assistant needed to increase her restraint of the dog to keep it in the same position. The dog was agitated/moved frequently.	2
High	The assistant had to hold the dog firmly to keep it on the examination table or help the veterinarian perform the clinical examination. The dog tried to escape.	3

Table 7

Rated manipulations performed by the veterinarian during the examination phase and the meaning of their success and difficulty score.

Manipulation	Definition	Score and Value	
Table	Dog was picked up and lifted onto the examination table	Failure, 0 [a] Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Eye	Eye and mucosa observation	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Ear	Ear manipulation and observation	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Mouth	Examination of teeth and mouth mucosa	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Palpation	Abdominal and lymph node palpation	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Skin fold	Examination of scapular skin fold	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Auscultation	Cardiac and pulmonary auscultation	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Thermometer	Measuring rectal temperature	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult
Paws	Manipulating paws	Failure, 0 Success, 1	Difficulty (from 1 to 5) 1, Easy / 5, Difficult

[a] Each dog received a score of 0 or 1, these scores were used to calculate the percentage of success of all 25 dogs.

804 **Table 8**

805 Emotional state of dogs in a veterinary practice with the presence or absence of the owner

806 during the exploration phase. Results are expressed as the mean ± standard error.

Behaviours (units)	Owner present condition	Owner absent condition	t	*P*	1-ß (%)
Entering room (score)	3.24 ± 0.76	2.72 ± 1.27	-2.7	0.012	100
Emotional State (score)	1.76 ± 0.63	2.22 ± 0.69	3.682	0.001	69.2

807 Entering room, Rated apparent comfort in entering the room (1 = Dog has to be drawn to
808 enter, 5 = Dog enters voluntarily, pulls on leash; also see Table 5); Emotional State, Rated
809 emotional states of dogs (1 = Relaxed, No or low frequency of movement, with no visual
810 evidence of tension in the body; 2 = Aroused, Tense, with high frequency of movement, but
811 no visual evidence of anxious behaviours; 3 = Tense, with licking, yawning, crying, agitation
812 or observable fearful posture; also see Table 4).

Table 9

Behaviour of dogs in a veterinary practice with the presence or absence of the owner during the examination phase. Results are expressed as the mean ± standard error. Non-significant results are not presented.

Behaviours (units)		Owner present condition	Owner absent condition	*t*	*P*	1-ß (%)
Behaviour towards veterinarian and/or assistant						
Contact V+A	Duration (% time)	2.33 ± 4.91	1.34 ± 3.86	-2.187	0.039	12.2
Behaviour towards owner and/or door						
Gaze O+Ad	Duration (% time)	37.32 ± 19.33	21.64 ± 12.17	3.342	0.0008	93
Gaze Door	Duration (% time)	12.46 ± 9.56	25.15 ± 13.52	3.813	0.0008	96.9

Contact V+A, Sum of percentages of time spent in contact with veterinarian (V) and/or assistant (A); Gaze O+Ad, Sum of percentages of time spent gazing at owner (O) when present or straight ahead (Ad) when absent; Gaze Door, Sum of percentages of time spent gazing at the door; % time, Percentage of time (behaviour duration/phase duration; also see Table 3).

Table 10

Behaviour of dogs in a consultation room with the presence or absence of the owner during the greeting phase. Results are expressed as the mean ± standard error. Non-significant results are not presented.

Behaviours (units)		Owner present condition	Owner absent condition	*t*	*P*	1-ß (%)
Behav. Tow. Owner	Duration (% time)	129.24 ± 50.70	170.76 ± 49.70	3.455	0.002	83.3
Reunion / Dog	Score	3.11 ± 1.29	4.24 ± 0.79	5.106	0.00003	96.2
Gaze Door	Duration (% time)	8.12 ± 8.95	12.32 ± 13.50	1.818	0.081	25.4

Behav. Tow. Owner, Behaviour Towards Owner, Sum of percentages of time spent gazing at, having contact with, and seeking proximity to the owner (also see Table 3); Reunion / Dog, Rated greeting intensity by dog towards owner (1 = indifferent; 5 = very happy, jumps on the owner, seeks contact; also see Table 5); % time, Percentage of time (behaviour duration/phase duration); Gaze Door, Percentage of time spent gazing at the door.

832 **Figure legends**

833

834 Fig. 1. Image of the experimental room, with the two videos assembled in a single image.

835 Left: 'Owner: absent condition'. Right: 'Owner: present condition'

836

837 Fig. 2. Layout of the experimental room. A: veterinarian's chair, B: assistant's chair, C:

838 owner's chair, X: owner's position during the veterinary examination

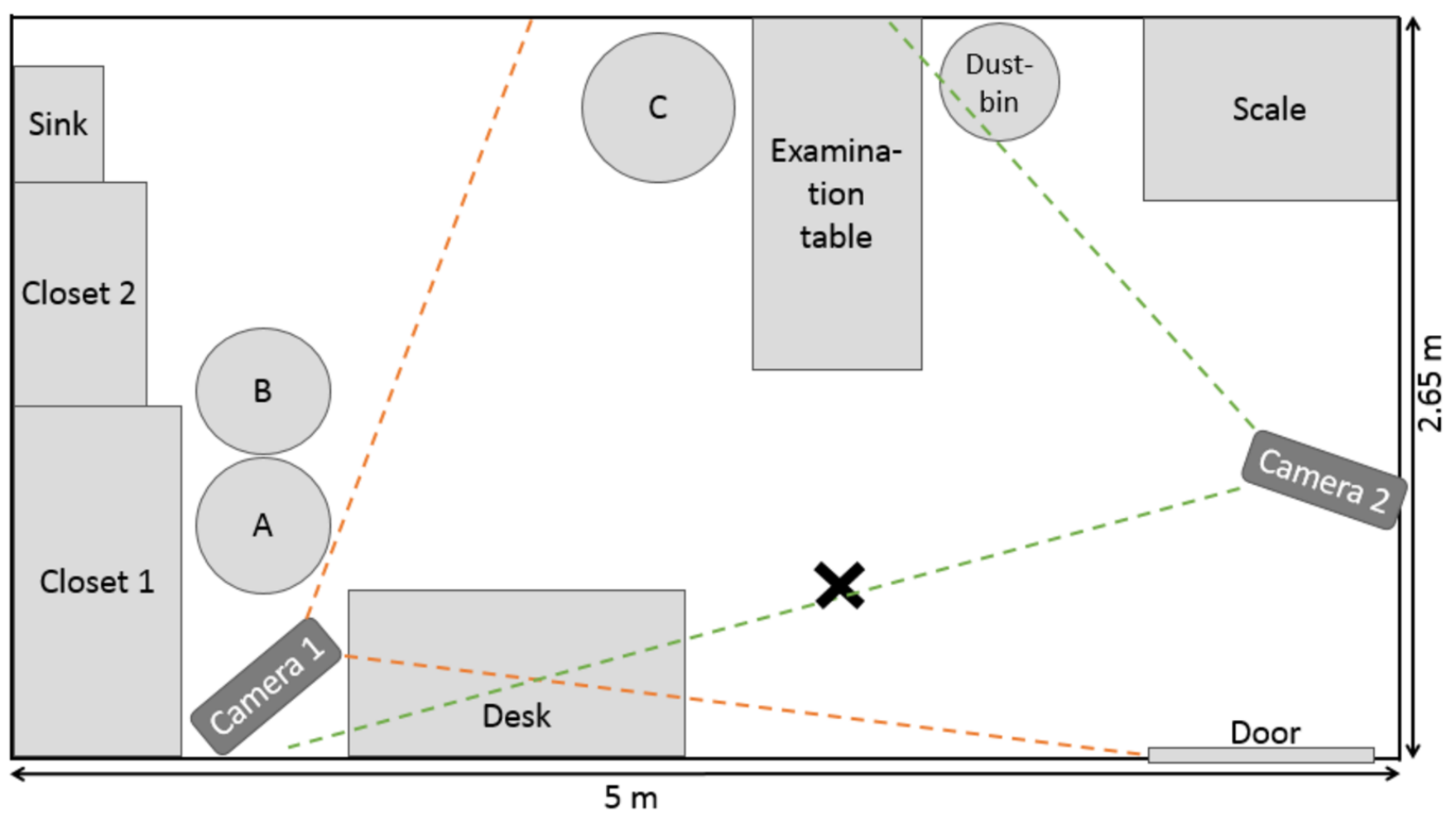
839

840 Fig. 3. Image of the standardised restraint by the assistant on the examination table. One hand

841 on the chest and another on the base of the tail, with the minimal necessary strength to keep

842 the dog sitting or standing on the table.





Sink
Closet 2
Closet 1
B
A
C
Examina-
tion
table
Dust-
bin
Scale
Camera 1
Camera 2
Desk
Door
2.65 m
5 m