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Review

Electronic training devices: Discussion on the pros and cons of their use in dogs as a basis for the position statement of the European Society of Veterinary Clinical Ethology



Sylvia Masson^a, Silvia de la Vega^b, Angelo Gazzano^c, Chiara Mariti^c,
Gonçalo Da Graça Pereira^d, Christine Halsberghe^e, Anneli Muser Leyvraz^f,
Kevin McPeake^g, Barbara Schoening^{h,*}

^a Behavioural Practice, Voreppe, France^b Behavioural Practice, Madrid, Spain^c Department of Veterinary Sciences, University of Pisa, Italy^d Center for Animal Knowledge, Alges, Portugal^e Behavioural Practice, Kortrijk, Belgium^f Behavioural Practice, Geneva, Switzerland^g University of Lincoln, UK^h Behavioural Practice, Hamburg, Germany

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ABSTRACT

In recent years, the affirmation of a greater ethical sense and research generating a better knowledge of the mechanisms of animal learning, evidence of the existence of an animal mind, and studies on the dog-human attachment bond have led to changes in the dog-human relationship. These changes have caused a notable improvement in dog training techniques. Increased emphasis on dog welfare, overall, led to questioning of many training techniques and tools that used aversive means. Recent research on the use of aversive training devices has been performed and, on this basis, it has been possible to create guidelines to inform the public about utility and the possible detriments related to the use of these devices as a tool in dog training. The European Society of Clinical Animal Ethology has released a public position statement based on the current scientific information available on e-collars, punitive training techniques, and canine welfare. This study elaborates and discusses the arguments “pro and contra the use of e-collars and aversive training methods” leading to the statement in more detail. As a conclusion, European Society of Clinical Animal Ethology strongly opposes the use of e-collars in dog training and urges all European countries to take an interest in and position on this welfare matter.

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Introduction

In recent years, the affirmation of a greater ethical sense and research generating a better knowledge of the mechanisms of animal learning, evidence of the existence of an animal mind (Spence et al., 2017), and studies on the dog-human attachment

bond (Mariti et al., 2013) have led to changes in the dog-human relationship. These changes in the dog-human relationship have caused a notable improvement in dog training techniques. Increased emphasis on dog welfare, overall, led to questioning of many training techniques and tools that used aversive means. The changes in the approach to dog training have questioned the effectiveness and ethics of aversive training techniques and tools, which had been previously used without discussion, and proposed replacing them with welfare-friendly methods. For instance, it is now clear that coercive methods that inhibit the emission of a behavior without addressing its causes are not effective mediators of long-term solutions. Moreover, coercive

* Address for reprint requests and correspondence: Barbara Schoening, Behavioural Practice, Hohensasel 16, Hamburg 22395, Germany. Tel: +49 40 6979 6248; Fax: +49 40 4677 5418.

E-mail address: bs@ethologin.de (B. Schoening).

methods may increase or cause stress to the animal and overall diminish its welfare (Fernandes et al., 2017). Similarly, confrontational methods have been found to increase aggression in dogs (Herron et al., 2009), causing risk for owners and any third parties.

Electric collars (e-collars), also known as shock collars and e-stim, are probably one of the most discussed training tools. Their use is controversial, and several European countries (i.e., Austria, Denmark, Finland, Germany, Norway, Slovenia, Scotland, and Sweden) have decided to either ban or restrict their use in the interest of dog welfare, which could be at risk.

E-collars can be of 3 types (Polsky, 1994):

- Antibark collars that operate automatically in response to the dog barking: the vibrations produced by the larynx are detected by a sensor on the collar and the dog is shocked.
- Electronic boundary fences that are activated by a radio signal transmitted from a remote wire, buried underground on the perimeter of an owner's property.
- Remote-controlled collars that can be activated manually via a remote-controlled transmitter.

The development and use of e-collars as a tool was based on the learning theory and 2 principles of operant conditioning. When e-collars are used to reduce or stop an undesirable behavior, they act as a positive punishment. If maintained active (i.e., the shock continues) until a desired behavior is shown, they act as a negative reinforcement. Modern e-collars have an inbuilt shutdown: they rarely deliver a shock longer than 10 seconds, even if a handler presses the button longer. This means that modern e-collars are most often very probably used as a positive punishment.

Recent research on the use of these devices has been performed and, on this basis, it has been possible to create guidelines to inform the public about utility and the possible detriments related to the use of these devices as a tool in dog training. The European Society of Clinical Animal Ethology (ESVCE) established a working group in 2016 to gather scientific information concerning the current knowledge regarding e-collar training. The goal of this working group was not only to provide ESCVE members with accurate scientific information concerning e-collar use but also to create a public position statement based on the current scientific information available on e-collars, punitive training techniques, and canine welfare. This statement was discussed, voted for, and subsequently released on the last Annual General Meeting 2017. The statement can be found here: <http://www.esvce.org/position-statements/>. The following text elaborates and discusses the arguments “pro and contra the use of e-collars” in more detail.

Arguments in favor of and against the use of e-collars

The use of e-collars is debated in the field of dog training and veterinary behavioral medicine. For the purposes of this study, we present the arguments by owners, manufacturers, trainers, researchers, clinicians, and so on, both in favor of and against the use of e-collars. When literature is available, it is cited. When sources are not available, claims are based on authors' experience.

People who use e-collars as a training tool claim to have obtained good results from their use. In a study comparing the use of e-collars with the use of behavioral modification without e-collars in dogs with recall-related problems (Cooper et al., 2014), it was found that e-collars were indeed effective but that there was no significant difference in reported efficacy between the treatment groups. The authors therefore concluded that there is no consistent benefit to be gained from e-collar training. Juarbe-Diaz and Houpt (1996) evaluated the effectiveness of a citronella spray collar and an

electronic shock collar for dog barking. Although both collars showed some improvement in decreasing barking, the citronella spray collar was actually more effective (88.9% vs. 44.4%).

Another consideration when talking about “effectiveness” is that dogs may create an association between the presence of the e-collar and receiving a shock: dogs may discriminate when they can or cannot display the behavior without receiving a shock. This outcome occurs because positive punishments aim only to suppress a certain behavior, while alternative, nonaversive techniques can alter undesired behavior and the underlying emotional states, which can likely lead to long-term behavioral improvements. When e-collars are used for negative reinforcement, they may be used to reinforce alternative behaviors, a process readily obtained by using other nonaversive techniques (Polsky, 2000).

Another argument often supporting the use of e-collars is the speed with which they can resolve problems. Owners who hope for a quick resolution of a behavioral problem and who do not want to engage in an often lengthy behavioral modification program may be convinced to use these tools. From an ethical point of view, this putative outcome cannot be considered an advantage *per se*, but it could be beneficial if there is a sufficient risk to the dog that they are likely to be euthanized or surrendered if the problem is not quickly solved. Christiansen et al. (2001) demonstrated the efficacy of e-collars to stop behaviors when training dogs with different stimuli (a rag being pulled across the track 10 m in front of the dog, an unfamiliar human 3–4 m away trying to attract the dog by his voice, a bundle of tin cans being thrown upon stones on the track 7 m in front of the dog, and a single sheep tied at the end of the track 5 m from the dog) and in a sheep confrontation test where dogs were fenced in with a sheep group and given shocks when approaching 1–2 m from sheep. These scenarios were retested for 2 consecutive years. Half of the dogs chased or attacked sheep in the first year, but none did it in the second.

The main reason why manufacturers of e-collars believe that e-collars are quickly effective is that they have a precisely controllable, variable intensity that allows a targeted level of stimulus sufficient to interrupt the behavior over a wide range of thresholds. However, establishing the correct intensity of a shock for every single dog is quite difficult. If it is too strong, the shock can be painful, provoking an emotional response that can interfere with the dog's ability to learn (Polsky, 1994). A strong shock could be ineffective if the dog's motivation is high, requiring repeated applications (Polsky, 2000). Such a scenario usually leads to desensitization of the stimulus or its intent without abatement of the behavior and possible subsequent behavioral intensification. By contrast, if the shock is not sufficient to stop a behavior, a further and stronger shock will be required, quickly inducing habituation (Davis & Wagner, 1969).

Great individual difference in sensitivity to pain caused by the shock seems to exist, which is unrelated to the thickness of the dog's coat. Dog skin is more sensitive to shock than is human skin (in answer to the people who test the e-collar on themselves, see <https://www.vetwest.com.au/pet-library/skin-the-difference-between-canine-and-human-skin/>: “The epidermis of a dog is 3–5 cells thick; however, in humans, it is at least 10–15 cells thick.”). Moreover, the humidity of the coat can influence the intensity of electrical stimulation, increasing skin conductivity. Therefore, although the intensity of shocks is adjustable, finding the “correct” intensity for an individual dog is difficult and may require various attempts, with the aforementioned risks.

An easy and often used argument to support the usage of these instruments is that e-collars pose a smaller risk to the long-term welfare of dogs than other punishing techniques (Lindsay, 2005). Schalke et al. (2007), in a study performed on 14 laboratory-bred Beagles, concluded that when animals were able to clearly

associate the electric stimulus with their action (i.e., touching “prey,” a dummy rabbit they had been trained to hunt) and consequently were able to predict and control the stressor by aborting the trained behavior, they did not show considerable or persistent stress indicators. Other treatments in this study that did not have the rigid association between a trained response and a shock showed significant behavioral and physiological signs of stress. The authors concluded that “The results of this study suggest that poor timing in the application of high-level electric pulses, such as those used in this study, means there is a high risk that dogs will show severe and persistent stress symptoms.” (page 379).

Multiple studies have shown that e-collars pose a higher risk to the welfare of dogs when specifically compared to positive training techniques. For example, Cooper et al. (2014), in their research performed on 63 pet dogs, demonstrated that the immediate effects of training with an e-collar give rise to behavioral signs of distress, particularly when used at high settings. Similar effects are described by Schilder and Van Der Borg, 2007 who, in a study involving 32 German Shepherd dogs, noted that receiving shocks is a painful experience to dogs based on altered body postures. The subjects trained with e-collars had learned that the presence of their owner (or his commands) announced reception of shocks, even outside of the normal training context, as reflected in their behaviors and body postures when compared with dogs not trained with e-collars.

Some owners are attracted by the idea that e-collars may be cheaper than engaging a long and expensive program with behaviorists, trainers, and/or veterinary behavioral specialists. However, the price can be higher than expected since the welfare of dogs and the relationship with the owner can be compromised. Most owners, themselves, express a preference for not using an e-collar, considering other tools as being more humane (Juarbe-Diaz & Houpt, 1996). The importance of ethical issues in engendering client compliance should not be underestimated. Hence, no argument given so far as a support for using e-collars, even in the most restrictive context, makes a valid point for their use in dog training. Instead, there are many proven risks, as demonstrated by the scientific community for several decades. The following paragraphs focus on these risks and discuss those aspects that clearly speak against the use of e-collars as a tool to be used for training and behavior modification of behavior problems.

The first issue encountered when using an e-collar is related to judgment of the intensity of the shock: to act effectively as a positive punisher, the shock needs to be intense enough to prevent habituation (i.e., the dog will habituate to the supposed aversive stimulus, which will become neutral, inducing no reaction at all from the dog). However, too high intensity can lead to the development of intense fear or pain (Schalke et al. 2007), intensification and aggression as an escape response (Polsky, 2000), phobias (Polsky, 2000), or learned helplessness (Seligman, 1972). Even the attachment between owner and dog might deteriorate as a consequence to shocks received (Deldalle and Gaunet, 2014).

Many parameters require consideration when modulation the shock delivered and the level of pain felt by the dog are concerns: shock intensity (Schilder and Van Der Borg, 2007; Lindsay, 2005), shock duration (Schilder and Van Der Borg, 2007), electrode size (Lindsay, 2005), beep warning and response time (Schalke et al. 2007), degree of humidity, and the morphology of the dog itself [hair length, moisture level of skin, subcutaneous fat level (Jacques and Myers, 2007)]. Together, these data render it nearly impossible to determine the appropriate intensity of shock for a particular dog in any given situation (Lindsay, 2005).

Obstacles for e-collar use in everyday situations, include the many uncontrolled environmental stimuli that can be associated with the shock, including the trainer (Schilder and Van Der Borg, 2007). As an example, Polsky (2000) reported a case in which a

dog associated with a person walking near the electronic fence with the pain from the shock and exhibited human-directed aggression after receiving e-collar training.

E-collars carry a risk of physical damage to the skin of the neck (Polsky, 1994). To ensure that the metal pins are in close contact with the skin of the neck, an e-collar must be fitted tightly. Aside from being uncomfortable, the points where the metal pins make contact with the skin can become irritated, and this can result in the development of pressure necrosis or wounds. Antibarking collars and electronic fence collars must be worn for long periods, so these risks are especially high in these contexts. Furthermore, there is a risk of device malfunction, which can lead to damage caused by electricity. In a study by Lines et al., (2013), there were 2 malfunctioning devices among 21 (10%) examined.

An acknowledged risk stems from the perfect timing required between the undesired behavior and the delivery of the shock (Schalke et al., 2007). If there are timing errors, there is an increased likelihood of both fearful and aggressive responses being shown and becoming part of the dog’s behavioral repertoire (Polsky, 1994; Christiansen et al. 2001). Consequently, unqualified trainers may be more at risk for inducing a negative outcome when using e-collars (Salgirli et al., 2012), and this risk may be higher for lay owners. Moreover, if a dog owner activates the collar because of frustration or anger caused by a “misbehaving dog,” there is a risk of frank abuse (Schilder and Van Der Borg, 2007; Schalke et al., 2007, Blackwell et al. 2012)

Use of e-collars has been reported to cause a rise in physiological parameters that may be related to stress, such as salivary cortisol (Beerda et al., 1998) and heart rate. As noted, both increase with shock unpredictability and uncontrollability (Schalke et al., 2007). A rise in salivary cortisol has been found in dogs with previous experience in e-collar training when wearing a dummy e-collar (DEFRA AW1402, 2013) and in dogs when evaluated 3 months after e-collar training, on arrival at the training facilities that used the e-collar (DEFRA AW1402a, 2013).

Several studies show behavioral consequences to e-collar use including an increase in behaviors related to stress, fear, pain, and negative emotions in dogs trained with shock collars. Thirty-six percent of e-collar using dog owners reported yelping from their dog the first time they applied a shock. Twenty-six percent also observed yelping from their dogs in subsequent applications (DEFRA AW1402, 2013). Another study reported vocalizing in 59% of dogs being trained with e-collars (Salgirli et al., 2012).

Other behaviors associated with a negative emotional state have been reported with e-collar use: lowered body postures (Beerda et al., 1998; Schilder and Van Der Borg, 2007; Salgirli et al., 2012) as well as avoidance, paw lifting, tongue flicking, yawning, panting, behavioral inhibition, or reduced exploration (DEFRA AW1402, 2013). These behaviors can be seen in dogs trained with e-collars even under the most benign and controlled training conditions (Cooper et al., 2014).

Stress-related behaviors can generalize to other elements of the training context, including the trainer or the training facilities, and remain midterm to long term (Schilder and Van Der Borg, 2007; DEFRA AW1402, 2013; DEFRA AW1402a, 2013).

More evidence of the risks linked to e-collar use comes from the scientific literature evaluating aversive methods in general. Indeed, punitive training methods induce higher risks of aggression (Beerda et al., 1998; Herron et al., 2009), fear, anxiety (Arhant et al., 2010), and undesirable behaviors (Blackwell et al., 2008) being shown, while decreasing the quality of the dog-owner relationship (Hiby et al., 2004), dog welfare, and dog-human team performance (Haverbeke et al., 2008) compared to nonaversive techniques. Negative emotional responses as a consequence of aversive techniques can lead to behavioral inhibition and can be detrimental for

learning and performance of dogs, undermining the general purpose of training.

Negative emotional responses are of particular concern with positive punishment, where an aversive event (an electric shock, a kick, etcetera) follows an undesirable dog behavior, and in the case of negative reinforcement, where an aversive event (an electric shock, a sharp pull, or a check on a choke or prong collar) ends only after the dog exhibits the behavior desired by the human.

Two recent reviews of the literature regarding aversive training techniques conclude that, although more research is needed, aversive-based methods generate stress in dogs, can have unintended outcomes, and put dog's welfare at risk (Fernandes et al., 2017; Ziv, 2017).

When evaluating efficacy, no study shows a superior efficacy when comparing an e-collar to positive reinforcement training. Some survey-based studies conclude a superior efficacy of positive reinforcement training as perceived by owners (Hiby et al., 2004; Blackwell et al., 2012) or results below average for e-collar training when compared with any other training method (Arnett et al., 2014). One experimental study found no difference in efficacy, but a decrease in welfare when using e-collars (Cooper et al., 2014). With respect to electronic fence collars, 1 study even suggests a higher risk of escape when using an e-fence rather than a normal fence (Starinsky et al., 2017).

In the literature reviews discussed previously, the scientific data examined do not support the popular belief that e-collars are more effective generally, nor does the data support their use as a last-resort technique where other methods have failed.

Most owners participating in 1 survey declared that they used e-collars for behavior problems, mostly recall and predatory behavior on livestock (DEFRA AW1402, 2013).

E-collars are seen as an “easy fix” (even if, as demonstrated previously, they are not). This impression neglects a preferable approach that would seek to understand the mechanisms of canine behavior on every level which cause undesirable behavior and then identify a successful and welfare compatible resolution (Schilder and Van Der Borg, 2007).

E-collars are not recommended for the treatment of behavior problems because they do not take into consideration the root cause of the problems. Such lack of redress can result in problems worsening, being masked or expressed in other ways (e.g., in the case of e-collar use to stop barking in separation-related problems, if barking is suppressed, dogs can develop other behaviors such as destructiveness or compulsive/obsessive-compulsive disorders). E-collars are especially contraindicated in behavior problems related to anxiety, fear, or frustration, due to the risk of worsening these problems.

The risk of increased aggression when using aversive techniques deserves special attention when considering safety. Pain directly triggers aggression (Polisky, 1994), but additionally, the use of aversive techniques can worsen any negative associations (e.g., the trainer) by which a dog already feels threatened. Finally, using shocks to punish warning signals of aggression, such as growling or baring teeth, can lead to a suppression of these, so the dog in the future may attack without overt warning, resulting in apparent unpredictability and increasing the risk of injury (Overall, 2013).

Spray collars and electronic boundary fences

In the section [Introduction](#), we mentioned 3 types of electronic devices commonly used in dog training. Besides the e-collar, these include electronic boundary fences and collars that are activated automatically in response to a dog's barking. These collars usually come as a “spray-collar,” that is, a puff of air, plain mist, or mist charged with a fragrance-like lemon that is released from a box on the collar under the dog's lower jaw and sprayed upward against

the face. What exactly constitutes the aversive element is not clear. The aversive stimulus may be the noise when the puff is released, the smell, or the mist, itself. In some dogs, the aversive stimulus could be a mixture of all elements. So even in cases where the collars do not elicit direct pain, spray collars might elicit as much stress and fear as e-collars. Ziv (2017) stated consequently that the more relevant question is not whether these bark collars work, but rather whether there are other effective training methods that can alleviate barking without the added stress that is associated with spray collars. ESVCE suggests that, if at all, spray collars should be used under veterinary or qualified behavioral supervision instead of bark activated collars and remote-controlled collars. This would allow the cause of the behavior problem to be addressed and not just the nonspecific sign or symptom.

Electronic boundary fences carry the same risk already mentioned with e-collars and automatically activated spray collars. An easy solution to prevent dogs from leaving a property could be to replace the electronic boundary fence with actual fences (even actual electrified fences, if necessary, to absolutely protect the dog from, e.g., a highway). This choice would prevent the electronic fences being used incorrectly as is the case when owners do not give the dog the opportunity to learn where the fence is located in the ground. What is unappreciated about electronic fences is the fact that intruders can easily compromise the boundaries without cost, and so, other dogs may attack the resident dog on its own property.

Discussion

When taking all aforementioned points into account, training with e-collars is associated with numerous well-documented risks concerning dog health, behavior, and welfare. When e-collars are used to treat behavior problems, there is a risk of such problems worsening and/or additional problems emerging. This risk is greater when this aversive tool is used by an unqualified trainer or even just the lay owner. Dog training is largely unregulated throughout the European Union so there is a risk that many trainers do not have a proper education in canine ethology and learning theory, both dense, complicated fields. Bennett (2013) showed both this lack of knowledge and its effect for Austria, when she examined the work of a “so-called” dog-expert in a television show. Scott & Bowen (2016) showed that dog trainers were no better than lay owners in correctly identifying the behavior of dogs—and both, sadly, significantly misinterpreted aggressive behaviors as play behaviors. Browne et al. (2017) looked at 5 best-selling books on dog training and how their content related to basic learning theory. The results showed marked differences across all books, including inconsistencies in the depth of information provided, with some starkly contrasting training methods were advocated. The authors concluded that overall, these books could not qualitatively be instructional manuals. Owners and trainers relying on such information get ill advice and the chance that these people rely on aversive training methods and tools is large, with concomitant risk.

Because dog trainers and lay owners lack knowledge of the scientific literature, they may know that the efficacy of these collars has not been proven to be greater than other alternatives such as positive reinforcement training. Hence, ESVCE encourages education programs that use positive reinforcement methods and avoid positive punishment and negative reinforcement, thereby promoting positive dog welfare and a humane, ethical, and moral approach to dog training at all times.

Conclusions

As stated previously, ESVCE members argue that there is no credible scientific evidence to justify e-collar use and the use of

spray collars or electronic fences for dogs. On the contrary, there are many reasons to never use these devices. Better training options exist, with proven efficacy and low risk exist. This said, the aim of ESVCE is to improve dog welfare and consequently ESVCE has been working on possible solutions to manage situations where e-collars have been a choice. One desirable action would be to ban e-collar sale, use, distribution, promotion (including Internet sale and promotion within Europe), under European legislation, immediately applicable in all member states. In parallel, the law must be enforced and adhered to. By using the animal welfare acts or the equivalent in each member state, significant fines might be introduced for a first or minor offence, where unintentional harm is caused to the dog. In the case of successive offences or where a collar has been used to intentionally abuse a dog, a custodial sentence in line with that applicable to similar offences might be introduced. In addition, significant fines need to be implemented for persons identified as selling, distributing, or promoting e-collars.

Members of ESVCE strongly oppose the use of e-collars in dog training, using the previously stated arguments as a basis for our position, and we urge all European countries to take an interest in and position on this welfare matter.

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