Preventive Veterinary Medicine 159 (2018) 40–50

Contents lists available at ScienceDirect

Preventive Veterinary Medicine

journal homepage: www.elsevier.com/locate/prevetmed

How effective are interventions designed to help owners to change their behaviour so as to manage the weight of their companion dogs? A systematic review and meta-analysis

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ARTICLE INFO

Keywords:
Obesity
Weight
Behaviour
Intervention
Feeding
Exercise

ABSTRACT

Objective: The present review sought to evaluate whether – and to what extent – targeting owners' behaviour is an effective way to reduce the problem of overweight and obesity among companion dogs.

Methods: A systematic search of electronic databases identified 14 studies that evaluated the effect of an intervention targeting owners' behaviour on (i) the owner's behaviour or (ii) the weight, (iii) body fat, or (iv) body condition of the dog. We coded aspects of the study design (e.g., the outcome variable), intervention (e.g., use of theory, specific behaviour change techniques or BCTs, inclusion of nutritional intervention alongside the behavioural intervention), and sample (e.g., age, gender, and weight of the dogs at baseline) that could influence the effect sizes.

Results: The interventions had, on average, a medium sized effect on outcomes ($d_+ = 0.59$, 95% CI: 0.23 to 0.96, $k = 14$, $N = 384$). The effect sizes from the primary studies were relatively homogenous, $Q(13) = 12.10$, $p = .52$ and the nature of the intervention, methodological and sample characteristics did not moderate the effect sizes.

Conclusions and clinical relevance: The findings of the review suggest that targeting owners' behaviour can be an effective way to reduce overweight and obesity among companion dogs. However, this conclusion is based on a limited number of studies and so we hope that the present findings serve as the impetus for further research in this area.

1. Introduction

Overweight and obesity[1] are common problems in dogs; and between 30 and 60% of adult companion dogs worldwide are estimated to have an excess of body fat (McGreevy et al., 2005; Colliard et al., 2006; Lund et al., 2006; Mao et al., 2013). An excess of body fat can predispose dogs to a number of serious health conditions, including musculoskeletal disorders, diabetes, cardiovascular disease, and cancers (Rocchini et al., 1987; Perez Alenza et al., 2000; Rand et al., 2004; Marshall et al., 2009). It has also been linked to a reduced life span (Kealy et al., 2002) and impaired wellbeing; in part, as a result of reduced energy and activity levels (Yam et al., 2016). Overweight and obesity can also have financial implications for the owner, who will likely have to pay for treatment. Together then, it is clear that what has been termed 'the obesity epidemic' among companion dogs is a serious concern (Kushner et al., 2006; Sandoe et al., 2014) and that there is a need to identify effective ways to address this problem.

Traditionally, weight management interventions for companion dogs have centred around prescribing specific foods or feeding regimes to reduce energy intake (Laflamme et al., 1997; Burkholder and Bauer, 1998). This approach has been shown to produce desired outcomes in dogs kept in experimental conditions where feeding and living conditions can be easily controlled (Laflamme et al., 1997; Yamka et al., 2007). However, its effectiveness in dogs living in domestic contexts is less clear (German et al., 2012). This might be because the effectiveness of nutritional interventions for dogs living at home depends on owners

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[1] It is difficult to define overweight and obesity in dogs, primarily because breeds differ in size so that simple calculations of, for example, the ratio of height to weight (as used to compute BMI in humans), are not possible. There have been some efforts to quantify obesity (e.g., Simpson et al., 1993, stated that an animal could be deemed obese when it was 15% over its optimal weight); however, most people use the terms overweight or obese simply to refer to "an excess of body fat or adipose tissue (e.g., Crane, 1991), which is typically operationalised in terms of a body condition score (Laflamme et al., 1997). Scores of 6 or 7 on the 9-point BCS (or 4 on the 5-point BCS) mean that the dog is overweight; scores of 8 or 9 on the 9-point BCS (or 5 on the 5-point BCS) mean that the dog is obese.

https://doi.org/10.1016/j.prevetmed.2018.08.016
Received 19 March 2018; Received in revised form 13 August 2018; Accepted 31 August 2018

adhering to the feeding regime; something which has been shown to be less than optimal (German et al., 2012). More recently, pharmacological treatments have become available to treat overweight and obesity in dogs (Roudebush et al., 2008). However, while pharmaceutical treatments have been shown to assist weight loss (Pena et al., 2014) they can be associated with side-effects (Wren et al., 2007) and, similarly to nutritional interventions, they rely on the owners' adherence to a medication regime which has, again, been shown to be problematic (Gossellin et al., 2007).

1.1. Managing the weight of dogs by targeting owners' behaviour

One key factor that influences a dog's weight is their owner's behaviour. That is, it is typically the owner that feeds and exercises the dog and thus dictates their energy intake and expenditure. Perhaps not surprisingly then, evidence suggests that the behaviour of owners of overweight and obese dogs differs from that of the owners of healthy weight dogs. For example, the owners of overweight and obese dogs tend to walk their dogs less frequently, feed them more treats, and weigh their dog less often than owners of dogs of an optimal weight (Kienzle et al., 1998; Robertson, 2003; Bland et al., 2009; Raffan et al., 2015). Therefore, promoting weight loss in companion dogs likely involves finding ways to help the owner to feed and exercise their animal appropriately (Webb, 2015; White et al., 2016).

Researchers have started to develop interventions that explicitly target owners' behaviour, either as part of a multi-component intervention or as its primary focus. For example, German et al. (2007) designed an intervention that combined a nutritional component (each dog was fed high protein, fat restricted food with the size of the portion tailored to the specific needs of each dog), with advice to owners on strategies to prevent excessive feeding (e.g., providing non-food-related rewards) and to increase the dog's physical activity levels (e.g., playing with the dog indoors). The intervention also provided owners with feedback on their dog's weight during the intervention. Another intervention exclusively targeted the behaviour of owners of overweight dogs in an effort to increase the amount of time that they spend walking their dog - owners received information on the health benefits of exercising the dog, the likely exercise needs of their dog (stratified by breed and age), and instructions on how to start walking their dog more (Rhodes et al., 2012). Despite the recent interest in interventions designed to modify owners' behaviour however, to date, there has not been a systematic review of these studies. As a result, researchers and practitioners currently do not know whether – and to what extent – targeting owners' behaviour is an effective way to reduce overweight and obesity among companion dogs. The primary aim of the present review then, was to estimate the effectiveness of interventions targeting owners' behaviour.

1.2. Behaviour change techniques

It is also unclear what specific techniques have been used to modify owners' behaviour and whether the use of particular techniques is linked to the effectiveness of the intervention. Around 10 years ago, there was a similar problem in health psychology with many interventions designed to promote health behaviour among humans being unclear about the specific intervention techniques that they used. As a consequence, it was difficult to reach conclusions about the best way to intervene (i.e., to identify which components of the intervention were effective and might be taken forward to subsequent interventions). To facilitate the accumulation of evidence, replication of interventions, and evaluation of behaviour change interventions, researchers attempted to classify Behaviour Change Techniques (or BCTs, defined as 'reliable components of an intervention designed to alter or redirect causal processes that regulate behaviour', Michie et al., 2011) according to their content (Abraham and Michie, 2008; Michie et al., 2011), culminating in the Behaviour Change Techniques Taxonomy (BCTTv1, Michie et al., 2013). A second aim of the present review then, was to use this taxonomy to describe the BCTs used in interventions designed to help the owners of overweight and obese dogs to manage the weight of their dogs and attempt to link the use of specific BCTs to effectiveness. So doing should not only help to describe the current 'state of the art' (e.g., what do these interventions typically do?), but also help to identify which BCTs are effective in promoting changes in relevant outcomes (as well as those that are less effective).

1.3. Other factors that may influence the effectiveness of interventions

It is also important to consider the extent to which interventions and the use of particular BCTs has been informed by theory. For example, theoretical models such as Control Theory (Carver and Scheier, 1982) would suggest that selecting BCTs that target the three putative processes involved in regulating behaviour (namely, goal setting, goal monitoring, and goal operating) might be particularly effective. However, whether interventions that are informed by a theory are more effective than interventions that are not informed by a theory remains an open question and, to date, a large proportion of interventions are not based on theory (Prestwich et al., 2015). Therefore, the present review aimed to identify the extent to which interventions designed to help dog owners to change their behaviour with respect to their dog are informed by theory and whether this influences their effectiveness. Finally, the present review aimed to evaluate the impact of other factors that could influence – or moderate – the effectiveness of interventions targeting owners' behaviour. For example, the inclusion of an additional nutritional interventions alongside interventions designed to change owners' behaviour may produce a larger effect on relevant outcomes than interventions that only target the owners' behaviour. Similarly, methodological characteristics such as the duration of the intervention, design of the study (e.g., between vs. within designs, duration of the follow-up), risk of bias (e.g., methodological quality of the study and source of funding) and type of outcome reported (e.g., the dog's weight, body fat, or body condition, owners' behaviour) may influence the actual, or apparent, effect of the interventions on these outcomes.

1.4. The present review

The primary aim of the present review was to estimate the effect of interventions that target owners' behaviour on the owner's behaviour or on the weight or body condition of the dog. The review also had three secondary aims – (i) to describe the BCTs used in interventions designed to help owners to manage the weight of their dogs and attempt to link the use of specific BCTs to effectiveness, (ii) to identify the extent to which interventions designed to help dog owners to change their behaviour are informed by theory and whether this influences their effectiveness, and (iii) to evaluate the impact of other factors that could influence – or moderate – the efficacy of interventions targeting owners' behaviour.

2. Material and methods

2.1. Inclusion criteria

There were four inclusion criteria for the review. First, the study needed to evaluate an intervention that was intended to help owners to make changes to their behaviour in an effort to manage the weight of their companion dog. As this review focused on the effects of interventions targeting owners' behaviour, studies evaluating weight loss interventions for dogs living in research facilities (e.g., kennel dogs) were excluded. Second, the intervention had to contain at least one BCT designed to change owners' behaviour with regards to feeding, exercising and / or other weight management behaviours (e.g., weighing the dog), with BCTs defined as those included in the BCTTv1 taxonomy