



## Using research on self-regulation to understand and tackle the challenges that owners face helping their (overweight) dogs lose weight



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### ABSTRACT

The present research sought to (i) understand the challenges that dog owners encounter in helping their pet lose weight, and (ii) develop and test an intervention designed to help dog owners to deal with these challenges. A series of focus groups ( $N = 79$  dog owners, veterinarians, and industry experts) informed the content of an intervention designed to prompt owners to form if-then plans (or “implementation intentions”) identifying challenges (e.g., inclement weather) and specifying how to respond (e.g., play with the dog indoors). This intervention was evaluated in a single-blind, randomized controlled trial ( $N = 106$  owners of overweight dogs) against a control condition who were simply asked to set relevant goals. Changes in the owners’ beliefs, behaviour, and the dog’s weight and body condition were measured around 2 months later. The primary finding was that dogs in the intervention condition lost the same percentage of their body weight on average each week ( $M = -0.065$ ,  $SD = 0.65$ ) as dogs in the control condition ( $M = -0.24$ ,  $SD = 0.55$ ),  $F(1, 36) = 0.70$ ,  $p = .41$ ,  $\eta^2 = .019$ , although it should be noted that follow-up data was only available for around half of the sample. Analysis of the factors that were associated with changes in weight among the dogs in the trial suggested that owners’ lack of knowledge about appropriate feeding and exercise was associated with poorer outcomes, suggesting that future interventions may need to provide information and help owners to set appropriate goals before encouraging them to make if-then plans to support the implementation of those goals.

### 1. Introduction

Over half of the domestic dogs in the U.S. are obese (i.e., grossly overweight), increasing their risk of a number of health conditions including osteoarthritis, diabetes, high blood pressure, heart and respiratory disease, ligament injuries, kidney disease, and many forms of cancer (Association for Pet Obesity Prevention, 2016). Furthermore, there is evidence that this is a growing problem, leading some to talk about a “pet obesity epidemic” (Lee, 2016). Given that feeding and levels of exercise among domestic pets are typically decided by their owners, it is crucial to understand why owners often fail to balance the energy needs and demands of their dogs and to find ways to change these behaviours. Webb (2015) proposed that balancing the energy needs and demands of companion animals is essentially a self-regulatory problem and used Control Theory (Carver and Scheier, 1982) as a conceptual framework to identify three self-regulatory processes that owners might find challenging when managing the weight of their dog:

(1) setting goals (e.g., to help an overweight dog lose weight), (2) monitoring relevant behaviours and outcomes (e.g., amount of food consumed, activity levels and the dog’s weight), and (3) taking action as needed (e.g., reducing the amount of food provided or increasing energy expenditure).

In addition to helping to understand the challenges that dog owners are likely to experience managing their dog’s weight, adopting a self-regulatory perspective also suggests potential strategies for helping owners to overcome these challenges. Evidence suggests, for example, that the gap between intentions and behaviour can be bridged by forming ‘if-then’ plans (Gollwitzer, 1999). That is, an owner who struggles to act on their intention to feed their dog appropriately because they give into begging could be prompted to form the plan: ‘If my dog is begging for a treat, then I will give him/her a cuddle instead!’ Forming if-then plans has been shown to be an effective way of achieving goals including increasing physical activity, changing dietary behaviours, and promoting weight loss among humans (for a review,

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**Table 1**  
Themes Identified Following the Focus Groups, Organized by Self-Regulatory Process.

Self-regulatory process	Theme	Focal behaviour	
		Feeding	Exercising
Goal setting	Challenges Potential solutions	Knowing what, or how much to feed Ask vet or veterinary nurse for advice Remember it is the owner's responsibility to feed an appropriate diet	Knowing how much to exercise Ask vet or veterinary nurse for advice Look on the internet Think about the financial consequences of not taking action Think 'an overweight dog is an unhappy dog'
Goal monitoring	Challenges	Not monitoring intake Lack of information on packaging	
Goal operating	Potential solutions	Use a measuring cup	
	Challenges	Using food to communicate/show love Giving leftovers to the dog Celebrating special occasions Others feeding the dog	Lack of time Feeling lazy Changes in circumstances Other people or dogs' (negative) reactions Lack of appropriate space Dog not able to exercise
	Potential solutions	Cuddle or play with the dog Include treats in daily food allowance Remember that a small treat is a lot of calories Use a clicker, rather than treats, to train Record when dog is fed	Walk dog immediately after work Walk for an extra 10 minutes Ask friends, family, or a dog walker to help Keep dog on the lead Walk when there are few other people/dogs around

see Gollwitzer and Sheeran, 2006). However, the ideas have yet to be applied to the problem of obesity among companion animals. The present research developed a “volitional help sheet” (Armitage, 2008) that can be used by owners to form if-then plans by choosing the situation(s) and response(s) that are most relevant to them. We then evaluated the effect of this intervention on the weight and body condition of the dogs by comparing outcomes between owners that received vs. did not receive the help sheet.

## 2. Materials and methods

The content of the volitional help sheets were informed by ten focus groups with owners (six groups), vets and veterinary nurses (two groups), and employees of Nestlé Purina (two groups). Participants were asked questions about how they (or those that they work with as part of their professional practice) feed and exercise their dogs. For example, participants were asked (i) how they decide how much, and what type of food to feed their dog, (ii) to identify situations in which they might be tempted to feed their dog when perhaps they shouldn't, (iii) how they exercise their dog, (iv) reasons why dogs don't get enough exercise, and (v) potential strategies for dealing with challenges in each of these areas. The transcripts of each focus group were analysed using thematic analysis and NVivo software version 10 to identify situations that result in inappropriate feeding (e.g., a dog begging for food) and lack of exercise (e.g., inclement weather) along with potential solutions to these situations (e.g., play with the dog indoors). These were organised into the three key self-regulatory processes as identified by Control Theory (Carver and Scheier, 1982) – namely, goal setting, goal monitoring, and goal operating – with respect to each of the two focal behaviours (i.e., feeding and exercise) and are summarized in Table 1. This information was then used to inform the content of two help sheets; one designed to help owners to feed their dog appropriately and one designed to help owners to increase their dog's level of physical activity (see Supplementary Materials A).

A randomized controlled trial was then conducted to evaluate the impact of providing the volitional help sheets on outcomes. We approached 20 veterinary practices in and around the Sheffield region on an ad hoc basis; of whom 6 (30%) agreed to help us with the research. Staff at these practices looked at their lists of appointments and identified owners who would be attending with overweight or obese dogs. Owners were eligible for inclusion in the trial if their dog had a Body Condition Score [or BCS, Laflamme, 1997] of 6 or more and did not

have a serious health condition which would not make it appropriate for them to take part (e.g., they were unable to walk, or had to be fed a special diet). Suitable owners were then approached by a researcher when they visited the practice, given an information sheet, and asked if they would be interested in taking part. If so, then they were asked to sign a consent form and to complete a questionnaire that measured their beliefs about exercising and feeding their dog, along with various demographic characteristics using items from the Dogs and Physical Activity tool (Cutt et al., 2008), the Dog Obesity Risk and Appetite questionnaire (Raffan et al., 2015), a questionnaire informed by the Theory of Planned Behaviour (Rohlf et al., 2010), and the Dogs and WalkinG Survey (Richards et al., 2013). The questionnaire that participants received is reproduced in Supplementary Materials B, D and E list the measures that were derived from these responses. The intervention was presented at the end of the questionnaire; and the owners were randomly assigned to receive a volitional help sheet or simply to set goals with respect to feeding and/or exercising their dogs.<sup>1</sup> The practice provided information on the weight of the dog on the day of the visit (as assessed by the practices' weighing scales) and BCS (the latter was assessed by a qualified vet or veterinary nurse and rated on a 9-point scale).

All participants were contacted 2 months later (by phone, email, or post, depending on their preference) and asked to complete a follow-up questionnaire.<sup>2</sup> We also contacted the veterinary practices to ask for the dog's weight and BCS at their most recent visit to the practice. Note that we did not explicitly instruct clients to return to the practices so that we could obtain follow-up measures – rather, we obtained measures when

<sup>1</sup> Randomization was achieved using an online random number generator (<https://andrew.hedges.name/experiments/random/>) to generate a list of 150 numbers (ranging from 0 to 1). The questionnaires were then printed and arranged the questionnaire in that order. As the first few pages of the questionnaires for the intervention and control conditions were identical, the researcher was essentially (although not strictly) blind to condition at the point of recruitment and follow-up. Participants were not aware that there were different conditions and so we describe the trial as 'single-blind'.

<sup>2</sup> The follow-up questionnaire contained similar measures of owners' beliefs and behavior with respect to feeding and exercising their dogs as the baseline questionnaire (see Supplementary Material C). Descriptive statistics for these variables at baseline and follow-up are reported by condition in Table E of the Supplementary materials. Owners who did not respond to the original request within two weeks were asked a second time if they would be willing to complete a follow-up questionnaire.

owners returned to the veterinary practice as part of the usual care of their animal. As at baseline, weight was assessed and BCS was rated on a 9-point scale by a qualified vet or veterinary nurse. The data on the dogs from owners who had returned to the practice less than 4 weeks (28 days) following recruitment was not included. We did not place a limit on how long following recruitment the dogs' weight and BCS could be taken, but computed the percentage change in weight per week for each dog to permit comparison. The study received ethical approval from the Research Ethics Committee in the Department of Psychology at the University of Sheffield.

### 2.1. Participants and design

Power analysis (based on a medium-to-large effect,  $d = 0.66$ , of volitional help sheets on weight loss in humans, Armitage et al., 2014), and ANCOVA analysis, comparing changes in weight and BCS between baseline and follow-up between intervention and control conditions, with two covariates (likely baseline weight and BCS) suggested that a sample of 38 participants in each condition would provide 80% power to detect a similar effect size (at  $p < .05$ ). Fig. 1 shows the flow of participants through the study.  $N = 124$  owners were approached, of whom  $N = 106$  (85%) agreed to take part and were randomly allocated to conditions ( $N = 57$  intervention,  $N = 49$  control). The baseline

characteristics of the sample are described in Supplementary Materials D and E. We obtained information on the weight of 50 of these dogs (47%) at least one month following recruitment and 30 of the owners (28%) completed a follow-up questionnaire.

### 3. Results

Sixty one of the 96 dogs remaining in the trial at follow-up (64%) were weighed at the veterinary practices following the intervention. Eleven of these dogs (11%) were weighed less than one month following the baseline assessment and so were not included in the analyses. In order to ensure that participants that dropped out of the trial and/or did not provide follow-up data did not differ (e.g., were older, less motivated to exercise their dog appropriately, or have dogs that weighed more on average), we compared the baseline characteristics between the  $N = 50$  participants for whom we had data on the dogs' weight at follow-up and the 56 participants for whom we did not using a series of  $t$ -tests. The probability value for determining statistical significance was corrected to reduce for the increased risk of a Type I error associated with running multiple tests (new  $p = \text{old } p / 65 = .0008$ ). None of the variables differed significantly according to this criterion. On average, the remaining 50 dogs were weighed 13 weeks ( $SD = 6$ , range = 4–32 weeks) following the baseline assessment

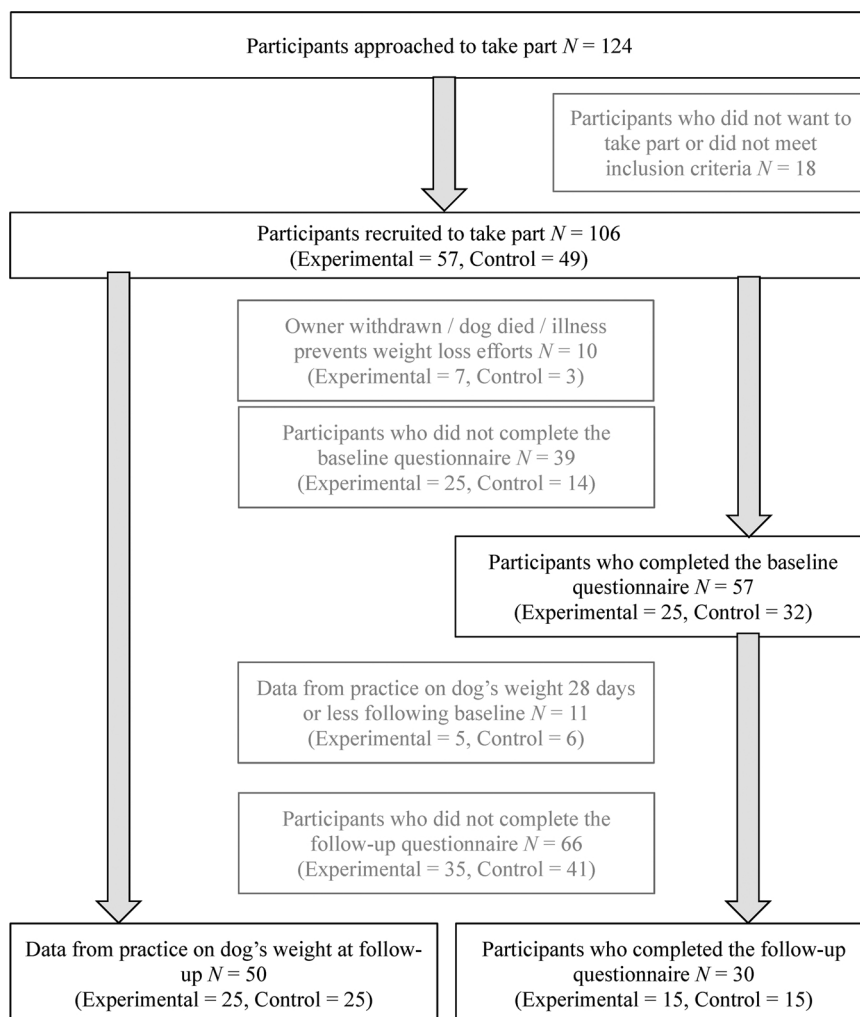


Fig. 1. Flow of Participants Through the Trial.

and allocation to condition. This time did not differ between the conditions ( $M_{\text{EXP}} = 14$ ,  $M_{\text{CONT}} = 12$ ,  $SDs = 6$ ),  $t(48) = 1.3$ ,  $p = .21$ .

### 3.1. What factors predict the extent to which dogs lose weight during the trial?

Before evaluating the effect of condition on the primary outcomes (i.e., changes in weight and BCS), we ran Pearson's correlations to see whether any of the variables measured at baseline (for a full list see Supplementary Material D and E) were associated with these primary outcomes. Nine variables were significantly correlated with the average percentage change in weight per week (lack of knowledge with respect to feeding,  $r = -0.44$ , BCS at baseline,  $r = -0.41$ , perceived behavioural control with respect to feeding,  $r = 0.40$ , strength of normative beliefs from others with respect to feeding,  $r = -0.39$ , lack of knowledge with respect to exercising,  $r = -0.38$ , owner's perception of their dog's weight,  $r = -0.37$ , strength of beliefs about feeding to please the dog,  $r = -0.35$ , and the strength of normative beliefs from the vet,  $r = -0.37$ , and others,  $r = -0.32$ , with respect to feeding) and six variables were significantly correlated with BCS scores at follow-up (number of adults in the household,  $r = -0.54$ , owners' perceptions of the importance of the positive outcomes of dog walking,  $r = -0.52$ , BCS at baseline,  $r = 0.51$ , the proportion of table scraps/leftovers that the dog is fed,  $r = 0.50$ , the average number of days that the dog is walked in a typical week,  $r = 0.48$ , and weight at baseline,  $r = 0.36$ ). It was not possible to control for all of these variables in the subsequent analyses as only around half of the sample completed the baseline questionnaire; however, we controlled for the dogs' weight and BCS at baseline as we had reasonable complete data on these variables, by entering them as covariates.

### 3.2. Effect of the intervention on dogs' weight and body condition

27 dogs (54% of the sample) lost weight between the baseline and follow-up assessments and 23 dogs (46% of the sample) did not. A 2-between (condition: Intervention vs. control) ANCOVA with the average percentage change in weight per week as the DV and weight and BCS at baseline as covariates, revealed that the average percentage change in weight did not differ as a function of condition,  $F(1, 36) = 0.70$ ,  $p = .41$ ,  $\eta^2 = .19$ , and dogs owned by participants in the intervention condition lost the same percentage of their body weight per week on average ( $M = -0.065$ ,  $SD = 0.65$ ) as dogs owned by participants in the control condition ( $M = -0.24$ ,  $SD = 0.55$ ).<sup>3</sup> A similar 2-between (condition: Intervention vs. control) ANCOVA with body condition score (BCS, rated by the vet or veterinary nurse) as the dependent variable, revealed that BCS at follow-up did not differ as a function of condition,  $F(1, 22) = 0.045$ ,  $p = .83$ ,  $\eta^2 = .002$ , and dogs owned by participants in the intervention condition had the same BCS on average ( $M = 6.4$ ,  $SD = 1.1$ ) as dogs owned by participants in the control condition ( $M = 6.3$ ,  $SD = 0.87$ ) at follow-up.

## 4. Discussion

The present research drew on our understanding of the challenges that people face when regulating their thoughts, feelings, and behaviour to develop an intervention intended to help the owners of overweight or obese dogs to help their dogs lose weight. We then investigated the effect of providing these volitional help sheets to owners when they attended a veterinary clinic with their dog. The trial suffered

<sup>3</sup> In addition to this 'intention-to-treat' analysis, we also compared outcomes between participants in the intervention condition who completed ( $N = 10$ ) versus did not complete ( $N = 16$ ) the planning exercise. However, the findings did not differ between these two groups ( $M_{\text{PLAN}} = -0.23$ ,  $SD = 0.74$ ,  $M_{\text{NOPLAN}} = 0.069$ ,  $SD = 0.57$ ),  $F(1, 16) = 0.93$ ,  $p = .35$ ,  $\eta^2 = 0.055$ .

from relatively few participants completing baseline questionnaires and a substantial loss to follow-up, with the consequence that it did not achieve the desired statistical power (80%) to detect the anticipated medium-to-large effect of the intervention on outcomes. However, we proceeded with the planned analyses, which suggested that, in contrast to existing research which attests to the benefits of if-then planning, dogs owned by participants in the intervention condition lost the same percentage of their body weight per week on average as did dogs owned by participants in the control condition. Furthermore, the body condition scores of dogs owned by participants in the intervention condition did not improve more than that of participants in the control condition.

There are a number of possible reasons why the intervention may not have influenced the weight and/or body condition of the dogs. First, it is possible that the intervention influenced owners' behaviour (e.g., the amount that they walk the dog or the way in which they feed them) but did not influence outcomes; either because there was insufficient time for changes in behaviour to translate into changes in outcomes or perhaps because owners compensated for improvements in, for example, exercise, by providing more food (termed 'compensatory behaviour', Radtke et al., 2012). However, the intervention did not seem to influence the way that owners fed and/or exercised their dogs either, suggesting that this explanation is unlikely. A second hypothesis is that owners allocated to the intervention condition and provided with the volitional help sheets did not form plans as instructed. This was often the case – only 10 of the 26 participants in the intervention condition who returned the baseline questionnaire completed the planning exercise, perhaps because it was embedded at the end of a relatively long questionnaire. However, additional analyses suggested that the outcomes for participants who completed the if-then planning exercise were comparable to those who did not, suggesting that this difference did not account for the lack of effects on behaviour and/or outcomes.

We suspect that if-then planning may not have been effective because a key problem that owners faced was a lack of knowledge about appropriate feeding and exercise. This hypothesis is based on two observations. First, the analysis of the factors that were associated with changes in weight among the dogs in the trial suggested that lack of knowledge about appropriate feeding and exercise were associated with changes (or lack thereof) in weight. That is, when owners felt that they knew when, what, and how much to feed and exercise their dog, the dog tended to lose weight. In contrast, when owners did not feel that they knew when, what, and how much to feed and exercise their dog, the dog tended to gain weight. Second, examination of participants' responses to the questions on exercising suggested that participants were already exercising their dog relatively frequently (on average, participants walked their dog every day; typically, 2 or 3 times) and perceived relatively few barriers to so doing, suggesting that the issue may have been the nature of the exercise provided (e.g., a short walk on a lead that did not provide sufficiently intense activity to promote weight loss) rather than enacting the intended exercise. In short, the primary challenges that owners face may be motivational (i.e., to do with setting appropriate goals), rather than volitional (i.e., to do with translating those goals into action). The implication of this explanation is that future interventions might provide guidance to owners (e.g., on how to feed and exercise their dog).

## 5. Limitations

The above conclusion should be taken in the context of a number of limitations to the described research. First and perhaps foremost, the primary follow-up measures (i.e., weight and BCS of the dog) were available for only around half of the sample. Although our sample was still larger than most studies in this area (for a review, see Krasuska and Webb, under review) and there was no evidence to suggest that participants for whom follow-up measures were available differed from those who we could not follow-up, the substantial rate of attrition does mean that the study did not achieve the desired 80% power to detect a

medium-to-large change in outcomes – in fact, post-hoc analyses suggested that our sample provided 63% power to detect a change of this magnitude. The difficulty that we experienced recruiting and retaining a sample of community-dwelling dog owners is not uncommon, but it does point to the need for researchers to find creative ways to manage this problem in order to accurately estimate the impact of interventions targeting owners' behaviour.

#### Declarations of interest

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#### Appendix A. Supplementary data

Supplementary material related to this article can be found, in the online version, at <https://doi.org/10.1016/j.prevetmed.2018.08.017>.

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