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# The Effect of an Intervention Program on Parenting Styles of Dog Owners

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# **THE EFFECT OF AN INTERVENTION PROGRAM ON PARENTING STYLES OF DOG OWNERS**

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## Abstract

Dogs' affective states are influenced by their owners' behaviour and, assumingly, positive owner reinforcement during raising a dog will ensure a positive affective state in the dog, leading to more desirable behavioural responses and a better emotional bond with the owner. The ways in which dog owners raise their dogs can be categorized into different parenting styles represented by variation in the dimension demandingness and responsiveness. Possibly, these parenting styles can be altered towards the most optimal parenting style by means of educational interventions. The goal of this study was to influence parenting styles of dog owners by educating them on a desired style, and consequently improve the owner-dog relationship. Eighty-eight dog owners were randomly assigned to either an intervention group, which received information on how to best raise a dog, or a control group, which received information on how to train a dog. The participants filled in a questionnaire on parenting styles before and after the online educational intervention. The questionnaire data was expressed as percentages of maximum scores and analysed with linear mixed models, revealing that parenting styles had altered after the intervention, but both in the group that received information on parenting and in the group that was informed on training practices. For the authoritative parenting style a significant increase occurred in the training control group, as scores went from 82.7% to 88.3%. For the authoritarian parenting style a significant decrease occurred in both groups, where the strongest change occurred in the parenting intervention group (From 11.7% to 8.1%). No differences were found in the scores for permissive or uninvolved, which we attribute to these styles being rare in our study sample. More varied study populations are necessary to detect changes in the permissive or uninvolved parenting styles, which is of importance as especially these parenting styles should be changed towards a more desired style.

## 1. Introduction

In the Netherlands, relinquishment of dogs is still common judging from the total of 10,472 dogs that were relinquished to 51 shelters in 2014. Of these dogs, 2,149 were relinquished by their owners and 6,569 were strays (Heijst et al., 2015). An important reason for owners to relinquish their dog to a shelter is due to ownership dissatisfaction and the breaking down of the owner-dog relationship (Kass et al., 2001). If the causes for ownership dissatisfaction are known, a first step can be taken towards improving ownership satisfaction and lowering the number of dogs being relinquished. In a study on dog-ownership satisfaction (Van Herwijnen et al., 2018a), 977 Dutch dog owners were asked to fill in an online questionnaire containing questions about among other things dog characteristics, the dog's behaviour and general questions. The majority of the participants were satisfied with their dog, given the average satisfaction score of 4.7 on a scale of 1 to 5 (738 participants scored a 5 and 239 participants less than that). Aggression ( $p < 0.001$ ) and disobedience ( $p < 0.001$ ) increased the probability of being less than very satisfied and these two misbehaviours combined especially reduced satisfaction of the dog owner ( $p < 0.005$ ). Dog owners that used a correction chain as a training aid typically reported high perceived ownership costs ( $p = 0.006$ ) and were more likely to be less than very satisfied with their dog ( $p < 0.005$ ). Overall, dog ownership satisfaction had a direct relation to having a good owner-dog relationship, including low perceived costs of having a dog (Van Herwijnen, et al., 2018a). This owner-dog relationship exists of attachment bonds similar to those of human caregiver-infant relationships (Serpell, 1996), and can change in time depending on the way the human and dog interact with each other (Power, 2008).

A positive owner-dog relationship has physiological and emotional benefits for both parties and it promotes their well-being. Next to providing food, humans are a social partner to dogs and are a source of emotional attachment and fulfilment (Topál et al., 1998). Having a positive relationship with a dog gives people physiological and emotional health benefits, like reduced stress hormone (cortisol) levels (Barker & Wolen, 2008). Dogs show the particular behaviours indicative of this attachment bond with humans, like proximity seeking. Meaning that dogs actively seek contact with the person they are attached to, in general or in order to cope with stress (Schöberl et al., 2012). Absence of the attachment person causes separation-related distress, which is another sign of attachment. As is the secure base effect, meaning that dogs feel more confident to investigate unknown environments when the attachment person is present (Horn et al., 2013). The fourth key manifestation of attachment is the safe haven effect, and this shows that dogs respond with less distress in threatening situations when their owner is near (Gácsi et al., 2013).

Owner behaviour influences his/her dog's affective state and behaviour, such as that positive reinforcement in training situations or affiliative interactions promote a positive effect (Deldalle & Gaunet, 2014; Horváth et al., 2008). Assumably, positive affective states are conducive to desirable behaviour in the dogs, as opposed to negative effects caused by the use of aversive training methods such as positive punishment and negative reinforcement (Ziv, 2017). The attitude of dog owners regarding dogs and animals in general is known to be associated with the dog's behaviour and stress levels (Schöberl et al., 2012).

Misunderstandings in the owner-dog relationship can occur when the owner has unrealistic expectations of companion animals, for example when the owner believes the dog understands it disobeyed and expresses guilt. Misunderstandings and conflicts can contribute to the disruption of the owner-dog relationship (Horowitz, 2009). In an insecure relationship with their owner, dogs may be prone to stress and misbehaviour, which play a part in relinquishment. The leading cause of relinquishment are behavioural problems (Scarlett et al., 2002), as 48% of dog owners relinquished their dogs at an animal shelter because of at least one behavioural problem (Kwan & Bain, 2013). Behavioural problems are more often mentioned than other reasons for relinquishment, such as moving, reduced health of the owner, human expectations, having no time for their pet and the costs of having pets (Lambert et al., 2015). Dog owners that had relinquished their dogs scored lower on companion animal attachment in comparison to

control dog owners (Kwan & Bain, 2013), indicating that they had a lesser owner-dog relationship. A better understanding of it can help to improve it, strengthen owner attachment to the dog and reduce the number of dogs being relinquished. One way to better understand and possibly optimize the owner-dog relationship can be via parenting styles directed at the dog. Parenting styles in dogs were recently determined in a study on 519 dog owners (Van Herwijnen et al., 2018b). In the human-child relationship, parenting styles reflect the quality of the parent-child relationship and influence the development of children including behavioural problems (Sangawi et al., 2016).

Parenting styles are based on the two dimensions demandingness and responsiveness. Demandingness reflects the amount of control that a parent exerts and responsiveness reflects the consideration a parent shows for the needs and wishes of their child. Four categories of parenting styles are based on these two dimensions, being authoritarian, authoritative, permissive or uninvolved parenting (Maccoby & Martin, 1983). In a study on parenting styles and emotional eating in children (Topham et al., 2011), the Parenting Styles and Dimensions Questionnaire (PSDQ) was used to score parents on each parenting style. This showed that a child with an authoritative mother ( $p < 0.01$ ) and a more emotionally responsive family ( $p < 0.05$ ) was less likely to respond to negative emotions by eating. In contrast, children showed more emotional eating if the parents were less responsive to their child's negative emotions ( $p < 0.05$ ). Children with authoritative parents became more mature, academically competent, less distressed and less likely to exhibit problem behaviour compared to children parented otherwise (Steinberg et al., 2006).

Because of the similarities in relationship between parent-child and owner-dog, Alexander J. German suggested the existence of similar parenting styles directed at dogs, resembling the parenting styles directed towards children (German, 2015), and this was confirmed by Van Herwijnen et al. (2018b). A survey was used including general questions about the owner and dog, with 62 items from the Parenting Styles and Dimensions Questionnaire (PSDQ). An adapted child-directed PSDQ was validated for measuring the dog-directed parenting styles and significant correlations were found between child-directed and dog-directed parenting styles. Principal Component Analyses identified two distinct authoritative styles (authoritative-intrinsic value orientated and authoritative-training orientated) and an authoritarian-correction orientated parenting style. Thus, the Dog-Directed Parenting Styles and Dimensions Questionnaire (DD-PSDQ) was constructed (Van Herwijnen et al., 2018b).

Possibly, an owner's parenting style can be altered towards an optimum by means of education programs, i.e. interventions. For humans, research was done to determine the effectiveness in child obesity programs between an intervention targeting only the parents versus an intervention targeting both parent and child (Golan et al., 2006). Thirty-two families were randomly assigned to one of two research groups and each group received 6 months of an educational program on a healthy lifestyle. For this study, parents were encouraged to only adopt an authoritative parenting style. The results showed that the parent-only program was more effective than the program targeting both parent and child ( $p < 0.05$ ), as there was also a significant reduction in the overweight percentage in the parent-only group (Golan et al., 2006). Showing that an intervention aimed on authoritative parenting has a positive effect on obesity in children. The demands for lifestyle changes made during this intervention most likely ensured the disadvantage of the children's presence in these sessions. Using a set-up only focused on a family-based intervention, Croker et al. (2012) did not find a significant difference in overall change in BMI between an intervention and a control group, though the intervention group had a significant reduction in systolic blood pressure and improvements in quality of life and eating habits. Interventions on parenting styles in children may be effective, though this is far from guaranteed and this raises questions about the effectiveness of interventions on dog-directed parenting. There are few research papers on educational interventions for dog owners, but some relevant work was done in the field of dog obesity. Results of a 6-month weight loss period of a conventional obesity treatment program were compared with the results of an obesity treatment program that included education of dog owners (Yaissle et al., 2004). The mean weight loss in the conventional program was 14.7% and in the owner education program it was 15%. Unexpectedly,

the results did not show favourable effects of the educational intervention over the conventional obesity treatment program. Interventions aimed at stockmen to improve human-animal interactions have been demonstrated to be effective. Hemsworth et al. (2002) performed a cognitive behavioural intervention in stockpersons to change their behaviour and attitude towards dairy cows. The cognitive behavioural intervention indeed had an effect in comparison to the control group, as stockpersons showed a more positive attitude about how to best handle cows ( $p < 0.01$ ) and they used fewer negative interactions when handling the cows ( $p < 0.05$ ). As a result, cows in the intervention group developed a shorter flight distance to humans ( $p < 0.05$ ), indicating reduced fearfulness, and a higher milk yield ( $p < 0.05$ , Hemsworth et al., 2002). Results were confirmed by a study by Main et al. (2012). During the 3-years long study, the farms that participated in the study received an intervention that encouraged them to make husbandry changes in order to reduce lameness in dairy cows. The farms were divided into two intervention groups. One intervention group was only monitored by the research group, the other group received monitoring and additional support on technical solutions and social marketing. The intervention group that received additional support implemented more changes in their husbandry practice than the group that did not receive additional support. Also, a greater reduction in lameness was found in the additional support group compared to the group that only received monitoring (Main et al., 2012). Seeing how these interventions proved effective, cognitive behavioural interventions on dog owners might also prove effective in improving the owner-dog relationship.

A promising basis for a dog-directed parenting style intervention program seems the Triple P-Positive Parenting Program, which is used as a preventively oriented parenting and family support strategy. The Triple P intervention program is a behavioural intervention based on social learning principles. The aim of this program is to reduce behavioural and emotional problems in preadolescent children, by means of raising knowledge, skills and confidence in parents. One of the main goals of the Triple P program is to develop an individual's capacity of self-regulation. The Triple P program consists of five different intervention levels, which differ in intensity and can be used according to the parental need. Level 1 focuses on providing parents with useful information about parenting, levels 2 to 4 consist of different training sessions done individually or in a group, and level 5 is for special need cases. The Triple P-Positive Parenting Program is based on offering children a safe and stimulating environment, helping children learn through positive support, using the right discipline, having realistic expectations and taking care of yourself as a parent. The program works on these 5 principles via influencing parenting skills by specifying positive child management skills as alternative to coercive parenting practices (Sanders, 1999). Various randomized clinical trials showed the effectiveness of parenting programs based on positive parenting practices. Particularly, in ensuring better developmental outcomes and mental health in children, in comparison to the usual care or no treatment at all. (Sanders, 1999; Taylor & Biglan, 1998).

Although the Positive Parenting Program is effective on the children's development it is unknown if the intervention program works for dog owners. No interventions have been performed that focused on influencing the parenting styles of dog owners. To test if the Positive Parenting Program principles could benefit the owner-dog relationship by affecting the dog owners' parenting style, the five core principles of the Triple P program were used to create an educational intervention program for dog owners. The goal of this study is to test if an educational intervention can positively influence dog owners' parenting style. This will be done by promoting appropriate, positive, parenting in dogs and steering dog owners towards desired parenting styles. By targeting underlying elements of owner-dog interactions, it is attempted to change dog owners' parenting styles. Helping future and existing dog owners understanding the owner-dog relationship and their mechanisms, may help to reduce the occurrence of dysfunctional owner-dog relationships. The study aims to determine the effect of an educational intervention program on dog-directed parenting styles and we expect that the intervention will increase levels of the desired authoritative parenting style in dog owners and decrease levels of the other parenting styles compared to pre-intervention levels.

## 2. Methods and materials

A quantitative survey study was performed to examine the effects of a digital educational intervention on the parenting styles of dog owners and determine if there would be a change in dog owners' interactions with dogs as shown by their parenting styles. The dog owners were not aware in which treatment group they were placed and were randomly divided over the treatment groups. The first treatment group consisted of the parenting intervention, where the dog owners received information and video's on how to raise their dog. The second treatment group consisted of the training (control) group, where the dog owners received basic information on training a dog, which was not expected to influence their parenting style.

### 2.1. Recruitment of participants

The recruitment of dog owners was mainly done digitally, via websites on the internet and Social Media channels like Facebook groups. Websites frequently used by dog owners to discuss dog topics, like internet fora, were used also. There were no criteria for the participation of this study, other than owning a dog now or having owned a dog in the past year. At the start of the survey the broader goal of the study was explained, the contents of the survey and how much time it would take. The study itself did not contain treatments or involvement in the daily life of the dogs, meaning it was not subject to reviewing by an ethics committee.

### 2.2. Web-based intervention

The five core elements of the Triple P program, as detailed in the introduction, were adapted to fit the owner-dog relationship. Next, an educational intervention was made explaining these five core elements and how to implement them. The study consisted of two groups. The intervention group received the information of the five core Triple P program elements on how to raise a dog and the control group received basic information on how to train a dog with a clicker. This information was provided in the form of a link to a video-transformed PowerPoint and three tutorial video's elaborating on the information given in the PowerPoint video.

To increase the validity of the Triple P translation for dogs, five behavioural experts of certipet.org evaluated the survey and their feedback was incorporated and processed for the final intervention. Unclarities were further tracked by having the surveys tested by three native speakers all owning a dog.

Interventions (parenting or training) were assigned randomly to participants via the website [www.dierenwetenschap.com](http://www.dierenwetenschap.com). The language of the intervention program was in Dutch and it ran from the start of January 2019 until the end of February 2019. The intervention program consisted of three main parts, the first part consisting of the start survey before the intervention, the second part consisting of the information transfer and the third part consisting of the end survey after the intervention. The start and end surveys were similar but different in details on how situations were described and questions asked. The two similar surveys, which measured the same constructs, were randomly used as a start survey or end survey across participants, with each participant filling out one of each. Surveys started with an explanation of the objective of the study, what the study consisted of and how long it would take to participate. At the end of the survey, the participants were provided with a randomized link to either the intervention (parenting) information or the control (training) information. After watching these video's, the participant would see a notification telling them to save the website link in order to do the second survey after a few days. This second survey started with a short exam, to test if the participants paid attention to the information provided in the videos. Following the exams, which were tailored to treatments, the end survey measured the same practices regarding raising or training a dog as the first survey, but with slightly different questions. The participants who did not fill in the second survey in two weeks' time, received an email as a reminder to still participate in the second survey to complete the research.

### 2.2.1. Surveys

The surveys itself consisted of 34 parenting style questions and 25 questions that assessed how dog owners reacted to certain day-to-day situations with their dog (practical situations). From these 25 practical situation questions, 20 assessed the parenting styles and 5 assessed information regarding Triple P. These were on Triple P environment, behaviour, rules, expectations, rest and an overall score. The practical situation questions contained 27 items from the 32/62-PSDQ and DD-PSDQ used in the study by Van Herwijnen et al. (2018b). These 27 items were attained from a PCA-analysis after rotation for the 32/62-PSDQ (Robinson et al., 1995) and the new dog-directed parenting styles that loaded  $\geq |0.4|$ , choosing the 27 items that reflected our practical situations from a total of 37 items. After this, two permissive items from the 32-PSDQ were added to get a more balanced item set. Consequently, these 29 items were translated in order to reflect longer term interaction tendencies, which dog owners can perform in day-to-day situations.

The PSDQ and practical situation items in the surveys were measured on a five-point Likert scale as never (1), nearly never (2), neutral (about half of the time, 3), nearly always (4) and always (5). The calculation for the parenting style scores were done by summing the scores for items on the same parenting style, some of these items were scaled reversely. These sums were expressed as percentages of the theoretical maximum.

For the analysis and scoring of the parenting styles, the 29 items from the PSDQ and DD-PSDQ were linked to Parenting Style labels. For the DD-PSDQ this was AUN for authoritarian-corrected orientated, AUTi for authoritative-intrinsic value orientated and AUTt for authoritative-training orientated. In the PSDQ this was AUN for authoritarian, AUT for authoritative, PERM for permissive and UNIN for uninvolved. Both the DD-PSDQ and 32-PSDQ were used as the DD-PSDQ does not capture the permissive and uninvolved styles. This is why the 32-PSDQ is better at capturing the full spectrum of all four parenting styles.

For the examination of the exam tests of the second survey, the analysis was set for a cut-off of 55% correct questions and participants needed to have 55% or more of the examination questions correct in order to be included in the analysis. Seven of the 95 participants were excluded for failing the exam, leaving a total of 88 participants to analyse.

### 2.3. Statistical Analysis

The data collected via online surveys was analysed using the statistical program SPSS. For the analysis, a Restricted Maximum Likelihood (REML) procedure was performed. The 14 different parenting styles (7-PSDQ and 7-practical situation styles) and the six Triple P measurements were the dependent variables and the survey (before or after the intervention) and group (parenting or training), including 2-way interactions, were the independent variables. Thus, it was analysed if treatments differed in before or after comparisons. For all tests, a value of  $p < 0.05$  was considered as significant.

A one-way analysis of variance was performed to look for associations between the parenting styles and candidate explanatory factors. With the LSD post-hoc test we analysed in which group and direction associations existed.

With the objective to test consistency between the measured parenting styles pre-intervention and post-intervention, Spearman rank correlation tests were run between dog-directed and child-directed parenting styles and the 32-PSDQ and practical situations.

### 3. Results

#### 3.1. Participants

In total, 427 participants enrolled in the first survey. Of these 427 participants, 95 completed the intervention program of which 7 participants were excluded due to not making the 55% cut-off point for answering the examination questions. Of the 88 participants included, 44.3% (N = 39) completed the intervention program and 55.7% (N = 49) finished the training program. Of this set, 83% was female (N = 73) and 17% (N = 15) was male. The majority of participants followed or completed education at BSc level ('HBO', 40.2%, N = 35) and at MSc level ('WO', 25.3%, N = 22). Vocation studies had been done by 21.8% ('MBO', N = 19) and 12.6% completed high school (N = 11). Most participants ranged in the age of 45-54 years old (31.8%, N = 27) or 55-64 years old (24.7%, N = 21). Over half (52.3%, N = 45) of the participants owned one dog, 24.4% (N = 21) owned two dogs. The mean ( $\pm$  s.d.) number of dogs was  $1.80 \pm 1.00$  on a four-point Likert scale of one to four or more. The majority of the participants were very satisfied with their dog(s) (63.6%, N = 56) and only a small percentage rated satisfaction as average (8%, N = 7). Eighty-three percent (N = 73) of the participants had visited a dog school in the past, 39.5% (N = 34) of these visited the dog school for a period of two years or longer. Of the participants, 78.4% (N = 69) indicated to spend at least 90 minutes a day or more of their time with the dog and 72.7% (N = 64) of the participants took care of the dog for 75 – 100% of the time. Table 1 shows how the parenting styles were divided at the start of the intervention, it shows that the participants were mainly characterized by the authoritative parenting styles in the PSDQ and the practical situations (AUT<sub>32</sub>  $\mu$  = 76.3, DD-AUT<sub>t32</sub>  $\mu$  = 83.5, AUT<sub>pr</sub>  $\mu$  = 61.2, DD-AUT<sub>tpr</sub>  $\mu$  = 76.0) and to a lesser extent characterized by the authoritarian parenting styles (AUN<sub>32</sub>  $\mu$  = 13.6, DD-AUN<sub>32</sub>  $\mu$  = 12.0, AUN<sub>pr</sub>  $\mu$  = 16.0, DD-AUN<sub>pr</sub>  $\mu$  = 16.5). Complete descriptive statistics per group are displayed in Appendix 1.

Table 1. Dog owners answered questions on 5-point Likert Scales about how they interact with their dog. Multiple Item scores were summed into scores for dog-directed parenting styles and expressed as % of the maximum. Mean +/- SD (range), median, minimum and maximum and lower and upper quartile of parenting style scores of dog owners at the start of the study (N = 88).

Parenting style	Mean $\pm$ St. Dev	Median	Min-Max	25th %ile – 75th %ile
<b>DD-32</b>				
AUN	12.0 $\pm$ 9.3	9.4	0-40.6	3.1-15.6
AUTi	67.9 $\pm$ 17.4	70.8	16.7-95.8	58.3-79.2
AUTt	83.5 $\pm$ 13.5	87.5	45.8-100	79.2-95.8
<b>CD-32</b>				
AUN	13.6 $\pm$ 8.8	14.1	0-37.5	6.3-18.8
AUT	76.3 $\pm$ 12.4	80.0	46.7-95.0	70.0-85.0
PERM	25.5 $\pm$ 13.7	25.0	0-70.0	15.0-35.0
UNIN	20.4 $\pm$ 7.8	18.8	4.2-45.8	16.1-24.5
<b>DD-PR</b>				
AUN	16.5 $\pm$ 13.9	13.3	0-62.5	6.3-23.1
AUTi	50.1 $\pm$ 14.4	50.0	5.6-87.5	43.1-59.7
AUTt	76.0 $\pm$ 16.1	77.1	25.0-100	65.8-89.3
<b>CD-PR</b>				
AUN	16.0 $\pm$ 14.7	12.5	0-63.8	5.0-20.9
AUT	61.2 $\pm$ 12.2	64.6	15.6-82.5	52.8-70.3
PERM	9.9 $\pm$ 10.3	7.5	0-57.5	2.5-12.5
UNIN	22.7 $\pm$ 8.2	21.1	7.0-61.7	17.8-26.4

### 3.2. Correlations between parenting styles

Before starting to look for associations or effects of the intervention, a t-test was performed to look at any significant differences between the parenting styles of the parenting group and training group before the intervention. This t-test showed no significant differences between the means of the two groups, indicating the similarity at the start.

The results of the tested associations before and after the intervention show that for both the 32-PSDQ and practical situations the similar child-directed and dog-directed parenting style outcomes significantly associated with each other (Table 2). Showing that there is a consistency between the child-directed and dog-directed scores of similar parenting styles and that there is consistency between the 32-PSDQ and the practical situation outcomes of parenting styles.

#### 3.2.1. Pre-intervention

In the parenting style scores the 32-PSDQ, child-directed and dog-directed parenting styles associated for AUN<sub>32</sub> and DD-AUN<sub>32</sub> ( $r_s = 0.88, p < 0.001$ ), AUT<sub>32</sub> and DD-AUTi<sub>32</sub> ( $r_s = 0.88, p < 0.001$ ), AUT<sub>32</sub> and DD-AUTt<sub>32</sub> ( $r_s = 0.74, p < 0.001$ ). There was also an association between the child-directed UNIN<sub>32</sub> and PERM<sub>32</sub> parenting style ( $r_s = 0.52, p < 0.001$ ).

For the practical situations, child-directed and dog-directed parenting styles associated for the AUN<sub>pr</sub> and DD-AUN<sub>pr</sub> ( $r_s = 0.98, p < 0.001$ ), AUT<sub>pr</sub> and DD-AUTi<sub>pr</sub> ( $r_s = 0.75, p < 0.001$ ), AUT<sub>pr</sub> and DD-AUTt<sub>pr</sub> ( $r_s = 0.83, p < 0.001$ ). Child-directed UNIN<sub>pr</sub> associated with PERM<sub>pr</sub> parenting style ( $r_s = 0.67, p < 0.001$ ).

Parenting styles of the PSDQ and practical situations associated logically for the child-directed parenting styles of AUN ( $r_s = 0.58, p < 0.001$ ) and AUT ( $r_s = 0.50, p < 0.001$ ) with  $N = 88$  for all comparisons, and no associations were found for the PERM and UNIN parenting styles. For all three of the dog-directed parenting styles there was a logical association (DD-AUN  $r_s = 0.53, p < 0.001$ , DD-AUTi  $r_s = 0.46, p < 0.001$ , DD-AUTt  $r_s = 0.57, p < 0.001$ ,  $N = 88$  for all comparisons).

#### 3.2.2. Post-intervention

In the 32-PSDQ, similar significant associations as before the intervention were found between the child-directed and dog-directed parenting style outcomes for AUN<sub>32</sub> and DD-AUN<sub>32</sub> ( $r_s = 0.85, p < 0.001$ ), AUT<sub>32</sub> and DD-AUTi<sub>32</sub> ( $r_s = 0.86, p < 0.001$ ) and AUT<sub>32</sub> and DD-AUTt<sub>32</sub> ( $r_s = 0.64, p < 0.001$ ). A negative association was found between AUN<sub>32</sub> and DD-AUTi<sub>32</sub> ( $r_s = -0.50, p < 0.001$ ). There was also a significant association between the child-directed UNIN<sub>32</sub> and PERM<sub>32</sub> parenting style ( $r_s = 0.60, p < 0.001$ ).

For the practical situations, similar significant associations were found between the child-directed and dog-directed parenting style outcomes of AUN<sub>pr</sub> and DD-AUN<sub>pr</sub> ( $r_s = 0.99, p < 0.001$ ), AUT<sub>pr</sub> and DD-AUTi<sub>pr</sub> ( $r_s = 0.82, p < 0.001$ ), AUT<sub>pr</sub> and DD-AUTt<sub>pr</sub> ( $r_s = 0.75, p < 0.001$ ). Another association found was between the UNIN<sub>pr</sub> and DD-AUN<sub>pr</sub> ( $r_s = 0.52, p < 0.001$ ), which was similar for the UNIN<sub>pr</sub> and AUN<sub>pr</sub> ( $r_s = 0.55, p < 0.001$ ). A significant association was found between the child-directed UNIN<sub>pr</sub> and PERM<sub>pr</sub> parenting style ( $r_s = 0.66, p < 0.001$ ).

The parenting styles of the 32-PSDQ and the practical situations associated significantly with each other for some of the child-directed parenting styles (AUN  $r_s = 0.71, p < 0.001$ , AUT  $r_s = 0.36, p = 0.001$ ,  $N = 88$  for all comparisons). There were no significant associations found between the child-directed PERM and UNIN parenting styles of the 32-PSDQ and practical situation outcomes. For all three of the dog-directed parenting styles there also was a significant association (DD-AUN  $r_s = 0.72, p < 0.001$ , DD-AUTi  $r_s = 0.31, p = 0.003$ , DD-AUTt  $r_s =$

Table 2. Correlations between parenting styles before and after the intervention.

Correlations	Before	After
	$r_s$	$r_s$
<b>32-PSDQ</b>		
AUN & DD-AUN	0.88	0.85
AUT & DD-AUTi	0.88	0.86
AUT & DD-AUTt	0.74	0.64
UNIN & PERM	0.52	0.60
<b>Practical-Sit</b>		
AUN & DD-AUN	0.98	0.99
AUT & DD-AUTi	0.75	0.82
AUT & DD-AUTt	0.83	0.75
UNIN & PERM	0.67	0.66
AUN & UNIN	0.23	0.55
AUT & UNIN	0.44	0.52
<b>PSDQ &amp; PR</b>		
AUN	0.58	0.71
AUT	0.50	0.36
DD-AUN	0.53	0.72
DD-AUTi	0.46	0.31
DD-AUTt	0.57	0.56

0.56,  $p < 0.001$ ,  $N = 88$  for all comparisons). A negative correlation existed between DD-AUTi and DD-AUN ( $r_s = -0.59$ ,  $p < 0.001$ ).

### 3.3. Parenting styles and associations

A one-way analysis of variance was performed with parenting styles as dependent variables using the first survey records ( $n = 88$ ). Significant differences were found between the amount of time the participants spent daily with their dog and scores for the DD-AUTt<sub>32</sub> ( $F = 3.5$ ,  $p = 0.034$ ), AUT<sub>32</sub> ( $F = 5.3$ ,  $p = 0.007$ ), DD-AUTi<sub>pr</sub> ( $F = 3.9$ ,  $p = 0.023$ ), DD-AUTt<sub>pr</sub> ( $F = 4.6$ ,  $p = 0.012$ ) AUT<sub>pr</sub> ( $F = 6.2$ ,  $p = 0.003$ ). The LSD post-hoc test revealed that the participants who spent at least 90 minutes or more with their dog on a daily basis, had an overall higher authoritative parenting style than the dog owners who spent around 30-60 minutes of their time with their dog.

Another significant difference was found for the DD-AUTt<sub>32</sub> between participants that had visited a dog school in the past and participants that had not ( $F = 5.2$ ,  $p = 0.026$ ). Dog owners who had visited a dog school had the higher DD-AUTt<sub>32</sub>. The degree of recent dog schooling associated with DD-AUTt<sub>32</sub> ( $F = 2.9$ ,  $p = 0.027$ ), DD-AUN<sub>pr</sub> ( $F = 3.6$ ,  $p = 0.009$ ) and AUN<sub>pr</sub> ( $F = 3.7$ ,  $p = 0.008$ ). The LSD post-hoc test revealed that the longer dog school attendances related to higher DD-AUTt<sub>32</sub> scores and a decrease in the DD-AUN<sub>pr</sub> and AUN<sub>pr</sub> parenting style scores.

Looking at the age of the participants, there was a significant difference for the PERM<sub>32</sub> parenting style. Dog owners in the age of 65 years old or older had a lower score of the permissive parenting style than that of dog owners in the age of 35-44 or 55-64.

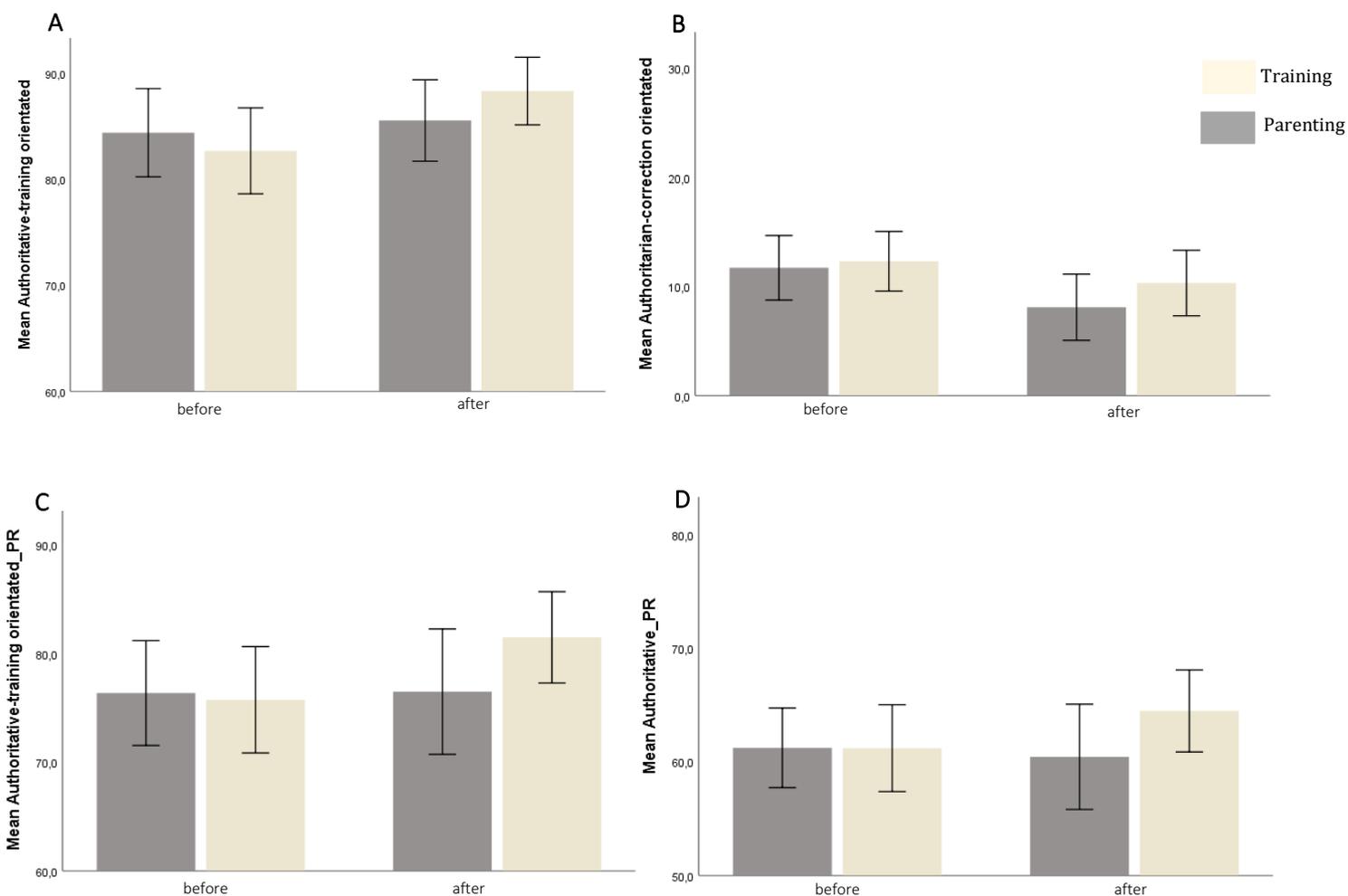
### 3.4. Intervention effects

The effects of the interventions on parenting styles and Triple-P measurements of the 88 participants were tested with restricted maximum likelihood (REML), including the fixed effects survey (start, end) and treatment (parenting, training), and the random effect participants.

The interaction between survey and treatment for the DD-AUTt<sub>32</sub> parenting style was significant ( $F = 6.4$ ,  $p = 0.013$ ), as was the main effect of the survey ( $F = 14.7$ ,  $p < 0.001$ ). As shown in figure 1, the training group had a significant increase in score after the intervention, as this mean increased by 5.6 while that of the parenting group increased by 1.2 and was not significant. For the DD-AUN<sub>32</sub> parenting style there was a significant effect of the main effect survey ( $F = 9.1$ ,  $p = 0.003$ ), with a decrease from 12.0 to 9.2% after the intervention. Of this reduction, the parenting group had a slightly bigger decrease (from 11.7 to 8.1%) than the training group (from 12.3 to 10.3%) as shown in figure 1. For the AUN<sub>32</sub> parenting style a similar significant effect was found for the main effect survey ( $F = 6.2$ ,  $p = 0.015$ ), showing a decrease from 13.6 to 11.5%.

The same REML tests on the practical situations showed that the interaction effect of survey and treatment was significant for the DD-AUTt<sub>pr</sub> parenting style ( $F = 6.0$ ,  $p = 0.016$ ), as was the main effect of survey ( $F = 5.5$ ,  $p = 0.021$ ). The training group scored significantly higher after the intervention than the parenting group (Figure 1). The mean of the training group increased from 75.8% before the intervention to 81.5% after, while the parenting group only slightly increased from 76.4 to 76.5%. For the AUT<sub>pr</sub> parenting style there was a trend for the interaction effect of the survey and treatment ( $F = 3.8$ ,  $p = 0.053$ ). A slight increase in scores of the training group was found after the intervention, as the mean increased from 61.2 to 64.5% (Figure 1).

For the Triple P measurements there was a significant effect of the intervention on scores for environment ( $F = 6.9$ ,  $p = 0.010$ ), showing that the parenting group overall had a significantly lower mean (67.6%) than the training group (77.8%). A significant effect of the interaction between survey and treatment was found on the Triple P component behaviour ( $F = 6.8$ ,  $p = 0.011$ ) and there was an increase of the parenting group from 76% to 83%. Triple P expectations was affected by the main effects of the intervention ( $F = 8.2$ ,  $p = 0.005$ ) and the survey ( $F = 8.5$ ,  $p = 0.004$ ), and by the interaction between these ( $F = 9.2$ ,  $p = 0.003$ ). The parenting group had the significant increase in means from 62.2% to 79.5% thereafter. A significant main effect of the survey on Triple P rest was found ( $F = 6.9$ ,  $p = 0.010$ ), with an overall higher mean score after the intervention (86.6%) than before (80.1%). No significant effect on the overall Triple P score was found.



**Figure 1. Mean parenting style scores ( $\pm$  95% CI) before and after the intervention for the parenting and training group. (A) Significant increase in the 32-PSDQ Authoritative-training orientated parenting style for the training group. (B) Significant decrease in the 32-PSDQ Authoritarian-Correction Orientated parenting style for both groups. (C) Significant increase in the practical Authoritative-Training Orientated parenting style for the training group. (D) Trend in the increase of the practical Authoritative parenting style for the training group.**

## 4. Discussion

Authoritative parenting positively influences social development and school performance in children and we assume that appropriate dog-directed parenting also results in favourable outcomes in dogs. However, how to direct dog owners to a desired parenting style is yet unknown. Therefore, the aim of this study was to determine if an educational intervention program that focused on appropriate, positive, parenting of dogs could steer dog owners towards a desired parenting style. Dog owners (N = 88) filled out online surveys before and after accessing video footage about parenting or training and their answers were calculated into scores for dog-directed parenting styles. We compared scores for the intervention with information on positive parenting to that of an intervention with conventional training information, and we found that parenting styles changed following interventions. Unexpectedly, an increase in the authoritative parenting styles was most pronounced in the training group. In the parenting group, the intervention was effective in decreasing the authoritarian parenting style and the findings support that dog owners may change their parenting ways based on information provided to them. However, the present effects were small and more comprehensive interventions seem necessary for changing the ways in which owners parent their dogs.

Dog-directed parenting styles were determined by van Herwijnen et al. (2018b), showing that child-directed and dog-directed parenting styles are associated. Three distinctive dog-directed parenting styles were found, being authoritative-intrinsic value orientated (DD-AUTi), authoritative-training orientated (DD-AUTt) and authoritarian-correction orientated (DD-AUN). Items regarding parenting styles were answered on a five-point Likert scale for the 32-PSDQ and practical situation questions, the score was then determined by converting these scales to percentages and summing the right items fitting the parenting styles. In this study, comparisons between the dog owners indicated parenting styles to be stable over time and scores, before the intervention and after the intervention correlated significantly (all styles  $p < 0.05$ ). Surprisingly, scores for the parenting styles uninvolved (UNIN) and permissive (PERM) also correlated significantly ( $p < 0.05$ ) in both the 32-PSDQ and practical situations. These two parenting styles seem to be associated, which could make sense as both are seen as a parenting style of 'least effort parenting'.

Earlier studies done on parenting styles showed that the authoritative parenting style is found most, followed by the authoritarian and permissive or uninvolved parenting style (Eastin et al., 2006; Rosen et al., 2008). However, a study that focused on parents of juvenile offenders found that their parenting was mostly characterized by the uninvolved style (49%), followed by permissive (23%) with authoritative (15%) and authoritarian (13%) being the lowest (Steinberg et al., 2006). The results of the survey that was administered to the participants before our intervention showed that the majority of the dog owners were characterized by the authoritative parenting styles for both the 32-PSDQ (Parenting group: 77% authoritative (AUT), 85% dog-directed authoritative training (DD-AUTt); Training group: 75% AUT, 83% DD-AUTt) and practical situations (Parenting group: 61% AUT, 76% DD-AUTt; Training group: 62% AUT, 76% DD-AUTt). This would correspond with the more training orientated dog owners. This is consistent with the research done by van Herwijnen et al. (2018b), showing that the authoritative style had the highest mean score and thus characterized the participants parenting style the most. Our study also showed that the majority of the participants were female (83%). This could be explained via a study done on 749 dog owners' interactions with their dogs and pet ownership (Dotson & Hyatt, 2008). It showed that women have a higher score on the dimensions of dog-companionship experience compared to men ( $p < 0.05$ ) and are usually the primary caregivers (72.6%; Dotson & Hyatt, 2008). The permissive or uninvolved parenting styles were barely found in this study. This would make sense as uninvolved dog owners are less likely to bother to participate in a study about raising or training their dog when this requires an effort. Seeing as this parenting style is known for making little effort in parenting, we suspect that our study population did not consist of a lot of dog owners with the uninvolved parenting style as the intervention was very time-consuming. This was also shown in the study by van Herwijnen et al.

(2018b), where permissive or uninvolved parenting styles were not detected. However, it could also be possible that the permissive or uninvolved parenting style do not apply in the dog-directed parenting styles. Possibly the authoritative-intrinsic parenting style could be the dog-directed permissive or uninvolved style or there could still be an unidentified dog-directed parenting style that would apply for being permissive or uninvolved. Further studies on child-directed parenting styles however also observed the uninvolved parenting style the least of all, reporting an unbalanced divide in parenting styles (Eastin et al., 2006; Rosen et al, 2008). Thus, as the majority of our participants were mainly already characterized by the desired authoritative parenting style the study population was not ideal.

Previous studies showed that an intervention on farmers, focused on motivating them to implement husbandry changes, resulted in a reduction of lameness (Main et al., 2012). Showing that such interventions can prove effective in making changes. The present interventions of watching video footage on dog parenting or training did also have effects and this was showed in the PSDQ parenting styles, the practical situation parenting styles and the Triple P measurements, with significant differences between before and after the intervention. Participants who received the conventional training program had increased scores for the practical authoritative (AUT<sub>pr</sub>) style and both the 32-PSDQ and practical dog-directed authoritative training style (DD-AUT<sub>t32</sub> and DD-AUT<sub>tpr</sub>). Information on how to properly train a dog could be expected to increase DD-AUT<sub>t32/pr</sub> scores, as this dog-directed authoritative-training oriented parenting style is mainly characterized by training elements and items on training were frequently used as practical situations (*e.g. 'I give praise when my dog is good'; 'I practice behaviour step by step with my dog, so I am sure he understands what I ask of him'*). For the parenting intervention group, we expected to find an increase in responsiveness but also demandingness, as the intervention was targeted on emotional warmth, supportive actions, structured environments and clear rules. This should have resulted in an increase of the AUT parenting styles, as optimal parenting is characterized by scoring high on both dimensions. However, the conventional training program showed the stronger effects on AUT parenting, and no effects of the parenting intervention were found for the AUT<sub>32</sub> or dog-directed authoritative-intrinsic value orientated parenting styles (DD-AUT<sub>i32/pr</sub>). Both the interventions on parenting and training caused decreased scores for the 32-PSDQ dog-directed authoritarian (DD-AUN<sub>32</sub>) and child-directed authoritarian (AUN<sub>32</sub>) parenting styles, with most marked effects for the parenting group. The parenting intervention actually had a slight positive effect on steering dog owners towards a desired parenting style, as it weakened authoritarian parenting. The effects mentioned before on AUN<sub>32</sub> and AUT<sub>pr</sub> parenting styles, did not show in DD-AUN<sub>pr</sub> and AUN<sub>pr</sub>. Training aspects might be relatively easy to influence and/or practical situations were more fitting for the AUT parenting style than for the AUN parenting style. Possibly, the parenting intervention mainly influenced the balance of demandingness and responsiveness, and not so much aspects of correctional methods as used in the practical situations. Five core principles of the Triple P-Positive Parenting Program were adapted into measurements to fit our dog-directed intervention program. The parenting intervention group had an overall lower mean than the training group for Triple P environment, which could be due to chance as there was only a main effect and no interaction effect. This would also be unexpected, as the dog owners in the parenting group received information about a safe environment while the training group did not. For Triple P behaviour and expectations interaction effects were found, showing that the parenting group had a significant increase in scores contrary to the training group. This could suggest that the parenting group had a better responsiveness on this subject while the training group was informed more on training aspects, which might make them miss the relevance of these Triple P aspects. For Triple P rest an overall higher mean score for both groups was found at the end of the intervention period compared to the initial starting score.

Previous study showed that a cognitive behavioural intervention on stockpersons resulted in a more positive attitude about how to best handle cows, using fewer negative interactions with the animals to improve the cows' welfare. However, this study by Hemsworth et al. (2002) used a more intense procedure to induce behavioural changes, including a one-hour individual session with a researcher where the material was to be discussed and questions could be asked. Afterwards, the researchers visited the farms again for a check-up and to discuss progress or

problems. For handling pigs, it was also shown that an educational intervention improved stockpersons attitudes and behaviour towards pigs, reducing pigs' fear. This via the same methods used in the other research with dairy cows (Hemsworth et al., 1994; Coleman et al., 2000). In our study, the owner education on positive parenting did not provide additional benefits over the conventional-training program. It is possible that more intense attempts at changing the behaviour are necessary for steering parenting styles in the desired direction, or that a positive parenting program for dog owners isn't the ideal intervention to change parenting styles. The conventional training program showed more results in steering towards a desired authoritative parenting style. The positive parenting program did however result in decreasing the authoritarian parenting style more so than the conventional training program. As the intervention only consisted of a PowerPoint and some videos, it could be that the absence of verbal communication is not the ideal method to target specific parenting styles. The use of PowerPoint in lectures was studied via a questionnaire on nurse major students, showing that 25% of the students that participated thought PowerPoints were dull and not interesting, resulting in a decrease in understanding of the knowledge provided. A mixture between a PowerPoint presentation and verbal communication was preferred by most students (Xingeng & Jianxiang, 2012).

Different studies have shown that authoritative parenting has a more positive effect on children than other parenting styles. Children showed less emotional eating with an authoritative mother (Topham et al., 2011) and became more academically competent and less likely to show problem behaviour or distress compared to children otherwise parented (Steinberg et al., 2006). In this study, an unexpected but logical association was found. Participants spending at least 90 minutes daily with their dog in activities had an overall higher authoritative parenting style score than participants spending 30-60 minutes daily. This corresponds with the results of Dotson & Hyatt (2008), showing that the higher the amount of "quality time" spent with the dog, the higher dog owners scored on the dimensions of dog-companionship and thus had a better owner-dog relationship. Our study also showed that participants that had visited a dog school in the past had a higher DD-AUT<sub>t32</sub> parenting style. This would make sense, as dog owners receive information and guidance on how to train a dog in dog schools. The DD-AUT<sub>t32</sub> score became higher the more the participants visited the dog school over the past two years. Contrary to the DD-AUT<sub>t32</sub> outcome, a decrease in the DD-AUN<sub>pr</sub> and AUN<sub>pr</sub> was shown the longer a dog owner visited the dog school. This could be explained by the fact that dog schools might steer the dog owners in a more authoritative parenting style, with a balanced dimension of demandingness and responsiveness. The use of positive reinforcement is also more enjoyed by dog owners than more dominant methods (Ryan, 1998). This would correspond with the idea that the authoritative parenting style is seen as the optimal parenting style to form a stronger owner-dog relationship, partly achieved by positively training with the dog.

In conclusion, the results of this study show that an educational intervention program aimed on positive parenting offers no clear advantage over a conventional-training program. The current study showed that dog owners are capable of retaining knowledge about training a dog, resulting in higher scores of the desired authoritative parenting styles. Our findings probably do not apply to the whole population of Dutch dog owners, as our study is more likely to contain participants with strong commitments to their dogs. Further research will be necessary to improve educational interventions, and find a way to also include more permissive or uninvolved dog owners to see if their parenting style can be steered in a more desired direction. Reaching the right population is necessary, as these least effort parenting styles are expected to relinquish their dog to a shelter more quickly than other parenting styles. In further research a more verbal and interactive intervention might improve information retention, and a systematic approach for a follow-up might be necessary to better ensure long-term retention of the provided information.

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## Appendix 1. Descriptive statistics

Table 3. Pre-intervention scores for dog-directed parenting styles expressed as % of the maximum. Mean +/- SD (range), median, minimum and maximum and lower and upper quartile of parenting styles of dog owners in the parenting (intervention) group (N = 41).

Parenting Style	Mean ± St. Dev	Median	Min-Max	25th %ile – 75th %ile
<b>DD-32</b>				
AUN	12.05±9.46	9.38	0-40.63	6.25-15.63
AUTi	67.32±16.85	70.83	20.83-95.83	60.42-79.17
AUTt	84.55±12.68	83.33	50.00-100	79.17-95.83
<b>CD-32</b>				
AUN	13.51±8.76	10.42	0-35.42	7.29-18.75
AUT	77.08±11.49	80.00	46.67-95.00	70.00-84.17
PERM	25.73±12.78	25.00	0-55.00	17.50-25.00
UNIN	20.17±5.97	18.75	8.33-39.58	16.67-22.92
<b>DD-Practical</b>				
AUN	16.95±15.54	12.50	0-57.81	5.00-22.66
AUTi	50.25±12.77	48.53	26.39-87.50	42.85-59.72
AUTt	76.00±14.87	76.47	40.79-100	66.45-88.89
<b>CD-Practical</b>				
AUN	16.34±16.45	11.25	0-63.75	4.61-20.63
AUT	61.02±10.70	61.25	33.13-77.56	52.19-69.06
PERM	11.33±13.51	7.50	0-57.50	3.13-13.75
UNIN	23.53±10.46	20.31	7.03-61.72	17.86-26.56

Table 4. Pre-intervention scores for dog-directed parenting styles expressed as % of the maximum. Mean +/- SD (range), median, minimum and maximum and lower and upper quartile of parenting styles of dog owners in the training (control) group (N = 54).

Parenting Style	Mean ± St. Dev	Median	Min-Max	25th %ile – 75th %ile
<b>DD-32</b>				
AUN	13.19±10.26	12.50	0-40.63	3.13-18.75
AUTi	66.50±18.17	68.33	16.67-95.83	57.29-80.21
AUTt	82.82±13.89	87.50	45.83-100	75.00-91.67
<b>CD-32</b>				
AUN	14.64±9.59	14.58	0-37.50	6.25-20.83
AUT	74.98±12.61	77.50	46.67-93.33	65.00-85.00
PERM	24.93±13.96	20.00	5.00-70.00	15.00-35.00
UNIN	20.59±8.99	18.75	4.17-45.83	15.58-25.00
<b>DD-Practical</b>				
AUN	19.22±15.72	15.63	0-62.50	6.56-26.95
AUTi	50.30±16.28	50.00	5.56-95.00	43.06-61.11
AUTt	75.84±17.12	79.84	25.00-98.68	64.58-90.79
<b>CD-Practical</b>				
AUN	18.59±15.78	15.00	0-58.75	5.20-27.81
AUT	61.58±13.75	64.74	15.63-96.43	53.28-70.45
PERM	9.44±7.22	7.70	0-36.25	3.44-12.81
UNIN	23.16±8.26	21.88	8.59-60.42	18.50-26.56

Table 5. Post-intervention scores for dog-directed parenting styles expressed as % of the maximum. Mean +/- SD (range), median, minimum and maximum and lower and upper quartile of parenting styles of dog owners in the parenting (intervention) group (N = 41).

Parenting Style	Mean ± St. Dev	Median	Min-Max	25th %ile – 75th %ile
<b>DD-32</b>				
AUN	8.00±9.14	6.25	0-40.63	0-12.50
AUTi	68.94±19.44	70.83	10.00-100	58.33-85.42
AUTt	84.84±12.02	87.50	54.17-100	75.00-91.67
<b>CD-32</b>				
AUN	9.91±8.51	8.33	0-37.50	4.17-13.54
AUT	76.68±13.21	76.67	32.14-96.67	69.17-85.00
PERM	23.87±11.79	25.00	5.00-45.00	15.00-35.00
UNIN	18.28±6.45	18.18	4.17-37.50	14.58-21.88
<b>DD-Practical</b>				
AUN	15.52±18.59	9.38	0-75.00	3.13-19.53
AUTi	47.64±16.59	47.22	2.94-95.00	37.50-58.33
AUTt	75.48±18.15	77.94	30.88-100	65.72-90.13
<b>CD-Practical</b>				
AUN	14.28±18.02	7.50	0-75.00	2.50-18.75
AUT	59.72±14.33	61.88	23.75-87.50	50.63-71.20
PERM	10.83±17.71	5.00	0-100	1.28-11.88
UNIN	22.86±14.17	20.31	0-87.50	15.23-26.17

Table 6. Post-intervention scores for dog-directed parenting styles expressed as % of the maximum. Mean +/- SD (range), median, minimum and maximum and lower and upper quartile of parenting styles of dog owners in the training (control) group (N = 54).

Parenting Style	Mean ± St. Dev	Median	Min-Max	25th %ile – 75th %ile
<b>DD-32</b>				
AUN	11.44±11.04	9.38	0-56.25	3.13-15.63
AUTi	64.74±19.42	66.67	16.67-95.83	50.00-80.21
AUTt	87.79±11.37	91.67	50.00-100	79.17-96.88
<b>CD-32</b>				
AUN	14.10±9.93	14.58	0-43.75	6.25-18.75
AUT	75.47±12.68	78.57	48.33-93.33	65.00-85.42
PERM	23.47±13.94	22.50	0-55.00	15.00-35.00
UNIN	19.60±8.03	18.75	6.25-37.5	12.50-25.00
<b>DD-Practical</b>				
AUN	18.70±19.17	10.94	0-81.25	6.25-30.19
AUTi	51.83±16.71	52.17	1.39-87.50	43.75-62.52
AUTt	81.19±15.28	83.33	15.28-100	74.65-93.32
<b>CD-Practical</b>				
AUN	17.83±19.04	10.52	0-81.25	5.00-26.37
AUT	64.66±12.73	67.30	9.38-88.16	57.12-72.66
PERM	9.42±15.92	5.26	0-100	1.25-10.53
UNIN	26.94±16.28	22.23	5.47-85.00	18.70-29.23