

## The Effects of an Online-Guided, At-Home Dog Training Session on Owner Anxiety, Mood, and General Self-Efficacy During COVID-19

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Many studies have now demonstrated the positive effects on humans from brief, unstructured interactions with dogs, including improved mood and reduced anxiety. Few studies, though, have explored the psychological impact when humans take part in more structured obedience training with the dog. This study examined the effects of owners taking part in a single session of online-guided training with their own dog in their own home during COVID-19 lockdowns. This group was compared to a similar group having an unstructured play session with their dog. Dog-owner relationship quality was also measured to investigate whether this influenced any observed changes to the outcome variables. Participants ( $N = 83$ ) were assigned to either the training group, involving 10-minutes of basic obedience training, or a play group, involving 10-minutes of unstructured play. Before the sessions, participants in each group watched videos demonstrating the interaction and then completed the Dog Owner Relationship Scale (DORS) to measure owner-dog relationship quality. Before and immediately after the session, they completed the 6-item version of the state scale of the State Trait Anxiety Inventory (STAI-6), the Positive and Negative Affect Schedule (PANAS), and the New General Self-Efficacy Scale (NGSE). A mixed between-within multivariate analysis of variance (MANOVA) was conducted with follow-up Bonferroni-corrected univariate analysis of variance, to measure differences in the outcomes between groups over time. Results indicated no significant differences between groups, but revealed a significant, large effect on scores for both groups on all measures over time. Multiple regression, analysing interaction effects between the outcome measures and the DORS, found no significant effects, indicating dog-owner relationship did not moderate the observed improvements over time. Results from this preliminary study suggest that a brief, single-session, online-guided interaction with a dog – whether training or playing with them – can confer short-term, psychological benefits for the owners.

*Keywords:* human-animal interaction, companion animal, lockdown, well-being

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**Acknowledgements:** We greatly appreciate all participants that took part in this study to help us better understand the psychological impacts of dog interactions. We also appreciate the feedback from the two anonymous reviewers, whose useful comments helped to improve this manuscript.

In the past twenty years, interacting with animals, especially dogs, as a way to alleviate distress and improve well-being in humans has become increasingly popular (Amiot & Bastian, 2015; Nimer & Lundahl, 2007). Brief, unstructured interactions with dogs that can have psychological benefits on the human have received considerable attention in the human-animal interaction (HAI) literature over the past two decades (Barker & Wolen, 2008; Gee et al., 2021).

When measuring the psychological effects of a short interaction with a dog, two commonly measured outcomes in the literature are state anxiety and mood (i.e., positive and negative affect; Grajfoner et al. 2017; Hoffman et al., 2009; Nepps et al., 2014). One study found that self-reported anxiety using the state portion of the State Trait Anxiety Inventory (STAI) significantly reduced after a 15-minute interaction with a dog (Wood et al., 2018). While Wood and colleagues did not use a control group, other studies have compared dog interactions to active or passive control groups. For example, Thelwell (2019) found larger reductions in anxiety on the STAI and improvements in mood on the Positive and Negative Affect Schedule (PANAS) from participants who played with and patted a dog for ten minutes, compared to those who watched a dog video for ten minutes. Crossman et al. (2015) also found that medical students reported a significant and large increase in positive mood and decrease in negative mood as measured using the PANAS, and a significant reduction in self-reported anxiety using the STAI, after a brief time spent patting a dog compared with a control group who had no interaction. Ward-Griffin et al. (2018) took a broader set of measurements, including participant's stress, positive and negative affect, and energy, happiness, and life satisfaction levels before and after an interaction with a dog. Positive changes in all measures were seen immediately after the session. Negative affect and perceived stress were also still lower than the control group 10 hours later, though these changes were smaller, suggesting that the positive benefits had begun to wear off. Research has found that reduced stress levels can even be obtained in participants after as little as five minutes with a therapy dog (Barker et al., 2005).

The above studies were all conducted in laboratories or under controlled conditions, impacting the generalisability of findings. To take more ecologically valid measurements, a recent study by Janssens et al. (2020) used experience sampling techniques to measure both the positive and negative affect of pet owners at 10 time-points across five days. The researchers also asked participants how much and what type of interactions they were having with their dog or cat in that moment. The authors found that passive presence (i.e., the animal was near the owner, but no interactions were occurring) was associated with reduced negative affect but no changes in positive affect, while the active presence of a pet (e.g., playing, walking, cuddling) was associated with both increases in positive affect and decreases in negative affect. While this study was labelled as part of the overall “pet effect” – that living with a pet can bestow psychological benefits (Herzog, 2011) – the in-the-moment measurements taken lend extra support to the notion that brief interactions with pets can have a positive psychological impact. The authors suggest that there is an important difference between “passive” and “active” presence of a pet, and that the type of interaction with a pet should be taken into consideration when measuring mood states.

The above studies involved unstructured interactions with dogs, such as petting, talking to, or playing with the dog. Few studies have investigated the psychological effects when individuals take part in more structured, goal-oriented interactions with dogs, such as obedience training. The existing literature on the effects of dog training on humans is sparse and only focused on specific populations, such as dog training programs (DTP) in prisons, with individuals experiencing post-traumatic stress disorder (PTSD), and with at-risk youths.

Cooke and Farrington (2014; 2016) researched the benefits of DTPs in correctional facilities, where inmates learn to train shelter dogs for adoption (Strimple, 2003). A frequently noted benefit in taking part in the DTPs is an improvement in offenders' self-

efficacy and feelings of empowerment. This could be related to a feeling of performance accomplishment (Bandura, 1977) from observing the dog's behaviour improve after training them. Cooke and Farrington (2016) wrote that "both program coordinators and participants report that, often for the first time in their lives, participants feel empowered, proud, and able to achieve goals that they set for themselves" (p. 3). Overall, they concluded that DTP's in prisons had a large effect on recidivism, and a significant but small effect on psychological factors. Other reported benefits include decreases in depression, anxiety, and loneliness, and increases in self-esteem, pride, patience, and empathy (e.g., Flynn et al., 2020; Leonardi et al., 2017).

Dog training has also been assessed for its effects on psychological outcomes when individuals with post-traumatic stress disorder (PTSD) train their own assistance dogs (Yount et al., 2012). These programs allow individuals with diagnosed PTSD to not only adopt an assistance dog and work with them for support and therapeutic means but, crucially, to also take part in the process of training the dog across a number of months (Bergen-Cico et al., 2018). A pilot study by Whitworth et al. (2019) examined two assistance dog providers, one contributing participants for the experimental group and the other for a waitlist control. Participants in the experimental group took part in the 14-week program, consisting of weekly 1-hour sessions learning how to train their dogs in introductory obedience tasks. Compared to the waitlist control, the dog training group experienced reductions in a number of PTSD symptoms, including self-disturbance, anxiety, anger, and depression. Another study, investigating a similar program, found levels of post-traumatic stress, perceived stress, self-compassion, and self-judgement all improved pre- to post-intervention in the training group but had no significant changes in the control group (Bergen-Cico et al., 2018).

Two more recent randomised controlled trials (RCT) comparing dog training to an active control group also found some positive changes. Lahav et al. (2019) assigned adolescents with social or emotional difficulties to either a dog training group (i.e., learning sit, drop, stay, and heel) or an empowerment training group (e.g., solving social problems and setting goals, with no direct dog interactions). The researchers found that participants in the training group improved more in empathic concern compared with the control group. Syzmanski et al. (2018) found improvements in the cognitive writing styles of at-risk youths who took part in a dog training program, more than those who simply walked dogs for the same time.

While these studies show potential for positive psychological effects to occur due to dog training, all the DTPs involved specific populations, and these findings may not generalise to the typical pet dog owner. Furthermore, the relationship that participants may have developed with the dog over the course of the DTP, ranging from 10 weeks (Syzmanski et al., 2018) to 12 months (Bergen-Cico et al., 2018), could account for the positive changes observed. Single-session, play-based interactions with a dog have been shown to be effective in improving psychological health and well-being (e.g., Crossman et al., 2015); therefore, research is needed to understand whether single-session, training-based interactions with a dog may be equally beneficial. Teasing out which types of interactions between human and animals lead to positive changes in psychological functioning may help elucidate the conflicting findings from the literature (Herzog, 2011). For example, while some evidence suggests a relationship between dog ownership and reduction in mental illnesses (Endo et al., 2020; Liu et al., 2019), studies often do not take into account the felt relationship and specific activities shared between dog and owner (Barcelos, et al., 2020), which may account for the changes.

Additionally, in 2020, lockdowns resulting from COVID-19 have led to increases in mental health concerns such as stress, anxiety, and depression (Salari et al., 2020) with prevalence of generalised anxiety disorder symptoms in one sample of German participants reaching almost 50% (Bäuerle et al., 2020). A review of the evidence of quarantine also

found that those in isolation were much more likely to experience feelings of psychological distress, anxiety, and frustration than those who were not isolated (Brooks et al., 2020). It is important, therefore, to investigate whether an at-home dog interaction may be effective in improving mood and reducing anxiety. Given the effectiveness of dog interactions and DTPs in other contexts, it is likely that similar effects may be seen in the home environment, with owners training their own dogs.

The aim of this study was to measure the psychological effects among typical dog-owning adults taking part in a 10-minute, single-session, online-guided training session with their own dog in their own home. As previous studies have demonstrated that brief, single-session play-based interactions with a dog can have psychological benefits, the present study aimed to extend this investigation to training-based interactions and compare the findings to a similar play-based group. As such, there were two groups: the *training group*, who took part in an introductory obedience training session, and were compared to a comparison group, who were given an alternative interaction, referred to as the *play group*. The play group had an unstructured interaction, similar to previous single-session studies (e.g., Crossman et al., 2015) involving petting and playing with their dog, with no specific goals during the session. We measured four variables related to psychological health and well-being from the HAI and DTP literature: self-reported state anxiety, positive and negative affect, and general self-efficacy (GSE). To account for the effect of relationship quality on any observed changes, we also measured the owner-dog relationship. We hypothesised that decreases in anxiety and improvement in mood (i.e., decreases in negative affect and increases in positive affect) would be observed in both groups, but only the training group would see improvement in GSE, due to the accumulation of successful outcomes. Finally, we hypothesised that dog-owner relationship quality would moderate any changes in the well-being measures, with a better relationship associated with greater improvements in the outcome measures.

### Methods

The study was approved by the La Trobe University Human Ethics Committee (approval number: HEC20181). Approval was not required from the Animal Ethics Committee, as no data were collected on the dogs, and the play and training sessions were considered to fall within the scope of a typical dog's daily activities (J Malaterre, personal communication).

#### Participants

Current dog owners ( $N = 83$ ) were recruited to participate in this study. Women comprised 82% ( $n = 68$ ) of the sample, and no participants identified as non-binary. The mean age was 44.1 years ( $SD: 13.7$ , range 18 – 72). Inclusion criteria for participation included: being over 18 years of age; owning or living with a pet dog; having access to a computer and internet; and being able to communicate in English. Participants were recruited via social media ads, university communications, media releases, and a snowball method, which encouraged previous participants to invite other people via word of mouth. All participants were provided with a participant information statement and gave informed consent by returning a signed consent form.

#### Materials

##### 6-item version of the state scale of the State Trait Anxiety Inventory (STAI-6).

The short form of the STAI (Marteau & Bekker, 1992) is a 6-item version of the original 20-item state sub-scale of the STAI, which is a reliable and validated scale for measuring anxiety (Spielberger, 1983). The STAI-6 asks participants to rate on a 5-point Likert scale (“not at all” to “very much so”) how much they currently feel six different adjectives (e.g., “calm” “relaxed” “worried”). This scale has good internal reliability ( $\alpha = .82$ ) and has been validated against the original state sub-scale, in which there were no statistical differences found between the two measures (Marteau & Bekker, 1992). Scores on the STAI-6 can range from 20 – 80, in keeping with the scoring range from the original, 20-item sub-scale.

Higher scores indicate higher levels of state anxiety. In normative data based on a sample of 1,838 participants, Spielberger (1983) reported a mean score of state anxiety on the original STAI across adult males and females of 35.46 and college student of 37.62. In a sample of 200 pregnant women, Marteau and Bekker (1992) found that the 6-item version obtained a mean score of 37.1.

**Positive and Negative Affect Schedule (PANAS).** The PANAS (Watson et al., 1988) is a 20-item scale that asks participants to rate on a 5-point Likert scale (“not at all” to “extremely”) which emotions they currently feel. The scale is comprised of two sub-scales measuring positive affect (PA) using 10 positive emotional adjectives (e.g., “excited”, “alert”) and negative affect (NA) using 10 negative emotional adjectives (e.g., “nervous”, “irritable”). The scale has good internal reliability for the present moment time ratings (PA:  $\alpha = .89$ ; NA:  $\alpha = .85$ ). It also has good convergent and concurrent validity when measured against scales of similar constructs (Watson et al., 1988). Scores on each sub-scale can range from 10 – 50, with higher scores on positive affect and lower scores on negative affect indicating a more positive mood. Watson et al. (1988) reported a mean score of 29.7 (PA) and 14.8 (NA) for the in-the-moment time rating.

**New General Self-Efficacy Scale (NGSE).** The NGSE (Chen et al., 2001) is an updated version of an earlier GSE scale by Sherer et al. (1982). The scale asks respondents to rate questions, such as, “When facing difficult tasks, I am certain that I will accomplish them” on a five-point Likert scale from “strongly agree” to “strongly disagree”. The scale has good test-retest reliability ( $r = .67$  at 20 days apart) and internal reliability ( $\alpha = .90$ ). It has good discriminant validity when measured against self-esteem (i.e., they were found to be highly related [ $r = .75$ ] but still distinct when using a goodness of fit model). It was also found to have good predictive validity when correlated with 10 occupation-specific self-efficacy sub-scales (all  $p < .05$ ). Scores on the scale can range from 1 to 5, with higher scores indicating a stronger belief in one’s ability to succeed at accomplishing goals. In a sample of 323 undergraduates, Chen et al. (2001) reported a mean score for the NGSE scale of 3.87 at time 1 and 3.91 at time 2.

**The Dog Owner Relationship Scale (DORS).** The DORS (Howell et al., 2017) is an updated version of the Monash Dog Owner Relationship Scale (MDORS) created by Dwyer et al. (2006). The DORS is a 32-item scale with Likert-type responses that measure dog-owner relationship quality. It includes positive items (e.g., “My dog helps me get through tough times”) and negative items (e.g., “There are major aspects of owning a dog that I don’t like”). Participants answer on a 5-point scale with response options depending on the question (e.g., “strongly agree” to “strongly disagree” or “very easy” to “very hard”). Based on the original MDORS (Dwyer et al., 2006) there are three sub-scales: Dog-Owner Interactions (i.e., the type and frequency of activities that the owner engages in with the dog;  $\alpha = .67$ ), Perceived Emotional Closeness (i.e., the level of emotional support the owner feels from owning a dog;  $\alpha = .84$ ), and Perceived Costs (i.e., the disadvantages of owning a dog;  $\alpha = .84$ ). The sub-scales have a range of 1 to 5, with higher scores indicating better perceived relationship quality.

**Training and Play Videos.** Participants in the training group were shown an 8-minute training video in which the student researcher, an experienced dog behaviourist qualified via the National Dog Trainers Federation (NDTF) of Australia, demonstrated how to teach a basic ‘stay’ command. This involved teaching participants a release word, which indicated to the dog when they could leave the position to receive a treat. Participants were then taught to increase the difficulty of the stay command by increasing the duration (i.e., how long the dog could hold the position), distance (i.e., how far the owner could move away from the dog while the dog held the position), and distractions (i.e., introducing distracting sounds or movements while the dog was holding the position). The technique used reward-based positive reinforcement and was designed to be simple enough that a dog with no previous obedience training could take part, but flexible enough that a more

advanced dog could take part by increasing the difficulty of the exercises (e.g., the owner taking extra steps away from the dog). To ensure that both groups watched a similar video, participants in the play group watched a 5-minute video of the student researcher demonstrating suggested interactions to engage in with their dog. The video included ways to massage them, move around in a playful way with them, and play basic games such as tug-of-war and fetch. Links to the videos are available in supplementary materials.

### **Procedure**

Data collection proceeded over three months from June through August 2020, during the strict COVID-19 lockdown measures in place in Victoria, Australia. Data were collected online using Zoom™ video conferencing software. The participants interacted with their own dog in their own home and participated in a one-on-one, 10-minute interaction guided by the researcher.

Participants were not offered any rewards for their participation in the study. After returning the signed consent form, participants were allocated to either the training or play group based on when they signed up, with spots for each group alternating. This allocation process continued for the three months of participant recruitment, and it allowed an unbiased allocation to groups while keeping the groups balanced as participants were recruited gradually across the time period.

The morning of the scheduled session, participants were sent a link to the relevant video, along with the Zoom™ link for the session, and a link to the pre-session questionnaire on Qualtrics™ online survey platform. The questionnaire comprised demographics (i.e., gender, age, education, employment), STAI-6, PANAS, NGSE, and DORS.

Once the Zoom™ meeting began, participants were asked to fill out the pre-session questionnaire, if they had not done so prior to the meeting. If they had not yet watched the training or play video, they were asked to do so at that point. Following this, the 10-minute play or training interaction began. The training group were instructed to follow the video they had watched. The researcher aided participants by reminding them of certain commands from the video and informing them when to move to the next exercise. To keep the interaction similar between groups, the researcher briefly talked to the participants in the play group, asking questions about their dog. These interactions were kept brief so as to limit the amount of exposure to the researcher and keep the participants' focus on their dog. In all sessions, the researcher constantly monitored the dog's behaviour, making sure that none of the techniques used during training or play were aversive or appeared to be causing the animal distress (e.g., no physical punishment was used by the owner and the dog did not display overt fear responses, such as licking lips, tucking the tail, or trying to avoid the owner).

The training and play sessions were timed on an iPhone stopwatch to make sure all sessions were of equal length. After the 10-minutes had elapsed, participants were asked to stop the interaction and fill out another questionnaire comprising the STAI-6, PANAS, and NGSE. After survey completion, participants were debriefed.

### **Data Analysis**

The IBM™ Statistical Package for the Social Sciences™ (SPSS) was used for all data analyses. Chi-square and independent samples t-tests were conducted to check for significant differences between the groups on education level, work situation, age, and pre-session dependent variables (STAI-6, PANAS, NGSE, and DORS). All tests were non-significant ( $p > .05$ ) indicating there were no differences between groups before the session on any of these variables.

To test whether the play and training groups differed on the outcome measures pre- to post-session, a mixed between-within groups multivariate analysis of variance (MANOVA) was conducted. The pre- and post-session time points acted as the within-groups independent variables and the training and play groups acted as between-group

independent variables (Schutz & Gessaroli, 1987). Following the MANOVA, univariate mixed analysis of variance (ANOVA) was conducted for each of the four outcome variables. A Bonferroni correction was applied to reduce the chance of a Type I error:  $.05/4 = .0125$ , therefore the new  $\alpha = .0125$ .

All assumptions for MANOVA were met, except that three variables were not normally distributed and could not be fixed by transformations. ANOVAs and MANOVAs can be robust against even severe violations of normality, especially in a sample of this size (Blanca et al., 2017; Vallejo & Ato, 2012). Therefore, these variables were kept in their original form for analysis.

The Dog Owner Relationship Scale (DORS) was used to investigate whether dog-owner relationship quality moderated any pre- to post-session changes. Analysis of correlations among the post-session variables (independent variables) and the three subscales of the DORS (moderators) revealed four significant correlations (Table 1). Therefore, following the recommendation for moderation analysis by Dawson (2014), these were followed with multiple regression analyses, testing for an interaction effect.

**Table 1**  
*Pearson's Product-Moment Correlation Coefficients for Outcome Variables and DORS Sub-Scales*

|                               | Anxiety |       | Positive affect |       | Negative affect |        | Self-efficacy |      |
|-------------------------------|---------|-------|-----------------|-------|-----------------|--------|---------------|------|
|                               | Pre     | Post  | Pre             | Post  | Pre             | Post   | Pre           | Post |
| Dog-owner interactions        | -0.18   | 0.08  | 0.06            | 0.14  | -0.04           | -0.008 | 0.2           | 0.19 |
| Perceived emotional closeness | 0.03    | -0.16 | .31**           | .38** | 0.17            | -0.08  | 0.2           | .24* |
| Perceived costs               | -0.18   | -.25* | 0.13            | 0.15  | -0.14           | -0.1   | .24*          | .24* |

Note: \*  $p < .05$ , \*\*  $p < .01$

### Results

The omnibus interaction effect between group and time was found to be non-significant, Wilks' Lambda  $F_{(4, 78)} = .75, p = .56$ , partial  $\eta^2 = .04$ , indicating that participants' psychological state across time was not influenced by whether they trained or played with their dog. Inspection of the omnibus main effect for group was also non-significant,  $F_{(4, 78)} = .79, p = .53$ , partial  $\eta^2 = .04$ . The main effect for time, though, was significant,  $F_{(4, 78)} = 49.37, p < .001$ , partial  $\eta^2 = .72$ , with a large effect size, based on Cohen's (1988) recommendations. Table 2 displays Means, standard deviations, and change scores for each of the outcome measures.

Mixed, between-within ANOVAs were used to investigate which of the four outcome variables led to the MANOVA's significant effect for time. The main effect for time showed a Bonferroni-corrected significant, large effect for all four dependent variables. Anxiety levels significantly decreased after the session ( $F_{(1)} = 80.92, p < .001$ , partial  $\eta^2 = .50$ ), while positive affect levels significantly increased ( $F_{(1)} = 109.36, p < .001$ , partial  $\eta^2 = .57$ ). Negative affect levels significantly decreased ( $F_{(1)} = 48.20, p < .001$ , partial  $\eta^2 = .37$ ), and general self-efficacy levels significantly increased ( $F_{(1)} = 64.01, p < .001$ , partial  $\eta^2 = .44$ ). Based on Cohen's (1988) recommendations, this indicates that participants in both the training and play groups had a significant, large improvement in anxiety, mood, and general self-efficacy over time (see Figure 1).

**Table 2**  
*Means, Standard Deviations, and Change Scores Pre- to Post-Session for Outcome Variables by Group.*

|                       | <i>Hypothetical Range</i> | <b>Training (n = 42)</b> |                  |               | <b>Play (n = 41)</b> |                  |               |
|-----------------------|---------------------------|--------------------------|------------------|---------------|----------------------|------------------|---------------|
|                       |                           | <b>Pre</b>               | <b>Post</b>      | <i>Change</i> | <b>Pre</b>           | <b>Post</b>      | <i>Change</i> |
|                       |                           | <i>Mean (SD)</i>         | <i>Mean (SD)</i> |               | <i>Mean (SD)</i>     | <i>Mean (SD)</i> |               |
| Anxiety               | 20 – 80                   | 39.2<br>(12.2)           | 27.9<br>(7.4)    | -11.3         | 38.1<br>(11.4)       | 27.8<br>(8.6)    | -10.3         |
| Negative Affect       | 10 – 50                   | 15.4<br>(5.5)            | 12.3<br>(3.5)    | -3.1          | 14.7<br>(4.5)        | 11.6<br>(2.4)    | -3.1          |
| Positive Affect       | 10 – 50                   | 29.3<br>(8.4)            | 39.5<br>(7.3)    | +10.2         | 28.4<br>(8.2)        | 35.7<br>(7.6)    | +7.3          |
| General Self-Efficacy | 1 – 5                     | 4.07<br>(0.61)           | 4.43<br>(0.57)   | +0.36         | 4.04<br>(0.58)       | 4.36<br>(0.51)   | +0.32         |

For moderation analysis, the four post-session measures that significantly correlated with at least one DORS sub-scale were entered into a regression analysis with interaction terms calculated (see Table 3). None of the variables showed a significant interaction effect. This indicates that dog-owner relationship quality did not significantly moderate any of the observed changes in the owner’s psychological state over time.

**Table 3**  
*Multiple Regression Interaction Effects Between Correlated DORS Sub-Scales and Post-Session Outcome Variables*

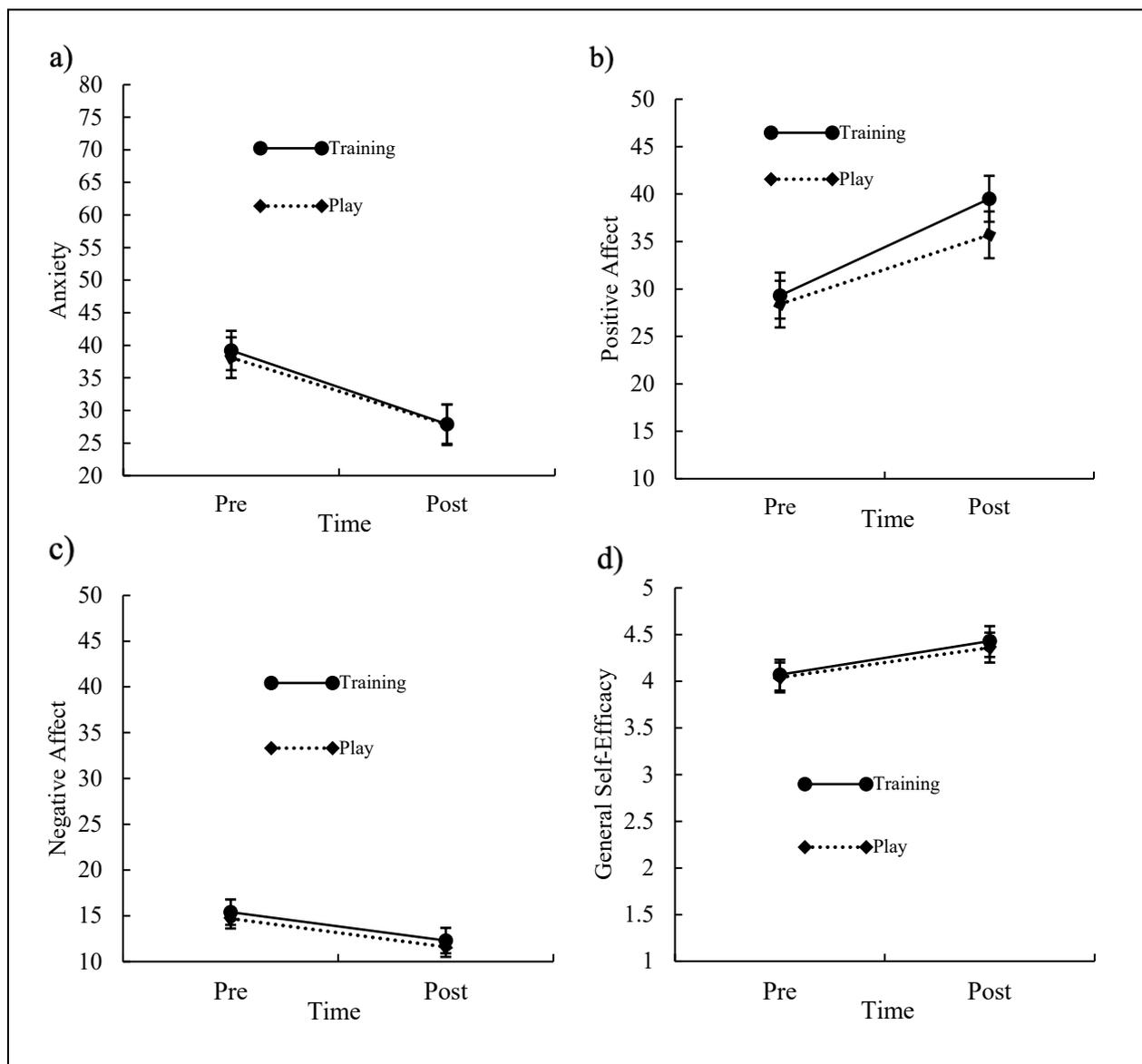
|  | <i>b</i> | <i>SE</i> | <i>p</i> |
|--|----------|-----------|----------|
| <i>Anxiety x Perceived Costs</i>                             | .27      | .83       | .75      |
| <i>Positive Affect x Perceived Emotional Closeness</i>       | .28      | .79       | .72      |
| <i>General Self-efficacy x Perceived Emotional Closeness</i> | -.01     | .04       | .71      |
| <i>General Self-efficacy x Perceived Costs</i>               | -.06     | .04       | .11      |

### Discussion

The purpose of this study was to investigate the psychological effects on owners of an online-guided, single-session, at-home dog training session in comparison to an unstructured play session. As the research was conducted with participants at home during COVID-19 lockdowns, the study also investigated the psychological effects these interactions would have on the owners during a time of social isolation. As hypothesised, both groups experienced improvements in anxiety and mood. The hypothesis that only the training group would improve in general self-efficacy (GSE) was only partially supported, as both groups significantly improved. Contrary to expectations, owner-dog relationship quality did not moderate these improvements.

**Figure 1.**

*Pre- and post-session mean scores by group for a) short form of the state scale of the State Trait Anxiety Inventory, b) Positive and Negative Affect Schedule (Positive affect sub-scale), c) Positive and Negative Affect Schedule (Negative affect sub-scale), and d) New General Self-Efficacy Scale. Error bars indicate 95% confidence intervals.*



This study demonstrates that a brief training- or play-based interaction with a dog can significantly reduce participants' state anxiety and negative affect (NA), while increasing their positive affect (PA). The findings are in line with previous dog training studies. Across different populations, taking part in dog training sessions has been shown to have a positive impact on empathy, pride, patience, self-esteem, anxiety, anger, and depression (e.g., Cooke & Farrington, 2016; Lahav et al., 2019; Whitworth et al., 2019). These findings are from specific populations, whereas the present study is the first, to our knowledge, to measure changes in mood and anxiety among typical dog owners training their own dog at home. While Clark and Boyer (1993) did use a small sample from the general population, they only measured the dog's obedience and the owner-dog bond after the training intervention; they did not focus on psychological variables such as anxiety and

mood. The improvements in anxiety and mood for the play group are also consistent with previous research (e.g., Binfet, 2017; Crossman, et al., 2015).

The results of the present study are consistent with the study by Janssens and colleagues (2020) that found the type of pet interaction was important for predicting mood states. Participants in that study reported decreases in NA and increases in PA only when having an active interaction with their dog, not a passive interaction. As participants in both groups of the present study were having a very active interaction with their dog it would be expected that both groups improved in PA and NA.

Unexpectedly, both groups significantly improved in their GSE scores after interacting with their dog. GSE improvements in the training group were expected as participants were given set goals to attain, and successfully achieved them. This is in line with Bandura's (1977) concept that performance accomplishment can improve self-efficacy – that is, succeeding in a task raises the mastery expectations of the individual for future performances. One explanation for why the play group also improved in GSE, is that seeing their dog play calmly and listening to them, may have instilled similar feelings of accomplishment from watching them play in a well-behaved manner. Anecdotally, this was mentioned by a couple of participants in the play group during the debrief, who noted that they were proud of their dog and felt a sense of achievement from observing their behaviour.

Another mechanism suggested by Bandura (1977) that impacts self-efficacy – verbal persuasion – may have been an important aspect that influenced participants' GSE. The student researcher who facilitated the sessions is a qualified dog behaviourist. He gave feedback on each participant's progress, indicating when they had done a good job and congratulating them when they had reached a goal. This may have served as a stronger influencer of self-efficacy than the performance achievement alone, as the mechanisms often do not influence self-efficacy in isolation, but rather, work together (Bandura & Cervone, 1983). This highlights an important question for future research: is self-efficacy in training a dog influenced more by the act of seeing the dog succeed or by the feedback and reinforcement offered by a professional? While the play group did not receive direct encouragement and feedback about goal achievement, the general conversation and questions from the researcher about their dog may have served as a form of positive reinforcement for participants in the play group, assisting in the observed increase in GSE. The play group served as a comparison group, but future research may help to clarify this effect by including a passive control group, having no interaction with the dog or researcher.

Owner-dog relationship quality did not moderate the effects seen. Research on well-being in relation to general pet ownership has been inconsistent (Herzog, 2011) and the relationship between pet attachment and well-being may be even more complex (Johnson et al., 1992). For example, Antonacopoulos and Pychyl (2010) found that pet owners living alone that were highly attached to their pet were more depressed compared to those with low attachment, but this effect disappeared when accounting for social support. As research has shown that the frequency (Bennett et al., 2015) and type (Janssens et al., 2020) of pet interaction can play an important role in the impact on the owner's psychological health, it may be that the experimental manipulation in the present study was enough to reduce any effects of relationship quality that would have otherwise influenced the outcome variables. Herwijnen and colleagues (2018) found that as aggressive and disobedient behaviour in dogs increased, this significantly lowered the likelihood that owners reported being "very satisfied" with their dogs. Therefore, it may be that training a dog influences the dog-owner relationship rather than the other way around.

A key point of difference between this study and previous research is that previous dog training studies have run in external locations for multiple weeks (e.g., Lahav et al., 2019: 12 weeks; Syzmanski et al., 2018: 10 weeks; Whitworth et al., 2019: 14 weeks). The

present study was a 10-minute, single-session, online-guided interaction, suggesting that, even during a challenging time such as the COVID-19 lockdowns, a single play- or training-based intervention at home can have a positive impact on the owner's psychological health. While research has shown that engagement with training activities is associated with fewer problematic behaviours and more obedience in the dog (Bennett & Rohlf, 2007), the current study can add that engagement with training, even when performed at home, can also be beneficial for the owner.

This study attempted to tease apart how different interactions with dogs can affect humans, but it is a preliminary study, and the results should be viewed in the light of some methodological limitations. Most participants in the present study were women. Research has shown that women report more empathy (Hills, 1993) and more favourable attitudes (Schenk et al., 1994) towards animals than men. Therefore, this demographic issue may limit the interpretation and generalisability of results.

An aspect limiting this study in drawing strong causal conclusions is the researcher's presence, which may have had an effect on the outcome variables. Studies have shown that self-efficacy is affected by verbal persuasion from another person, especially when following a performance accomplishment (Wise & Trunnell, 2001) and this may have partially explained the results seen in the current study. In contrast, the researcher's presence may have influenced mood and anxiety in the opposite direction. Allen et al. (1991) found that, during a stressful task, participants who had a dog with them showed lower skin-conductance (a measure of physiological arousal, indicative of anxiety) than those with a friend or spouse. Similarly, Grajfoner et al. (2017) found that students significantly improved in mood when only a dog was present, whereas they improved less when the dog and handler were present simultaneously. This suggests that perhaps mood and anxiety in the current study would have reduced even more had the researcher not been present in the session, watching their behaviour.

Two suggestions for future research design may help to increase the generalisability of the current findings. First, the use of a control group, whereby the participants spend the same time taking part in an activity with no dog interaction, would help to disentangle these phenomena. Second, future studies could sufficiently educate and support participants in how to train their dog before the study, allowing them to interact with their dog independently during the session. This would help to remove the possible confound of the researcher's presence and help to isolate the effects of the dog interaction on the outcome measures.

One important consideration when measuring the short-term effects on psychological health is how long the effects last. Research has demonstrated that positive effects of single-session, play-based dog interactions can last for 10-hours (Ward-Griffin et al., 2018), but have been shown to wear off two weeks after the interaction (Binfet, 2017). It may be advantageous for future research to examine whether these long-term benefits differ in a group training their own dog, especially if delivery of the intervention is at the participant's home. Furthermore, the length of the training program may have an important effect. While this study aimed to measure the effects after a single session, owners engaging in week- or months-long dog training courses may have different experiences. For example, perhaps general self-efficacy may be impacted more if the owner sees large improvements in their dog's behaviour, rather than any small changes observed across a 10-minute session.

Finally, an aspect of future investigations involving people engaging in obedience training with their dog should be to measure the extent to which someone believes they have succeeded in their training goals. The underlying presumption of positive changes in the outcome measures, especially self-efficacy, was that owners were succeeding in the objectives given to them. While this study was designed so that dogs (and owners) of any level of prior training could succeed, participants' own perceptions of success were not

measured. Perhaps participants who more easily reached the goal set by the researcher improved in some of the outcome variables, more so than those who struggled in the task. Studies of similar design may consider asking participants to rate how well they think they succeeded at their given tasks and examine whether this mediated any outcome variables.

This study contributes to the HAI literature by confirming and expanding on previous findings about the psychological benefits of play- and training-based interactions with dogs. While the play group saw similar changes in the outcomes as the training group, this study was the first to demonstrate that taking part in a single, brief dog training session (even if guided over the internet) can be beneficial to the psychological health of the owner. This may serve as a starting point for future research to investigate the specifics of how dog training impacts the owner, and how it differs from other human-animal interactions. This study adds weight to previous findings that have demonstrated that brief, single-session, play-based interactions with a dog can have psychological benefits for the human. As the present study was conducted during the COVID-19 pandemic lockdowns and was exclusively based online, it also supports the use of methods to teach owners ways to improve their psychological health by interacting with their dog, even if they are unable to leave their home. These methods offer cheap processes that can easily be scaled up to facilitate large groups that will assist dog owners in taking part in activities that could benefit both them and their dog.

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