Adopting a Companion Dog Helps Veterans with Posttraumatic Stress Disorder in a Pilot Randomized Trial

Stephen L. Stern\textsuperscript{a–c,}\textsuperscript{*}, Erin P. Finley\textsuperscript{a,d,e}, Jim Mintz\textsuperscript{a}, Matthew D. Jeffreys\textsuperscript{a,f}, Bonnie V. Beaver\textsuperscript{g}, Laurel A. Copeland\textsuperscript{h,i}, Mistie D. Seawell, Courtney H. Bridgeman\textsuperscript{k,*}, Alison B. Hamilton\textsuperscript{l,m}, Emma L. Mata-Galani, Stacey Young-McCaughan\textsuperscript{a}, John P. Hatch\textsuperscript{a,*}, Ana Luiza C. Allegretti\textsuperscript{a,n}, Willie J. Hale\textsuperscript{a,o}, Alan L. Peterson\textsuperscript{a,c,o}, for the STRONG STAR Consortium

a) Department of Psychiatry and Behavioral Sciences, University of Texas Health Science Center, San Antonio
b) Psychiatry Service, South Texas Veterans Health Care System, San Antonio, Texas
c) Research and Development Service, South Texas Veterans Health Care System, San Antonio, Texas
d) Department of General and Hospital Medicine, University of Texas Health Science Center, San Antonio
e) Veterans Evidence-based Research Dissemination, and Implementation Center (VERDICT), South Texas Veterans Health Care System, San Antonio, Texas
f) VA Texas Valley Coastal Bend Health Care System, San Antonio, Texas
g) Department of Small Animal Clinical Sciences, Texas A&M College of Veterinary Medicine and Biomedical Sciences
h) VA Central Western Massachusetts Healthcare System, Leeds, Massachusetts
i) Department of Population and Quantitative Health Sciences, University of Massachusetts Medical School

* Stephen L. Stern, the corresponding author, is now in Greenwich, CT; he remains affiliated with the University of Texas Health Science Center at San Antonio and the South Texas Veterans Health Care System. His email address is sterns@uthscsa.edu, ORCID: 0000-0002-5315-3276.

Erin P. Finley is currently at the VA Greater Los Angeles Healthcare System.

Courtney H. Bridgeman is now affiliated with Dragonfly Veterinary Services, Boerne, Texas. John P. Hatch is now retired from the University of Texas Health Science Center at San Antonio.
Posttraumatic stress disorder (PTSD), a common disorder among military veterans from every era (Seal et al., 2007), is marked by painful re-experiencing of
a traumatic event or events together with other characteristic symptoms, such as fearfulness and hyperarousal. It is often accompanied by depression, social isolation, and an impaired quality of life (American Psychiatric Association, 2013). Despite major advances in the treatment of PTSD, including two types of trauma-focused psychotherapy – cognitive-processing therapy (Monson et al., 2006; Resick et al., 2008, 2017) and prolonged exposure therapy (Foa et al., 2005; Rauch et al., 2009) – as well as pharmacotherapy (Puetz et al., 2015), many veterans decline treatment or remain symptomatic afterwards, indicating a need for new interventions.

One promising intervention involves nonhuman animals, who have been reported helpful for people with various psychological and physical problems (Allen et al., 2001; Friedmann & Son, 2009; Malcolm et al., 2018; Serpell, 1991; Wisdom et al., 2009). Recently there has been considerable interest in the use of service dogs, who are extensively trained to accompany veterans into anxiety-provoking situations (O’Haire & Rodriguez, 2018). Many proponents of trauma-focused psychotherapies for PTSD have, however, expressed concerns that service dogs might reinforce avoidance activities and inhibit recovery in some veterans by reducing the veteran’s opportunity to regain a sense of mastery over environments and situations that provoke anxiety (Finley, 2014).

Another approach involves companion dogs (Stern et al., 2013), who differ from service dogs in that they are not allowed into environments where dogs are normally prohibited and do not require such extensive training (Krause-Parello et al., 2016). Believing that adopting a shelter dog might be an accessible and affordable option for many veterans and that doing so would also provide a home for homeless animals, our group conducted the first randomized trial of companion dog adoption from a shelter as an adjunct to treatment for veterans with PTSD and associated symptoms. The goal of this pilot study was to assess the feasibility and preliminary efficacy of the intervention and to inform whether a larger randomized study would be warranted. Our primary hypothesis was that over the three months following randomization, the improvement on the PTSD Checklist for DSM-5 (PCL-5; Bovin et al., 2016) in the veterans assigned to adopt a dog immediately would exceed the improvement in the veterans assigned to a waitlist by more than 13 points. Secondary outcomes included changes in depression and health-related quality of life.

Materials and Methods

Participants
The participants were 19 veterans of the United States military with current PTSD (Table 1). All learned about the study from their Department of Veterans
Affairs (VA) mental health clinician or from posters and brochures distributed in VA clinics except for one referred by a non-VA therapist. Information about the trial also was made available online, at veterans’ events, and through radio and newspaper advertisements. The participants’ mental health clinicians provided usual care throughout the study – psychotherapy, pharmacotherapy, or both – independently of the study team.

| TABLE 1 | Participant demographics^a |
|----------|----------------------------|
| **Demographic** | Immediate adoption group (n = 9) | Delayed adoption group (n = 10) |
| **Age (years)** |  |  |
| Range | 28–64 | 23–56 |
| Mean | 45.00 | 39.20 |
| SD | 13.76 | 11.38 |
| **Sex** |  |  |
| Male | 6 (66.7%) | 5 (50.0%) |
| Female | 3 (33.3%) | 5 (50.0%) |
| **Race/Ethnicity** |  |  |
| Hispanic or Latino^b | 2 (22.2%) | 4 (40.0%) |
| Non-Hispanic White | 5 (55.6%) | 3 (30.0%) |
| Black | 2 (22.2%) | 3 (30.0%) |
| **Nature of traumatic event** |  |  |
| Combat-related | 6 (66.7%) | 4 (40.0%) |
| Military sexual trauma (MST) | 2 (22.2%) | 4 (40.0%) |
| Other | 1 (11.1%) | 2 (20.0%) |

^a There were no statistically significant differences between the two groups on any of these characteristics.

^b All the Hispanic/Latino participants were Mexican American.
Companion Dogs Help Veterans with PTSD in a Pilot Study

Table 1: Participant demographics (cont.)

| Demographic                        | Immediate adoption group (n = 9) | Delayed adoption group (n = 10) |
|------------------------------------|----------------------------------|--------------------------------|
| Living alone                       |                                  |                                |
| Yes                                | 2 (22.2%)                        | 3 (30.0%)                      |
| No                                 | 7 (77.8%)                        | 7 (70.0%)                      |
| Completed service after 9/11/2001  |                                  |                                |
| Yes                                | 5 (55.6%)                        | 6 (60.0%)                      |
| No                                 | 4 (44.4%)                        | 4 (40.0%)                      |
| Military Grade                     |                                  |                                |
| Junior Enlisted                    | 0 (0.0%)                         | 1 (10.0%)                      |
| Noncommissioned Officers (NCOs)    | 7 (77.8%)                        | 9 (90.0%)                      |
| Senior NCOs                        | 1 (11.1%)                        | 0 (0.0%)                       |
| Officers                           | 1 (11.1%)                        | 0 (0.0%)                       |

Procedure

The Rehabilitation Research and Development Office of the VA sponsored this research and advised the study team during the trial. The local Institutional Review Board (IRB) and Research and Development Committee approved the study, and the local Institutional Animal Care and Use Committee (IACUC) and a Data Safety Monitoring Board (DSMB) monitored it. The investigators used a priori power analysis to determine a target enrollment goal of 48, but were unable to achieve that goal, primarily because of the extensive study entry criteria. They randomly assigned 20 participants in a parallel design, half to immediate dog adoption (Immediate Group) and half to delayed adoption (Delayed Group), which involved a 3-month waitlist followed by adopting. One veteran randomized to the Immediate Group was later found not to meet the criteria for current PTSD, leaving nine subjects in that group. The total study duration for each participant was six months. Participants anticipated keeping their companion indefinitely after the end of the study.
Enrollment opened in October 2013 and closed at the end of September 2014, six months before the prespecified study end date of March 31, 2015. Study staff used the inclusion and exclusion criteria listed in Table 2 to screen the 236 veterans who inquired about the study. Figure 1, a CONSORT flow diagram (Eldridge et al., 2016), outlines the reasons why the team did not randomize many of the callers. Staff referred veterans who appeared eligible to the principal investigator (PI), who reviewed their VA electronic medical records and contacted their mental health provider with their permission. The PI excluded a few veterans whose mental health provider did not consider them to be good candidates.

| Inclusion criteria                                                                 | Exclusion criteria                                                                 |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| – Meets DSM-5 criteria for current PTSD                                            | – Has had a dog or other companion animal within the past 12 months               |
| – Scores 39 or more on the PCL-5                                                    | – Current alcohol or drug abuse or dependence                                      |
| – Feels able to afford to care for a dog                                            | – Has a primary psychiatric diagnosis other than PTSD                             |
| – Spouse or partner and property owner agree with adopting a dog                   | – Has had significant suicide/homicide risk, psychosis, mania, or a psychiatric admission during the past 3 months |
| – Agrees to be primary caretaker and keep the dog inside most of the time           | – Has mental or physical impairments that would interfere with caring for the dog or self |
| – Had a dog previously as child or adult                                           | – Has a history of moderate or severe traumatic brain injury                       |
| – Served during Vietnam era or more recently                                       | – Requires a puppy or a breed that is fierce or uncommonly available for adoption at the Humane Society |
| – In active therapy for PTSD for at least 1 month and plans to continue            | – Has a history of animal cruelty or abuse or clinician expresses concern about the potential for such behavior |
| – Has a plan for someone else to take care of the dog if she or he cannot           |                                                                                   |
| – VA Mental Health Treatment Coordinator approves of study participation           |                                                                                   |
| – Stable housing situation for the past 3 months, with approval by case manager if in the HUD/VASH program |                                                                                   |

Note. DSM-5 = Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition; PTSD = post-traumatic stress disorder; PCL-5 = PTSD Checklist for DSM-5; VA = U.S. Department of Veterans Affairs; HUD/VASH = U.S. Department of Housing and Urban Development – Veterans Affairs Supportive Housing
Staff then invited potential participants to an in-person appointment at a VA research clinic, where veterans gave written informed consent after the PI explained the study to them. A trained independent evaluator next administered the Clinician-Administered PTSD Scale for DSM-5 (CAPS-5; Weathers et al., 2017) and Mini International Neuropsychiatric Inventory (MINI; Sheehan et al., 1998) to determine whether veterans met criteria for current PTSD as their primary psychiatric diagnosis. The PI then interviewed veterans who scored 39 or higher on the PCL-5. Veterans also completed the Patient Health Questionnaire-9 (PHQ-9; Kroenke et al., 2001), Beck Depression Inventory-II (BDI-II; Beck et al., 1996), and Veterans RAND 12-item Health Survey (VR-12; Selim et al., 2009), among other rating scales.1

1 The other administered rating scales were the AUDIT Alcohol Consumption Questions (AUDIT-C; Bush et al., 1998), Community Integration Questionnaire (Willer et al., 1993), Numeric Pain Scale (McCaffery & Beebe, 1993), Physical Activity Questionnaire (Kohl et al., 1988), Pittsburgh Sleep Quality Index – PTSD Version (Buysse et al., 1989; Germain et al., 2005), and UCLA Loneliness Scale (Russell, 1996).
Veterans next completed a semi-structured interview to explore their prior experiences with dogs, their expectation and hopes for getting another one, and their current daily activities and quality of life. The interview was designed by an experienced qualitative methodologist and conducted by staff trained in qualitative interviewing.

At the end of the evaluation, the investigators randomized veterans who met study entry criteria and gave written informed consent into either the Immediate or the Delayed Group. They used randomization schedules provided by the statistical consultant, stratifying assignment with respect to whether the veteran served in the military after September 11, 2001 (two strata). The investigators randomly assigned participants by blocks of four to assure that groups remained relatively balanced as the study progressed, preparing opaque envelopes for each stratum and numbering them in sequence. Randomization remained concealed from the study team and participants until the end of the baseline evaluation, when the PI opened the next-numbered envelope in the veterans’ presence and informed them of the group assignment.

Following randomization, veterans completed a questionnaire about the qualities they were looking for in their new dog, which the chief veterinarian for the local Humane Society used to choose five candidate dogs for each veteran assigned to the Immediate Group. The veterinarian excluded animals with significant medical problems or any signs of aggression and those younger than one year or weighing <30 pounds, considering such dogs more likely to engage in potentially annoying behaviors. The investigators then invited veterans and their families to the nearby Humane Society facility to meet with an adoption counselor and select one of the candidate dogs, with the understanding that other animals were also available.

The Humane Society gave the dogs necessary vaccinations, spayed or neutered them, implanted microchips, supplied six months of flea and heartworm medications, and waived the adoption fee. Veterans were responsible for the costs of caring for their dog except for veterinary care, which was provided free of charge during the study. The study team and Humane Society gave veterans verbal and written instructions about how to care for their dog and phone numbers to call with any questions. Veterans returned to the Humane Society the next week for the first of eight weekly basic obedience classes, which the chief veterinarian gave exclusively for study participants. Staff also called each veteran one day and one week postadoption. The investigators followed the same procedures when veterans in the Delayed Group adopted a dog after their three-month waitlist period.

Members of both groups returned to the research clinic without their dogs for visits at one, three, and six months post-randomization and received a phone
call from study staff at two weeks, two months, and four and a half months. Veterans in the Delayed Group also had a four-month post-randomization clinic visit, which was one month after they were able to adopt a dog. The PI and study staff readministered the rating scales and semi-structured interviews at all follow-up clinic visits. Humane Society and study staff also visited veterans in their homes to see how they and their dogs were doing at two weeks postadoption. In addition, study staff made home visits at two and a half months and, for veterans in the Immediate Group, five and a half months post-adoption. The study reimbursed veterans for the time involved in all visits and planned phone calls according to a schedule approved by the IRB.

Within 15 days of adoption, a veterinarian at a collaborating animal care clinic gave the dogs a general physical examination and a complete blood count, chemistry panel, and urinalysis, following up on any abnormal findings. A second visit within two weeks of the end of study participation included vital signs, abdominal palpation, fecal analysis for parasites, and neurologic, otoscopic, ophthalmologic, rectal, coat and skin, and dental examinations, with tartar removal if indicated. The PI, IACUC, and DSMB monitored and evaluated adverse events independently and in aggregate throughout the study in accordance with a Data and Safety Monitoring Plan.

**Instruments**

The PCL-5 (Bovin et al., 2016) is a 20-item self-report scale that assesses the presence of the 20 PTSD symptoms of DSM-5 over the past month on a five-point scale (0 = not at all, 1 = a little bit, 2 = moderately, 3 = quite a bit, 4 = extremely). In addition to a total score, it also yields subscale scores for the four PTSD symptom clusters, each of which includes two or more items: re-experiencing (five items, e.g., disturbing dreams of the stressful experience), avoidance (two items, e.g., avoiding memories, thoughts, or feelings related to that experience), negative mood (seven items, e.g., feeling distant or cut off from other people), and arousal (six items, e.g., irritable behavior).

The PHQ-9 (Kroenke et al., 2001) is a four-point, patient-rated scale that assesses the occurrence of the nine symptoms of DSM-5 major depression over the past 2 weeks (0 = not at all, 1 = several days, 2 = more than half the days, 3 = nearly every day). A PHQ-9 score ≥ 10 has both a sensitivity and specificity of 88% for major depression diagnosed by a mental health professional.

The BDI-II (Beck et al., 1996) is a 21-item, self-report scale for depression in which each item consists of four statements that describe varying levels of symptom severity over the past two weeks.

The VR-12 (Selim et al., 2009) consists of 12 self-rated items that assess the extent to which emotional and physical problems have interfered with the respondent’s functioning over the past four weeks. It yields two scores: the
Mental Component Summary (MCS) and the Physical Component Summary (PCS). A score of 50 ($SD = 10$) is the mean for the 2000–2002 U.S. civilian population for both the MCS and the PCS.

The CAPS-5 (Weathers et al., 2017) is a semi-structured interview used for diagnosing $DSM$-5 PTSD.

The MINI (Sheehan et al., 1998) is a structured interview for assessing the presence of 15 common $DSM$-5 diagnoses. The independent evaluator assessed for all but two of these diagnoses (anorexia nervosa and bulimia nervosa).

The semi-structured interview questions, the wording of which varied for different visits, are available on request from the authors. All interviews were recorded with the veterans’ permission and professionally transcribed.

| Table 3 Baseline and 3-month scores for the immediate and delayed adoption groups |
|---------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                                  | Immediate adoption group | Delayed Adoption Group |
|                                 | ($n = 9$)             | ($n = 10$)        |
| BL                              | BL                | BL                | SE               | SE               | SE               | 3 Mos           | SE               | 3 Mos           | SE               |
| PCL-5                           |                   |                   | 61.11            | 3.53             | 45.91            | 4.76            | 59.20            | 3.35             | 51.43            | 4.48             |
| Total                           | Re-experiencing   | 3.07              | 0.19             | 2.18             | 0.31             | 3.06            | 0.18             | 2.14             | 0.29             |
| Avoidance                       | Negative mood     | 3.39              | 0.21             | 2.95             | 0.17             | 3.25            | 0.20             | 3.63             | 0.16             |
| Arousal                         |                   | 2.92              | 0.22             | 2.06             | 0.33             | 2.76            | 0.21             | 2.39             | 0.31             |
|                                 |                   | 3.09              | 0.20             | 2.40             | 0.30             | 3.02            | 0.19             | 2.77             | 0.28             |
| PHQ-9                           |                   | 16.56             | 1.42             | 12.48            | 2.12             | 16.60           | 1.34             | 17.31            | 2.00             |
| BDI-II                          |                   | 23.75             | 3.46             | 17.34            | 4.11             | 27.70           | 3.09             | 27.51            | 3.93             |
| VR-12                           |                   |                   |                   |                   |                   |                   |                   |                   |                   |
| MCS                             |                   | 31.82             | 2.36             | 37.82            | 5.04             | 29.20           | 2.24             | 31.50            | 4.74             |
| PCS                             |                   | 39.62             | 4.08             | 34.16            | 3.49             | 45.33           | 3.87             | 36.82            | 3.30             |

Note. BL = baseline; $SE = standard error$; Mos = months; PCL-5 = PTSD Checklist for $DSM$-5; PHQ-9 = Patient Health Questionnaire-9; BDI-II = Beck Depression Inventory-II; VR-12 = Veterans RAND 12-item Health Survey; MCS = Mental Component Summary; PCS = Physical Component Summary. Lower scores indicate improvement, except for the VR-12, where the opposite is true. For the PTSD subscales, the entries are the means of the item scores in the subscale so that the levels are comparable, as there are different numbers of items in the various subscales. All $df = 17$, except for BDI-II, where $df = 16$ due to exclusion of data from the veteran who was an outlier.
Table 4 Change between baseline and 3 months for the immediate and delayed adoption groups

|                          | Immediate adoption group (n = 9) | Delayed adoption group (n = 10) | Change | SE  | Change | SE  | p     | Effect size of difference | 95% CL of effect size |
|--------------------------|---------------------------------|---------------------------------|--------|-----|--------|-----|-------|--------------------------|----------------------|
| PCL-5                    |                                 |                                 |        |     |        |     |       |                          |                      |
| Total                    | -15.20                          | -7.77                           | 3.52   | .141| 3.29   | .909| .141  | -0.75                    | -1.85, 0.35          |
| Re-experiencing          | -.88                            | -.92                            | .23    | .222| .22    | .999| .909  | +0.06                    | -1.04, 1.15          |
| Avoidance                | -.44                            | .38                             | .25    | .249| .24    | .029| .029  | -1.16                    | -2.26, -0.06         |
| Negative mood            | -.86                            | -.37                            | .27    | .254| .25    | .202| .029  | -0.64                    | -1.74, 0.45          |
| Arousal                  | -.69                            | -.25                            | .29    | .275| .27    | .283| .015  | -0.54                    | -1.64, 0.56          |
| PHQ-9                    |                                 |                                 |        |     |        |     |       |                          |                      |
|                         | -4.07                           | .71                             | 1.20   | .010| 1.13   | .015| .015  | -1.41                    | -2.50, -0.31         |
| BDI-II                   |                                 |                                 |        |     |        |     |       |                          |                      |
|                         | -6.41                           | -.19                            | 1.72   | .015| 1.50   | .015| .015  | -1.36                    | -2.49, -0.23         |
| VR-12                    |                                 |                                 |        |     |        |     |       |                          |                      |
| MCS                      | 6.01                            | 2.34                            | 4.34   | .542| 4.06   | .542| .542  | +0.30                    | -0.80, 1.40          |
| PCS                      | 5.46                            | 2.49                            | 8.52   | .366| 2.25   | .366| .366  | +0.45                    | -0.65, 1.55          |

Note. SE = standard error; CL = confidence limits; PCL-5 = PTSD Checklist for DSM-5; PHQ-9 = Patient Health Questionnaire-9; BDI-II = Beck Depression Inventory-II; VR-12 = Veterans RAND 12-item Health Survey; MCS = Mental Component Summary; PCS = Physical Component Summary. Effect sizes are Cohen’s d, calculated as $d = \frac{2t}{\sqrt{df}}$, with confidence limits estimated from the confidence limits of the mean differences.

Quantitative Data Analysis
Data analyses were mixed effects regression using a 2 × 2 design with repeated measures at baseline (randomization) and 3-month post-randomization follow-up. Full descriptive and change scores are listed in Tables 3 and 4. Treatment (Immediate versus Delayed Adoption), time (baseline and 3-month follow-up), and their interaction were the fixed design effects. The treatment by time interaction tests the significance of the difference in extent of change from baseline to 3 months between the Immediate and Delayed groups. The BDI-II data for one veteran were excluded from the analysis as an outlier by Grubbs
test (Grubbs, 1950), which yielded a standardized score of $G = 2.89 \ (p = .011)$. The SAS procedure for “robust regression” (PROC ROBUSTREG) also identified this subject as an outlier with a standardized robust residual of 8.1.

The statistical consultant computed analyses with SAS 9.4 software, using unstructured covariance in all models because the variances tended to increase from baseline to the 3-month post-randomization visit. Values at the 3-month visit were missing for four of the 19 participants. The likelihood-based estimates produced by SAS PROC MIXED, which use data from all participants including those with missing data, are valid given the assumption that data are missing at random (MAR). Using data only from participants with both data points, the consultant conducted paired $t$ tests with SAS PROC MEANS to assess symptom change over the 3 months postadoption among veterans who had a dog for ≥ 3 months (Table 5). The consultant scored the VR-12 factors using a regression algorithm based on a large normative sample; these factors are thus a complex weighted sum of items. The consultant performed tests of statistical significance at unadjusted $p = .05$ (Nakagawa, 2004; Saville, 2013), supplemented by estimates of Cohen's $d$ with 95% confidence limits standardized using the standard deviation of change scores. Cohen (1988) suggested that values of $d$ of 0.5 are medium effects and 0.8 large; by convention, values of 1.0 or greater are considered very large.

**Table 5** Change over the 3 months following adoption in the 10 participants who had a dog for at least 3 months

|                      | Before | SD  | After | SD  | $p$  | $d$  | 95% CL          |
|----------------------|--------|-----|-------|-----|------|------|-----------------|
| **PCL-5 Total**      | 52.30  | 13.52 | 37.70 | 13.46 | .012 | −0.99 | −1.71, −0.28    |
| **PCL-5 Re-experiencing** | 2.36  | 1.04  | 1.74  | 0.82  | .027 | −0.83 | −1.55, −0.12    |
| **PCL-5 Avoidance**  | 3.35   | 0.71  | 2.40  | 0.97  | .049 | −0.72 | −1.43, −0.00    |
| **PCL-5 Negative Mood** | 2.46  | 0.92  | 1.69  | 0.77  | .029 | −0.82 | −1.53, −0.10    |
| **PCL-5 Arousal**    | 2.77   | 0.67  | 2.07  | 0.75  | .026 | −0.84 | −1.56, −0.13    |
| **PHQ-9**            | 15.60  | 5.04  | 9.30  | 5.70  | .002 | −1.36 | −2.08, −0.65    |
| **BDI-II**           | 21.60  | 8.64  | 12.90 | 7.94  | .002 | −1.35 | −2.07, −0.64    |
| **VR-12 PCS**        | 37.57  | 12.37 | 37.32 | 11.81 | .916 | −0.03 | −0.75, 0.68     |
| **VR-12 MCS**        | 33.86  | 9.82  | 42.42 | 13.24 | .086 | 0.61  | −0.10, 1.33     |

Note. CL = confidence limits, PCL-5 = PTSD Checklist for DSM-5; PHQ-9 = Patient Health Questionnaire-9; BDI-II = Beck Depression Inventory-II; VR-12 = Veterans RAND 12-item Health Survey; PCS = Physical Component Summary; MCS = Mental Component Summary. Paired $t$ test, $df = 9$. Effect sizes are Cohen’s $d$ with pre-post differences (and upper and lower confidence limits) standardized by the change score standard deviations.
Qualitative Data Analysis
Following standard methods for rapid qualitative analysis using data matrices (Zuchowski et al., 2015), the study team summarized the interview data into templates they developed to capture core content domains (e.g., expectations for dog adoption). The investigators then imported the content of these domains into the matrices, facilitating summary and description of interview content and comparison of experiences and perspectives across participants and time points.

Results

Dog Adoption
Of the 19 participants, 15 adopted a dog – eight of nine in the Immediate Group and seven of 10 in the Delayed Group (Figure 1). Three of the four who did not adopt were lost to follow-up; the sponsor required that the fourth veteran’s adoption be canceled, as described below. Six veterans returned their dogs to the Humane Society, five within the first two weeks and one after five months. All 10 participants who kept their dog for more than two weeks – six from the Immediate and four from the Delayed Group – went on to keep it for at least three months. Reasons veterans gave for the returns included the dog’s being too energetic and having an unpleasant odor.

Two veterans returned their dog because of growling at a family member who had been unable to attend the adoption visit. After the two incidents, the sponsor put further adoptions on hold, eventually canceling the last scheduled adoption. The incidents were reviewed by the IRB, which determined that they were not Unanticipated Problems Involving Risk to Subjects or Others, and by the IACUC, which determined they were nonreportable adverse events. The cases were also reviewed by the DSMB, which found no safety or ethical issues with the study. Other study-related adverse events included one participant’s distress over being assigned to the waitlist and several veterans’ concerns over problems with their dog. Three adopted dogs had medical problems that were successfully treated. There were no serious adverse events.

Quantitative Findings: Change in the Immediate and Delayed Adoption Groups over the Three Months after Randomization

PTSD
Total PCL-5 scores improved by 15.2 points (25%) in the Immediate Group, almost twice the 7.8 points (13%) in the Delayed Group (Tables 3 and 4), but the difference in change between the groups was less than 13 points – thus not
supporting our primary hypothesis – and was not statistically significant. The effect size (Cohen’s $d$) of the group difference in change was medium at $-0.75$. The Immediate Group improved significantly more than the Delayed Group on the avoidance subscale, with a very large effect size (Table 4). The group differences for the re-experiencing, negative mood, and arousal subscales were not significant, but the effect sizes of the group differences were medium for both negative mood and arousal.

**Depression**

Scores on the PHQ-9 improved by 25% in the Immediate Group and worsened by 4% in the Delayed Group; BDI-II scores improved by 27% in the Immediate Group and <1% in the Delayed Group (Table 3). The group differences between the Immediate and Delayed Groups were highly significant for both scales, with very large effect sizes (Table 4).

**Quality of Life**

The MCS score of the VR-12 improved by 19% in the Immediate Group and 8% in the Delayed Group; the PCS score worsened by 14% in the Immediate Group and 19% in the Delayed Group. None of these differences was statistically significant and none of the effect sizes was medium or greater (Tables 3 and 4).

**Quantitative Findings in the 10 Veterans Who Had a Dog for at Least Three Months**

As shown in Table 5, these veterans showed significant improvement in their PTSD symptoms over the three months following adoption, both in their total PCL-5 score and on all four of the subscales, with large or medium effect sizes. They also improved significantly on the PHQ-9 and BDI-II depression scales with very large effect sizes. Over the first month following adoption, the proportion of veterans scoring more than or equal to 10 on the PHQ-9, the cut-point for major depression (Kroenke et al., 2001) declined from 90% to 50%, remaining at 50% after three months. There were no significant changes during this time on the VR-12 quality of life scales, but the effect size for improvement in the MCS score was medium.

**Qualitative Findings for All Participants from the Semi-structured Interviews**

At their baseline interview, most participants said they expected that their dog would bring them love and companionship and help them feel safer, more trustful of others, and less depressed, anxious, or irritable. They also hoped that the dog would help them be more socially and physically active and give them a sense of purpose. Less frequently, veterans expressed concerns
about the demands of housebreaking, feeding, and walking the dog, and about meeting their companion’s emotional and physical needs. Most described a poor to moderate quality of life with high levels of anxiety and depression and varying levels of functional impairment. Many described solitary and sedentary daily routines and little social interaction beyond their immediate family.

The veterans in the Delayed Group did not describe any significant change in their symptoms or quality of life over the three months post-randomization, though at their three-month follow-up they reported eagerly anticipating adopting their dog the next week. Veterans in both groups who adopted a dog often initially noted having to deal with establishing new routines and housebreaking, and sometimes also with the dog’s chewing, shedding, or separation anxiety. Within the first month following adoption, however, most described experiencing companionship and affection from their dogs. They also noted becoming more physically active from walking and playing with their dog and more socially active from increased interaction with neighbors, friends, and relatives. Most of the 10 Veterans who had a dog for three months reported developing a loving bond and taking pleasure in the sense of purpose and motivation associated with caring for their dog. Nine of the 10 said their quality of life had improved; one reported no change. Those with significant safety concerns prior to adoption reported feeling safer at home and in public.

Among the six participants in the Immediate Group who had a dog for at least three months, five were followed beyond that time. Most described a continued positive experience, though one returned his dog after five months because of chewing behavior and another experienced increased physical problems that prevented her from enjoying her dog as much as initially.

Veterans were almost universally positive about their study participation, even those who returned their dog. Several said they would recommend a program like this to other veterans. Some suggested giving additional obedience training and integrating dog adoption into PTSD treatment. Participants’ sample quotes are included in Table 6.

### Table 6

Sample quotes from the semistructured interviews

| Baseline interviews (pre-adoption) |
|-----------------------------------|
| **Expectations for Dog Adoption** |
| “I will feel better ... not only would the dog help me, but I’ll be there to help the dog ... it's like we’re both going to be adopted.” |
| “No matter how your day is, your dog is always gonna be there.” |
Baseline interviews (pre-adoption)

Symptoms and Quality of Life
- “Terrible startle reflex, hypervigilant. I feel like I'm on duty – needing to know what is going on around me.”
- “It's hard to keep the anger in check – it's put a strain on my association with people.”

Post-adoption

Symptoms and Quality of Life
- “[M]y wife says it's a whole new me.... She says that I don't get as angry or ... frustrated as much ...”
- “Before I got Gordon [my dog] I couldn't remember the last time I had laughed ... Now that's a daily experience.”
- “I'm about to get my carpet shampooed, but other than that, it's been a joy.... Having her has given me a ... sense of responsibility ... because she needs me to be on my game.”
- “He's helping me get more out there. Before, I'd just totally avoid everybody.”
- “I feel my mood is less roller coaster and more steady.”
- “My outlook on life has changed – I see things more in a positive way so am getting closer ... with my family and trying to get to know my neighbors.”

Experiences with program
- “Because I know it's helping me, I can recommend it....”
- “I would recommend adopting a dog for a veteran with PTSD.... It opens up some areas to bring sunshine in your life....”

Record Review

At the end of the trial the PI, a psychiatrist, reviewed the veterans’ VA medical records, finding no changes in psychotherapy or pharmacotherapy that likely contributed to a veteran’s improvement. No veterans participated in trauma-focused psychotherapy during the trial. Four were not adherent to their psychotropic medication.
Discussion

This pilot study is the first randomized trial of companion dog adoption from a shelter for veterans receiving care for PTSD and associated symptoms. The results showed this to be a feasible adjunctive intervention that helped to improve PTSD and depressive symptoms for most participants, suggesting that this approach is worthy of further study.

The improvement in depression, if replicated in a larger study, could be of particular benefit given the strong evidence that comorbid depression has a detrimental effect on the quality of life and posttraumatic growth of individuals with PTSD (Teodorescu et al., 2012). Reports that behavioral activation can significantly benefit depression (Dobson et al., 2008), as well as PTSD and overlapping symptoms of PTSD and depression (Gros et al., 2012), suggest that some of the veterans’ improvement may have resulted from engaging in activities like playing with their dog and interacting more with other people. Although there was no statistically significant change in the VR-12, most veterans said in interviews that their dog improved their quality of life.

Strengths

The semi-structured interviews were a major strength, facilitating understanding of the intervention from the participants’ point of view and corroborating and supplementing the rating scale data. The randomized design helped clarify the extent to which the observed changes were due to the study intervention. The extensive entry criteria facilitated enrolling participants who were good candidates for benefiting from dog adoption and able to give their dog appropriate care. Providing free veterinary care and making obedience classes mandatory, as recommended by the sponsor, was also very helpful. The substantial proportion of women veterans, the wide range of ages and ethnicities of the participants, and the differing nature of their traumatic events enhanced the generalizability of the findings. The frequent visits and phone calls enabled the team to monitor the effects of the intervention closely and minimize risks to participants and dogs.

Limitations

Limitations included the small sample size. Our inability to achieve the target enrollment was due in large part to the extensive entry criteria, which disqualified many callers. Other veterans did not volunteer because of the many required visits or because they could easily adopt a dog on their own without the risk of being assigned to a waitlist. Newspaper articles or television pieces might have helped inform more veterans not receiving VA health care about
the study, but that would have required the PI to be interviewed by members of the media, which the sponsor requested not be done. It is unclear how well veterans who do not meet these entry criteria might benefit from shelter dog adoption or how long beyond six months the benefits might extend. It also is unknown how feasible and effective this intervention would be without the financial and other supports the study provided or whether it would provide additional benefit for veterans who receive trauma-focused psychotherapy.

**Future Directions**

A larger randomized clinical trial of this intervention would be worthwhile. Future studies should require that all members of the veteran’s family be present at the time of adoption without exception. As suggested by the participants, investigators might consider integrating dog adoption into clinical care and providing additional training for the veterans and their dogs. A comparison of companion dogs with service dogs, who are being studied by the VA (Saunders et al., 2017), is worth considering. Investigators might also study this intervention for veterans and others with depression even if they do not have PTSD.

**Conclusion**

The findings of this study suggest that adopting a companion dog from a shelter may be a helpful supplement to usual care for some veterans with PTSD and that this approach is worthy of further study. It is also important to keep in mind that, in addition to potentially helping veterans, shelter dog adoption provides a home and companionship for previously homeless animals.

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Disclaimer

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