

Service Dogs for Veterans and Military Members With Posttraumatic Stress Disorder: Replication With the PTSD Checklist for *DSM-5*

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Psychiatric service dogs are an emerging complementary intervention for veterans and military members with posttraumatic stress disorder (PTSD). Recent cross-sectional studies have documented significant, clinically relevant effects regarding service dogs and PTSD symptom severity. However, these studies were conducted using the PTSD Checklist (PCL) for the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM)*. The present study aimed to replicate and advance these findings using the latest version of the PCL for the fifth edition of the *DSM* (PCL-5). Participants included 186 military members and veterans who had received a PTSD service dog ($n = 112$) or who were on the waitlist to receive one in the future ($n = 74$). A cross-sectional design was used to investigate the association between having a service dog and PCL-5 total and symptom cluster scores. After controlling for demographic variables, there was a significant association between having a service dog and lower PTSD symptom severity both in total, $B = -14.52$, $p < .001$, $d = -0.96$, and with regard to each symptom cluster, $ps < .001$, $ds = -0.78$ to -0.94 . The results replicated existing findings using the largest sample size to date and the most recent version of the PCL. These findings provide additional preliminary evidence for the efficacy of service dogs as a complementary intervention for military members and veterans with PTSD and add to a growing body of foundational research serving to rationalize investment in the further clinical evaluation of this emerging practice.

Military members and veterans with posttraumatic stress disorder (PTSD) face many psychologically taxing symptoms, including intrusive flashbacks, avoidance, hypervigilance, and sleep deprivation (American Psychiatric Association [APA], 2013). In addition, experiences of PTSD may compound both physical health (e.g., pain, cardiorespiratory or gastrointestinal symptoms; Pacella et al., 2013) and psychological health (e.g., emotional withdrawal, relationship strain, heightened risk of suicide; Galovski & Lyons, 2004). There is a high prevalence of PTSD in the military population (e.g., Fulton et al., 2015; Hoge et al., 2014; Tanielian & Jaycox, 2008). Among veterans of recent and ongoing operations in and around Iraq and

Afghanistan, the prevalence of PTSD has been approximated at 23%, although some studies have reported prevalence as high as 60% (Fulton et al., 2015). It has been estimated that, in just 6 years of deployment between September 2001 and October 2007, over 300,000 U.S. veterans returned with major depression or PTSD (Tanielian & Jaycox, 2008). Among veterans who served after the September 11, 2001 (9/11) terrorist attacks, those diagnosed with a mental health condition could be 2.5 to 4.4 times more likely to commit suicide than the general population (Ilgen et al., 2012). Thus, due to the relative severity and high prevalence of posttraumatic stress symptoms in military personnel, there is increasing urgency to develop effective interventions for PTSD in this population (Hoge et al., 2014).

One emerging intervention option that is growing in popularity among the military population is the placement of a specially trained psychiatric service dog for PTSD. These service dogs are trained to perform specific tasks intended to mitigate PTSD symptoms, including interrupting flashbacks, applying deep pressure during heightened anxiety, and waking individuals from nightmares. Recent empirical studies have found that PTSD service dogs are not only associated with clinically significant differences in PTSD symptom severity (e.g., O’Haire & Rodriguez, 2018; Yarborough et al., 2017), anxiety (e.g., Rodriguez et al., 2018), and depression (e.g., Kloep et al., 2017), but also with improved mental, social, and emotional health

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(e.g., Bergen-Cico et al., 2018). Despite this rapid growth in the field, a 2018 systematic literature review concluded that due to inconsistencies in study design and measurement tools, there is not yet enough undisputed empirical evidence to support the efficacy of service dogs as an intervention for PTSD (van Houtert et al., 2018).

These noted inconsistencies are further limited by minimal replication of findings. In the current climate of a looming replication crisis in psychological research (Maxwell et al., 2015), multiple iterations of quantitative studies on PTSD service dogs are essential to establishing a reliable and robust evidence base for this emerging complementary intervention. Further, it is necessary for PTSD research to expand alongside updates of the *Diagnostic and Statistical Manual of Mental Disorders (DSM)*. The most recent edition of the *DSM*, the fifth (i.e., *DSM-5*; APA, 2013), contains new symptom criteria for PTSD that were not present in previous editions. These diagnostic updates have prompted corresponding progression within this body of research.

The purpose of the present study was to replicate the findings from previous cross-sectional studies (O'Haire & Rodriguez, 2018; Yarborough et al., 2017), using the PTSD Checklist (PCL) for the *DSM-5* (i.e., PCL-5). Studies conducted by both Yarborough and colleagues (2017) and O'Haire and Rodriguez (2018) compared self-reported PTSD symptom severity using the PCL-Civilian Version (PCL-C) for the fourth edition of the *DSM* (i.e., *DSM-IV*). In the first study, Yarborough and colleagues (2017) assessed 78 veterans, comparing self-reported PCL-C scores from 24 veterans who had already been placed with a service dog (i.e., treatment group) to scores from 54 veterans awaiting placement (i.e., waitlist control group). Participants were recruited from five not-for-profit PTSD service dog providers. Four out of the five providers were accredited by Assistance Dogs International (ADI), and all five providers adhered to ADI's standards for the ethical treatment of clients, humane dog-training methods, and service dog public access evaluations. Four of the providers placed service dogs with veterans during a 2-week on-site training session. The fifth provider trained veterans being placed with service dogs over a longer period of time, but with a similar overall total number of training hours (Yarborough et al., 2017).

In the second study, O'Haire and Rodriguez (2018) assessed 141 veterans and compared self-reported PCL-C scores from 75 veterans who had already placed with a service dog (i.e., treatment group) to scores from 66 veterans awaiting placement (i.e., waitlist control group). Participants were recruited from a single not-for-profit and ADI-accredited PTSD service dog provider. Similar to four of the providers in the prior study, veterans who received service dogs attended a 2-week on-site training session (O'Haire & Rodriguez, 2018). Both studies contained a longitudinal component in addition to the cross-sectional comparisons of PTSD symptom severity.

In replicating these two studies, we aimed to determine the effect of having a service dog on *DSM-5* PTSD symptom severity in military members and veterans. As a secondary aim, we

explored the association between PTSD symptom severity and time since service dog placement among individuals who had been placed with a service dog. We hypothesized that having a service dog would be associated with lower total PCL-5 scores as well as lower scores for each PTSD symptom cluster. Further, we hypothesized that PCL-5 total and symptom cluster scores among individuals with a service dog would be related to the amount of time since service dog placement.

Method

Participants

Participants were 186 military members and veterans who had been accepted to receive a service dog from K9s For Warriors, a non-profit organization providing service dogs free of cost to U.S. military members and veterans with PTSD. Within the total sample, 112 participants had already received a PTSD service dog and 74 were on the waitlist to receive one. Participants were primarily male (74.2%) and were a mean age of 40.01 years ($SD = 8.61$). Most participants reported being married or cohabitating with a partner or significant other (62.9%) and had at least one child (55.4%). Close to half of the participants had a pet dog living in the home (46.8%). Among participants with a service dog, the mean time since placement was 22.04 months ($SD = 19.85$), with a range of 2 weeks to 7 years. Between-group comparisons for age, gender identity, relationship status, children, and pet dog ownership were conducted using *t* tests and chi-square analyses. There were no significant group differences in any of these demographic variables, except gender identity (see Table 1).

Procedure

The study protocol was approved by the Purdue University Human Research Protection Program Institutional Review Board (IRB Protocol 1607017967). A waiver was granted by the Institutional Animal Care and Use Committee (IACUC) as no direct interactions occurred between researchers and service dogs. Contact information for recruitment was acquired from the database of K9s For Warriors. Study inclusion criteria consisted of acceptance into the organization's program, through which participants either had already been placed with a service dog (i.e., service dog group) or were slated to be placed with a service dog in the future (i.e., waitlist group). Requirements for veterans' acceptance into the K9s For Warriors program included (a) PTSD diagnosis verified by a letter from a healthcare professional, (b) service in the military after 9/11, (c) honorable discharge or current honorable service, (d) no more than two dogs in the home, (e) lack of substance abuse, and (f) lack of conviction of any crime against animals. There were no regulations regarding participation in other PTSD treatments; this unrestricted access to treatment will henceforth be referred to as "usual care."

Table 1
Demographic Characteristics of the Sample

| Variable | Waitlist (<i>n</i> = 74) | | Service dog (<i>n</i> = 112) | | <i>t</i> | $\chi^2(N = 186)$ | <i>df</i> | <i>p</i> |
|--------------------------|---------------------------|-----------|-------------------------------|-----------|----------|-------------------|-----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | | | |
| Age (years) ^a | 39.81 | 9.17 | 40.14 | 8.26 | -0.25 | | 180 | .801 |
| | <i>n</i> | % | <i>n</i> | % | | | | |
| Gender identity | | | | | | 6.48* | 2 | .039 |
| Male | 48 | 64.9 | 90 | 80.4 | | | | |
| Female | 25 | 33.8 | 22 | 19.6 | | | | |
| Prefer not to say | 1 | 1.4 | 0 | 0 | | | | |
| Relationship status | | | | | | 5.01 | 5 | .414 |
| Married/cohabitating | 48 | 64.9 | 69 | 61.6 | | | | |
| Single | 8 | 10.8 | 15 | 13.4 | | | | |
| Separated | 5 | 6.8 | 5 | 4.5 | | | | |
| Divorced | 11 | 14.9 | 22 | 19.6 | | | | |
| Widowed | 0 | 0 | 1 | 0.9 | | | | |
| Prefer not to say | 2 | 2.7 | 0 | 0 | | | | |
| Children | | | | | | 0.37 | 1 | .542 |
| Yes | 43 | 58.1 | 60 | 53.6 | | | | |
| No | 31 | 41.9 | 52 | 46.4 | | | | |
| Pet dog | | | | | | 0.62 | 1 | .433 |
| Yes | 32 | 43.2 | 55 | 49.1 | | | | |
| No | 42 | 56.8 | 57 | 50.9 | | | | |

Note. Means, standard deviations, and test statistics for demographic characteristics included 112 participants in the service dog group and 74 participants in the waitlist group (*N* = 186).

^a Date of birth was missing for three participants with a service dog and one participant on the waitlist; therefore, the age analyses were calculated for 109 participants in the service dog group and 73 participants in the waitlist group (*N* = 182).

* *p* < .05.

Recruitment was conducted using emailed invitations distributed by the research team from January 2016 to May 2016. The overall response rate was 51.4% (*n* = 217 respondents). Participants were informed that their responses would be confidential before being asked to verify their informed consent at the start of the survey. Upon survey completion, participants were compensated with their choice of \$20 (USD) in cash (43.2%) or a \$20 gift card (56.8%).

Measures

Demographic Information

In the first section of the online survey, participants were asked to complete items related to personal demographic characteristics, including date of birth and gender identity, and family characteristics, including relationship status, whether the participant had children, and pet ownership. Participants with a service dog from K9s For Warriors were asked to provide the month and year that they had received their service dog. After verification with the organization’s records, these dates were used to calculate the number of months the participant had the service dog before study participation. Similarly, date

of birth was used to calculate participant age at the time of survey completion.

PTSD Symptom Severity

The 20-item PCL-5 (Weathers et al., 2013) was used to assess PTSD symptom severity. Updates to the PCL-5 that had been made from the PCL for *DSM-IV* included a change from 17 to 20 items, altered wording on existing items, and an adjusted rating scale. One item, related to feelings that one’s future will be cut short, was not retained from the previous version. Four items were added to assess negative beliefs, blame, negative feelings, and reckless behavior. New and retained items were regrouped to include a fourth symptom cluster: negative alterations in cognition and mood. Textual response descriptors remained consistent, but numerical response ratings were changed from the 1–5 traditional scale to a 0–4 Likert-type scale. As a result, the range in possible scores for overall symptom severity shifted from 17–85 to 0–80. Despite alterations in the wording of seven retained items, correlations have been shown to be high, and there is a strong continuity in symptom reporting between the two versions (Blevins et al., 2015). However, scores from the PCL-5 and PCL for *DSM-IV*

are not interchangeable (Weathers et al., 2013), and raw scores may not be compared (Moshier et al., 2019).

All participants reported military service-related trauma exposure, but specific stressors were unknown, as the PCL-5 format used in the present study did not include the Criterion A (i.e., traumatic event identification) component. Respondents rated how much they had been bothered by each symptom in the past month based on a scale of 0 (*not at all*) to 4 (*extremely*). Survey items addressed the *DSM-5* symptom categories across four cluster scores: intrusion symptoms (Cluster B, Items 1–5), avoidance symptoms (Cluster C, Items 6–7), negative alterations in cognition and mood (Cluster D, Items 8–14), and alterations in arousal and reactivity (Cluster E, Items 15–20). Possible total scores for the PCL-5 range from 0 to 80, with higher scores indicating more symptom severity. The cutoff score for a provisional PTSD diagnosis is 33 or higher (Bovin et al., 2016). Scores that demonstrate a reliable and clinically meaningful symptom change for the PCL-5 are still being determined, but it is predicted that they will be similar to the PCL for *DSM-IV*: 5 points for reliable change and 10 points for clinically significant change (Weathers et al., 2013). The PCL-5 has demonstrated good test-retest ($r = .84$) as well as strong convergent and discriminant validity (Blevins et al., 2015; Bovin et al., 2016). In the present sample, the Cronbach's alpha values for internal reliability was .95 for the total score; for the symptom cluster scores, the values were .91 for Cluster B, .84 for Cluster C, .88 for Cluster D, and .86 for Cluster E.

Data Analysis

To examine the effect of having a service dog on PTSD symptom severity, a series of hierarchical regression models was conducted with the total and symptom cluster PCL-5 scores entered as dependent variables. Before conducting the regression models, preliminary analyses were conducted to test the assumptions of normality, linearity, multicollinearity, and homoscedasticity with each independent variable. No violations of these assumptions were found. The first step of each hierarchical model included the independent variables of age, gender identity (male or other), relationship status (married/cohabitating or other), children (yes or no), and pet dog ownership (yes or no). These demographic variables were determined a priori and included in the first step to account for demographic variance in observed PCL-5 scores. The second step of each hierarchical model introduced the additional independent variable of service dog presence (i.e., the participant had been placed with a service dog) or absence (i.e., the participant was on the waitlist). This key independent variable of interest was entered second to produce a conservative estimate of outcome variance explained by having a service dog above and beyond any outcome variance explained by personal and family characteristics.

To examine the association between time since service dog placement and outcomes of interest, an additional series of hierarchical regression models was conducted among only individuals with a service dog. Total and cluster PCL-5 scores were

each included as dependent variables across five hierarchical models. Demographic characteristics were entered in the first step of each model, including age, gender identity, relationship status, children, and pet dog ownership as independent variables. In the second step of each model, the number of months since service dog placement was added as the independent variable of interest. This method was used to produce conservative estimates of outcome variance explained by the length of time with a service dog above and beyond any outcome variance explained by personal and family characteristics.

A total of 41 participants were missing data on the PCL-5 measure. Participants missing all 20 items of the PCL-5 ($n = 31$) were excluded from the analyses. For the remaining 10 participants ($n = 7$ missing one item, $n = 2$ missing two items, $n = 1$ missing three items), values for missing items were predicted using mean imputation from nonmissing items within the symptom cluster. On covariate and demographic measures (i.e., service dog presence, age, gender identity, relationship status, children, and pet dog ownership), participants missing some or all items of the PCL-5 items were neither significantly different from each other nor significantly different from participants who completed the full PCL-5, $ps = .198-.829$.

Cohen's d values were calculated for effect size, with the cutoff values of 0.2, 0.5, 0.8 for small, medium, and large effects, respectively (Cohen, 1992). To account for the increased risk of Type 1 error associated with multiple independent comparison models, a Bonferroni correction was used to adjust the threshold for significance to $p < .005$ (i.e., the original threshold of .05 divided by 10 comparisons). Analyses were conducted using IBM SPSS Statistics (Version 24).

Results

Table 2 displays descriptive and hierarchical regression statistics for PCL-5 total scores and symptom cluster scores. Participants with a service dog reported total PCL-5 scores that were on average 14.63 points lower than scores reported by individuals in the waitlist control group, $d = -0.96$. The mean participant score for individuals with a service dog did not fall below the PCL-5 diagnostic threshold of 33 points ($M = 44.34$). Differences in PTSD symptom severity and symptom cluster scores across groups were observed, with large effect sizes.

Demographic characteristics did not significantly explain PCL-5 total scores, $F(5, 176) = 0.90$, $p = .482$, $R^2 = .025$. Adding the presence of a service dog accounted for an additional 16.3% of the total PCL-5 variance, $F(1, 175) = 35.15$, $p < .001$, $\Delta R^2 = .163$, with the full model significantly accounting for 18.8% of PCL-5 score variance, $F(6, 175) = 6.76$, $p < .001$, $R^2 = .188$. The results indicated a significant association between service dog presence and lower PCL-5 scores, $B = 14.52$, $p < .001$. In particular, after adjusting for demographic variables, the PCL-5 mean score among participants with a service dog was 14.52 points lower than the average score for individuals on the waitlist.

Table 2

Descriptive Statistics and Hierarchical Regression Outcomes for Posttraumatic Stress Disorder (PTSD) Symptom Severity

| | Descriptive statistics | | | | Hierarchical regression | | | | | |
|--|------------------------|-----------|------------------|-----------|----------------------------------|-----------|---|----------|--------------|----------|
| | Waitlist | | Service dog | | Block 1: | | Block 2: | | | |
| | <i>(n = 74)</i> | | <i>(n = 112)</i> | | Demographic characteristics only | | Demographic characteristics + Group (Service dog or waitlist) | | | |
| Total and cluster score | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | <i>R</i> ² | <i>B</i> | <i>SE B</i> | <i>t</i> | ΔR^2 | <i>d</i> |
| PCL-5 total symptom severity | 58.97 | 12.96 | 44.34 | 17.13 | 0.025 | −14.52*** | 2.45 | −5.93 | 0.163*** | −0.96 |
| Intrusion (Cluster B) | 14.68 | 4.15 | 10.91 | 4.71 | 0.020 | −3.83*** | 0.70 | −5.45 | 0.142*** | −0.85 |
| Avoidance (Cluster C) | 6.46 | 1.43 | 4.65 | 2.30 | 0.049 | −1.80*** | 0.31 | −5.84 | 0.155*** | −0.94 |
| Negative alterations in cognition and mood (Cluster D) | 20.11 | 5.24 | 15.38 | 6.81 | 0.017 | −4.61*** | 0.98 | −4.72 | 0.111*** | −0.78 |
| Alterations in arousal and reactivity (Cluster E) | 17.73 | 4.17 | 13.40 | 5.39 | 0.026 | −4.28*** | 0.77 | −5.53 | 0.145*** | −0.90 |

Note. Demographic characteristics included the continuous variable for age and binary variables for gender identity (male = 1, other [reference] = 0), marital status (married/cohabitating = 1, other = 0 [reference]), children (children = 1, no children = 0 [reference]), and pet dog (yes = 1, no = 0 [reference]). Demographic characteristics were not significant predictors in either block of any model. The binary variable for group (service dog = 1, waitlist = 0 [reference]), was added to the model in Block 2, and its unstandardized regression coefficients are presented.

*** *p* < .001.

Symptom cluster scores were not significantly explained by demographic characteristics R^2 s = .017–.049, ps = .109–.704. However, the addition of service dog presence or absence in Step 2 accounted for an additional 11.1%–15.5% of the within-model variance. The results indicated a significant association between service dog presence and lower scores on all four symptom clusters, ps < .001 (Table 2).

Among participants with a service dog, there was no significant effect of time since dog placement on overall PTSD severity, B = 0.12, $t(111)$ = 1.40, p = .164, nor was there any effect on symptom cluster scores: Cluster B (intrusion), B = 0.01, $t(111)$ = 0.28, p = .783; Cluster C (avoidance), B = 0.01, $t(111)$ = 0.93, p = .355; Cluster D (negative alterations in cognition and mood), B = 0.06, $t(111)$ = 1.77, p = .080; Cluster E (alterations in arousal and reactivity), B = 0.04, $t(111)$ = 1.59, p = .114. The models that included demographic characteristics and time since service dog placement could not significantly explain the total or cluster score variances within the service dog group, R^2 s = .046–.090, ps = .080–.783.

Discussion

The goal of the present study was to examine the association between having a service dog and PTSD symptom severity in military members and veterans with PTSD, with a specific aim to replicate findings from two recent cross-sectional studies (O’Haire & Rodriguez, 2018; Yarborough et al., 2017) using the latest version of the PCL (i.e., PCL-5). The results demonstrated statistically lower PTSD symptom severity in participants with a PTSD service dog, with a large effect size. By replicating prior findings using the largest sample to date, the present findings support existing evidence suggesting that service dogs are significantly associated with less PTSD symptom severity in military members and veterans. Analyses conducted with the current sample size (N = 186) were adequately statistically powered, reducing the chances of results being falsely positive or inflated (Maxwell et al., 2015). By conducting an additional iteration of methods used in two previous studies (O’Haire & Rodriguez, 2018; Yarborough et al., 2017), the present study engaged anti-replication-crisis efforts for this area of research.

Table 3

Descriptive Statistics for Posttraumatic Stress Disorder (PTSD) Total Symptom Severity Scores Empirically Equated for Comparison Across Present and Replicated Studies

| Variable | PCL version used | Waitlist | | | Service dog | | | <i>d</i> |
|----------------------------|------------------|----------|-----------------------------------|-----------------------------------|-------------|-----------------------------------|-----------------------------------|--------------------|
| | | <i>n</i> | PCL-C <i>M</i> score ^a | PCL-5 <i>M</i> score ^b | <i>n</i> | PCL-C <i>M</i> score ^a | PCL-5 <i>M</i> score ^b | |
| Present study | PCL-5 (DSM-5) | 74 | | 59 | 112 | | 44. | -0.96 |
| O'Haire & Rodriguez (2018) | PCL-C for DSM-IV | 66 | 66 ^c | 56 ^d | 74 | 58 ^c | 46 ^d | -0.66 ^e |
| Yarborough et al. (2017) | PCL-C for DSM-IV | 51 | 66 ^c | 56 ^d | 22 | 52 ^c | 38 ^d | -0.98 ^e |

Note. DSM = Diagnostic and Statistical Manual of Mental Disorders (DSM-5 = fifth edition; DSM-IV = fourth edition); PCL-5 = PTSD Checklist for DSM-5; PCL-C = PTSD Checklist, civilian version for DSM-IV.

^aPossible score range: 17–88. ^bPossible score range: 0–80. ^cRaw observed mean PCL-C scores from prior studies, rounded to the nearest whole number. These scores should not be compared with PCL-5 scores, but they are presented here as a reference for their translated scores in the adjacent columns. ^dPCL-5 equated mean scores that have been translated from adjacent raw PCL-C scores using the empirical crosswalk for PCL. Equated PCL-5 scores from this crosswalk have been found to be reliably comparable to true observed PCL-5 scores (Moshier et al., 2019). In concordance with the crosswalk, mean scores presented have been rounded to the nearest whole number. ^eAs reported in the original publication.

As meaningful comparisons cannot be made between raw PCL-C and PCL-5 scores, an additional test-equating procedure was used to compare the results of the present study to the results of the replicated studies. This novel test-equating procedure, the empirical crosswalk for the PCL, was developed by Moshier and colleagues (2019) to predict equated PCL-5 scores from observed PCL-C scores. The applications of this crosswalk for the present and replicated studies are presented in Table 3. When assessing reported PTSD symptom severity between the waitlist and service dog groups, we found a 15-point score difference. In comparison, equated PCL-5 scores estimated a 10-point difference for the findings reported by O'Haire and Rodriguez (2018) and an 18-point difference for Yarborough and colleagues (2017).

In addition to score comparisons allowed by Moshier and colleagues' crosswalk (2019), the present and replicated studies can also be meaningfully compared by their relative effect sizes. The effect size of total PTSD symptom severity in the present study was almost equal to that found by Yarborough and colleagues (2017) and 0.3 units larger than that found by O'Haire and Rodriguez (2018; see Table 3). Despite these relative effect sizes, the participant sample used in the present study was closer to the sample in the study by O'Haire and Rodriguez (2018) compared to the sample in the study by Yarborough et al. (2017). Participants in the present study and the study by O'Haire and Rodriguez (2018) were recruited from the same singular service dog provider. Thus, service dog application and placement criteria, service dog training and selection, and dog–veteran pairing were identical. Yarborough and colleagues (2017) recruited from multiple providers, which may allow for more generalizability of findings. However, there may be confounding effects from provider differences, such as

varied program application requirements, service dog training methods, and veteran–dog pairing procedures. These comparisons demonstrate the need for future research with specific attention to provider differences and their potential effects on veteran outcomes. Further, this replication of prior findings justifies ongoing rigorous investigations of the mechanisms by which service dog-related benefits may occur.

In addition, participants in the present sample with a service dog did not report PTSD symptom severity below the PCL diagnostic threshold, which was in line with the two prior studies (O'Haire & Rodriguez, 2018; Yarborough et al., 2017). Thereby, the present study reinforces these prior studies' findings that service dogs do not appear to cure or eliminate the condition of PTSD itself. Service dog placement is therefore recommended as a complementary PTSD intervention method used in addition to, not in place of, usual care.

The present results indicated no significant correlation between time since service dog placement and symptom severity, suggesting that the effects of a service dog may not be linear. This may have a conceptual basis in prior descriptions of PTSD symptomology as a cyclical pattern related to changing life circumstances, notable events, and trauma anniversaries (Wang et al., 1996). Based on this concept, it seems likely that PTSD symptomology would continue to rise and fall even after the addition of a service dog. Early longitudinal research has begun to measure changes over time following receipt of a service dog, and the present findings reinforce the claim that further longitudinal research is necessary. This will be essential to reveal changes over time in the association between service dog placement and symptom severity and to determine how the service dog intervention may compound with evidence-based treatment for PTSD to reduce symptomology.

The present study was focused on efforts to replicate existing findings with the updated PCL-5 measure, supporting the state of knowledge in this growing field. It was not intended to address all limitations identified in the replicated studies. Thus, there are several limitations of the present study requiring consideration. One such limitation is that nonrandomized group assignment bars this study from the level of rigor that would be required of a clinical efficacy trial. The self-selection bias associated with a sample that had already applied for and been accepted to a single service-dog program limits the study's generalizability to only individuals interested in receiving a service dog and those who meet the requirements of the specific organization (e.g., post-9/11 military service and honorable service or discharge). Generalizability is additionally limited by sample characteristics (e.g., disproportionate number of male-identifying participants). Further, although the PCL-5 is a gold-standard measure of PTSD symptom severity, it carries a notable risk of reporting and recall bias by nature of being a self-report measure.

There were three key pieces of information omitted from data collection that may have limited model interpretations: recent or ongoing PTSD treatments, PTSD symptom severity before service dog placement, and participants' race and ethnicity. Because information was not collected on participants' other PTSD treatments, it was unknown whether other unmeasured treatment commonalities within the service dog group could have inflated the association between service dog presence and less severe symptoms. The lack of information on a participant's PTSD before service dog placement prevented us from controlling for prior symptom severity. Although service dogs are placed in the order that applications are received regardless of applicants' PTSD severity, it was not possible to account for the main effects and possible interactions of original symptom severity. Further, without participants' race and ethnicity, there is a potential that observed service dog effects were inaccurately skewed in either direction by unrecognized sample distributions. As significant variances by race and ethnicity have been found in both PTSD symptom endorsement (Koo et al., 2016) and perceptions of human-dog dynamics (e.g., Brown, 2002; Gray & Young, 2011; Siegel, 1995), there is a critical need to include these demographic characteristics in future research. Finally, this cross-sectional analysis did not allow us to infer causality.

In conclusion, the present investigation replicated and expanded upon prior empirical studies of psychiatric service dogs for military veterans with PTSD. The results mirror previous findings, suggesting a significant association between having a service dog and self-reported PTSD symptom severity as measured by the updated PCL-5. These findings provide valuable replication, thereby adding to the research-based rationale for in-depth clinical evaluation of the intervention. Thus, the present study reinforces existing evidence and supports a better understanding of the effects that psychiatric service dogs may have on military members and veterans with PTSD.

Open Practices Statement

The study reported in this article was not formally preregistered. Neither the data nor the materials have been made available on a permanent third-party archive. Requests for the data or materials can be sent via email to the corresponding author at mohaire@purdue.edu.

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