



## Posttraumatic stress disorder service dogs and the wellbeing of veteran families

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### ABSTRACT

**Background:** Benefits and challenges associated with service dogs for veterans with posttraumatic stress disorder (PTSD) may extend beyond veterans to their families.

**Objective:** The purpose of the current study is to evaluate the impact of veterans' PTSD service dogs on spouses and families in a parallel-group, longitudinal design with assessments at baseline and three months follow-up.

**Method:** A total of 88 United States military veteran spouses completed a survey composed of multiple standardized measures at baseline and three months later. In the intervention group ( $n = 48$ ), veterans received service dogs shortly after baseline while the waitlist control group ( $n = 40$ ) did not.

**Results:** Linear regression analyses demonstrated significantly lower caregiver satisfaction, higher caregiver burden and higher participation in life activities among spouses who had service dogs in their homes compared to those on the waitlist. Though not significant, small effect sizes were present among additional measures.

**Conclusion:** Results suggest that although previous literature demonstrates service dogs may offer significant improvements for veterans, spouses and children may not experience those same benefits. Clinicians should consider how to prepare veteran spouses and families for integrating service dogs into their home. Future studies should explore family-focused approaches for service dog integration, defining an optimal strategy for the benefit of the entire family.

### Perros de asistencia y bienestar en familias de veteranos con trastorno de estrés post traumático

**Antecedentes:** Los beneficios y desafíos asociados con los perros de asistencia para veteranos con trastorno de estrés postraumático (TEPT) pueden extenderse más allá de los veteranos a sus familias.

**Objetivo:** El propósito del estudio actual es evaluar el impacto de los perros de asistencia en el TEPT de cónyuges y familias de veteranos en un diseño longitudinal de grupos paralelos con evaluaciones al inicio y a los tres meses de seguimiento.

**Método:** Un total de 88 cónyuges de veteranos militares de los Estados Unidos completaron una encuesta compuesta por múltiples medidas estandarizadas al inicio y tres meses después. En el grupo de intervención ( $n = 48$ ), los veteranos recibieron perros de asistencia poco después del inicio, mientras que el grupo de control en lista de espera ( $n = 40$ ) no lo hizo.

**Resultados:** Los análisis de regresión lineal demostraron una satisfacción del cuidador significativamente menor, una mayor carga del cuidador y una mayor participación en las actividades de la vida entre los cónyuges que tenían perros de asistencia en sus hogares, comparado con los que estaban en la lista de espera. Aunque no significativos, pequeños tamaños de efecto estuvieron presentes entre las medidas adicionales.

**Conclusión:** Los resultados sugieren que aunque la literatura previa demuestra que los perros de asistencia pueden ofrecer mejoras significativas para los veteranos, es posible que las cónyuges y sus hijos no experimenten los mismos beneficios. Los clínicos deben considerar cómo preparar a las cónyuges y familias de veteranos para integrar perros de asistencia en sus hogares. Los estudios futuros deberían explorar enfoques centrados en las familias para la integración del perro de asistencia, definiendo una estrategia óptima para el beneficio de toda la familia.

### 创伤后应激障碍服务犬与退伍军人家人的幸福感

背景: 对于患有创伤后应激障碍 (PTSD) 的退伍军人来说, 与服务犬相关的好处和挑战可能会超出退伍军人对其家人的影响。

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### 关键词

动物辅助干预, 创伤, 军人家庭, PTSD

### HIGHLIGHTS

- Though service dogs may improve wellbeing for veterans with posttraumatic disorder, families of veterans may not experience those same benefits. Researchers and clinicians should consider how to best prepare veteran families for integrating service dogs into their homes.
- Though posttraumatic stress disorder (PTSD) service dogs are trained specifically for veterans, recent studies have demonstrated that their impact may go beyond veterans themselves (McCall, Rodriguez, Wadsworth, Meis, & O'Haire, 2020; Nieforth, Craig, Behmer, MacDermid Wadsworth, & O'Haire, 2021). PTSD service dogs may provide both benefits and challenges for veteran families.

目的: 本研究旨在一个在基线和三个月的随访中进行评估的平行组纵向设计中评估退伍军人的 PTSD 服务犬对配偶和家人的影响。

方法: 共有 88 名美国退伍军人配偶在基线和三个月后完成了一项由多项标准化测量组成的调查。在干预组 ( $n = 48$ ) 中, 退伍军人在基线后不久收到了服务犬, 而候补名单对照组 ( $n = 40$ ) 则没有。

结果: 线性回归分析表明, 与候补名单上的配偶相比, 在家中有服务犬的配偶的照顾者满意度、照顾者负担和生活活动参与度显著降低。尽管不显著, 但附加测量中存在小效应量。

结论: 结果表明, 尽管以前的文献表明服务犬可能为退伍军人提供显著改善, 但配偶和子女可能不会体验到同样的好处。临床医生应考虑如何让经验丰富的配偶和家庭做好将服务犬融入家中的准备。未来的研究应该探索以家庭为中心的服务犬整合方法, 为整个家庭的利益定义最佳策略。

## 1. PTSD & veteran families

As many as one in four post 9/11/2001 United States combat veterans have been diagnosed with PTSD (Fulton et al., 2015). PTSD occurs when individuals are exposed to or experience a significant traumatic event. PTSD is characterized by intrusion symptoms, avoidance of stimuli that are connected to the event, negative alterations in cognition and mood, and alterations in arousal and reactivity (American Psychiatric Association, 2013). Many veterans with PTSD have comorbid depression, anxiety, suicidal ideation and difficulty with interpersonal relationships (Gates et al., 2012; Scotland-Coogan, 2019). Veteran families may experience both personal and relational difficulties because of symptoms associated with PTSD. Spouses of veterans with PTSD may experience a multitude of negative psychological outcomes (e.g. depression, anxiety and secondary traumatic stress) in addition to increased caregiver burden and decreased relationship satisfaction (Allen, Knopp, Rhoades, Stanley, & Markman, 2018; Bergmann, Renshaw, Allen, Markman, & Stanley, 2014; Caska & Renshaw, 2011; Frey, Blackburn, Werner-Wilson, Parker, & Wood, 2011; Goff, Crow, Reisbig, & Hamilton, 2007). When a veteran is diagnosed with PTSD, increased levels of maladjustment in both marriages and families post-deployment have been reported (Dekel & Monson, 2010). Treatment of PTSD can be complicated as many individuals retain their PTSD diagnosis after treatment (Steenkamp, Litz, Hoge, & Marmar, 2015). Consequently, many are seeking out complementary and integrative health interventions to supplement their PTSD treatment (Reisman, 2016). An increasingly common complementary intervention is a psychiatric service dog.

## 2. PTSD service dogs

Studies suggest that service dogs may be an effective complementary intervention for PTSD (Husband, Ahmed, & Dell, 2020; Kloep, Hunter, & Kertz, 2017; O'Haire & Rodriguez, 2018; Scotland-Coogan,

Whitworth, & Wharton, 2020; Vincent et al., 2019). Symptoms of PTSD may be directly mitigated by tasks that the service dog is trained to perform (e.g. wake from nightmares, comfort anxiety, interrupt panic attacks). In addition to benefits from trained tasks, veterans also describe perceptions of nonjudgmental social support, feelings of safety and the ability to be more social that emerge after meeting their service dog (Crowe, Sánchez, Howard, Western, & Barger, 2018; Krause-Parello & Morales, 2018). Though benefits of service dogs are often shared, challenges are also described, including increased financial responsibility, training and care, as well as jealousy of the dog among family members (McLaughlin & Hamilton, 2019; Nieforth et al., 2021; Whitworth, O'Brien, Wharton, & Scotland-Coogan, 2020; Yarborough, Stumbo, Yarborough, Owen-Smith, & Green, 2018). Given that service dogs live alongside veterans in their family homes, recent literature has begun to identify the importance of examining the potential impact of service dogs on veteran families.

Veteran families may experience both benefits and challenges when living with a PTSD service dog. For example, service dogs may help veterans mitigate their PTSD symptoms, thus potentially improving their ability to interact with other people. Additionally, service dogs have been described as a relational bridge, possibly helping veterans and families reconnect, improve relationships and build resiliency (Crowe et al., 2018; Krause-Parello & Morales, 2018; Nieforth et al., 2021; Whitworth et al., 2020). Service dogs may also assist veterans in being more comfortable outside their homes, allowing for more opportunities for family activities (Lessard et al., 2018). On the other hand, service dogs may also be a challenge for veteran families, creating additional responsibilities and caregiver burden (Krause-Parello & Morales, 2018; Yarborough et al., 2018).

Despite growing literature, there has been a dearth of quantitative assessment of service dogs and veteran families using standardized measures. Only one study to date has taken this approach, in a single timepoint cross-sectional design (McCall et al., 2020). This study compared a waitlist control group and a service dog

intervention group using standardized survey measures to explore the individual and relational functioning of veteran spouses. Results suggest that though not statistically significant, effect sizes demonstrate that spouses in the intervention group may have higher levels of resilience and companionship paired with lower levels of anger, isolation, and work impairment than those in the waitlist group.

To build upon this initial work, the purpose of the current study is to evaluate the impact of veterans' PTSD service dogs on spouses and families in a parallel-group, longitudinal design with assessments at baseline and three months follow-up. This study will not only incorporate outcomes focused on veteran spouses but will also briefly explore PTSD service dogs and veteran children.

### 3. Methods

#### 3.1. Participants and procedure

Participants in this analysis were part of a preregistered clinical trial (clinicaltrials.gov ID: NCT03245814) and were recruited from a United States nonprofit service dog provider that provides service dogs free of charge for eligible veterans. To be eligible, veterans were required to have served on or after 9/11/2001, be honourably discharged or current honourable service, have a PTSD diagnosis from a medical professional, and have no criminal history against animals. Veterans participating in the study also had to have a PTSD diagnosis verified by a blinded clinician through the Clinician-Administered PTSD Scale (Weathers et al., 2013). Spouses were invited to be a part of the study if the veteran met inclusion criteria and consented to participate. Prior to inclusion, all spouses gave informed consent. Inclusion criteria for spouses included cohabitation with the veteran. Blinded clinician assessment, self-reported clinical surveys, qualitative surveys, ecological momentary assessment, and physiology measures (actigraphy and salivary cortisol) were collected at baseline and three months later. Spouses participated in all measures except for the blinded clinician assessment. A total of  $N = 88$  spouses participated in the clinical survey portion of the larger trial, which is the focus of the current manuscript.

This study was approved by the University Human Research Protection Program Institutional Review board (IRB Protocol: 1702018766) and the University Institutional Animal Care and Use Committee (IACUC Protocol: 1702001541). We utilized a parallel-group design to compare spouses of veterans who obtained a service dog (treatment) with those who remained on the waitlist (control) at baseline and three months later at follow-up. Both groups had unrestricted access to usual care. An independent

data and safety monitoring board supervised the study (Table 1).

#### 3.2. Measures

At baseline and three months later, participants filled out a survey composed of multiple standardized clinical measures focused on the wellbeing of spouses, the wellbeing of children, and family functioning.

##### 3.2.1. Spouse wellbeing

Spouse wellbeing was measured by the *Bradburn Scale of Psychological Wellbeing* (BSPW, (Bradburn, 1969)), a scale with 10 yes/no items. The *affect balance* on the BSPW is calculated by subtracting the *negative affect score* (questions 6–10) from the *positive affect score* (questions 1–5). The range of scores is 0–5 for each subscale (total range = –5–5). A higher score indicates more positive affect and wellbeing. Cronbach's alpha in the current sample was acceptable (BSPW affect balance  $\alpha = 0.489$ , BSPW positive affect  $\alpha = 0.673$ , BSPW negative affect  $\alpha = 0.649$ ).

Spouse resilience was measured by the 10-item version of the *Connor Davidson Resilience Scale* (CDRS, Campbell-Sills, Forde, & Stein, 2009). Respondents rated items on a scale from 0 (not true at all) to 4 (true nearly all the time) and all items were summed to give scores that range from 0 to 40. Higher scores indicate higher resilience. Cronbach's alpha for the current sample was  $\alpha = 0.838$ .

Participation in activities was measured by an *Activity Questionnaire* (Hendryx, Green, & Perrin, 2009) which asked spouses to rate how often they participate in a list of 10 activities on a scale of 1 (not at all) to 5 (daily). The resulting scores are summed (range = 10–50), with higher scores indicating that participants were taking part in more activities. For this study, a subset of 10 items was selected from the full questionnaire. Cronbach's alpha was  $\alpha = 0.571$ .

Caregiver experience was captured by subscales of the revised Caregiver Appraisal Scale (RCAS); *Caregiving Satisfaction* and *Caregiving Impact* (Lawton, Kleban, Moss, Rovine, & Glicksman, 1989). All items ask participants to rate the frequency of their experiences on a scale of 1 (never) to 5 (nearly always). *Caregiving Satisfaction* was measured by six items summed to produce a total score (range = 6–30). A higher score indicates higher caregiver satisfaction. *Caregiving Impact* was measured by three items which were summed to produce a score (range = 3–15). A higher score indicates less favourable impact. Cronbach's alpha was  $\alpha = 0.879$  for *Caregiving Satisfaction* and  $\alpha = 0.766$  for *Caregiving Impact* in the current sample.

Caregiver burden was measured by the 4-item screening-version of the *Zarit Caregiver Burden Scale* (Bédard et al., 2001). Participants rated how often

**Table 1.** Demographic characteristics of spouses, children & families at baseline.

	Waitlist (n = 40)	Service Dog (n = 48)	t or $\chi^2$	p
<b>Spouses</b>				
Age, M (SD)	37 (8.6)	36 (7.5)	0.49	0.55
Gender, n (%)			-0.30	> 0.99
Female	35 (88%)	43 (90%)		
Male	5 (12%)	5 (10%)		
Socioeconomic status, n (%)			-2.32	0.028
Comfortable	22 (55%)	13 (27%)		
Just enough to make ends meet	15 (38%)	30 (62%)		
Not enough to make ends meet	3 (8%)	5 (10%)		
Education, n (%)			0.03	0.60
Some high school	0 (0%)	1 (2.1%)		
High school/GED	9 (22%)	6 (12%)		
Some college	11 (28%)	17 (35%)		
2-Year degree	5 (12%)	6 (12%)		
4-Year degree	9 (22%)	14 (29%)		
Post-graduate Degree	6 (15%)	4 (8.3%)		
Race/Ethnicity, n (%)			0.16	0.81
BIPOC	14 (35%)	14 (30%)		
Not BIPOC	26 (65%)	33 (69%)		
Unknown	0 (0%)	1 (2%)		
VA caregiver, n (%)	5 (12%)	9 (19%)	-0.80	0.56
Relationship status, n (%)			-0.17	0.85
Living with significant other	3 (8%)	5 (10%)		
Married	37 (92%)	42 (88%)		
Divorced	0 (0%)	1 (2%)		
Has child(ren), n (%)			-0.40	0.14
None	6 (15%)	5 (10%)		
1	12 (30%)	10 (21%)		
2	9 (22%)	22 (46%)		
3	13 (32%)	11 (23%)		
<b>Children</b>				
Age, M (SD)	8 (4)	8 (5)	-0.25	0.87
Gender, n (%)			-0.09	0.79
Female	13 (38%)	13 (30%)		
Male	21 (62%)	29 (67%)		
Prefer not to answer	0 (0%)	1 (2%)		
<b>Families</b>				
Have Pet(s), n (%)	30 (75%)	34 (71%)	0.43	0.81
Family assessment device				
Affective responsiveness, M (SD)	2.09 (0.70)	2.03 (0.63)	0.39	0.62
Family assessment Device				
General functioning, M (SD)	2.04 (0.59)	1.92 (0.63)	0.90	0.23

Notes: Statistical Tests performed: t-test, Fisher's exact test. BIPOC: black, indigenous, person of colour. McMaster Family Assessment Device: Affective Responsiveness subscale has a score range of 1–4. Higher scores indicate worse functioning (lower ability to experience appropriate affect). General functioning subscale has a score range of 1–4. Higher scores indicate worse functioning.

they experienced specified feelings of burden on a scale from 0 (never) to 4 (nearly always). These ratings were summed, resulting in a score ranging from 0 to 16. Higher scores indicate higher levels of burden. Cronbach's alpha for the current sample was  $\alpha = 0.823$ .

Various aspects of the participants' mental and social health were quantified using *Patient-Reported Outcomes Measures Information System* (PROMIS, Cella et al., 2010). Every PROMIS measure comprised items asking participants to rate how often they experienced relevant feelings on a scale of 1 (never) to 5 (always). PROMIS raw scores were found by summing ratings for all items on the survey. T-scores were calculated using the raw score and the PROMIS t-score conversion chart. Higher t-scores indicate the participants were experiencing more of the outcome being measured. *PROMIS Anxiety* (8a, 8-items) measured emotional distress as explained by fear, anxious misery, hyperarousal, and somatic arousal symptoms experienced. *PROMIS Depression* (8a, 8-items) measured negative mood and views of self as well as loneliness and decreased positive affect. We

also used PROMIS to examine the social health of veteran spouses, including *PROMIS Companionship* (6a, 6-items), *PROMIS Ability to Participate in Activities* (8a, 8-items), and *PROMIS Social Isolation* (8a, 8-items). Cronbach's alpha in the current sample was high across *PROMIS Anxiety* ( $\alpha = 0.912$ ), *Depression* ( $\alpha = 0.932$ ), *Companionship* ( $\alpha = 0.893$ ), *Ability to Participate in Activities* ( $\alpha = 0.923$ ) and *Social Isolation* ( $\alpha = 0.953$ ).

### 3.2.2. Spouse's relationship with service dog

The *Monash Dog-Owner Relationship Scale* (MDORS) comprises three subscales which were used to capture the relationship between spouses and service dogs (Dwyer, Bennett, & Coleman, 2006). The *Dog-Owner Interaction Subscale* (9-items) asks participants to rate how frequently they participate in certain activities with the service dogs on a scale of 1 (never) to 5 (at least once a day/ once a week). The *Perceived Emotional Closeness Subscale* (10-items) asks participants to rate their level of agreement with given statements on a scale of 1 (strongly disagree)



to 5 (agree). The *Perceived Costs Subscale* (9-items) asks participants to rate their agreement or the frequency with which they experience specified negative sentiments towards the service dogs on a scale of 1 (strongly agree/at least once a day) to 5 (strongly disagree/never). All summary scores were found by summing the items of each subscale, such that scores for the *Dog-Owner Interaction Subscale* and *Perceived Costs Subscale* ranged from 9 to 45 and scores for the *Perceived Emotional Closeness Subscale* ranged from 10 to 50. Higher scores for each of the subscales indicate a more positive dog-owner relationship, with higher levels of interaction, greater closeness, and lower perceived costs. Cronbach's alpha indicated high reliability for all three subscales (*Dog-Owner Interaction Subscale*  $\alpha = 0.849$ , *Perceived Emotional Closeness Subscale*  $\alpha = 0.920$ , *Perceived Costs Subscale*  $\alpha = 0.846$ ).

The *Inclusion of Other in Self* scale was used to quantify the relationship between the spouses and service dogs (Aron, Aron, & Smollan, 1992). Participants selected one of seven Venn diagrams which best described their relationship with the service dog. Diagram 1 represented no overlap with the service dogs and 7 represented almost complete overlap. Raw scores were utilized as final scores (range = 1–7). Higher scores correspond to greater inclusion of service dogs in self.

The *Lexington Attachment to Pets Scale* (23-items) evaluated spouses' emotional attachment to the service dogs (Johnson, Garrity, & Stallones, 1992). Participants rated items on a scale of 0 (strongly disagree) to 3 (strongly agree). Summary scores were calculated by summing all responses (range = 0–69). Higher scores indicate greater emotional attachment. Cronbach's alpha was  $\alpha = 0.935$ .

### 3.2.3. Family measures

The *Pediatric Quality of Life Inventory (PedsQL) Family Impact Module* (Varni, Sherman, Burwinkle, Dickinson, & Dixon, 2004) is a 36-item measure that quantifies six scales of family functioning. The scales include physical functioning, emotional functioning, social functioning, cognitive functioning, communication, worry, daily activities and family relationships. Each item can be rated as 'not a problem' (0) to 'always a problem' (5). Items are linearly transformed to a 0–100 scale after reverse scoring. Higher scores indicate higher levels of family functioning. The total score is the sum of the 36 items divided by the total number of questions answered. The *family functioning summary score* (based upon 8-items) is the sum of the items divided by the number of items answered in the daily activities and family relationships scale. The *health-related quality of life (HRQOL) summary score* (based on 20-items) is the sum of the items divided by the number of items answered in the

physical, emotional, social, and cognitive functioning scales. Higher scores on these scales indicate higher levels of family functioning and less negative impact of veteran's health on spouse's quality of life. Cronbach's alpha was high for both the family functioning summary score ( $\alpha = 0.916$ ) and the HRQOL score ( $\alpha = 0.945$ ).

The *Inclusion of Other in Self (IOS)* scale was also used to quantify the relationship between the spouses/veterans and spouses/children (Aron et al., 1992). Participants were asked to select one of seven Venn diagrams which best described their relationship. Diagram 1 represented no overlap with the individual while diagram 7 represented almost complete overlap. Scores range from 1 to 7, where higher scores correspond to greater inclusion in self.

### 3.2.4. Child measures

The *PROMIS Pediatric Positive Affect Score* (4a, 4-item) examines positive/rewarding experiences of the child where higher scores indicate more positive affect (Ravens-Sieberer et al., 2014). The *PROMIS Psychological Stress Scale* (8a, 8-items) examines the child's experience with challenging situations where higher scores indicate more stress (Bevans, Gardner, Pajer, Riley, & Forrest, 2013). On both scales, each item is rated on a scale of 1 (never) to 5 (always). Total raw scores were found by summing all items with T-scores calculated using the *PROMIS* t-score chart. Cronbach's alpha was  $\alpha = 0.956$  and  $\alpha = 0.941$  respectively.

## 3.3. Data analysis

Data were analysed using linear regression (Seber & Lee, 2012) to examine differences in relation to group (service dog vs. waitlist) at three months follow-up. Covariates included: age (continuous), gender (male/female), socioeconomic status (aggregated into a binary of comfortable yes/no), education (aggregated into a binary of college yes/no), race/ethnicity (aggregated into a binary of black, indigenous, person of colour (BIPOC) or not), Veteran's Administration caregiver status (yes/no), relationship status (cohabitating, married, divorced), pet ownership status (yes/no), children (yes/no), and a baseline score for the outcome of interest. For parsimony of the model, covariates with  $p$ -values of  $>0.09$  were removed from the final analyses. Effect sizes are reported as Cohen's  $d$  where 0.2–0.49 is a small effect, 0.5–0.79 is a medium effect and  $>0.8$  is a large effect (Cohen, 1992). Given the small sample size of spouses and the fact that the parent clinical trial study was powered around veterans (not spouses), we chose not to limit initial comparisons with a stringent correction (Armstrong, 2014; Rothman, 1990). We decided to report all effect sizes given that they are helpful in comparing

across studies as they are independent of the measures themselves (Schäfer & Schwarz, 2019). It is possible that smaller effects present in smaller samples such as ours may not be statistically significant, where in a larger sample size these effects may be significant (Schäfer & Schwarz, 2019). We chose to report effect sizes for all results (even null findings) for comparability across studies as well as the consideration that sample sizes can influence statistical significance. Analyses demonstrated three categories of findings: statistically significant differences ( $p < 0.05$ ), null findings with small-medium effect sizes ( $d = 0.2$ – $0.49$ ) and null findings ( $d < 0.1$ ). Measures related to the relationship between the spouses and service dogs could only be assessed at follow-up and were therefore not suited to the analysis method described above. Instead, descriptive summary statistics were calculated.

## 4. Results

Results are reported in Table 2 (descriptives & regression analysis) and Table 3 (human–animal bond).

### 4.1. Spouse wellbeing

Regression analysis revealed non-significant results in the *Bradburn Scale of Psychological Wellbeing* (BSPW) affect balance scores between groups at three months follow-up ( $p = 0.344$ ) with a small effect size ( $d = 0.29$ ). Non-significant results were also identified for

BSPW *positive affect scores* ( $p = 0.229$ ) with a small effect size ( $d = 0.37$ ) and in BSPW *negative affect scores* ( $p = 0.779$ ;  $d = -0.09$ ). Although non-significant, effect sizes may correspond with spouses in the service dog group reporting greater positive affect, but not reporting differences in negative affect.

Comparison of *Connor Davidson Resilience Scale* (CDRS) scores at three months follow-up yielded non-significant differences between groups ( $p = 0.210$ ). The small effect size ( $d = 0.22$ ) may indicate that spouses may be more likely to identify with statements that suggested resilience if there was a service dog in the household.

Scores on the *Activity Questionnaire* indicated a significant difference between groups at follow-up ( $p = 0.014$ ) when analysis was conducted. A medium effect size ( $d = 0.59$ ), the largest found in the study, showed that spouses with service dogs may participate in more activities, such as going shopping and on trips, than those in the waitlist group.

While not significant in regression analysis ( $p = 0.069$ ), the *Caregiving Impact* subscale of the *Caregiver Appraisal Scale* (CAS) yielded a small effect size ( $d = 0.24$ ), indicating that spouses with service dogs may be more negatively impacted by caregiving. On the *Caregiving Satisfaction* subscale, a significant difference with a small effect size was found between groups at three months follow-up ( $p = 0.046$ ,  $d = -0.46$ ). Spouses sharing their households with service dogs may report feeling less satisfied in their roles as caregivers.

**Table 2.** Control group and intervention group means, standard deviations and regression analysis comparing waitlist control group to service dog intervention group controlling for covariates and baseline scores.

Clinical Survey Measures	N	b	t	Cohen's <i>d</i>
<i>Spouse Measures</i>				
<i>Bradburn Scale of Psychological Wellbeing</i>				
Positive Affect	72	0.36	1.21	0.37
Negative Affect	72	-0.08	-0.28	-0.09
Affect Balance	72	0.44	0.95	0.29
Connor Davidson Resilience Scale	72	1.36	1.26	0.22
Activity Questionnaire	72	2.73*	2.53	0.59
<i>Caregiver Appraisal Scale</i>				
Caregiving Satisfaction	72	-1.90*	-2.04	-0.46
Caregiving Impact	72	0.89	1.85	0.24
Zarit Caregiver Burden Scale	72	1.26*	2.02	0.38
<i>Patient-Reported Outcomes Measures Information System</i>				
Anxiety	72	0.14	0.10	-0.04
Depression	72	-2.28	-1.46	-0.24
Companionship	72	0.68	0.46	0.31
Ability to Participate in Activities	72	-1.07	-0.76	-0.12
Social Isolation	72	-1.57	-1.00	-0.30
<i>Family Measures</i>				
<i>PedsQL Family Impact Module</i>				
Family Functioning	71	3.39	0.64	0.11
Health-Related Quality of Life	71	2.24	0.55	0.22
<i>Inclusion of Others in Self</i>				
Relationship with Veteran	72	0.01	0.02	0.08
Relationship with Children	62	0.41	1.69	0.49
Veteran's Relationship with Children	62	-0.30	-0.95	-0.27
<i>Child Measures</i>				
<i>Patient-Reported Outcomes Measures Information System</i>				
Pediatric Positive Affect	63	0.28	0.16	-0.01
Pediatric Psychological Stress	63	0.77	0.46	-0.11

Note. Reference group: waitlist group, \* $p < 0.05$

**Table 3.** Spouse relationship with service dog group means and standard deviations ( $N = 34$ ).

Human–animal bond measures	<i>M</i>	<i>SD</i>
<i>Spouse Relationship with Service Dog</i>		
Monash Dog–Owner Relationship Scale (MDORS)		
Dog–owner interaction	30.38	8.86
Perceived emotional closeness	27.97	8.53
Perceived costs	35.97	6.76
Inclusion of Others in Self (IOS)	4.06	1.7
Lexington Attachment to Pets Scale (LAPS)	42.44	13.07

Note: MDORS dog–owner interaction and perceived costs scores ranges from 9 to 45 while the perceived emotional closeness scale score ranges from 10 to 50. Higher scores indicate greater interaction, emotional closeness and perceived costs. The LAPS score ranges from 0 to 69. Higher scores indicate greater attachment.

A significant difference in *Zarit Caregiver Burden* scores was found between groups with a small effect size ( $p = 0.048$ ,  $d = 0.38$ ). Coinciding with the direction of the results on the *Caregiver Appraisal Scale*, spouses in the service dog group may experience more caregiver burden than the waitlist group.

None of the *PROMIS* measures related to spouse wellbeing had significant differences between groups. Nonetheless, *PROMIS Depression* ( $p = 0.149$ ,  $d = -0.24$ ), *PROMIS Social Isolation* ( $p = 0.322$ ,  $d = -0.30$ ) and *PROMIS Companionship* ( $p = 0.649$ ,  $d = 0.31$ ) had small effect sizes. Spouses with service dogs may have lower depression, lower perceived social isolation and higher feelings of companionship when compared to the waitlist group. There was no effect on *PROMIS Anxiety* ( $p = 0.920$ ,  $d = -0.04$ ) nor *PROMIS Ability to Participate in Activities* ( $p = 0.453$ ,  $d = -0.12$ ).

#### 4.2. Spouse relationship with service dog

The mean of the *Dog–Owner Interaction Subscale* of the *Monash Dog–Owner Relationship Scale* was 30.38 ( $SD = 8.86$ ), the mean of the *Perceived Costs Subscale* was 35.97 ( $SD = 6.76$ ) and the mean of the *Perceived Emotional Closeness Subscale* was 27.97 ( $SD = 8.53$ ). Although spouses reported relatively high interaction and perceived emotional closeness, they also reported high perceived costs.

On the *Inclusion of Other in Self* scale, spouses most often identified closeness with the service dog corresponding to the diagram in the middle of the two extremes ( $M = 4.06$ ,  $SD = 1.72$ ). The mean of the sample of spouses was 42.44 ( $SD = 13.07$ ) on the *Lexington Attachment to Pets* scale indicating a moderate attachment to the service dog.

#### 4.3. Family measures

Analysis for both the *Family Functioning* and *HRQOL Score* subscales on the *PedsQL Family Impact Module* returned non-significant results ( $p = 0.524$  and  $p = 0.585$ ). The effect size calculated for *Family Functioning* ( $d = 0.11$ ) was negligible, whereas a small effect size

was found for the *HRQOL score* subscale ( $d = 0.22$ ). Although there were no significant differences in family functioning, there was a non-significant, small effect size for spouses of veterans with service dogs feeling that their quality of life was less negatively impacted by veterans' health.

Analysis of the spouse's perspective of their relationship with the veteran according to the *Inclusion of Other in Self* scale returned a non-significant result between groups ( $p = 0.98$ ,  $d = 0.08$ ). A subset of the sample had children ( $n = 77$ ). Among this subset, there were no significant differences in spouse's perspectives of their relationship with their children ( $p = 0.10$ ,  $d = 0.49$ ) nor the veteran's relationship with the children ( $p = 0.35$ ,  $d = -0.27$ ), though each yielded small effect sizes. The small effect size for the spouses' relationships with their children may suggest closer relationships once the service dog is in the home, while the small negative effect size for the veteran's relationship with their children may suggest moderately less close relationships from the spouse's perspective.

#### 4.4. Child measures

*PROMIS Pediatric Positive Affect* and *PROMIS Psychological Stress* were used to measure child wellbeing. Both analysis and effect size calculations at three months follow-up revealed that there were no significant differences between the service dog and waitlist groups for either measure ( $p = 0.871$ ,  $d = -0.01$  and  $p = 0.649$ ,  $d = -0.11$ , respectively). Service dogs may not affect spouses' perceptions of the positive affect or psychological stress of their children.

### 5. Discussion

The purpose of this analysis was to explore empirical measures in a longitudinal study of veterans and their spouses to provide insight regarding PTSD service dogs within veteran families. Post-deployment can be a difficult time for many military couples as they are forced to create a new set of norms and interaction patterns when a veteran is diagnosed with PTSD (Freytes, LeLaurin, Zickmund, Resende, & Uphold, 2017; Sayers, 2011). PTSD service dogs are not a targeted intervention for veteran families, but rather are a 'personalized support' targeted at mitigating PTSD symptoms of the veteran (Husband, Ahmed, & Dell, 2019). Though personalized to veterans, service dogs may act as an additional interaction partner for all family members as a constant presence within families.

Findings suggest that though service dogs may not directly affect the mental health of spouses or children, as evidenced by non-significant differences between groups for most measures, there does appear to be a meaningful relationship between service dogs, overall

caregiver experience and social health of veteran spouses. Statistically significant findings include higher caregiver burden, lower caregiver satisfaction and higher average participation in activities of spouses in the service dog group. Non-significant findings with small-to-medium effect sizes for the service dog group included higher overall and positive affect, higher levels of resilience, higher caregiver impact, and less negative impact of veteran's health on spouse's quality of life. Additionally, there are non-significant small-to-medium effect sizes for lower depression, lower social isolation, and higher companionship among spouses in the service dog group. Non-significant findings with negligent effect sizes were found with negative affect, anxiety, ability to participate in activities, family functioning, and child-focused measures.

There were three major findings in this study. The first is that spouses of veterans with service dogs may experience higher caregiver burden in comparison to spouses of veterans on the waitlist. Previous literature suggests that burden on spouses is affected when adding service dogs into veteran homes (Yarborough et al., 2018). This increased burden is often due to the added responsibility of caring for service dogs rather than increased burden in the veteran/spouse relationship. Service dogs are a constant presence in households, requiring bathroom breaks, training, grooming and veterinary care. Some of these tasks fall on spouses when veterans are not available. When placed with service dogs, veterans are educated on how to care for and train the dogs. Spouses are typically not included in that process, leaving them unsure of how to care for or engage with the dogs, though they may be in situations that require this knowledge throughout integration. This uncertainty may strain the relationship between spouses and service dogs as well as between veterans and spouses.

The second major finding was that spouses of veterans with service dogs may experience lower caregiver satisfaction in comparison to spouses of veterans on the waitlist. If veterans are benefiting from the addition of service dogs into their homes and are becoming more independent, they do not require as much care from their spouses. Previous literature has found that sometimes it is hard for spouses to let the dogs assist when it is a task that they, as a caregiver, have traditionally done, leading to difficulty accepting the service dogs (Whitworth et al., 2020; Yarborough et al., 2018). Additionally, qualitative data from this same population suggests that service dogs may get in the way of veteran/spouse relationships by interrupting intimacy and other interactions (Nieforth et al., 2021). This experience and potential jealousy of service dogs may lead to less caregiver satisfaction among spouses as they adapt to not being 'needed.'

The third major finding was the difference in the number of activities spouses take part in between groups, with service dog spouses participating in more on average than waitlist spouses. Previous literature describes how service dogs help veterans return to daily activities, creating less dependence on spouses and the ability for veterans and spouses to participate in more activities, both as a family and individually (McCall et al., 2020; Whitworth et al., 2020). This increase in the ability to participate in activities outside of the home is beneficial to veteran spouses as often they are required to make personal sacrifices due to their caregiving responsibilities that can lead to isolation (Whitworth et al., 2020). The presence of a service dog in the home may combat this isolation, allowing spouses to become more social and involved in their communities.

Qualitative data analysed through the Theory of Resilience and Relational Load (Affi, Merrill, & Davis, 2016) from this same population suggests that service dogs increase the relational load (e.g. stressors that affect relationships) (Nieforth et al., 2021). Though service dogs have been shown to increase caregiver stress through increased burden, decreased satisfaction and increased jealousy, relational load may be an important piece of a mechanism that promotes resilience. These qualitative results showed that service dogs increased emotional reserves and facilitated relational maintenance behaviours creating a resilience development process. With appropriate expectations and education as to how to problem solve challenges associated with service dogs, veteran families may be provided opportunities to grow and deepen relationships with service dogs serving as catalysts for this process.

Findings from measures focused on spouse/service dog interaction suggest that spouses do not have a particularly close nor distant attachment with the service dog. Additionally, service dogs may not have a notable impact on veteran children nor the relationships that veterans and spouses have with their children. It is important to note that spouses filled out measures on behalf of children. The spouse perspective may have been affected by their own experiences. Findings may have differed if the children themselves filled it out or if this manuscript had integrated both spouse and veteran perspectives; however, the focus was to highlight and amplify spouse voices. Additionally, not all families may be impacted by service dogs in the same way and in small sample sizes, patterns may be difficult to identify.

Findings align with the idea that the service dog belongs to and is specifically trained to help the veteran. Care should be taken to purposefully educate families on how to integrate the service dogs into their homes. Family-focused education could focus on typical experiences veteran families have with



service dogs, including both benefits and challenges. Clinicians suggesting PTSD service dogs should consider that service dogs are different from traditional intervention options in that they are a constant presence that adds a living being into a veteran's life, which may be shared with a spouse and children. Creating appropriate expectations regarding integrating a service dog into the family may help to mitigate negative outcomes. Misalignment of expectations and experiences may motivate the differential outcomes present in this analysis. Based on novel findings from this study, it seems prudent for veterans and spouses to be aware of these nuances and to both be equally involved in the discussion to determine if a service dog is appropriate for their specific family situation as well as planning for successful family integration.

## 6. Limitations and conclusion

Findings from this analysis reflect the experience of spouses associated with one service dog provider. It is possible that spouses of other providers would have different experiences. Future studies should focus on the differences in how providers may educate and communicate with veteran families regarding integration of the service dog into the home. Family-focused service dog integration strategies should be explored. Variability of results suggests that further work is needed to determine which families are most likely to benefit from service dogs and how to identify and support families that may not benefit as much. Though controlled for in analyses, there were significant differences in socioeconomic status between groups. Future studies should further investigate this difference to understand how it may be meaningful. Additionally, the time between baseline and follow-up surveys was only three months. Significant changes may be evident at a longer follow-up timepoint. It is possible that the service dog is not completely integrated into the home at three months. Indeed, it is suggested in multiple studies that a six-month waiting period occur prior to assessing service dog outcomes (Sachs-Ericsson, Hansen, & Fitzgerald, 2002; Vincent et al., 2019). Lastly, veteran outcomes were not reported in this manuscript. It is possible that the degree to which veteran symptomology is being addressed by the service dog may directly influence how the spouses view the service dogs. Future studies should present veteran and spouse data side by side to explore the potential influences of veteran outcomes on spouse outcomes.

Overall, findings suggest that spouses of veterans with service dogs may have different caregiving experiences, suggesting that the impact of service dogs may reach beyond veterans alone. Results emphasize the need for education to inform veteran

families of the possible challenges associated with integrating a PTSD service dog into their homes. Findings may also provide meaningful avenues for intervention improvement and the formulation of family-focused strategies to relieve burden and foster stronger family outcomes.

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## Data availability statement

The data that support the findings of this study are available from the author upon reasonable request. This information cannot be made publicly available due to privacy reasons.


## Ethics statement

This study was approved by the Purdue University Human Research Protection Program Institutional Review board (IRB Protocol: 1702018766) and the Purdue University Institutional Animal Care and Use Committee (IACUC Protocol: 1702001541). All participants gave informed consent prior to participation.

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