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RESEARCH

# Australian veterans' experience of pet ownership: Benefits, costs, and moderating factors

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## Abstract

Australian military veterans, like many veteran populations globally, experience mental health issues, such as depression, anxiety, post-traumatic stress, and suicide, at rates higher than the general population. The impact of having a non-formally trained companion animal on veteran mental health is largely unknown, with literature focusing on trained assistance animals to look at specific illnesses. The aims of the current study were to assess current Australian veteran pet ownership, and to investigate if there was an association between both mental health and perceived cost of pet ownership with level of attachment to ones' pet.

An online survey targeting Australian veterans and including demographics, and validated scales for mental health, perceived cost of pet ownership and level of attachment was created. The survey was completed by 945 Australian veterans. Dogs were the most owned pet, at 86% of all respondents. Significant negative associations were found between mental health and level of attachment to a pet, with higher attachment associated with poorer mental health. In addition, the level of attachment was negatively associated with the perceived cost of pet ownership.

Pets play a vital role in the daily life of many Australian veterans. While higher attachment was associated with poorer mental health, a higher attachment was also associated with a lower perceived cost of having a pet. The costs and benefits of the human-animal bond are likely complex, and further research, including prospective studies, is required. This will ensure policy and programmes can be developed to maximise the positive impacts, whilst assisting in moderating perceived costs associated with pet ownership.

**Keywords:** veterans, pet ownership, mental health, attachment, perceived cost

## Introduction

Transitioning from active service into the general population can be difficult for veterans. In fact, it has been labelled as one of the most stressful periods of these men's and women's life due to changes in identity, community, residence, social networks, status, family role, occupation, finances, routines, responsibilities, supports and culture. It is not surprising that this myriad of changes can lead to mental health issues (Australia Department of Veterans' Affairs, 2011).

Suicide has been identified as a significant issue among veterans, both in Australia and internationally. The latest update on the suicide monitoring of serving and ex-serving Australian Defence Force (ADF) personnel from 2022, states that there were 1600 certified suicide deaths between 1997 and 2020 by Australian men and women with at least one day of active service in the ADF. When compared to the general Australian population, the age-adjusted rate of suicide for ex-serving men is 27% higher, and for ex-serving women 107% higher, however, these rates do vary within differing subpopulations of the ex-serving cohort (AIHW, 2022). Studies out of the United States and Canada have reached parallel conclusions. The United States assessed suicide risk among 1.3 million veterans who were on active duty during the Iraq and Afghanistan wars (Kang *et al*., 2015). Both deployed and non-deployed veterans were at a significantly higher risk of suicide than the general US population. In Canada, veteran suicide mortality was studied from 1976 to 2012 by Veteran Affairs' Canada (Simkus *et al*., 2017). Male veterans had a 36% higher risk of death by suicide than the Canadian general population. Males under 25 had the highest risk, 242% greater than age-matched civilians. The

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age-adjusted female veteran suicide risk was 80% higher than female civilians. This highlights the need for effective treatments for veterans once they have left active service, as they are at a higher risk of suicide. These global findings, also highlight that this issue is not one solely faced by Australian ex-serving members.

In addition to suicide, 46% of Australian veterans that had transitioned from active service within the previous five years met the 12-month diagnostic criteria for a mental disorder. This was paired with an increase in self-reported symptoms of psychological distress, depression, anxiety, anger, suicidality and alcohol use. Furthermore, 44.6% of ex-serving members met the criteria for an anxiety disorder in the past 12 months. Panic attacks were estimated at 23.5%, post-traumatic stress disorder (PTSD) at 21.3%, and agoraphobia and social phobia at 18.2% and 15.9%, respectively (Van Hooff *et al*., 2018).

Animals may work in many different roles to support human wellbeing, including veteran health, and these have recently been defined (Howell *et al*., 2022). An important differentiation for this paper is "assistance animals" and "therapy animals" compared to a "companion animal". An assistance animal is a specially trained animal that performs one or more identifiable tasks or behaviours to help mitigate the effects of a person's disability. Assistance animals are held to a high standard of behaviour and hygiene that enables them to access public spaces that are typically off-limits to most animals (Howell *et al*., 2022). A therapy animal is included in the work of a qualified health professional to provide a structured, goal-directed treatment (Howell *et al*., 2022). A companion animal, however, refers to a pet animal with no specialised employment training or specific use by a health professional. Whilst guardians may still enjoy mental or physical benefits from their companion animal, there is no intrinsic requirement upon the animal to offer these (Howell *et al*., 2022). Throughout this paper, the terms "pet" and a "companion animal" will be used synonymously.

Assistance and therapy dogs as well as equine-assisted psychotherapy can be beneficial for veterans suffering from PTSD, with multiple studies observing significantly lower levels of depression symptoms, a higher quality of life, higher social functioning, lower social isolation and higher perceived companionship (Johnson *et al*., 2018; O'Haire and Rodriguez, 2018; Burton *et al*., 2019; Jensen *et al*., 2021). Due to the high level of training involved in developing a qualified assistance dog, they can be very expensive, with a trained service dog costing more than $40,000 AUD. Whilst this expense may be covered by charities and/or not-for-profit organisations, access is still limited, with long wait-list periods common (Assistance Dogs Australia, 2020). These issues are not apparent for companion animals without specialised training, however, the bond between these pets and their owners can still potentially be described as not only life-enhancing but even lifesaving (Obradović *et al*., 2020; Young *et al*., 2020). For example, among elderly Latino pet owners, two-thirds of respondents considered their dogs to be their best friends and even their reason for getting up in the morning (Johnson and Meadows, 2002). It is this bond that forms the foundation of protective and therapeutic human-pet animal relationships. Similarly, social benefits have been identified from owning a companion dog through their ability to provide companionship and a social connection (Krause-Parello *et al*., 2016). This can be particularly important for veterans with mental or physical health problems, which may prevent them from normal socialisation (Krause-Parello *et al*., 2021). There is evidence that dogs may play a pivotal role by providing emotional attachment and mutual caregiving for individuals who are at high risk for mental disorders such as depression, social isolation and suicidal ideation (Taylor *et al*., 2013; Lass-Hennemann *et al*., 2014).

Although the benefits of companion animals are numerous, caring for one does not come without perceived costs to the guardian, be they financial, mental or physical. Whilst the majority of pet owners (88%) state that their overall experience of pet ownership is a positive one, 66% of respondents from a survey of 2000 Australians admitted that "pet parenting" does involve some challenges (Animal Medicines Australia, 2019). The ongoing financial cost is cited as the most common difficulty at 23%, followed by cleaning up after the pet (22%) and the inability to take the pet on holiday (22%). Nineteen percent of owners are worried that they do not give their pets enough attention, whilst 18% state that it is a challenge to regularly exercise their pet (Animal Medicines Australia, 2019). Comprehension of how perceived costs, such as the examples mentioned above, are associated with other factors of pet ownership are critical if we wish to enable pet ownership to be a net positive experience.

Whilst the efficacy of specifically trained assistance and therapy animals has been observed through numerous studies (Johnson and Meadows, 2002; Cherniack and Cherniack, 2014; Kamioka *et al*., 2014), there is still a knowledge gap regarding the role of everyday companion animals in the lives and wellbeing of Australian veterans and veterans worldwide. The current literature is specific in the species of animal addressed, with the majority using dogs as their sole study animal (Stern *et al*., 2013; Taylor *et al*., 2013). Furthermore, studies frequently assess specifically trained assistance or therapy dogs, as opposed to regular companion animals/pets (McLaughlin and Hamilton, 2019; Jensen *et al*., 2021). The literature is also specific in focus, with the majority of veteran studies focusing on those with a PTSD diagnosis (Stern *et al*., 2013; Burton *et al*., 2019). The literature is devoid of studies that simply look to identify the effect that household pets can have on the mental health and wellbeing of all veterans, regardless of diagnosis. It is important to investigate the effects pets may have on veterans due to the positive benefits of pets seen in other vulnerable populations, the prevalence of mental health issues faced by veterans and the difficulties in accessing highly trained support dogs, including the cost of training these animals (Assistance Dogs Australia, 2020).

The aims of the current study were to assess Australian veteran pet ownership, and to investigate if there was an association between both mental health and/or perceived cost of pet ownership with level of attachment to ones' pet.

## Methods

### PARTICIPANTS

Ethical clearance for this project was provided by the Departments of Defence and Veterans Affairs Human Research Ethics Committee (Protocol number and title: 399-21 The Australian Veterans Experience of Pet Ownership) and HREC approval from the University of Adelaide, (Approval number: 399-21).

Australian veterans were asked to complete an online survey in relation to their mental health and pet ownership.To be eligible for the study, participants were required to be ex-serving Australian veterans, and currently living with or owning a pet.

### SURVEY AND MEASURES

The survey was constructed with guidance from a select group of veterans, veterinarians, psychologists and pet owners, with an initial version being trialled before public release. Participants completed the online survey through the online platform "REDCap" accessible through a link shared through all recruitment methods.

The survey consisted of six sections with a total of 89 questions (Supplementary Material: Appendix 1). The first section included demographic data relating to the participants, including gender, age, location and living arrangements. The second section incorporated military questions, including the service of the Australian military, time served and whether the participant had deployed. The third section was questions relating to the participants' pets. These included the types of pets owned by the participants, and the pets age, health and satisfaction with pet behaviour. The final three sections consisted of the validated scales used to measure pet attachment, perceived cost of pet ownership, and mental and physical health. Using REDCap's branching logic, only the respondents that stated "cat" or a "dog", for the "pet they felt

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closest to" were then also prompted to answer the C/DORS scale as a measure of the perceived cost of owning a pet.

### PROCEDURE

Participant recruitment was primarily through Facebook®, in particular private groups for Australian veterans. Access to these groups had to be requested through the group administrators, and then once granted, the Department of Veterans' Affairs approved write-up and survey link were posted onto the group pages. All participants gave consent to participate in the study and were informed as to the nature of the research. The survey remained open from 20 December 2021 until 20 February 2022.

### LEVEL OF ATTACHMENT

Pet attachment was assessed using the Lexington Attachment to Pets Scale (LAPS). Developed by Johnson, Garrity, and Stallones in 1992, the LAPS is a scale for assessing the emotional attachment of individuals to their pets (Johnson *et al*., 1992). It consists of 23 self-reported questions and has strong psychometric properties. All questions in the LAPS utilise a 4-point Likert scale, with the final score having a range of 0–69, and a higher overall score indicating a greater attachment to ones' pet. The 23 items can also be split into three composite factors; general attachment, people substituting and animal rights/welfare, which score out of 33, 21 and 15, respectively (Johnson *et al*., 1992).

### OVERALL PERCEIVED COST

The costs of pet ownership were measured using a subscale of the Cat/Dog Owner relationship scale (C/DORS) (Howell *et al*., 2017). The scale consists of three subscales: Cat/Dog owner interaction, Perceived costs, and Perceived Emotional Closeness. Consisting of nine items, the perceived costs subscale is scored on a 5-point Likert scale, with the total score being the sum of all nine questions divided by five (Howell *et al*., 2017). This subscale was the sole measure used from the C/DORS in this study (henceforth called Overall Perceived Cost (OPC)), with a lower score indicating greater perceived costs of pet ownership. Using REDCap's inbuilt branching logic, this section was only completed by participants with a dog or cat as it is not validated for other pet species.

### MENTAL AND PHYSICAL HEALTH

The Veterans RAND 12 Item Health Survey (VR-12) was used to measure the emotional and physical health of the participants. Derived from the longer VR-36 survey, it comprises of 12 items that correspond to eight principal mental and physical health domains. The items are summarised into two scores, a mental health summary scale (MCS12) and a physical health summary scale (PCS12), with higher scores indicating better mental and physical health (Iqbal *et al*., 2007). MCS12 and PCS12 scores are derived using an algorithm that is referenced to a 2000–2002 US Medical Expenditure Panel Survey population. VR12 scores are standardised using a T-score metric with a mean of 50 and a standard deviation of 10 (Kazis *et al*., 2004).

### ANALYTIC APPROACH

The survey data was exported from REDCAP and statistical analysis was conducted through R Studio Version Mac OS X 12_0_1. The participant population data and their pet demographic data were analysed through descriptive statistics. The total scores of attachment (LAPS), overall perceived cost (C/DORS) and physical/mental health (VR12) were calculated according to their individual scoring algorithms (Johnson *et al*., 1992; Kazis *et al*., 2004; Howell *et al*., 2017). Shapiro-Wilk tests were performed on all measures to test for normality. The relationship between the predictors in the data-set and each of the two outcomes OPC and MCS12 was modelled using linear regression. The model selection process was a two-step process. In the first step, we performed a simple linear regression between each predictor and the outcome variable. Any predictor with a significant linear relationship at the 5% level was then incorporated into the initial final model. In the second step, a backward step algorithm was used to select the predictors in the final model.

All participants were included in the descriptive analyses, however, due to the limitations of the perceived cost scale, only those that answered "dog" or "cat" for the pet that they "felt closest to" were included in the modelling stages. Completion of the LAPS and OPC was required in full, or the participant was eliminated from the data set, however, the VR12 scale can be scored with missing values (Kazis *et al*., 2004).

## Results

### DESCRIPTIVE RESULTS

Over the two-month recruitment period, there were a total of 1034 responses to the survey. Of these, 89 were removed due to incomplete demographic information. This meant 945 participants were included in the demographic analysis (Table 1). Once the respondents not answering for dogs or cats, and those that did not complete the LAPS and/or the C/DORS scale in full were removed, the final number of participants for the general linear model analysis was 845.

Of the 945 respondents, the majority of respondents were male (624/945, 67%), with participants varying in age, most commonly in the brackets 45–54, 55–64, 35–44 years old, respectively (Table 1). Over half of the respondents owned the property they currently lived in (611/945, 64%). Most respondents had served in the army for more than 10 years, with almost a third giving over 20 years of service (272/945, 27%).

Dogs were the most common pet (815/945, 86.2%), followed by cats (328/945, 34.7%) (Table 2). Around a third (38.4%) of participants owned multiple species of pets (363/945).

Level of attachment, perceived cost, and mental health scores were all non-normally distributed (see Table 3) for the 845 respondents that stated they felt closest to a cat or dog. There was a generally high LAPS and perceived cost score, evident in Table 3. The MCS12, calculated from a standardised t-score metric, saw a significantly lower median than the reference population mean of 50 (std = 10). The level of attachment was significantly higher in dog owners than cat owners (median of 62 and 59, respectively, P=0.0187).

### ANALYTICAL RESULTS

The relationship between the two outcome variables OPC and MCS12 and their main predictors was assessed through linear regression for the above 845 respondents. The factors associated with the MCS12 in the final model are shown in Fig. 1. Full-time work was associated with a higher mental health score than part-time/casual work, retirees, and those not currently in paid employment. An increase in the number of times a participant moved house in the last two years predicted a lower mental health score. Increased attachment to pets was associated with a lower mental health score, whilst physical health score and perceived cost of pet ownership score were both associated with an increased mental health score.

The factors associated with perceived cost of pet ownership are shown in Fig. 1. Female respondents reported a lower perceived cost of pet ownership than males. Navy and Air force participants reported a higher perceived cost of pet ownership in comparison to those in the Army. Perceived costs of pet ownership decreased as satisfaction with pet behaviour increased. Mental health score was associated with an increased overall perceived cost score, and level of attachment, indicating lower mental health, and lower attachment was associated with perceived greater costs to pet ownership.

## Discussion

Through this exploratory study, data on the demographics, benefits and costs of pet ownership for Australian veterans was investigated,

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**Table 1.** Demographic information of Australian military veterans that live with/own pets, based on online survey responses between 20 December 2021 and 20 February 2022. n = 945.

| Category | Option | Count (n) | Percentage (%) |
|---|---|---|---|
| Gender | Male | 624 | 66.0 |
| | Female | 321 | 34.0 |
| Age | 18–34 | 153 | 16.2 |
| | 35–44 | 195 | 20.6 |
| | 45–54 | 265 | 28.0 |
| | 55–64 | 210 | 22.2 |
| | 65+ | 116 | 12.3 |
| Location | Queensland | 331 | 35.0 |
| | New South Wales | 199 | 21 |
| | Victoria | 145 | 15.3 |
| | Western Australia | 81 | 8.6 |
| | South Australia | 74 | 7.8 |
| | Australian Capital Territory | 50 | 5.3 |
| | Northern Territory | 35 | 3.7 |
| | Tasmania | 27 | 2.9 |
| | Currently residing outside AUS | 3 | 0.3 |
| Housing | Own property lived in | 611 | 64.7 |
| | Renting | 254 | 26.9 |
| | Other | 39 | 4.1 |
| | Live with family | 28 | 3.0 |
| Working status | Full time | 376 | 39.8 |
| | Retired | 297 | 31.4 |
| | Not currently in paid employment | 190 | 20.1 |
| | Part-time/casual | 79 | 8.4 |
| Carer status | Not a carer | 701 | 74.2 |
| | Carer to a child | 185 | 19.6 |
| | Carer to an adult | 54 | 5.7 |
| Military service | Army | 514 | 54.4 |
| | Navy | 266 | 28.1 |
| | Air force | 194 | 20.5 |
| Time in military | <5 years | 151 | 16.0 |
| | 5–10 years | 251 | 26.6 |
| | 10–20 years | 285 | 30.2 |
| | >20 years | 255 | 27.0 |

along with some of the moderating factors associated with these variables. The main objectives were to determine the types of companion animals owned by veterans and assess associations between mental health, perceived cost of pet ownership, and level of pet attachment.

## PET DEMOGRAPHICS

When assessing the current makeup of Australian veteran pet ownership, dogs were the most owned pet, with 86% of our sample of veteran pet owners having at least one dog. This is higher than that seen in the general Australian population, with approximately 68% of households owning a dog (Animal Medicines Australia, 2021), although respondents were probably selected to be more likely to own a pet and may not be representative. Whilst the most researched species used in animal-assisted interventions are dogs, 36% of veterans responding were cat owners. This illustrates the issue of the knowledge gap in current research, as it is important to not limit companion animal research and animal-assisted interventions/therapies to dogs alone but to include other species which may play important roles in people's lives. Cats may be easier to look after for those that are less mobile (Branson *et al*., 2019) and cats or other species may, in fact, be preferable to dogs for many individuals (Gosling *et al*., 2010).

## MENTAL HEALTH, ATTACHMENT, AND OTHER ASSOCIATED FACTORS

A significant association was found between mental health and attachment to dogs and cats, with mental health scores declining as attachment increased. Chur-Hansen *et al*. (2009) suggest that the relationship between attachment to pets and health benefits may follow an inverted U curve. This implies that higher levels of attachment can be detrimental to one's health and no attachment may yield no effects on health. Remaining home with one's pet can lead to further isolation and lack of human social support, however, it is unclear if pet attachment leads to less social support and human interaction, or vice versa (Cohen, 2002). An unwillingness to leave a pet has also been observed to reduce physical health, due to foregoing exercise, healthcare or food in order to satisfy the needs of one's pet. It has been noted in previous research that reluctance to part with a pet can lead one to ignore personal health advice, and a positive association between attachment and heavier owners has also been observed (McNicholas *et al*., 2005; Stephens *et al*., 2012). More recently Lass-Hennemann *et al*. (2022) observed that while a strong level of attachment to pets by itself was not negatively associated with mental health, this was mediated by an insecure attachment to other people. Dependence on other people was negatively associated with dog attachment, and it was hypothesised this lower comfort in trusting other humans led to the association with a higher mental health burden.

Mental health has been shown to be related to social isolation (Cornwell and Waite, 2009), which may play a part in the association between mental health and attachment observed in this study. It is conceivable that highly attached owners may prefer to remain at home, as opposed to separating from their pets to visit friends or family. This may be particularly pertinent to those that prefer their pet's company to humans, with very strong attachment levels.

Isolation and loneliness are particularly pertinent to Australian veterans, as the Australian Bureau of Statistics estimates there are many Australian veterans living in remote areas of Australia, who are prone to be socially isolated (Australia Department of Veterans' Affairs, 1996). Although potentially lacking access to many traditional healthcare services and supports, isolated veterans can still acquire pets. Hartwig and Signal (2020) when seeking to assess the detrimental consequences of loneliness on mental health and wellbeing in adolescents reported for young people with extreme levels of attachment to their pet, there was a

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**Table 2.** Information on the species make up of pet ownership from an online survey of military veterans who live with/own pets. Respondents could tick all pet species that applied, based on online survey responses between 20 December 2021 and 20 February 2022.

| Species | Dog | Cat | Bird | Fish | Small mammal | Reptile | Other[a] | Multiple Pets |
|---|---|---|---|---|---|---|---|---|
| Number (n) | 815 | 328 | 108 | 91 | 25 | 31 | 71 | 363 |
| Percentage (%) | 86.2 | 34.7 | 11.4 | 9.6 | 2.7 | 3.3 | 7.5 | 38.4 |

[a]Other pets included responses such as horses and goats.

**Table 3.** The descriptive statistics of the three non-normally distributed outcome variables, Lexington Attachment to Pets Scale (LAPS), Overall Perceived Cost (C/DORS), mental health component score (MCS12) and physical health component score (PCS12), for Australian veteran survey respondents that felt closest to a dog or a cat. n = 845 based on online survey responses between 20 December 2021 and 20 February 2022.

| Standardized scale | Lexington attachment to pets (LAPS) | Overall perceived cost OPC* | Mental health component scale MCS12 | Physical health component scale PCS12 |
|---|---|---|---|---|
| Median | 61.0 | 4.3 | 38.8 | 38.3 |
| IQR | 14.0 | 0.8 | 15.6 | 19.7 |
| Range | 0.0–69.0 | 1.7–5.0 | 5.7–65.9 | 12.8–67.9 |
| Shapiro-Wilk p-value | <0.001 | <0.001 | <0.001 | <0.001 |

*Note: A higher OPC score corresponds to less perceived costs of pet ownership.

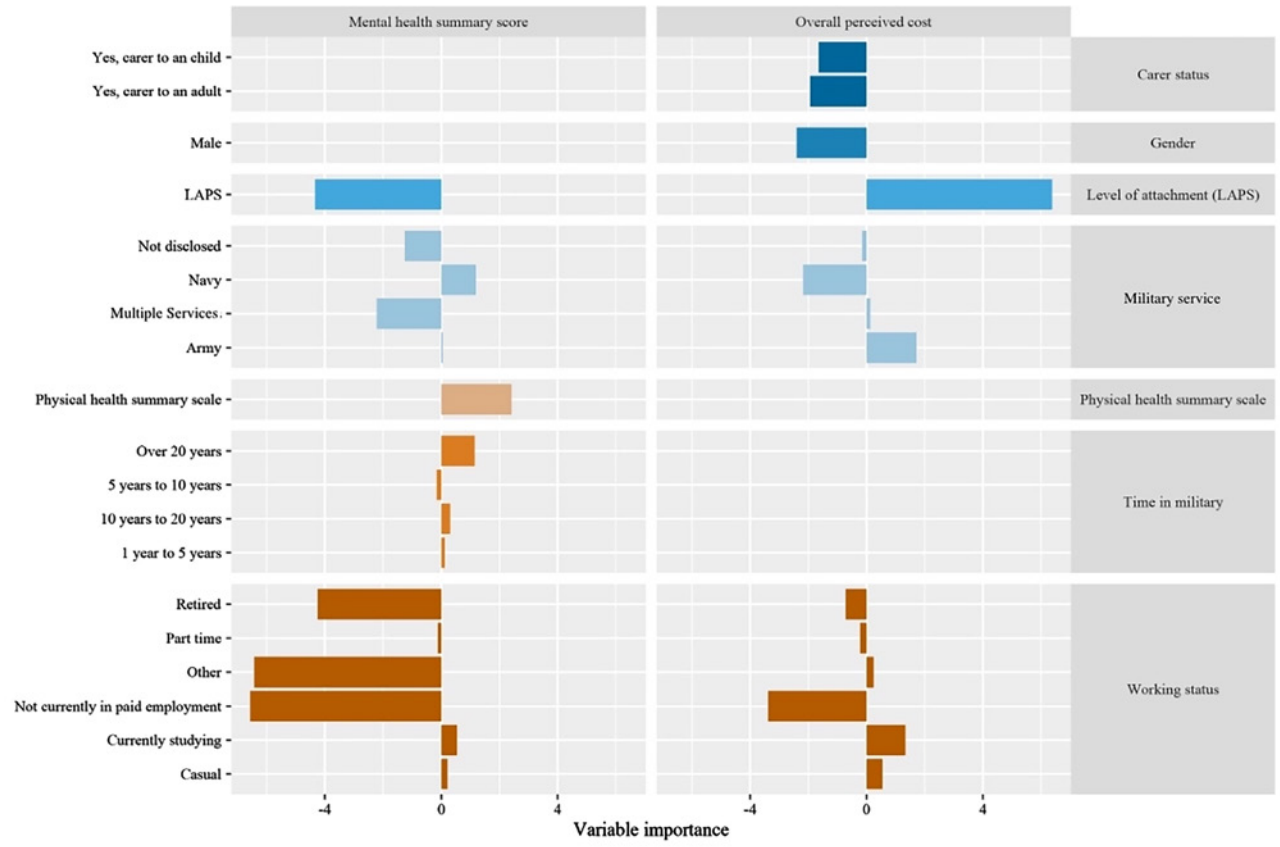


**Fig. 1.** Variable importance plot for the two outcomes for the primary models. The presence of bars for a variable indicates that the predictor is in the final model. Bars to the right of zero indicate that the outcome is larger for that level of the variable compared to the reference level, while bars to the left of zero indicate that the outcome is smaller for that level compared to the reference level. The length of the bar indicates the magnitude of the effect. The reference levels for; Carer status, Service, Time in military and Working status were; no not a carer, female, Air-force, No, <1 year and Casual, respectively.

significantly heightened level of loneliness and lower social support score (Hartwig and Signal, 2020). When considering our sample of Australian veterans, these relationships may be of importance, as we observed a generally high attachment score, greater than that seen in other studies (Miltiades and Shearer 2011; Stephens *et al*., 2012). Our study also observed a significantly higher attachment in dog owners compared to cat owners, which has also been observed in previous research (Lass-Hennemann *et al*., 2020). Lass-Hennemann *et al*. (2020) also saw higher attachment levels associated with higher levels of psychopathological symptoms and lower levels of health-benefitting factors.

Full-time work was associated with higher mental health scores than part-time or casual work, studying or not being in paid employment.

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The effects of working status on health have been explained using two hypotheses which may be observed in our results. The social causation hypothesis, which is touched upon below, talks of employment improving health. The second hypothesis, the selection hypothesis, states that healthier people are more able to obtain and retain jobs than unhealthy people (Mossakowski, 2014). Although both of the above hypotheses are valid, they can be interwoven, as having a job may help to sustain, nurture, and protect health, which is required for continued employment, while unemployment may also aggravate health problems, which, in turn, hinder potential employment (Mossakowski, 2014).

While there are financial effects of full-time employment that impact mental health, research has identified that these may, in fact, be small when compared to the non-financial costs of unemployment (Llena-Nozal, 2009). These include factors like low self-esteem, but the most prevalent issue targeting our population may be the psychosocial assets that come with full-time work. The social causation hypothesis defines assets such as a sense of control, self-confidence and social contact (Stanwick *et al*., 2006). For military veterans who have spent much of their life under a regimented military schedule, these assets are likely to be important, and the loss of these is specifically reported as some of the major issues facing veterans when transitioning from military to civilian life (Van Hooff *et al*., 2018). Many of those in the "not currently in paid employment" category stated they were "permanently and totally incapacitated", which again may have led to a lower stated mental health score.

### PERCEIVED COSTS AND ASSOCIATED FACTORS

We observed a decrease in the perceived cost of pet ownership as one's attachment level increased, with people who are highly attached to their pet reporting a lower perceived cost of pet ownership. This association between perceived costs of pet ownership and mental health may be critical when looking at programmes to support veterans. While owning a pet has numerous benefits (Taylor *et al*., 2013; Lass-Hennemann *et al*., 2014), and can even be lifesaving for some Australian veterans with mental health issues (Obradović *et al*., 2020; Young *et al*., 2020), the cost of caring for their pet can be stressful, reducing positive mental health engendered by the pet. Programmes and policies that help with the financial cost of ownership and provide access to services such as obedience classes and veterinary visits could be paramount in ensuring that pet ownership remains a net positive experience for Australian veterans.

### LIMITATIONS AND RECOMMENDATIONS

A limitation of this study is that as a voluntary survey, it may have a selection bias, with veterans with more positive views of pet ownership participating more than those with neutral or negative views on pets. Another limitation is that mental health is an incredibly complex issue, and it is impossible to ascertain all the information affecting mental health in an ethically low-risk, cross-sectional study. Mental health is a multifaceted issue with many factors. To fully assess mental health, a more rigid questionnaire that included scales such as the Depression Anxiety Stress Scale (DASS) are required. Finally, this study was only able to fully analyse results for dog or cat owners. This is due to the confines of the scales used, which are only validated for cats and dogs. Studies investigating other companion animals, such as birds and reptiles, are still needed.

### IMPLICATIONS

Findings from this study highlight the complicated relationship between veterans' strong attachment to their pets and their mental health, as well as the perceived cost of this relationship. These findings provide support for further research, implementation of pet ownership programmes and possible government policies for Australian veterans. This study can aid in identifying factors such as the perceived cost of pet ownership, to ensure the successful implementation of these pet-supporting policies. It may also assist in research related to assistance animals such as assistance dogs for veterans with PTSD. Although this cohort may not have the financial costs of pet ownership due to their dog being provided by the government or charity organisations, they still share many of the same issues regarding attachment, mental health and other costs of ownership. Further research that seeks to further analyse the associations between attachment, perceived cost and mental health may benefit from a longitudinal design, where one of the above variables is manipulated or an intervention is applied. This will allow greater insight into the veteran-pet relationship, and potentially further identify important factors influencing the positive and negative aspects of pet ownership for veterans.

## Conclusion

The current Australian veteran experience of pet ownership includes strong levels of attachment, substantial mental health impacts and perceived costs of ownership. This study observed significant associations between mental health scores, perceived costs of pet ownership, and attachment to one's pets. Veterans appear to be highly attached to their pets, future research should seek to understand the causation and directions of the above associations through longitudinal and/or interventional studies. There is evidence that the implementation of programmes and policies that lower the perceived cost of pet ownership may indeed be highly beneficial towards our Australian veteran population.

### CONFLICT OF INTEREST

It should be noted that both Dr Susan Hazel and Dr Janette Young are on the Board of Animal Therapies Ltd.

### ETHICS STATEMENT

The authors confirm that the research meets any required ethical guidelines, including adherence to the legal requirements of the study country.

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### AUTHOR CONTRIBUTIONS

The authors confirm their contribution to the paper as follows: study conception and design: Joshua Zoanetti, Dr Susan Hazel, Dr Torben Dahl Nielsen & Dr Janette Young. Data collection: Joshua Zoanetti, Dr Susan Hazel, Dr Torben Dahl Nielsen & Dr Janette Young. Analysis and interpretation of results: Dr Jono Tuke, Joshua Zoanetti, Dr Susan Hazel & Dr Torben Dahl Nielsen. Draft manuscript preparation: Joshua Zoanetti, Dr Susan Hazel, Dr Torben Dahl Nielsen & Dr Janette Young. All authors reviewed the results and approved the final version of the manuscript.

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