

**Title:** Socialisation, Training, and Help-Seeking – Specific Puppy Raising Practices That Predict Desirable Behaviours in Trainee Assistance Dog Puppies.

Dac L. Mai<sup>1,\*</sup>, Tiffani Howell<sup>1</sup>, Pree Benton<sup>2</sup>, Pauleen C. Bennett<sup>1</sup>

<sup>1</sup> Anthrozoology Research Group, Department of Psychology and Counselling, School of Psychology and Public Health, La Trobe University, Flora Hill, VIC 3552, Australia.

<sup>2</sup> Centre for Service and Therapy Dogs Australia, Melbourne, VIC 3162, Australia.

\* **Corresponding author:** Dac L. Mai, Anthrozoology Research Group, Department of Psychology and Counselling, School of Psychology and Public Health, La Trobe University, Edwards Rd, Flora Hill, Victoria 3552, Australia | Email: Jimmy.mai@latrobe.edu.au | Tel: +61-3-5444-7317 | Fax: +61-3-5444-7850

## Abstract

Puppies are often purpose-bred and carefully selected to be future assistance dog candidates. Early experiences during their stay with volunteer puppy raisers help shape their behaviour as young adults, which is an important determinant of whether they are selected for further training. Exactly how puppy raisers' practices contribute to puppy behavioural development during this time remains unknown. The current study aimed to address this by investigating relationships between puppy raisers' practices, various support factors, and puppy behaviour. A total of 231 puppy raisers (205 females, 25 males, 1 preferred not to say), aged between 18 and 79 years old ( $M = 40$ ,  $SD = 18$ ), completed an online survey. They provided demographic information, described their puppy raising practices (e.g., 'I walk my puppy regularly even when I don't feel like doing it', 'I know what to do when my puppy doesn't behave'), ranked their perceived support from various sources (e.g., organisation's dog trainers, other puppy raisers, family members, and friends) and rated their puppy's behaviour (e.g., [My puppy] pulls towards unfamiliar dogs). A principal component analysis revealed that the puppy-raising practices item set was factorable, with three internally consistent subscales, i.e., Socialisation, Training, and Help-Seeking Behaviour. Stepwise linear regression showed that Socialisation and Training predicted most puppy behaviours (Trainability, General Anxiety, Adaptability, and Excitability). In turn, these two factors were predicted by support from mentors/counsellors, although mediation analyses indicated that raiser's help-seeking behaviour mediated these relationships. While further research is required, it is recommended that, to ensure optimal puppy rearing outcomes, organisations should invest resources in improving and supervising puppy raisers' practices, particularly through promoting a help-seeking culture amongst puppy raisers and through sharing the experiences of previous puppy raisers.

**Keywords.** Dog temperament, guide dog, service dog, puppy walker, puppy foster carer.

## Socialisation, Training, and Help-Seeking – Specific Puppy Raising Practices That Predict Desirable Behaviours in Trainee Assistance Dog Puppies

### 1. Introduction

It may take a village to raise and train an assistance dog. These dogs are generally purpose-bred, raised by volunteer puppy raisers during their puppyhood, and later trained and certified by professional dog trainers to assist people with a disability (Bremhorst et al., 2018; Sachs-Ericsson et al., 2002; Wirth & Rein, 2008). In order for the adult dogs to assist their handlers in various places, they must possess traits deemed safe and desirable for themselves, for their handlers, and for members of the public (Bremhorst et al., 2018). For instance, they need to have low anxiety, high adaptability to new places, low distractibility by environmental stimuli, high trainability with tasks, attentiveness to the handler, and no aggression or excitability towards humans and other animals (Harvey et al., 2016; Hsu & Serpell, 2003; Vaterlaws-Whiteside & Hartmann, 2017). Because assistance dogs are required to have these characteristics, considerable effort has been invested in breeding and raising puppies to meet high standards. Predicting which puppies will develop into dogs that exhibit these traits is critical in improving industry efficiency and ensuring the welfare of participating dogs.

Research has attempted to predict adult dog behaviour on the basis of puppy behaviour, with assessments typically conducted at approximately 8-12 weeks of age (Vaterlaws-Whiteside & Hartmann, 2017). Unfortunately, the results have been disappointing. Dollion et al. (2019), for example, reports that, despite using a rigorous methodology to breed and select dogs for assistance work for more than 30 years, the Mira Foundation in Quebec still excludes up to 38% of dogs from its advanced training programs, mostly because of behavioural reasons. Given that it may cost up to US\$50,000 to train and certify an assistance dog, these failed puppies represent substantial losses in both financial costs (i.e., for breeding and raising them prior to their exclusion), and opportunity costs (i.e., when they fail to be fully certified and cannot support a person with disability) to assistance dog providers. In fact, research in companion dog (Fratkin et al., 2013; Jones & Gosling, 2005) and assistance dog (Asher et al., 2017; Kobayashi et al., 2013) populations suggests that puppies' behaviours at an early age are less predictive of their adult

behaviours than their behaviours at about one year old. Hence, how puppies behave when they enter a puppy raising program at 8-12 weeks of age may not be the same as how they behave one year later. Even though puppies often come from in-house puppy breeding programs (Goddard & Beilharz, 1982), where organisations provide them with early socialisation and examine their baseline behavioural profile (Vaterlaws-Whiteside & Hartmann, 2017), after leaving the litter, they may acquire traits and behaviours that may not be appropriate for future assistance roles. This behavioural plasticity suggests a need for puppy raisers to manage their puppy's early experiences, which interact with their inherited traits to determine adult behaviours (Plomin & Asbury, 2005).

A literature review by Rooney et al. (2016) recommends three practices for raising less fearful and anxious puppies, including: 1) selection of puppies suitable for their intended roles, 2) managing fearfulness and anxiety-provoking activities during puppyhood, and 3) introducing potential stressors in a controlled and positive manner. Implementing the first recommendation is clearly the responsibility of breeding and training staff. However, individual puppy raisers are ultimately responsible for managing puppy experiences during the raising period. Guidance and support from host organisations only indirectly influence puppies' behavioural outcomes via directly influencing puppy raisers' practices. Because early developmental stages, when puppies typically stay with a volunteer puppy raiser, are critical for their behavioural development (Appleby et al., 2002; Vaterlaws-Whiteside & Hartmann, 2017), it is worthwhile investigating how puppy raising practices contribute to desirable adult behaviours and also what factors influence puppy raising practices.

Mai et al. (2020) interviewed 17 participants who either had raised at least one assistance dog puppy, had been staff responsible for overseeing a puppy raising program at their organisation, or both. Organisational support was identified as a critical factor in potentially determining puppy raising practices, with several other factors also reported to affect puppy raisers' experiences and their puppy raising practices. Organisational support was reported to take various forms, ranging from provision of technical materials, enabling access to other current puppy raisers and puppy sitters and/or experienced puppy raisers called mentors or counsellors, to arranging for structured support provided by dog trainers.

Puppy raisers described turning to puppy sitters for temporary and short-term care for their puppy, and reaching out to other puppy raisers for informal answers to spontaneous puppy raising enquiries. Support from puppy raising mentors or counsellors was described quite differently. These mentors mostly had extensive experience in puppy raising and were selectively sought out to support puppy raisers with broader and more advanced issues. Additional sources of support included family members, friends, colleagues, access to technical information available online, and consultations with external canine professionals.

Mai et al. (2020) found that puppy raisers' levels of experience and understanding of their puppies' behaviours were associated with their puppy raising practices. Reported benefits of canine knowledge and previous dog training experiences were in line with prior research, which found that puppies were rated more favourably on their behaviour when being raised by experienced (Serpell & Duffy, 2016; Svartberg, 2002; Takeuchi et al., 2009), and knowledgeable (Fratkin, 2015) puppy raisers. Mai et al. (2020) also highlighted the potential negative impacts of puppy raisers not seeking help regarding their puppy raising practices. Reasons for not seeking help included hesitation due to a perception that they would be judged negatively for seeking help and a general unawareness of situations where they should ask for help. The help-seeking variable appeared to determine the extent to which puppy raisers benefited from supports available to them. Hence, it could be critical in terms of influencing the quality of their puppy raising and, consequently, behavioural outcomes for their puppy. These findings suggest a potential strategy for improving puppy raisers' practices and puppy behaviour, but they are limited by Mai et al.'s (2020) exploratory methodology and small sample size. Apart from Mai et al.'s (2020) study, we could find no published research that specifically investigated influences of raiser practices on puppy behaviour—a research gap that was explained in a recent critical review (Mai et al., 2021). Therefore, a more definitive examination of the proposed relationships is required.

The aim of this study was to further investigate putative relationships between puppy raisers' practices, provision of various supports to puppy raisers, and puppy behavioural outcomes. We created a scale measuring puppy raisers' practices since there is no such tool reported in existing literature. We

hypothesised that: 1) at least one of the measured variables, such as raisers' practices or perceived support, would statistically predict current puppy behaviour, and 2) puppy raisers' help-seeking behaviour would explain (mediate) any observed effects of support on raisers' practices.

## **2. Materials and methods**

This study was approved (HEC19278) by the Science, Health and Engineering College Human Ethics Sub-Committee, La Trobe University.

### *2.1. Participants*

A total of 231 puppy raisers (205 females, 25 males, 1 preferred not to say) were recruited from seven countries (179 United States, 25 Canada, 9 Ireland, 8 Australia, 8 New Zealand, 1 United Kingdom, 1 Uruguay), with ages ranging from 18 to 79 years old ( $M = 40$ ,  $SD = 18$ ). Participation was voluntary, with the inclusion criteria being simply that the respondent was 18 years or older and currently raising a puppy for an assistance dog training organisation. Most participants (44.2%) were first-time puppy raisers, while many others had previously raised up to two puppies (26.8%). A smaller group of puppy raisers (23%) had raised between three to ten puppies, whereas the remaining participants (6%) had raised more than ten and up to 38 puppies prior to their current puppy.

The puppies being raised were 105 males [45.45%; 66 intact (28.57%), 39 neutered (16.88%)] and 126 females [54.55%; 92 intact (39.83%), 34 neutered (14.72%)] with ages ranging between three and 25 months old ( $M = 10.25$   $SD = 5.5$ ). Most of the puppies were purebred or crossbred Labrador Retrievers (76.62%,  $n = 177$ ), followed by Golden Retrievers (15.15%,  $n = 35$ ), Poodles (3.46%,  $n = 8$ ), and other breeds (4.76%,  $n = 11$ ). They were being raised for a wide range of assistance roles but over half of them (53.25%,  $n = 123$ ) were prospective guide dogs. Of the rest, one half (25.11%,  $n = 58$ ) had yet to receive a specified assistance role, while the remainder had an intended role such as autism assistance dog or other developmental disorders (8.23%,  $n = 19$ ), mobility dog (6.49%,  $n = 14$ ), psychiatric assistance dog (4.76%,  $n = 11$ ), and other assistance roles (medical alert, hearing, and medical response dogs; 2.16%,  $n = 5$ ).

## 2.2. *Materials*

An online questionnaire was developed, encompassing several demographic questions about both the puppy raisers (age, gender, education, housing condition, and region) and their puppies (breed, age, gender, and intended role), and three scales assessing different aspects of puppy raising: raiser practices, support, and puppy behaviour.

**Raiser Practices Questionnaire.** We created 16 items intended to measure the quality of puppy raisers' practices on a five-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree). For example, one item measuring puppy socialisation activity was "I introduce my puppy to people with different appearances and of different ages," and an item about puppy training was "I never give in to my puppy when s/he does what s/he is not allowed to".

**Support Factors Questionnaire.** A collection of 14 items (see Table 1) asked puppy raisers to rate the extent to which they had received support from various sources on a five-point rating scale (1 = Not at all, 5 = A great deal of support). The support sources included those provided by the assistance dog training organisation (e.g., trainer, materials, other puppy raisers), general external support (e.g., family, friends, co-workers), and external informational support (e.g., social media, websites not from their organisation). Participants could also indicate if any of the support types did not apply to their puppy raising activities.

**Table 1.** Potential sources of support

| Categories              | Potential Sources of support  | n   | Scores <sup>a</sup> |        |
|-------------------------|---|-----|---------------------|--------|
|                         |   |     | Min-max             | Median |
| Organisational supports | Dog trainers from your organisation                                   | 222 | 1-5                 | 4      |
|                         | Puppy counsellors/mentors from your organisation                      | 217 | 1-5                 | 4      |
|                         | Veterinarian from your organisation                                   | 200 | 1-5                 | 3      |
|                         | Other puppy raisers from the organisation                             | 225 | 1-5                 | 5      |
|                         | Puppy sitters from your organisation                                  | 206 | 1-5                 | 4      |
|                         | Training materials (manual, newsletter, video) from your organisation | 226 | 1-5                 | 4      |
| External support        | Your own veterinarian   | 182 | 1-5                 | 3      |
|                         | Dog trainers, or professionals not from the organisation              | 160 | 1-5                 | 1      |
|                         | Family members  | 221 | 1-5                 | 4      |
|                         | Friends   | 224 | 1-5                 | 4      |
|                         | General community   | 223 | 1-5                 | 4      |
|                         | Co-workers  | 174 | 1-5                 | 4      |
|                         | Books, videos, websites other than what the organisation provides     | 180 | 1-5                 | 2      |
|                         | Social media (Facebook group, not affiliated with the organisation)   | 191 | 1-5                 | 3      |

<sup>a</sup> 1 = Not at all; 2 = A little support; 3 = A fair amount of support; 4 = Much support; 5 = A great deal of support

**Puppy behaviour.** The Puppy Training Supervisor Questionnaire (PTSQ) (Harvey et al., 2017) is a 35-item measure that asks puppy raisers to rate their puppy's behaviour. In this scale, 28 items are behavioural descriptions, and the remaining 7 items are adjectives. Items were scored using a 100mm visual analogue scale (VAS), using the anchors 'Never' and 'Almost Always' for behavioural descriptive items, and 'Really does not describe this dog' to 'Really describes this dog' for adjective items. The number of millimetres between the left anchor and the mark made by the rater was the response value. The PTSQ was developed for use within the guide dog puppy population, and demonstrated good internal reliability, temporal consistency, as well as predictive, construct and concurrent validity, when used in a sample of guide dog puppies from 5 to 12 months old (Harvey et al., 2017). The behaviour items were categorised into six trait subscales, i.e., Trainability (13 items, e.g., "[My puppy] refuses to obey



commands, which in the past it has proven it has learned”), General Anxiety (4 items, e.g., “[My puppy] is obviously startled by odd or unexpected things or objects”), Adaptability (2 items, e.g., “[My puppy] adapts well to new situations and environments”), Excitability (6 items, e.g., “[My puppy] is active and energetic”), Distractibility (5 items, e.g., “[My puppy] pulls (including lunging) towards unfamiliar dogs”), Stair Anxiety (2 items, e.g., “[My puppy] appears uneasy on closed stairs”), and Body Sensitivity (3 items, e.g., [My puppy] is uneasy with being physically handled/groomed”). The 100-point scales were converted to a 10-point continuous scale. After reversing scores of items one through six and 24, composite scores were computed by taking averages of item scores for each subscale. Higher scores on the subscales indicate higher levels of the corresponding behavioural traits.

### 2.3. *Procedure*

Data collection proceeded via Qualtrics, an online survey platform. The survey was conducted in English, was anonymous and was expected to take approximately 15 minutes to complete. Although it would be desirable to obtain information from non-English speaking communities, this was beyond the scope of the current study. Information about the study was advertised widely on social media platforms (e.g., paid advertisement on Facebook) to target assistance dog puppy raisers, and through a convenience sampling technique by sending an email to 46 assistance dog organisations in 13 countries (i.e., Australia, Belgium, Canada, Chile, Croatia, Finland, Ireland, New Zealand, Spain, Switzerland, the Netherlands, the United Kingdom, the United States of America), whose contact details were publicly available on their websites. Participants followed a link to access the online survey and provided informed consent before commencing the survey. Data collection ran from August 2019 to January 2020.

### 2.4. *Data preparation and analyses*

**Raiser Practices Questionnaire.** Items in this part of this questionnaire were based on findings from an earlier qualitative study (Mai et al., 2020) and were subjected to Principal Component Analysis (PCA) to identify emergent factors and internal consistencies. This allows for obtaining a minimum number of simple and interpretable factors (Wold et al., 1987). Eigenvalues greater than one and visual inspection of the scree plot suggested the number of components to be extracted and retained. Only factor

loadings greater than 0.40 were retained in the factor loading matrix table. For cross-loading variables (those that loaded on more than one factor), only the highest loadings were retained.

Cronbach's alphas were computed for all retained factors to examine their internal consistency. For the factors with acceptable to high internal consistency, we calculated composite scores by summing up ratings of items in those factors and converting the sums to a continuous 10-unit measure, with a higher score on each subscale indicating a higher level of its corresponding practice. Those scores were then used for further analyses.

**Puppy Training Supervisor Questionnaire.** With the current sample, six of the seven PTSQ sub-scales demonstrated good to excellent internal consistency: Trainability ( $\alpha = 0.83$ , Min-Max = 4.22-9.93; MED = 7.92), General Anxiety ( $\alpha = 0.84$ ; Min-Max = 0-8.88; MED = 0.80), Adaptability ( $\alpha = 0.81$ ; Min-Max = 0.10-10; MED = 9.5), Excitability ( $\alpha = 0.74$ ; Min-Max = 0.08-8.72; MED = 3.73), Distractibility ( $\alpha = 0.86$ ; Min-Max = 0-9.80; MED = 3.62), and Stair Anxiety ( $\alpha = 0.79$ ; Min-Max = 0-10; MED = 0.10). The Body Sensitivity subscale demonstrated low internal consistency (3 items;  $\alpha = 0.23$ ), so it was omitted from the current study.

**Predicting Puppy Behaviours.** Multiple regression analyses were conducted to examine if certain puppy raising factors, measured with the Raiser Practices Questionnaire, could predict puppy behaviours, measured by the PTSQ. In the preliminary analyses, a stepwise method was used to decide which variables should be controlled for when predicting puppy behaviours. The raiser experience variable (number of puppies raised) was excluded from all models and puppy age was the only control factor that was identified as predicting some puppy behaviours—trainability, distractibility, and stair anxiety. To that end, Puppy Age was entered into the analyses as the first block in models where it demonstrated significant relationships with puppy behaviour.

Then, exploratory variables were entered in the second block, including three Raiser Practices variables (namely Socialisation, Training, and Help-Seeking Behaviour) and fourteen support variables (refer to Table 1). Support types reported as non-applicable were coded as missing data and excluded in a pairwise manner.

Multiple regression analyses rely on several assumptions, such as normality, homoscedasticity, and absence of outliers and multicollinearity. While the assumption of multicollinearity was upheld in the current study, those for normality, homoscedasticity, and outliers were not met. Therefore, bootstrapped estimates from 2,000 simulated samples were calculated for all resulting stepwise regression models. Bootstrapping is a procedure whereby the statistics program, in this case the Statistical Package for Social Science (SPSS), randomly re-samples the original sample (of 231 observations) with replacement to produce 2,000 more empirically simulated samples. Bootstrapping does not aim to produce a normally distributed sample but it is used as a non-parametric and robust approach to linear regression analyses, which is appropriate when assumptions of sampling distribution are not met (Mooney & Duval, 1993). Each of the resulting models from the stepwise method were entered back into SPSS using a standard (Enter) method. Bootstrapped 95% confidence intervals were then reported together with respective parameters of the resulting regression models.

**Mediating effect of puppy raisers' Help-Seeking Behaviour.** We expected that raisers' Help-Seeking Behaviour would mediate any observed effects of support on Training and Socialisation. Macro PROCESS, an SPSS extension program for mediation and moderation analyses, was used to test this prediction.

Several conditions need to be met for a mediating relationship to be identified (Tabachnick & Fidell, 2013). Firstly, support variables need to significantly predict each of the dependent variables, i.e., Training and Socialisation, and to separately predict the proposed mediator variable (Help-Seeking Behaviour). When accounting for Help-Seeking Behaviour, the support variables must become less predictive of Training and Socialisation. At the same time, Help-Seeking Behaviour, the mediator, must significantly predict Training and Socialisation. In other words, the variance of Training and Socialisation that was initially explained by support factors must be better explained by raisers' Help-Seeking Behaviour. Inference of the results was then compared against confidence intervals of 10,000 bootstraps, as recommended by Hayes (2017).

### 3. Results

#### 3.1. *Raiser Practices Questionnaire*

Factorability of the 16 puppy raising practice items was examined using two criteria: the Kaiser-Meyer-Olkin (0.88) test suggested good sample adequacy while Bartlett's test of sphericity was significant ( $\chi^2 (120) = 1362.66, p < 0.001$ ), which together suggested good factorability of the 16 items.

A PCA was conducted and, based on a rotated solution of factor loadings of the variables (see Table 2), three factors were identified, reflecting three aspects of raisers' practices: Socialisation (4 items;  $\alpha = 0.72$ ), Training (8 items;  $\alpha = 0.82$ ), and Help-Seeking Behaviour (4 items;  $\alpha = 0.75$ ). The Socialisation items asked raisers the extent to which they put enough time into the socialisation of their puppies and to take their puppies to various places. The Training items focused on training aspects, such as the extent to which they understood their puppies' behaviours, and how consistent they were in their training. The Help-Seeking Behaviour items measured raisers' intention to seek help and collaborate with others in the training organisation to improve their puppy raising.

259 **Table 2.** Factor loadings of raiser practices questionnaire items on three raising factors

| Items   | Components                           |                                 |  |
|---|--------------------------------------|---------------------------------|--|
|   | Socialisation<br>( $\alpha = 0.72$ ) | Training<br>( $\alpha = 0.82$ ) | Help-Seeking<br>Behaviour<br>( $\alpha = 0.75$ ) |
| I take my puppy to many different public places<br>e.g., shopping centres, cafes, events. | <b>0.75</b>                          | 0.06                            | 0.30   |
| I introduce my puppy to people with different<br>appearances and of different ages        | <b>0.70</b>                          | 0.24                            | 0.05   |
| I put enough time into my puppy's socialisation   | <b>0.60</b>                          | 0.38                            | 0.14   |
| I ensure that my puppy is only exposed to new<br>experiences in a safe and positive way   | <b>0.50</b>                          | 0.48                            | 0.12   |
| I put enough time into training my puppy with<br>basic obedience skills                   | 0.18                                 | <b>0.74</b>                     | 0.04   |
| I put enough time into addressing my puppy's<br>undesirable behaviours                    | 0.31                                 | <b>0.69</b>                     | 0.04   |
| I am doing a good job of training my puppy  | 0.37                                 | <b>0.66</b>                     | 0.16   |
| I never give in to my puppy when s/he does<br>what s/he is not allowed to                 | 0.06                                 | <b>0.64</b>                     | 0.24   |
| I know what to do when my puppy doesn't<br>behave   | -0.01                                | <b>0.61</b>                     | 0.48   |
| I am always consistent with commands when<br>training my puppy                            | 0.32                                 | <b>0.57</b>                     | 0.24   |
| I know why my puppy behaves the way s/he<br>does  | 0.19                                 | <b>0.56</b>                     | 0.13   |
| I walk my puppy regularly, even when I don't<br>feel like it                              | 0.03                                 | <b>0.45</b>                     | 0.21   |
| I don't hesitate to reach out for help  | 0.11                                 | 0.21                            | <b>0.85</b>                                      |
| I know when I should ask for help   | 0.03                                 | 0.41                            | <b>0.76</b>                                      |
| I work with organisation staff to improve my<br>puppy raising                             | 0.43                                 | 0.02                            | <b>0.59</b>                                      |
| I enjoy helping other puppy raisers   | 0.27                                 | 0.13                            | <b>0.52</b>                                      |
| <b>Min scores</b>   | <b>6.00</b>                          | <b>5.25</b>                     | <b>5.00</b>                                      |
| <b>Max scores</b>   | <b>10.00</b>                         | <b>10.00</b>                    | <b>10.00</b>                                     |
| <b>Medians</b>  | <b>9.50</b>                          | <b>8.75</b>                     | <b>9.00</b>                                      |

260 The three factors demonstrated acceptable to high internal consistency, with Cronbach's alphas  
 261 ranging from 0.72 to 0.82, yet not too high (e.g., greater than 0.90) which would suggest redundancy of  
 262 their items (Tavakol & Dennick, 2011).

263 Relationships between the three puppy raising factors were examined using a non-parametric  
 264 Spearman's Rank-Order Correlation because all three factors were non-normally distributed. Results  
 265 show that raisers' practice variables were significantly correlated with one another, with strong positive  
 266 relationships ( $r_s > 0.50$ ; Cohen, 1988) between Socialisation and Training,  $r_s(231) = 0.62$ ,  $p < 0.001$ ,

Help-Seeking and Socialisation,  $r_s(231) = 0.51$ ,  $p < 0.001$ , and Help-Seeking and Training,  $r_s(231) = 0.54$ ,  $p < 0.001$ .

### 3.2. Predictability of puppies' and raisers' variables

To explore predictability of puppies' behaviour, measured with the PTSQ, from puppy raising factors (i.e., Socialisation, Training, Help-Seeking Behaviour, and 14 support variables), stepwise multiple regression analyses were conducted for each of six dependent variables, namely Trainability, General Anxiety, Adaptability, Excitability, Distractibility, and Stair Anxiety. Where applicable, Puppy Age was controlled for before the other exploratory variables were entered into the analyses. As can be seen in Table 3, all puppy behaviour variables were significantly predicted by at least one variable.

**Table 3.** Predicting puppy behaviours from various puppy raising factors when controlling for puppy age.

| Predictors             | PTSQ subscales |                 |              |              |                 |               |
|------------------------|----------------|-----------------|--------------|--------------|-----------------|---------------|
|                        | Trainability   | General Anxiety | Adaptability | Excitability | Distractibility | Stair Anxiety |
| Constants              | 0.73           | 5.6             | 4.9          | 10.06        | 10.8            | 1.39          |
| Puppy Age              |                |                 |              |              |                 |               |
| <i>b</i> , $\beta$     | 0.02; 0.26     | —               | —            | —            | -0.04; -0.37    | -0.02; -0.25  |
| <i>BL</i> ; <i>BU</i>  | 0.01; 0.02     | —               | —            | —            | -0.60; -0.30    | -0.03; -0.01  |
| Socialisation          |                |                 |              |              |                 |               |
| <i>b</i> , $\beta$     | 0.31; 0.21     | -0.46; -0.24    | 0.44; 0.23   | -0.60; -0.27 | —               | —             |
| <i>BL</i> ; <i>BU</i>  | 0.13; 0.51     | -0.82; -0.10    | 0.15; 0.75   | -0.97; -0.30 | —               | —             |
| Training               |                |                 |              |              |                 |               |
| <i>b</i> , $\beta$     | 0.41; 0.62     | —               | —            | —            | -0.59; -0.23    | —             |
| <i>BL</i> ; <i>BU</i>  | 0.20; 0.62     | —               | —            | —            | -0.94; -0.26    | —             |
| Organisation's sitters |                |                 |              |              |                 |               |
| <i>b</i> , $\beta$     | —              | —               | —            | -0.30; -0.19 | —               | —             |
| <i>BL</i> ; <i>BU</i>  | —              | —               | —            | -0.61; -0.12 | —               | —             |
| External Trainer       |                |                 |              |              |                 |               |
| <i>b</i> , $\beta$     | —              | —               | —            | 0.27; 0.20   | —               | —             |
| <i>BL</i> ; <i>BU</i>  | —              | —               | —            | 0.11; 0.59   | —               | —             |

*BL* = Bootstrapped lower level confidence interval; *BU* = Upper level confidence interval

A stepwise method was selected, with Puppy Age as a control variable in the first block of the multiple regression analyses. The results show that Puppy Age was included in the models predicting Trainability ( $F(3,126) = 17.52$ ,  $p < 0.001$ ), and Distractibility, ( $F(2,127) = 15.11$ ,  $p < 0.001$ ), and was the only variable that predicted Stair Anxiety ( $F(1,128) = 8.57$ ,  $p = 0.004$ ). In the second block of variables,

after controlling for Puppy Age, Socialisation and Training were the only two predictor variables for Trainability, while Distractibility was only predicted by Socialisation.

For analyses seeking to predict General Anxiety ( $F(1,128) = 7.83, p = 0.006$ ), Adaptability ( $F(1,128) = 6.81, p = 0.01$ ), and Excitability ( $F(3,126) = 7.39, p < 0.001$ ), Puppy Age was not a significant predictor and was not included in the final models. Among the exploratory variables, Socialisation predicted all puppy behaviour variables. Additionally, organisations' puppy sitter and external dog trainers were two support variables that further explained puppies' Excitability. Further bootstrapping confirmed these observed patterns with 95% confidence intervals.

In sum, higher ratings of Socialisation and Training, and more perceived support received from the organisation's puppy sitters, were predictive of higher scores in puppies' desirable behaviours such as Trainability and Adaptability, and lower scores in undesirable traits such as General Anxiety, Excitability, and Distractibility. Greater perceived support from external dog trainers predicted more Excitability in puppies. Puppies' Stair Anxiety was only predicted by their age, with improvement in this condition observed when they got older. General Anxiety, Adaptability, and Distractibility were predicted by either or both Socialisation and Training, regardless of the puppies' age.

Three other stepwise multiple regression analyses were carried out to determine if three Raiser Practices variables, i.e., Socialisation, Training, and Help-Seeking Behaviour, could be predicted by various support variables. Bootstrapping was also performed to further confirm the resulting regression models amid violation of assumptions of normality, homoscedasticity, and outliers. Results of the model testing and coefficients are presented in Table 4.

**Table 4.** Predictors of raisers' practices variables.

| Predictors                         | Socialisation | Training   | Help-Seeking Behaviour |
|------------------------------------|---------------|------------|------------------------|
| Constants                          | 8.58          | 7.94       | 6.83                   |
| Organisation's counsellors/mentors |               |            |                        |
| <i>b, <math>\beta</math></i>       | 0.17; 0.25    | 0.18; 0.23 | 0.26; 0.28             |
| <i>BL; BU</i>                      | 0.07; 0.26    | 0.07; 0.28 | 0.14; 0.46             |
| Organisation's sitter              |               |            |                        |
| <i>b, <math>\beta</math></i>       | —             | —          | 0.23; 0.24             |
| <i>BL; BU</i>                      | —             | —          | 0.06; 0.36             |

*BL* = Bootstrapped lower level confidence interval; *BU* = Upper level confidence interval

Overall, only support from the organisation's counsellors/mentors and puppy sitters predicted Raiser Practices variables. Specifically, more support from counsellors or mentors from the puppy raiser's organisation predicted higher ratings of Socialisation ( $F(1,128) = 8.55, p = 0.004$ ), Training ( $F(1,128) = 7.29, p = 0.08$ ) and more desirable Help-Seeking Behaviour ( $F(2,127) = 15.03, p < 0.001$ ), while extra support from puppy sitters contributed to puppy raisers' higher Help-Seeking Behaviour.

### 3.3. Mediating effects of Help-Seeking Behaviour

Since the previous findings showed that increases in perceived support from counsellors predicted higher ratings for Socialisation and Training, two mediation analyses were conducted to examine the ability of Help-Seeking Behaviour to explain these effects.

**Puppy socialisation.** The results revealed partial mediating effects of Help-Seeking Behaviour on the effects that support from counsellors had on Socialisation. As can be seen in Figure 1, support from counsellors significantly predicted Socialisation (path  $c'$ ,  $F(1, 215) = 14.36, p < 0.001$ ) and this support also significantly predicted Help-Seeking Behaviour (path  $a$ ,  $F(1,215) = 36.49, p < 0.001$ ).

[Figure 1 goes about here]

However, after accounting for Help-Seeking Behaviour, which was a significant predictor variable and was denoted as path  $b$ , the predicting effect of support from counsellors was reduced substantially (path  $c$ ) and became a non-significant predictor of Socialisation,  $F(2, 214) = 35.61, p < 0.001$ . Table 5 provides details of the mediating paths and the bootstrapped 95% confidence intervals of the coefficients.

**Table 5.** Coefficients of mediating paths for Socialisation and Training

| Raiser practices | Regression paths | Coefficients | $t$  | $p$     | $BL$  | $BU$ |
|------------------|------------------|--------------|------|---------|-------|------|
| Socialisation    | a                | 0.36         | 6.04 | < 0.001 | 0.22  | 0.50 |
|                  | b                | 0.33         | 7.30 | < 0.001 | 0.24  | 0.42 |
|                  | c                | 0.05         | 1.12 | 0.262   | -0.04 | 0.14 |
|                  | c'               | 0.17         | 3.79 | < 0.001 |       |      |
| Training         | a                | 0.36         | 6.04 | < 0.001 | 0.22  | 0.50 |
|                  | b                | 0.44         | 8.89 | < 0.001 | 0.33  | 0.56 |
|                  | c                | 0.02         | 0.39 | 0.696   | -0.08 | 0.11 |
|                  | c'               | 0.18         | 3.50 | < 0.001 |       |      |

$BL$  = Bootstrapped lower level confidence interval;  $BU$  = Upper level confidence interval



The standardised and unstandardised indirect effects as observed in the current sample were ( $\alpha*\beta$ ) = 0.18, and ( $a*b$ ) = 0.12, respectively. Bootstrapped confidence intervals (95%) with 10,000 simulated samples for both the standardised [ $BL = 0.11$ ;  $BU = 0.25$ ], and unstandardized [ $BL = 0.07$ ;  $BU = 0.18$ ] indirect effects did not contain the value of zero, which suggests a significant mediation effect.

**Training.** The results also revealed partial mediating effects of Help-Seeking Behaviour on the effects that support from organisation's counsellors/mentors had on Training. As can be seen in Figure 2, support from counsellors/mentors significantly predicted Training (path  $c'$ ,  $F(1, 215) = 12.24$ ,  $p < 0.001$ ) and Help-Seeking Behaviour (path  $a$ ,  $F(1, 215) = 36.49$ ,  $p < 0.001$ ).

[Figure 2 goes about here]

However, after accounting for Help-Seeking Behaviour, which was a significant predictor variable and was denoted as path  $b$ , the predicting effect of counsellors/mentors support was reduced substantially (path  $c$ ) and became a non-significant predictor of Training,  $F(2, 214) = 47.84$ ,  $p < 0.001$ . Table 5 provides details of the mediating paths and the bootstrapped 95% confidence intervals of the coefficients.

The standardised and unstandardised indirect effects as observed in the current sample were ( $\alpha*\beta$ ) = 0.21, and ( $a*b$ ) = 0.16, respectively. Bootstrapped confidence intervals (95%) with 10,000 simulated samples for both the standardised [ $BL = 0.12$ ;  $BU = 0.30$ ], and unstandardized [ $BL = 0.09$ ;  $BU = 0.24$ ] indirect effects did not contain the value of zero, which suggests a significant mediation effect.

To summarise, more perceived support from puppy raisers' counsellors or mentors was initially predictive of a higher rating of raisers' socialisation and training practices for their puppy. However, these effects were in part due to an increase in raisers' help-seeking behaviour. In other words, more support from counsellors/mentors predicted increases in raisers' help-seeking behaviour, which, in turn, improved their puppy raising practices.

#### 4. Discussion

The current study aimed to investigate putative relationships between puppy raisers' practices, various supports and puppy behaviours in a sample of people who were raising puppies as potential

assistance dogs. The first hypothesis posited that puppy behaviours would be predicted by raisers' practices or perceived support. The second hypothesis predicted that raisers' help-seeking behaviour would mediate the effect, if any, of support on raising practices. The hypotheses were mostly supported.

It was evident in the current study that socialisation and training, two of the puppy raisers' practices, were strong predictors of puppy behaviours even after controlling for puppy age. These findings suggest direct and central roles for puppy raisers' practices in determining puppy behaviours, with higher ratings of puppy socialisation and puppy training being associated with more desirable traits in the puppies. Interestingly, while past findings suggested that experienced and more knowledgeable puppy raisers produced puppies with more favourable behavioural outcomes and ultimate training success (Fratkin, 2015; Serpell & Duffy, 2016; Svartberg, 2002; Takeuchi et al., 2009), raiser experience was excluded from all predicting models in the current study. These findings provide further support for an argument we made previously (Mai et al., 2021) that, while raiser experience should be instrumental to the improvement of their practices, this requires the assumption that experience is directly correlated with competency. In our model it is the raisers' perceived practices, which are correlated but not interchangeable with experience, that have direct relationships with puppy behaviours.

The finding that support provided by the organisation's dog trainers and other technical supports did not predict puppy behaviours was in line with Batt et al. (2008). They found no significant improvement in puppies' outcomes despite the organisation's provision of extra training and socialisation sessions. However, direct relationships between puppy raisers' practices and puppies' behaviours were not examined in the Batt et al. (2008) study. It would be helpful to replicate this study to examine the effectiveness of having structured training sessions on puppy raisers' practices, which could then be linked to their puppy's behaviours and ultimate success rates. Because raisers are mainly responsible for socialisation and training of their puppy, it is appropriate to regard raisers' practices as direct factors influencing the development of their puppy's behaviour. Therefore, evaluation of organisational support and training programs should directly consider raisers' practices, rather than aiming solely at impacting puppy behaviours. In other words, provision of extra supports does not directly influence puppy

behaviours but is effective only in so far as the extra supports change puppy raiser practices, which then directly influence puppy behaviours.

It is important for organisations to have a variety of supports available for puppy raisers. However, it is equally important for organisations to know which resources best support raisers, so that they can focus their limited resources on the most effective approach. The current results revealed that, of the available supports, experienced puppy raisers regarded as mentors or puppy raising counsellors provided support that most substantially contributed to raiser practices. These findings support earlier findings of a qualitative study (Mai et al., 2020), suggesting that novice raisers typically turn to experienced raisers for advice, rather than professionals, presumably because these informal mentors can share their experiences and describe going through the same puppy raising journey. It was also reported in Mai et al. (2020) study that more experienced puppy raisers were more likely to reach out to their organisation's dog trainers for assistance with more advanced issues. The differences in preferred support figures are consistent with a concept called "Zone of Proximal Development" (Zaretskii, 2009), which refers to a tendency for people to obtain optimal learning outcomes when they acquire knowledge from those whose expertise is only slightly higher than their own.

Once decisions are made regarding investing in the most effective types of support, organisations should proactively work to remove any barriers to puppy raisers accessing this support. In this study, help-seeking behaviour was a mediating variable that determined how much support from mentors and counsellors benefitted puppy raisers' practices. This mediating effect implies that more supports from counsellors predicted more help-seeking behaviour in puppy raisers, which in turn helped improve the raisers' practices. As discussed earlier, it could be that support from counsellors and mentors was more readily available than from other sources (Mai et al., 2020). This would then reinforce and promote raisers' help-seeking behaviour. Nonetheless, factors such as perceived judgement and individual differences also presented as barriers to help-seeking behaviour in previous research (Clegg et al., 2006; Grayson et al., 1998; Mai et al., 2020), though these were not examined in the current study. Therefore, while acknowledging and encouraging experienced puppy raisers to offer support to novices, it is

recommended that organisations should also establish a positive organisational culture wherein help-seeking is strongly encouraged and rewarded, or a more proactive outreach approach for less competent raisers or those with challenging puppies. One caution for peer learning is to ensure the person offering advice is competent; organisations could facilitate this process by redirecting novice raisers' enquiries to appropriate advisors within their organisation.

#### *4.1. Limitations and directions for future research*

This study advances knowledge relating to how puppy raiser practices might predict puppies' current behaviour, with a large and diverse sample allowing the use of sophisticated statistical procedures not previously applied to this field. Nonetheless, there are certain limitations inherent to using self-reported and cross-sectional data. Participants might have rated their puppy behaviour and their practices in a socially desirable way, either intentionally or unintentionally, to reduce any cognitive dissonance from raising a poorly behaving puppy or to alleviate feelings of incompetence. Self-report bias is common, particularly when job performance within an organisation is concerned (Borman, 1991; Donaldson & Grant-Vallone, 2002; Moorman & Podsakoff, 1992), so might be expected in our sample even though the data were anonymous. In the current study, the mean ratings for positive variables such as puppy behaviours and raiser practices were high. It is possible that raisers with positive experiences (e.g., raising a 'better' puppy; highly competent) were more likely to participate in this research. It is also possible that this reflects a tendency towards social desirability. However, one might expect that assistance dog puppies are generally better behaved than a random sample of puppies would be, given that the puppies and raisers were often carefully selected and supported throughout the raising process, so this could explain the favourable ratings. This possibility might explain why puppy raisers' self-reporting of their puppy's behaviour in Batt et al. (2009) was predictive of their puppy's ultimate success. However, to further the current findings, future research should employ longitudinal or experimental methods, with independent and trained raters, to ensure more consistent and reliable data than could be obtained through cross-sectional and self-report measures. Hopefully, such research will confirm the

relationships identified between effective raiser practices, puppy behaviours, and organisational support types, which, in turn, could inform standardisation of assistance dog puppy raising programs.

It is strongly recommended that future research examining the ability to predict adult dog behaviours from puppy behavioural tests should consider incorporating measures of puppy raisers' practices. Future research may also consider validating raiser practice questionnaires with more objective measures which can be used by dog training organisations, e.g., frequency data in the form of activity logs completed by puppy raisers. Efforts to translate and validate constructs of such measures in different languages should also be considered, which would help organisations in many countries where English is not a primary language.

This will help account for the effects that individual puppy raisers have on the development of their puppies. This is not to say that care should not be exercised when selecting puppies for inclusion in raising programs, but too strong a reliance on genetic factors or traits observed in very young puppies risks overlooking the profound effects on development that puppy raisers may have. Organisations' efforts in improving puppy raising programs, such as those proposed in Batt et al. (2008), should also consider incorporating measures of puppy raisers' practices to better understand how interventions could benefit puppies' ultimate outcomes.

#### *4.2. Recommendations for organisations*

While organisations work to improve the effectiveness of their recommended training techniques and puppy selection, they should also pay attention to improving the actual practices of their raisers, particularly their engagement in puppy socialisation and training. These practices are central to puppies' behavioural development. One way to do this may be to enlist the support of experienced puppy raisers to help mentor less experienced puppy raisers. More formal types of support, such as that provided by dog trainers, veterinarians, and technical training platforms, may be useful when complex issues are encountered, but the participants in our study preferred to seek advice from other puppy raisers. Staff responsible for puppy raising programs should also strongly promote help-seeking behaviour amongst their raisers, which would allow these volunteers to benefit from any supports made available. It is

essential that, when giving a higher priority to improving raiser practices, organisations should ensure quality management and oversight of their raiser training and support programs.

## **5. Conclusions**

Puppy raisers typically provide training and socialisation to puppies under supervision of host assistance dog organisations. Although early learning experiences during this stage are critical to puppies' behavioural development, it was unclear how much impact puppy raisers' practices and provision of support for these volunteers may have on this process. This study is the first in the assistance dog literature to examine raiser practices, namely socialisation, training, and help-seeking behaviour, in a large and diverse sample of puppy raisers. Socialisation and training predicted most behavioural traits, including trainability, general anxiety, adaptability, and excitability. Among various supports either from their organisation or from their external networks, puppy raisers' mentors or counsellors contributed the most to positive ratings of raiser socialisation and training practices. These effects, however, were mediated by the raisers' help-seeking behaviour. In short, puppy raisers' practices (i.e., socialisation and training of the puppies) should be acknowledged as direct influencers of puppy behaviour. Improving raiser practices was most effective when the support came from puppy raiser mentors or counsellors, with the condition that the puppy raisers were willing to seek help.

**Acknowledgement.** We would like to thank puppy raisers for their participation in this study. This work was supported by a La Trobe University Full Fee Research Scholarship and a La Trobe University Postgraduate Research Scholarship.

**Conflicts of Interest:** The authors declare no conflict of interest.

## 6. References

- Appleby, D. L., Bradshaw, J. W. S., & Casey, R. A. (2002). Relationship between aggressive and avoidance behaviour by dogs and their experience in the first six months of life. *Veterinary Record*, 150(14), 434-438. <https://doi.org/10.1136/vr.150.14.434>
- Asher, L., Harvey, N. D., Green, M., & England, G. C. W. (2017). Application of survival analysis and multistate modeling to understand animal behavior: Examples from guide dogs. *Frontiers in Veterinary Science*, 4, 116. <https://doi.org/10.3389/fvets.2017.00116>
- Batt, L. S., Batt, M. S., Baguley, J. A., & McGreevy, P. D. (2008). The effects of structured sessions for juvenile training and socialization on guide dog success and puppy-raiser participation. *Journal of Veterinary Behavior*, 3(5), 199-206. <https://doi.org/10.1016/j.jveb.2008.05.001>
- Batt, L. S., Batt, M. S., Baguley, J. A., & McGreevy, P. D. (2009). The value of puppy raisers' assessments of potential guide dogs' behavioral tendencies and ability to graduate. *Anthrozoös*, 22(1), 71-76. <https://doi.org/10.2752/175303708X390482>
- Borman, W. C. (1991). Job behavior, performance, and effectiveness. In M. D. Dunnette & L. M. Hough (Eds.), *Handbook of industrial and organizational psychology* (pp. 271–326). Sage.
- Bremhorst, A., Mongillo, P., Howell, T., & Marinelli, L. (2018). Spotlight on assistance dogs - Legislation, welfare and research. *Animals*, 8(8), 129-129. <https://doi.org/10.3390/ani8080129>
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Routledge.
- Clegg, S., Bradley, S., & Smith, K. (2006). 'I've had to swallow my pride': Help seeking and self-esteem. *Higher Education Research & Development*, 25(2), 101-113. <https://doi.org/10.1080/07294360600610354>
- Dollion, N., Paulus, A., Champagne, N., St-Pierre, N., St-Pierre, E., Trudel, M., & Plusquellec, P. (2019). Fear/Reactivity in working dogs: An analysis of 37 years of behavioural data from the Mira Foundation's future service dogs. *Applied Animal Behaviour Science*, 221, 104864. <https://doi.org/10.1016/j.applanim.2019.104864>

- 499 Donaldson, S. I., & Grant-Vallone, E. J. (2002). Understanding self-report bias in organizational behavior  
500 research. *Journal of Business and Psychology*, 17(2), 245-260.  
501 <https://doi.org/10.1023/A:1019637632584>
- 502 Fratkin, J. L. (2015). *Examining the relationship between puppy raisers and guide dogs in training*.  
503 [Doctoral dissertation, The University of Texas at Austin]. Austin.  
504 <http://hdl.handle.net/2152/33291>
- 505 Fratkin, J. L., Sinn, D. L., Patall, E. A., & Gosling, S. D. (2013). Personality consistency in dogs: A meta-  
506 analysis. *PloS One*, 8(1), e54907. <https://doi.org/10.1371/journal.pone.0054907>
- 507 Goddard, M. E., & Beilharz, R. G. (1982). Genetic and environmental factors affecting the suitability of  
508 dogs as guide dogs for the blind. *Theoretical and Applied Genetics*, 62(2), 97-102.  
509 <https://doi.org/10.1007/BF00293339>
- 510 Grayson, A., Miller, H., & Clarke, D. D. (1998, 1998/05/01). Identifying barriers to help-seeking: a  
511 qualitative analysis of students' preparedness to seek help from tutors. *British Journal of*  
512 *Guidance & Counselling*, 26(2), 237-253. <https://doi.org/10.1080/03069889808259704>
- 513 Harvey, N. D., Craigon, P. J., Blythe, S. A., England, G. C. W., & Asher, L. (2016). Social rearing  
514 environment influences dog behavioral development. *Journal of Veterinary Behavior*, 16, 13-21.  
515 <https://doi.org/10.1016/j.jveb.2016.03.004>
- 516 Harvey, N. D., Craigon, P. J., Blythe, S. A., England, G. C. W., & Asher, L. (2017). An evidence-based  
517 decision assistance model for predicting training outcome in juvenile guide dogs. *PloS One*,  
518 12(6), e0174261. <https://doi.org/10.1371/journal.pone.0174261>
- 519 Hayes, A. F. (2017). *Introduction to mediation, moderation, and conditional process analysis: A*  
520 *regression-based approach* (2nd ed.). The Guilford Press.
- 521 Hsu, Y., & Serpell, J. A. (2003). Development and validation of a questionnaire for measuring behavior  
522 and temperament traits in pet dogs. *Journal of the American Veterinary Medical Association*,  
523 223(9), 1293-1300. <https://doi.org/10.2460/javma.2003.223.1293>



- 524 Jones, A. C., & Gosling, S. D. (2005). Temperament and personality in dogs (*Canis familiaris*): A review  
 525 and evaluation of past research. *Applied Animal Behaviour Science*, 95(1-2), 1-53.  
 526 <https://doi.org/10.1016/j.applanim.2005.04.008>
- 527 Kobayashi, N., Arata, S., Hattori, A., Kohara, Y., Kiyokawa, Y., Takeuchi, Y., & Mori, Y. (2013).  
 528 Association of puppies' behavioral reaction at five months of age assessed by questionnaire with  
 529 their later 'Distraction' at 15 months of age, an important behavioral trait for guide dog  
 530 qualification. *Journal of Veterinary Medical Science*, 75(1), 63-67.  
 531 <https://doi.org/10.1292/jvms.12-0148>
- 532 Mai, D., Howell, T., Benton, P., & Bennett, P. C. (2020). Raising an assistance dog puppy—Stakeholder  
 533 perspectives on what helps and what hinders. *Animals*, 10(1), 128.  
 534 <https://doi.org/10.3390/ani10010128>
- 535 Mai, D., Howell, T., Benton, P., & Bennett, P. C. (2021). Beyond puppy selection—Considering the role  
 536 of puppy raisers in bringing out the best in assistance dog puppies. *Journal of Veterinary*  
 537 *Behavior*, 42, 1-10. <https://doi.org/10.1016/j.jveb.2020.11.002>
- 538 Mooney, C. Z., & Duval, R. D (1993). *Bootstrapping: A nonparametric approach to statistical inference*.  
 539 SAGE Publications. <https://doi.org/10.4135/9781412983532>
- 540 Moorman, R. H., & Podsakoff, P. M. (1992). A meta-analytic review and empirical test of the potential  
 541 confounding effects of social desirability response sets in organizational behaviour research.  
 542 *Journal of Occupational and Organizational Psychology*, 65(2), 131-149.  
 543 <https://doi.org/10.1111/j.2044-8325.1992.tb00490.x>
- 544 Plomin, R., & Asbury, K. (2005). Nature and nurture: Genetic and environmental influences on behavior.  
 545 *The ANNALS of the American Academy of Political and Social Science*, 600(1), 86-98.  
 546 <https://doi.org/10.1177/0002716205277184>
- 547 Rooney, N. J., Clark, C. C. A., & Casey, R. A. (2016). Minimizing fear and anxiety in working dogs: A  
 548 review. *Journal of Veterinary Behavior*, 16, 53-64. <https://doi.org/10.1016/j.jveb.2016.11.001>

- 549 Sachs-Ericsson, N., Hansen, N. K., & Fitzgerald, S. (2002). Benefits of assistance dogs: A review.  
 550 *Rehabilitation Psychology*, 47(3), 251-277. <https://doi.org/10.1037/0090-5550.47.3.251>
- 551 Serpell, J. A., & Duffy, D. L. (2016). Aspects of juvenile and adolescent environment predict aggression  
 552 and fear in 12-month-old guide dogs. *Frontiers in Veterinary Science*, 3, 49-49.  
 553 <https://doi.org/10.3389/fvets.2016.00049>
- 554 Svartberg, K. (2002). Shyness–boldness predicts performance in working dogs. *Applied Animal*  
 555 *Behaviour Science*, 79(2), 157-174. [https://doi.org/10.1016/S0168-1591\(02\)00120-X](https://doi.org/10.1016/S0168-1591(02)00120-X)
- 556 Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics : Pearson new international*  
 557 *edition* (6th ed.). Pearson Education.
- 558 Takeuchi, Y., Hashizume, C., Arata, S., Inoue-Murayama, M., Maki, T., Hart, B. L., & Mori, Y. (2009).  
 559 An approach to canine behavioural genetics employing guide dogs for the blind. *Animal Genetics*,  
 560 40(2), 217-224. <https://doi.org/10.1111/j.1365-2052.2008.01823.x>
- 561 Tavakol, M., & Dennick, R. (2011). Making sense of Cronbach's alpha. *International Journal of Medical*  
 562 *Education*, 2, 53-55. <https://doi.org/10.5116/ijme.4dfb.8dfd>
- 563 Vaterlaws-Whiteside, H., & Hartmann, A. (2017). Improving puppy behavior using a new standardized  
 564 socialization program. *Applied Animal Behaviour Science*, 197, 55-61.  
 565 <https://doi.org/10.1016/j.applanim.2017.08.003>
- 566 Wirth, K. E., & Rein, D. B. (2008). The economic costs and benefits of dog guides for the blind.  
 567 *Ophthalmic Epidemiology*, 15(2), 92-98. <https://doi.org/10.1080/09286580801939353>
- 568 Wold, S., Esbensen, K., & Geladi, P. (1987, 1987/08/01/). Principal component analysis. *Chemometrics*  
 569 *and Intelligent Laboratory Systems*, 2(1), 37-52. [https://doi.org/10.1016/0169-7439\(87\)80084-9](https://doi.org/10.1016/0169-7439(87)80084-9)
- 570 Zaretskii, V. K. (2009, 2009/11/01). The zone of proximal development. *Journal of Russian & East*  
 571 *European Psychology*, 47(6), 70-93. <https://doi.org/10.2753/RPO1061-0405470604>

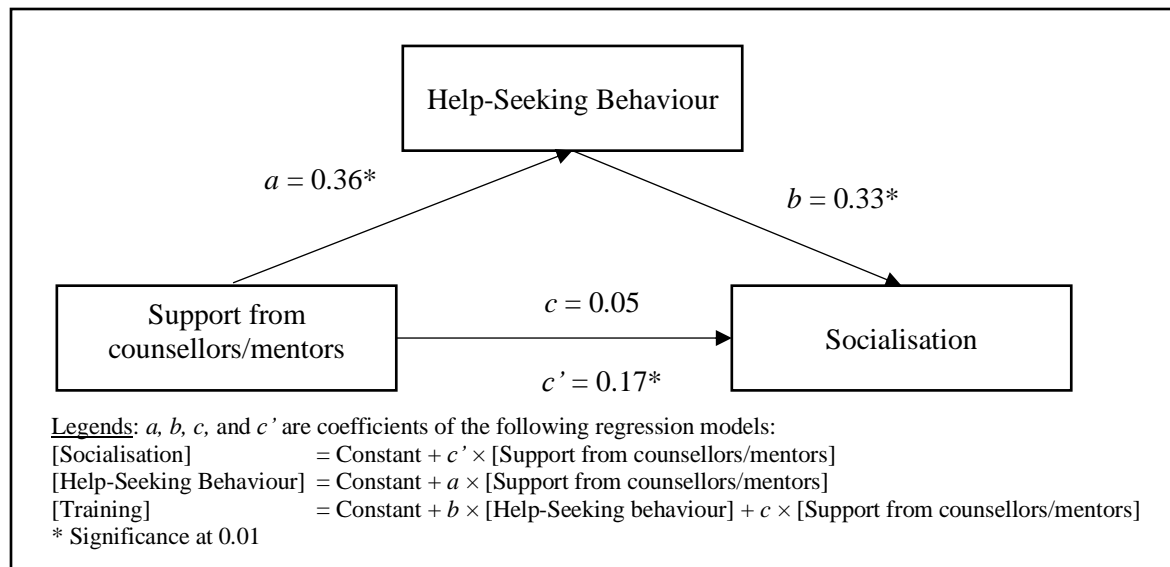
572     **7.     Figure Captions**

573     **Figure 1.** Mediation model of Help-Seeking Behaviour on predicting Socialisation.

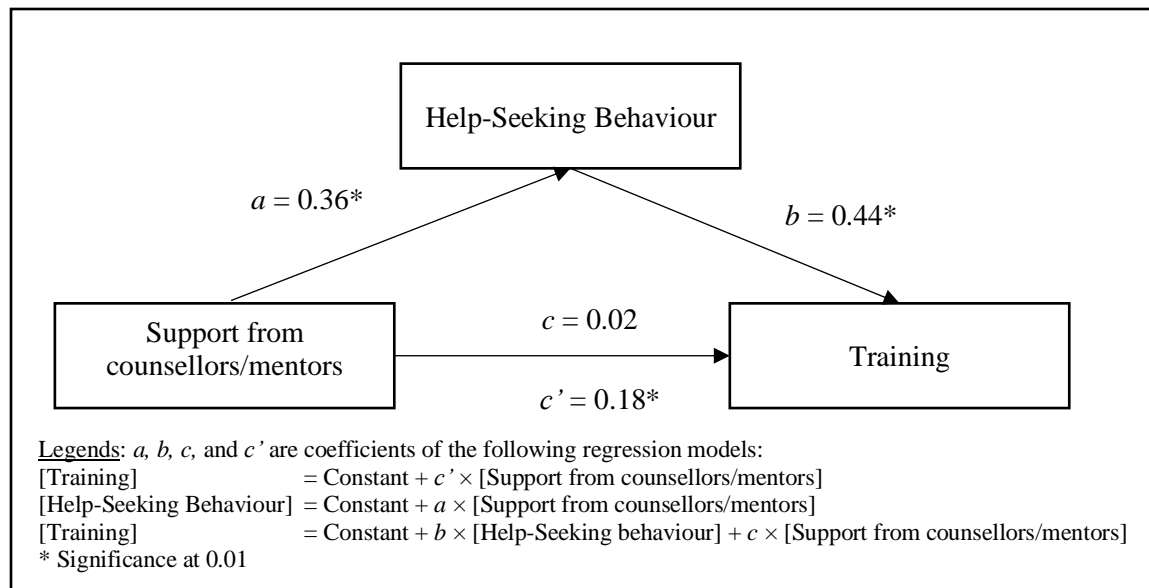
574     **Figure 2.** Mediation model of Help-Seeking Behaviour on predicting Training.

575

576



**Figure 1.** Mediation model of Help-Seeking Behaviour on predicting Socialisation.



**Figure 2.** Mediation model of Help-Seeking Behaviour on predicting Training.