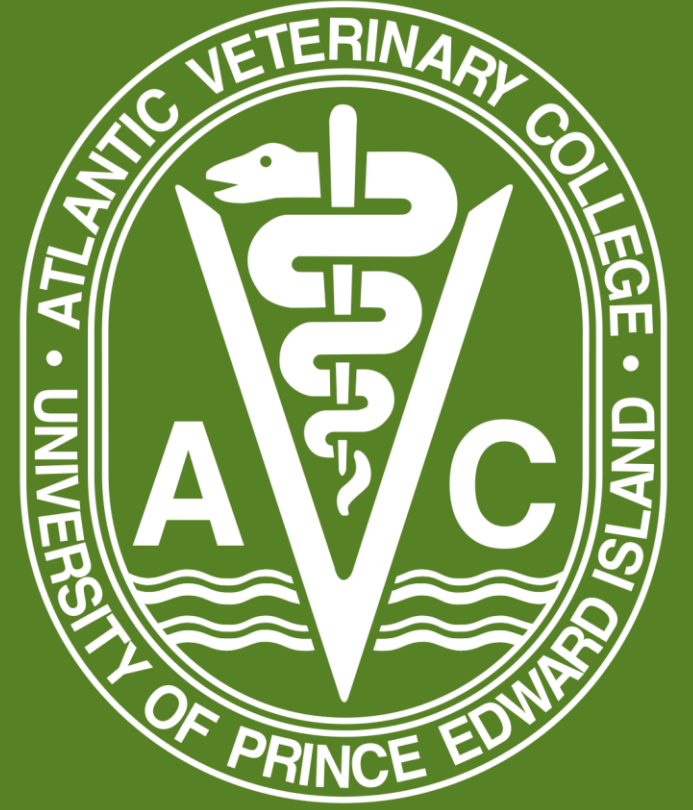




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Don't let fear slow you down: Can an open field novelty test help identify signs of early behavioural pathologies in dogs?

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Introduction

Fear and anxiety in pet dogs has been implicated in a reduced lifespan and poorer health outcomes, with behavioural issues a leading cause of euthanasia in pet dogs¹. Additionally, it has been shown that behavioural problems worsen over time, and early intervention is the best way to prevent to development and worsening of behavioural pathologies². The goal of the puppy project is to establish a series of standardized tests that can be easily given in a clinic or training environment along with a questionnaire to be completed by owners that can help predict behavioural pathologies in developing puppies and therefore allow for early behavioural intervention. To do this, standardized tests were developed from the Canine Intelligence Test Protocol (CITP) meant to be completed along with a modified version of the Working Dog Questionnaire (the WDQ-Pet) to be filled out by the owners in tandem with the in-clinic testing. This study focuses specifically on the results of one test at the ages of 3 and 12 months, the Open Field Test, which focuses on how a puppy interacts with different novel objects (cardboard boxes and toys) in an open arena space when given complete autonomy to explore.



Bruce completing his open field test at 3 months (left) and 12 months (right)

Materials

Originally 40 puppies from the community were included, with 36 completing the entire study. The open field test consisted of a clearly outlined arena with a midline marked. Spaced throughout the arena, cardboard boxes were placed on their sides and toys were placed within. Cameras were placed to film the test at multiple angles. The owner sat at one end of the arena and released the puppy when prompted. The puppy was given 5 minutes to explore at will, with a person walking to the opposite end of the arena at the time 02.30 to show the puppy that they had the option to explore the whole space. While the puppy could interact with the people in the arena if they chose, all humans in the space were instructed to not engage with the puppy in any way. The videos of the puppy were then analysed for the puppy's movement across the space and how they interacted with the environment. Parameters that were used in analysis were if the puppy crossed the midline of the arena, if they were willing to put their head in a box, and if they cringed or retreated from any of the boxes or toys. If the puppies cringed or retreated at all, it was recorded if they recovered or not and continued to explore. Fear scores were also assigned based on the videos, using a modified version of the ethogram used throughout the rest of the testing³. Scores were assigned for every 30 second interval and then added together to create a final score.

Results

Fear scores compared between the 36 dogs at 3- and 12-month ages (Fig. 1) showed a correlation and a moderate positive relationship (Spearman's; $r_s(35) = 0.51$, $p = 0.001$, $p = 0.51$)

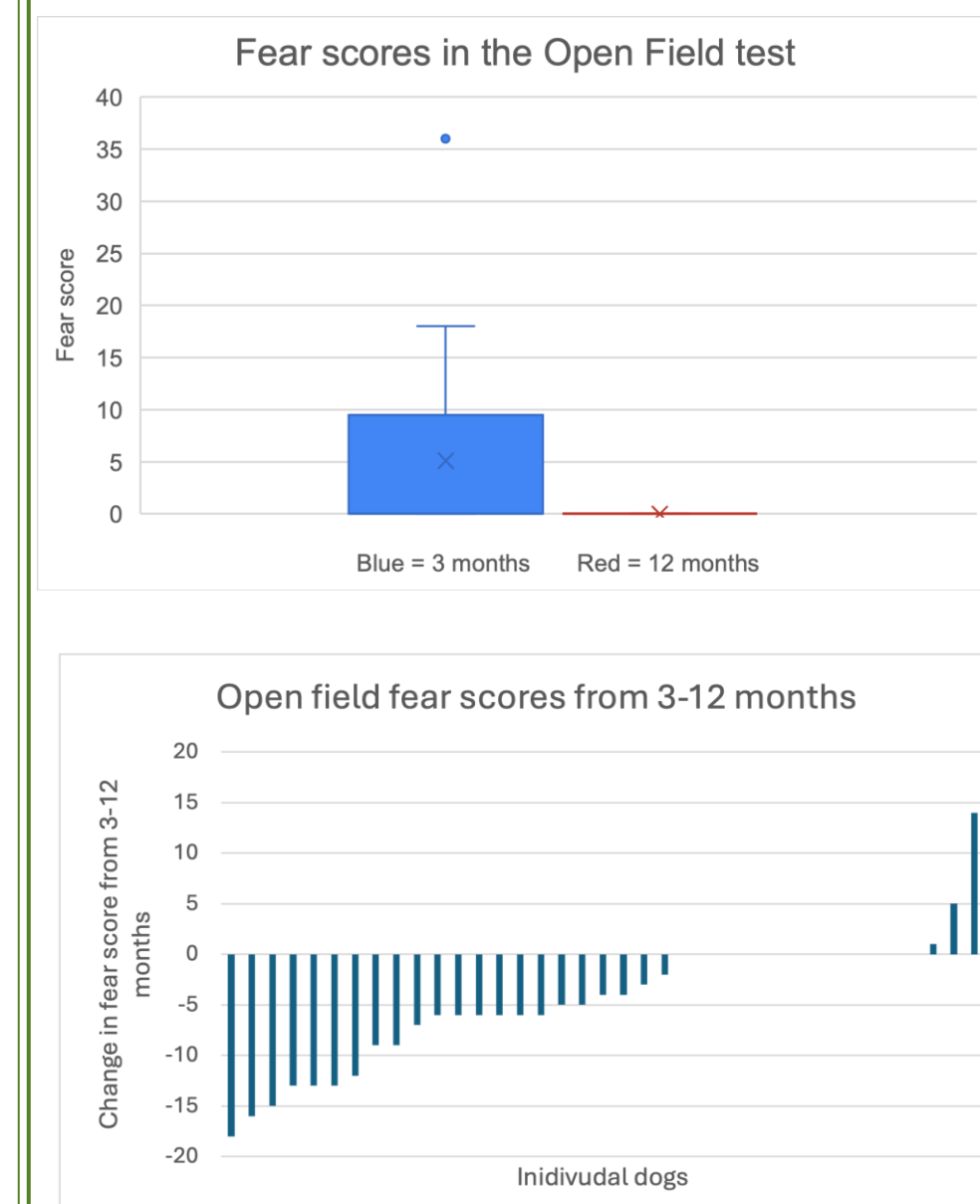


Figure 1. There were differences in fear scores at 3 and 12 months (Wilcoxon signed ranks test; $W = 37.00$, $p < 0.001$) (3 months: 9.24=Average fear score; 9.48=SD; 6.0=median; 12 months: 5.08=Average fear score; 7.99=SD; 0.0=median)

The pattern of fear scores in dogs while they were exploring the arena and the boxes differed between ages and was only compared at the age that they occurred (Figs. 3, 4). At 12 months, the 3 dogs that did not cross the midline had fear scores of 0. The same result was found in puppies that did not put their head in a box to explore.

Figure 2. Individual fear scores The differences were significant between the individual fears scores of dogs that improved, worsened, or stayed the same Mann Whitney U test; ($U = 13.50$, $p < .001$)

Figure 2. Individual fear scores

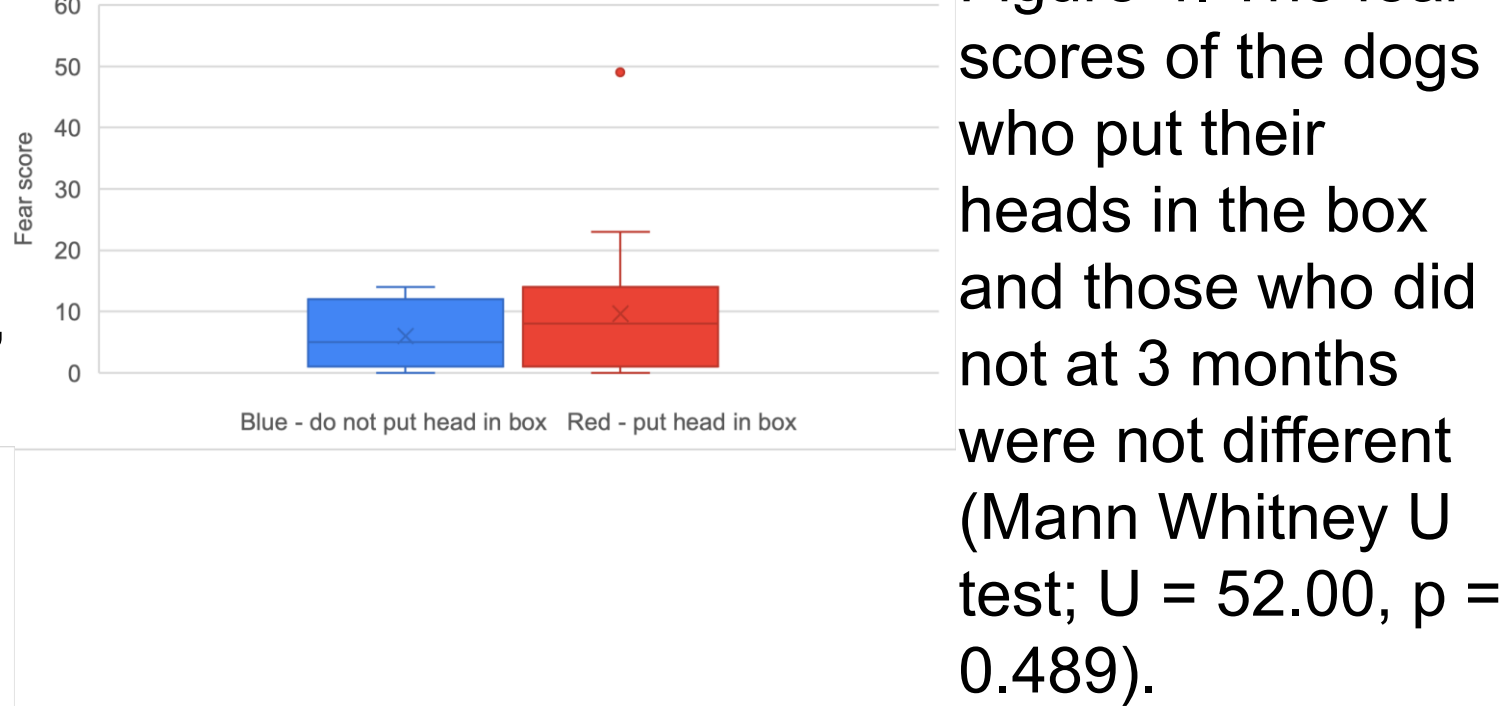


Figure 3. At 3 months 10/36 dogs did not cross the midline of the arena. There was no significant difference in the fear scores of those who crossed the median and those who did not (Mann-Whitney U test; $U = 134.00$, $p = 0.972$).

Figure 4. The fear scores of the dogs who put their heads in the box and those who did not at 3 months were not different (Mann Whitney U test; $U = 52.00$, $p = 0.489$).

The puppies did not exhibit cringing and retreating behaviour from the boxes at 3 months, but they did at 12 months (Fig. 5). There were 8/11 dogs with fear scores above the median cringed more dogs proportionately above the median fear score cringed (Z-test for proportions; $Z = -2.13$, $p = 0.033$). For the dogs that cringed/retreated, the mean fear score was 9.45, the SD was 11.00, and the median fear score was 6.0. For the dogs that did not cringe or retreat, the mean fear score was 3.0, the SD was 5.46, and the median fear score was 0.

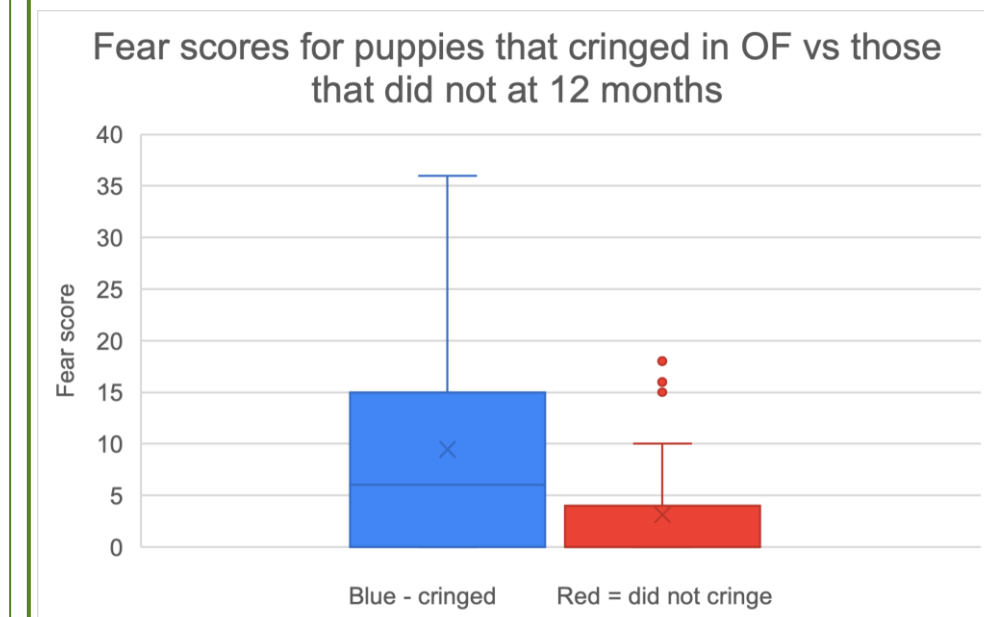


Figure 4. The fear scores of the dogs who put their heads in the box and those who did not at 3 months were not different (Mann Whitney U test; $U = 52.00$, $p = 0.489$).

For the 11 puppies that cringed/retreated, 5 returned to the boxes and 6 did not (Fig. 6). The returning fear score was 11.0, the SD was 15.20, and the median fear score was 0. The mean fear score of the puppies that did not return after a cringe/retreat was 8.17, the SD was 7.28, and the median fear score was 8.

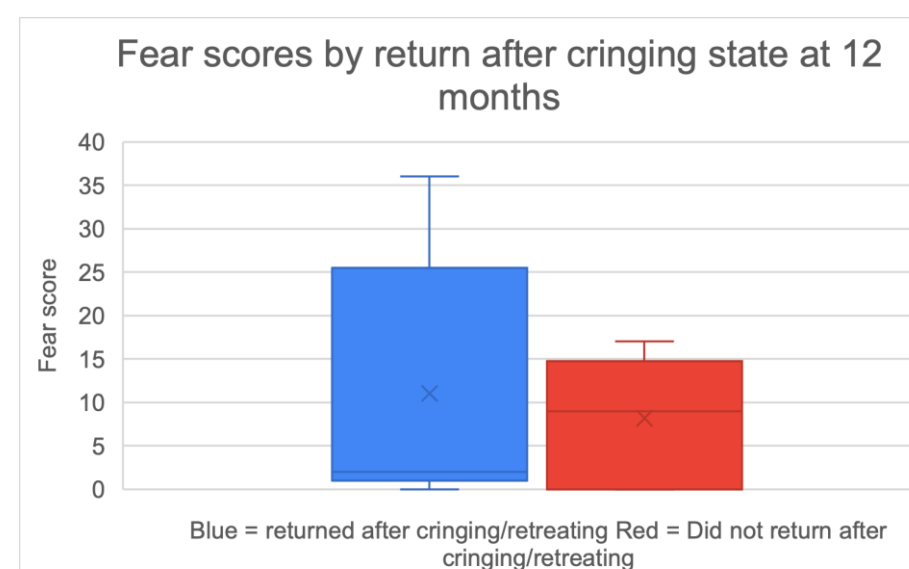


Figure 5. There was a significant difference fear scores for the puppies the cringed and those who did not cringe in the open field test at 12 months Mann Whitney U test; $U = 86.00$, $p = 0.027$.

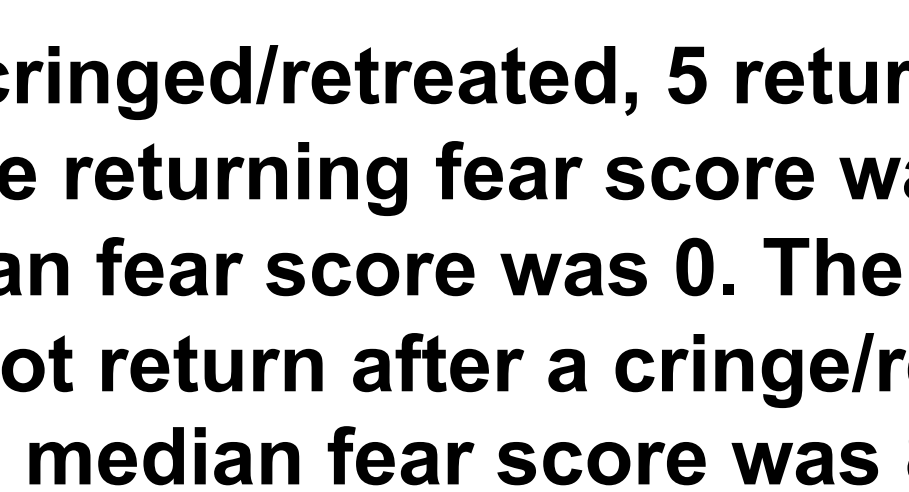


Figure 6. Fear scores of puppies who retreated vs those that did not

Discussion

When fear scores of puppies in the open field test at 3- and 12-months old were compared, a moderate positive correlation was found. Only 3 dogs showed a worsening of fear scores at 3-months old compared to 12 months. Most puppies showed no change or an improvement in score. The moderate relationship indicates that while a puppy's initial temperament at three months will remain a factor as they mature, it is not the only factor that influences their fearfulness as they age. Factors like exposure and training may play a role as well.

How the puppy chose to move around the arena space and explore the boxes was something that we initially hypothesized might have a relationship with the fear scores. The pattern of fear scores between these factors at 3- and 12- months was inconsistent and could only be compared within age brackets. Puppies that crossed vs did not cross the midline at 3 months showed no significant difference in fear scores. At 12 months, the 3 dogs that did not cross the midline had fear scores of 0, meaning failure to cross was likely due to other factors – in this case, they were napping. The dogs that did or did not put their head in a box also had no apparent relationship in fear scores at 3 months, and at 12 months the 3 dogs that did not put their head in a box also had a fear score of 0, meaning that distraction or disinterest was a more likely cause than fear.

Puppies at age of 3 months did not exhibit cringing/retreating behaviour from the boxes, but at 12 months there was a significant relationship between cringing and a puppy's level of fear. This means that cringing behaviour alone could potentially be used to measure a puppy's level of fearfulness during the test. When comparing recovery from a cringe/retreat, it was found that the more fearful a puppy was, the *more* likely to return and continue to investigate.

While further investigation is needed to indicate the potential of identifying early signs of pathologies in puppies, the findings that the test can demonstrate results with significant relationships to fear scores shows that the open field test does have potential to be included in the ongoing puppy project.

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